

S. 280.

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Zool. Journ.

TV.	pt.	13	publ.	July 1828
		14	—	Oct. 1828
		15	—	Jan. 1829
		16	—	May 1829

W.V.

THE
ZOOLOGICAL
JOURNAL.

VOL. IV.

FROM APRIL, 1828, TO MAY, 1829.

EDITED BY

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London:

Printed by E. J. Stirling, 20, Ironmonger Lane, Cheapside;

AND PUBLISHED BY G. B. SOWERBY, 156, REGENT STREET.

1829.

NO. 1000
1911

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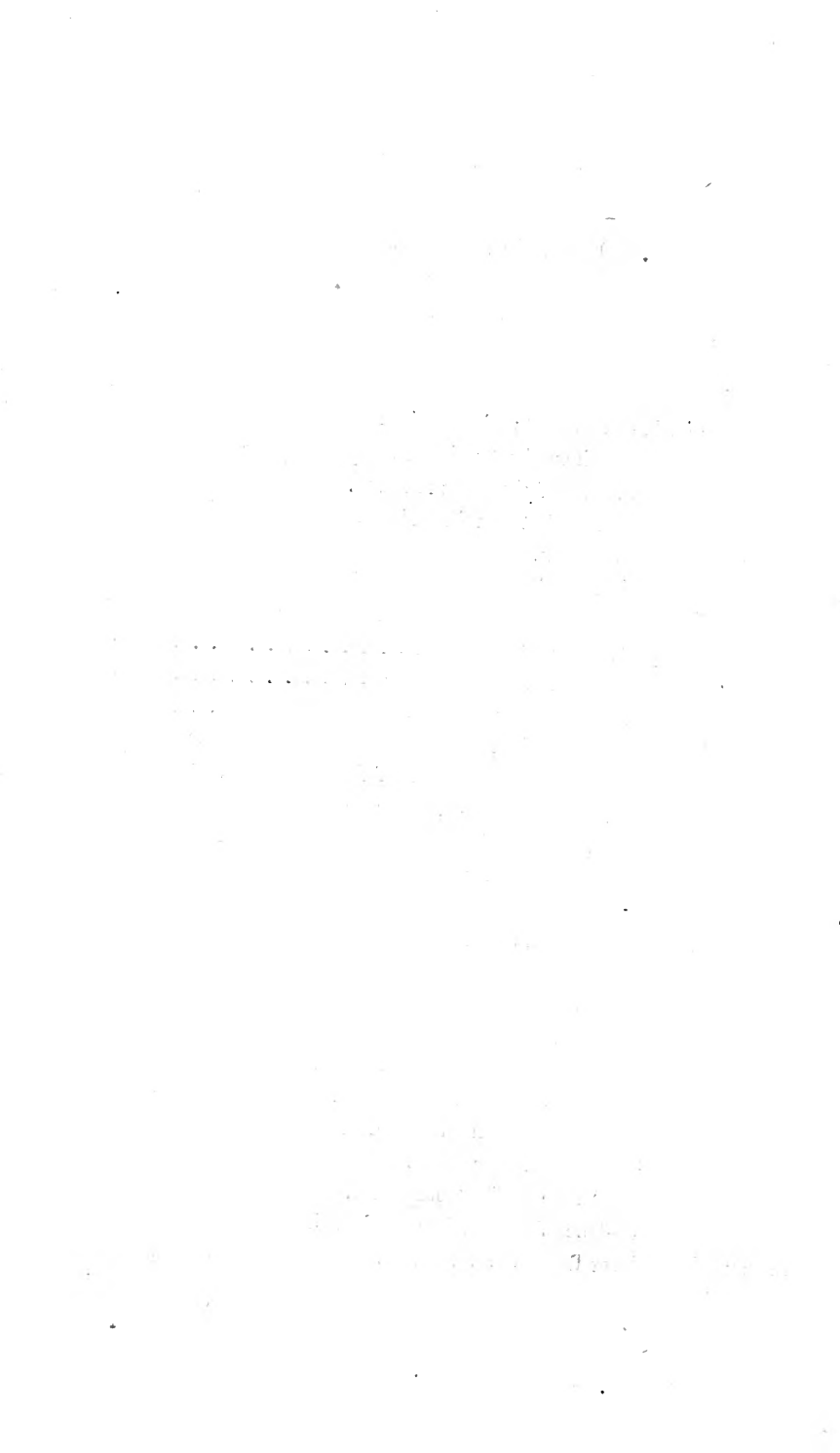
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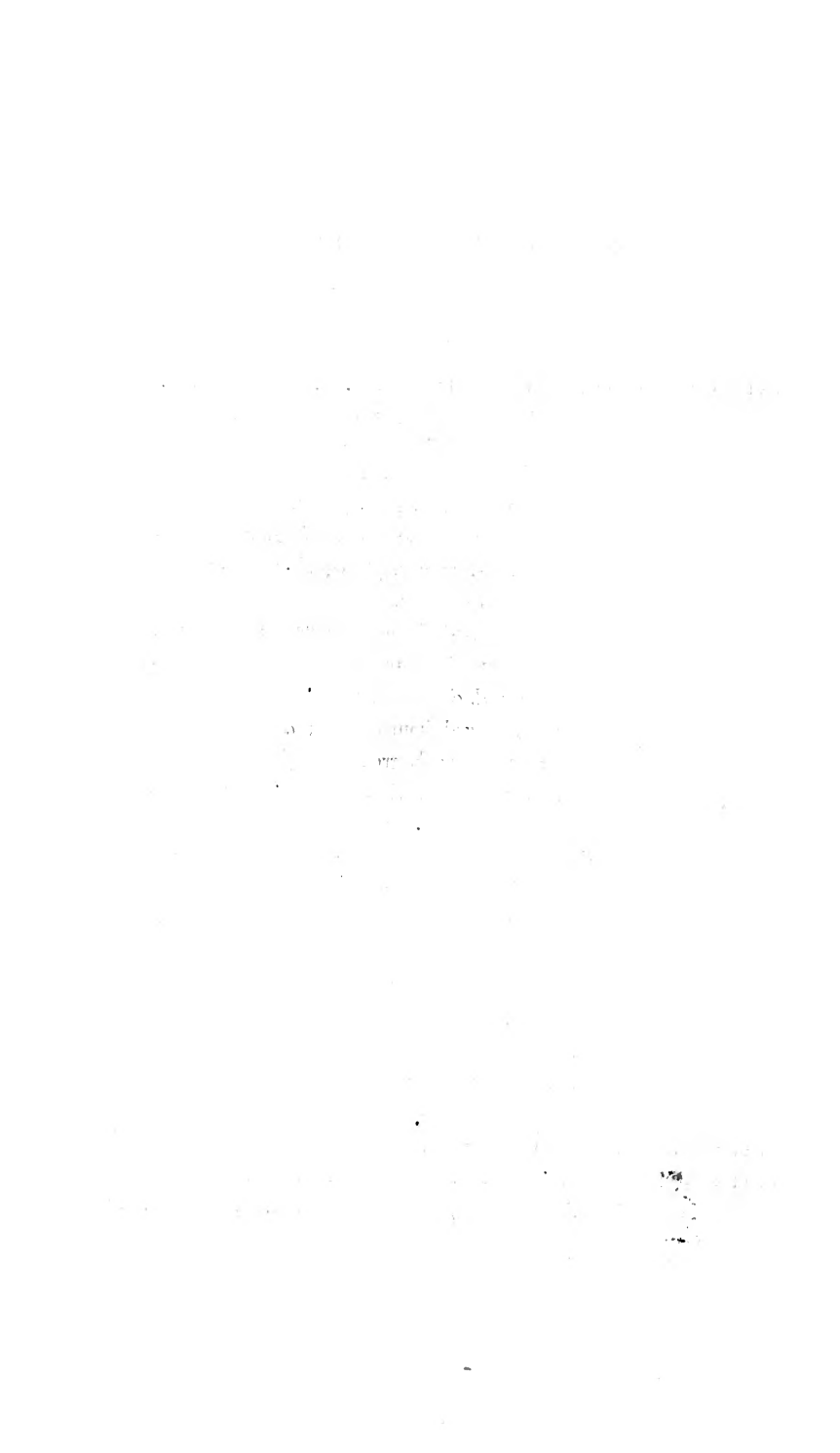
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THE
ZOOLOGICAL JOURNAL.

April—July, 1828.

ART. I. *Observations on Rhinopomastus of Dr. Smith, a new Genus among the Promeropidæ.* By SIR W. JARDINE, Bart., F. R. S. E., F. L. S., M. W. S., &c.

THIS new form, which Dr. Smith has lately placed in the South African Museum as the type of a separate genus, was sent to me a few months since for examination by that zealous Naturalist. In the notes remitted with the collection which accompanied it, the characters upon which the generic distinctions will rest are merely mentioned, and I am therefore now induced to make them out at more length, and to offer them for the use of the Zoological Journal.

The species from which Dr. Smith has formed his genus is the only one he has yet met with; and three specimens only have been seen by him. The last procured was remitted to myself, and from it the representations of the characters for the accompanying plate have been taken. It must be placed among the *Promeropidæ*, and would formerly have made part of the *Promerops* of Brisson; differing essentially, however, in the curious and I believe peculiar structure of the nostrils, which, in addition to the usual membrane that covers those of a similar formation, are again protected by an incumbent scale, or operculum, which nearly conceals the opening. The true membrane also is detached, and the nostrils are quite pervious, while in *Promerops* they are at once pierced in the substance of the bill, and have no covering membrane. The bill will form the character of next importance; in Dr. Smith's genus it is slender

and rounded; in *Promerops* it is of very considerable strength, particularly towards the base, is nearly triangular, and the culmen is flattened. In the form of the tarsi and feet, in the structure of the plumage, the colouring and markings, the two genera will nearly accord, and the characters thus blending will assist the passage to adjoining groups. The bird has been placed in the S. African Museum under the specific name of *Capensis*; but this being in many respects inapplicable, and being unpublished, I have thought the name now given was a just tribute to the merits of a person so interested in every department of Natural History, and who is certainly entitled to it as a discoverer of the species.

Genus RHINOPOMASTUS, Smith.

CHAR. GEN. *Rostrum* elongatum, incurvum, gracile, teretiusculum, basi trigonum.

Nares basales, mediæ, perviæ, membranâ semi-clausæ scutelloque incumbente tectæ.

Alæ mediocres.

Cauda gradata, elongata.

Pedes inessores, mediocres; tarsi brevissimis, acrotarsio scutulato, paratarsio integro; digito exteriori ad secundam phalangem connexo, interiore libero, acropodio scutulato; hallucibus validis, compressis, hallucis validiore.

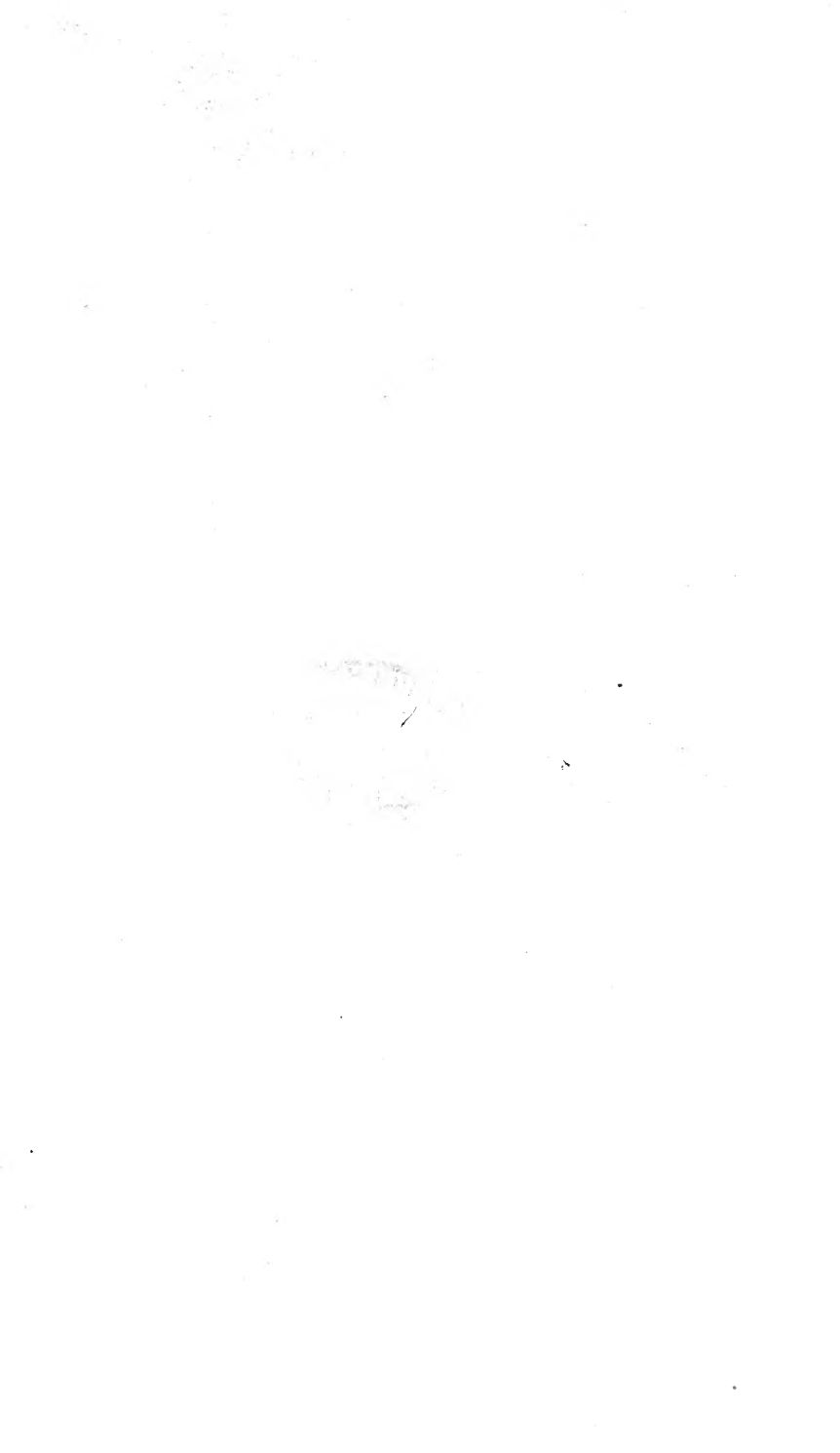
Typus genericus. *Rhinopomastus Smithii*, mihi.

RHINOPOMASTUS SMITHII.

R. supra chalybeo violaceoque nitore luce varians, subtus obscure niger.

TAB. I.

The length of this species is about $11\frac{1}{2}$ inches, that of the bill nearly $1\frac{3}{4}$. The whole plumage is loose and unconnected as in the true *Promerops*. The upper parts, including the wings and tail, are fine steel blue, with violet and greenish reflections, varying with the light; the under parts are entirely dull greenish black, on the throat and breast slightly tinged with green reflections. The wings are of considerable power, the greater co-





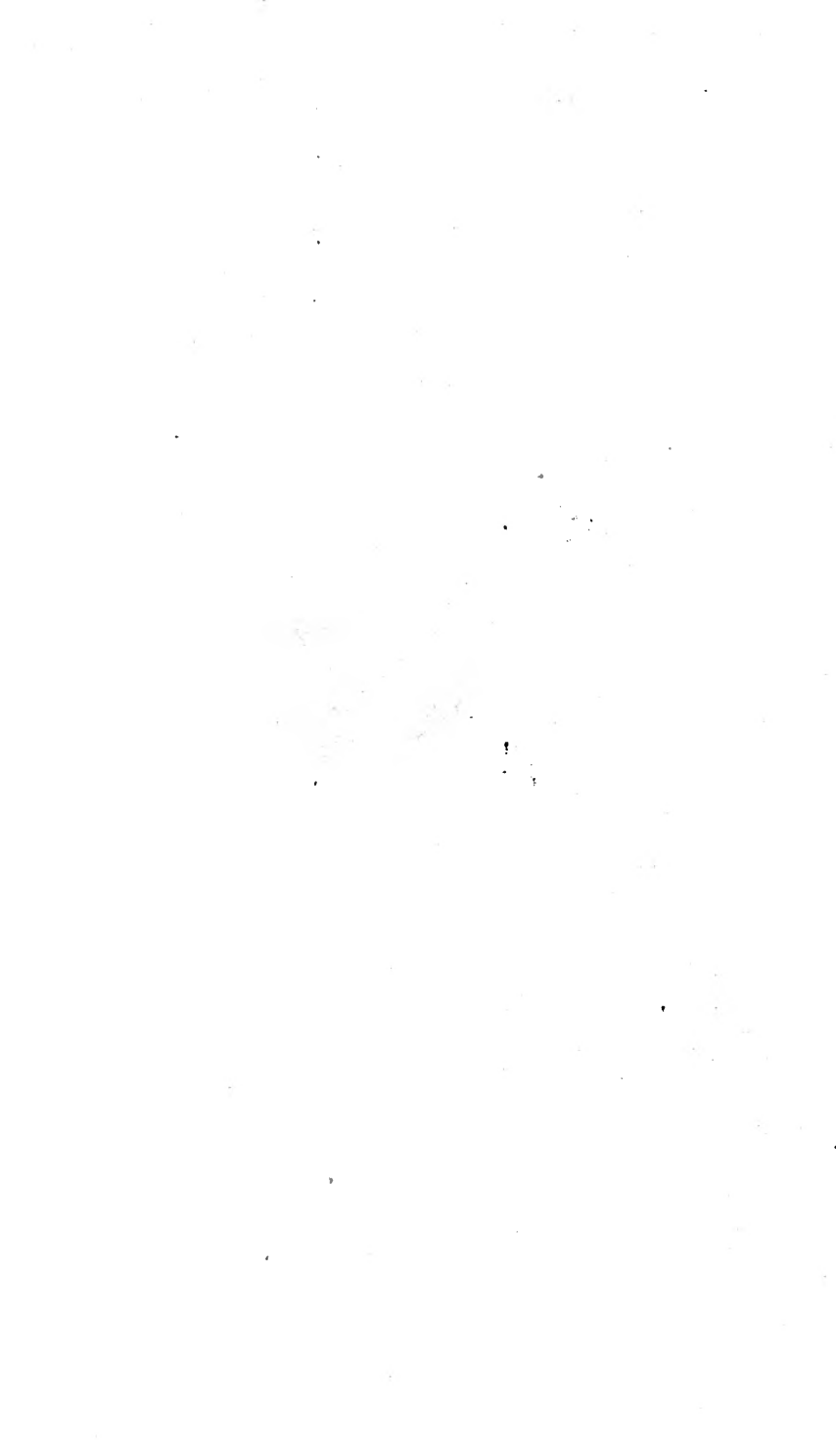
Rhinopomastus Smithii.

St. W. Jardine. Scit.



Rhinopomastus Smithii.

Str. W. Jardine, fecit.



verts are broad and rounded, the third and fourth quills are longest, and from the third to the ninth inclusive the inner webs are marked with a large irregular white spot, the outer webs of the fifth to the eighth inclusive are also marked with a square white patch opposite to that on the inner. The tail is much graduated, and the two exterior feathers have an oval white spot near the extremity of each. The legs and feet are black, and formed as in *Promerops*.

Dr. Smith observes that the species is of rare occurrence, he having met with it only three times. All the specimens were procured at the most northern boundary of the colony, and it is probable that they may be found in more abundance when his researches are continued in that direction.

On the Plate, Fig. 1. represents the bill seen from above with the incumbent scales in the proper place. Fig. 2. one of the scales removed. Fig. 3. left foot seen from above. Fig. 4. hallux. Fig. 5. bill of the natural size, showing the scale removed and the true membrane covering the nostrils.

ART. II. *On the Chalcididæ*. By J. O. WESTWOOD, Esq.,
F.L.S., &c.

- No. 1. Rules for Entomological Nomenclature.
- No. 2. Application thereof to the *Chalcididæ* and *Cynipidæ*.
- No. 3. Characters, &c., of the genera *Cleonymus* Latr. and *Cheiropachus mihi* belonging to the former family.

No. 1.

“ Il ne s'agit ici que de la seule Nomenclature.” SPINOLA.

There is no portion of the entomological productions of Great Britain which has been so completely disregarded by British Entomologists as the insects composing the family *Chalcididæ*; and when we have mentioned Latreille, Spinola and Dalman among the continental Entomo-

logists, the catalogue of authors who have attempted their investigation is complete; while at the same time there is hardly any group which can vie with them, either in the singularity of their economy, the peculiarity of their characters, or the brilliancy of their colouring.

Previously, however, to entering upon the history of the nomenclature of the family, I think it necessary to make a few preliminary remarks upon certain principles of Entomological Nomenclature; and, with Spinola, in the first place to declare, that “quant à la Nomenclature, la priorité est ma loi.”

It is well known that Linnæus, Fabricius, and their contemporaries often comprised in their extensive genera insects so different in structure, that certain of them are ascertained, their characters being now more minutely investigated, to belong even to other groups.

On the other hand it happened far more frequently that the greater part of the insects composing these genera were, from the great, and indeed surprising degree of discrimination possessed by the before-named authors, so nearly allied to each other in affinity, that the modern Entomologist has only to reject the few disagreeing species, to form the oldest generic name* employed in the group into that of a family, by transforming the termination of the last syllable of the genitive case of the generic name into the patronymic *idæ*; and to reduce the species into minor divisions and subdivisions, which we now term genera or sub-genera; the ancient generic

* Mr. Stephens, in his *Illustrations* (*Haustellata*, I. p. 74, note,) observes, “that the name of the family should unquestionably be derived from that of the *typical* group;” and adds, that from his limited knowledge of exotic forms he should not attempt to decide whether the name which he had employed, or that which had been employed by a contemporary author for the same family, ought to be retained. No further proof of the practical inconvenience of this plan, although it may perhaps be theoretically correct, can be required. Indeed, until the contents of any particular family are clearly ascertained, the supposed typical group, (or, in other words, that group which, from its situation in the family, possesses the characters of the adjacent families in a slighter state of development than any of the other groups in the same family,) will be continually subject to variation as new forms are discovered, and hence, if Mr. Stephens's rule should be adopted, the family name will necessarily be subject to similar variation. This inconvenience, however, may be at once obviated by adopting the rule which I have stated above.

name being generically reserved for that particular species, which, from being placed at the head of his genus, we are led to suppose was considered by its founder as the species more especially possessing the generic characters of the group;* indeed, in the works of Fabricius we invariably find a certain species selected, from which the characters are drawn, and in this case we are left without doubt as to the type of the genus. This is, however, a circumstance too often overlooked by modern authors.

At the period above referred to, it also not unfrequently occurred (as we shall see below) that an author, unacquainted with the works of his contemporaries, gave to some particular group, incorrectly supposed by him to be unnamed and uncharacterized, a generic name, in many instances derived from some peculiarity in the insect which he considered as the type, (adding at the same time to his genus other, and perhaps very distinct insects, rather than form them into new genera,) when, however, unfortunately for him, those very insects which he had regarded as the types of his new genus, had previously received from some other Entomologist a different generic name. Now in such a case it is quite clear that the second name must sink into a synonym. It has, indeed, been said that it ought to be retained, and that the insects placed by the author of the second generic name at the end of his genus, although completely disagreeing with the characters of the type, (from which type perhaps the second generic name was derived,) ought to be considered as entitled to such second generic name. This doctrine, however, in such cases is certainly not maintainable†, not even though the insects placed at the end of the genus by the second author may partially agree with his typical species.

* Fabricius, in his *Philosophia Entomologica* (p. 114) lays down the following rule, "Si genus receptum secundum leges naturæ et artis, in plura dirimatur, tum nomen antea commune *vulgatissimo* insecto manebit." I do not know any method so likely to create confusion and uncertainty as that contained in the above rule, since it is next to impossible that every Entomologist would select the same particular insect, and consider it as the most common in the family to which it belongs. Indeed Fabricius himself seems to have wished to inculcate this uncertainty, since, in p. 118 of the same book, he observes, "Locus et tempus insecti sunt maxime accidentalia."

† "Nomen genericum unius generis, nisi supervacaneum, in aliud transferri haud debet." Fab., *Phil. Ent.* p. 113.

Confusion has hitherto constantly attended, and cannot but attend, the employment of such synonymous names, which the introduction of new generic names would certainly have prevented. “Nominum genericorum enim mutatio semper ansam confusionis præbet.”*

* Fab., Phil. Ent. p. 105.

The genus *Eulophus* will afford an example of the application of the above rule in a somewhat different manner.

That genus was proposed by Geoffroy for a species, the male of which possessed branched antennæ. Latreille extended the genus, comprising in it all the species in the family whose antennæ were apparently six or seven jointed. Dalman adopted Latreille's views, but proposed that the generic name should be changed to *Entedon*, placing however in his arrangement of the species (which were formed into various sections and subsections) the species with the branched antennæ in the males in the first section at the head of his genus, thus considering them to possess the characters of the group in a greater state of developement than the other species, all of which have simple antennæ. But to the student of this portion of our Entomological productions it is evident that the group as extended by Latreille and Dalman is of higher than generic rank, forming in fact a subfamily, which may be named, after Mr. Vigors's plan, *Eulophina*, and that the generic name of *Eulophus* ought to be restricted to the species with branched antennæ in the males for which it was first proposed; and since Dalman has placed these species at the head of his genus, we may be permitted to say that his name *Entedon* is only synonymous with the true genus *Eulophus*, even without reference to the claims of the latter name on account of its priority, and consequently that the name *Entedon* ought not to be employed generically to designate any one of the other divisions or subdivisions comprised in Dalman's group, which are of equal rank with the true *Eulophi*; and for which (as it will be necessary to give them names) it would be far preferable that new generic terms should be employed. In the *Coleoptera* how many genera do we see proposed and adopted, whose characters are far less decided than those which characterize Dalman's sections and subsections! and shall the objects comprised therein, merely because they are minute, be denied the advantages (as I may almost call them) which their relatives of larger size enjoy?

But supposing that the name of *Eulophus* were to be generically employed for the true *Eulophi*, and the name of *Entedon* were not to be considered as a synonym, but were to be employed generically for the insects contained in any one of the said subdivisions of *Entedon*, I would ask how the Entomologist could say that he is describing the genus *Entedon* of Dalman, when that genus

In this investigation, however, I also think it equally clear that we ought to be allowed to consider the *Systema Naturæ* as our boundary mark, without being required to trace the name of an insect through all the old and fabulous authors who have treated upon it, and who have at the same time introduced so much confusion amongst the names by which the more commonly known insects were designated, that it is now almost impossible (although in itself a sufficiently interesting subject for investigation) to discover the insects alluded to by those authors. Linnæus, on the other hand, “*primus scientiam in formam systematis redegit, genera condidit, characteres nominaque eorum dedit,**” a system fixed and harmonious throughout, and sufficient in itself to carry his name down to the latest posterity, and as such, the names employed by him are now, notwithstanding the admitted impropriety of a very few of them, almost universally adopted. I therefore think that it would at once tend to overthrow so valuable a system were we unnecessarily to set aside his names, preferring to them others, which, even were they adopted, would lead to no satisfactory results.

There is also another question (too often overlooked) which, although not immediately connected with the present subject, I may be allowed to mention. I allude to priority in regard to the Nomenclature of Species. Now the purpose for which specific names are bestowed upon insects is comprised so many of such subdivisions? or to which of his other subdivisions ought his name *Entedon par preference* to be exclusively given?

It may however be said that the whole group having apparently six or seven joints in the antennæ is but of the rank of a genus, then in such case Dalman's name must inevitably sink into a synonym of *Eulophus*, since Latreille previously extended the latter generic name over the whole group, and that name would be then employed; first, as a generic one as proposed by Latreille for the whole group; and second, as a subgeneric one as proposed by Geoffroy for the true *Eulophi*, perhaps forming the name in the latter case, after Mr. Kirby's plan, into the subgeneric name *Eulophæ*; Dalman's other sections and subsections having new subgeneric names given to them similarly terminating; but for my own part, as between these two plans, which in the end may be said at most to possess a variance but no difference, I certainly at present feel inclined to prefer the former. In any case the adoption of Dalman's name *Entedon* will be attended with confusion.

* *Fab., Phil. Ent. p. 88.*

perfectly artificial; namely, that by such means an insect may be readily recognized amongst its fellows, “*Dentis nominibus rite determinatis aliis ideas nostras nullo modo communicare valemus,*”* and the aim of the Entomologist is fully accomplished if he is enabled thereby to make himself understood when mentioning or describing any particular insect; consequently a slight degree of importance is all that is requisite to be attached to the *names* themselves. It has however been said, that if an insect receive a name which is afterwards discovered to be incorrect, such name ought to be rejected, and that employed by the next author who described the insect adopted in its stead. For instance, if the oldest specific name be derived from a character which is afterwards discovered to be a generic one, (Ex. *Leistus spinibarbis*, *Loricera pilicornis*,) or if a comparative name be employed, and the comparison is afterwards destroyed, (Ex. *Hister maximus*, *Bombylius major*, *B. medius*, *B. minor*,) or again, if such name be derived from a sexual character, (Ex. *Eucera longicornis*, *Eulophus ramicornis*, *Eul. damicornis*,) or lastly, if a name be employed indicative of the habitation or place of capture of an insect, and it is afterwards discovered that the supposed habitation was merely accidental, or in fact erroneous, (Ex. *Curculio Alliarie* and *C. Lapathi*, noticed by Kirby and Spence, Vol. I. p. 196,) or it is discovered that the insect is not confined to the supposed locality, (Ex. *Agonum Austriacum*, *Raphidia Londinensis*,) I think, for the reasons above mentioned, that in each of these cases it is going too far to contend that such name ought to be rejected, “*Toleranda tamen sunt,*” says Fabricius, “*quamvis haud imitanda;*”† for if the propriety of every specific name were to be thus rigidly examined, we should find but few which would survive the test.‡ In one of the cases mentioned Messrs. Kirby and Spence are of a

* *Fab.*, ib. p. 101.

† *Id.* *ibid.* p. 118.

‡ Here may be noticed the useless curtailment of the Linnæan names of the *Tineæ*, which has latterly been adopted by some of our Entomologists. I would ask what advantage is gained thereby; for would not “*Anacampsis cinerea* or *Juniperi*,” as written by Mr. Curtis, (*British Entomology*, No. 189,) be more satisfactorily known by the old established Linnæan names “*cinerella* or *Juniperella*?” “*Nomina trivialia nunquam absque summâ urgenti necessitate mutanda sunt.*” *Fab.*, ib. p. 121.

different opinion, (Introduction, Vol. I. p. 196, note,) but De Jean, in his Preface to the first volume of his "Species général des Coléoptères," expresses a strong opinion on the propriety of retaining the oldest specific name, to the exclusion of recent *improved* ones, giving for examples *Loricera pilicornis* and *Leistus spinibarbis*, above noticed. It would not, however, be proper to pass over in silence, or without censure, the contradictory opinion previously expressed by that author in the same Preface, where he announces his intention of adopting the names *most generally used*, immaterial whether they have or have not priority of date!, adding, that the investigation of the prior claim to a name is a waste of labour, and ever attended with more trouble than can be compensated by the benefit to be derived therefrom. How unworthy is this remark of the work in which it is contained! There is one case, however, in which the earliest specific name of a particular insect must be rejected in favor of the subsequently employed name, viz. where such earliest trivial name has previously been used by some preceding author, for a different species, in the same genus.

No. 2.

We now proceed to the history of the nomenclature of the Chalcididæ and Cynipidæ.

The genus *Cynips* was proposed by Linnæus in the 6th edition of the *Systema Naturæ*, and was evidently intended, (although comprising insects belonging to other and very different modern genera and even families,) for the reception of the true Gall Flies, those insects being placed by him at the head of the genus. Most of the minute insects of the parasitic family Chalcididæ were, from the similarity in their habits, placed by him amongst his "*Ichneumones minuti*," as they were also by De Geer. Geoffroy shortly afterwards, in 1764, established the genus *Diplolepis* composed entirely of the true Gall Flies or *Cynips* of Linnæus, while the genus *Cynips*, which he also retained, comprised many of the *Ichneumones minuti* of Linnæus, having one of them, belonging to the family Chalcididæ, for its type, and also comprising several other species belonging to the latter family which Linnæus had incorrectly placed at the end of the Gall Fly genus, *Cynips*.

In the *Systema Entomologiæ* of Fabricius, published in 1775, that author adopts the genus *Cynips* as proposed by Linnæus; and unites *Chalcis sispes* with his *Chrysidæ*, and the small *Chalcididæ* either with the *Ichneumones*, or places them at the end of the genus *Cynips*.

In the *Mantissa Insectorum* of the same author, published in 1787, the genus *Chalcis* was first established; but in that work the smaller species of the family *Chalcididæ* were still placed either with *Ichneumon* or *Cynips*.

In 1795, Swederus established, in the *Swedish Transactions*, the genus *Pteromalus*, comprising the greater portion of those "*Ichneumones minuti*" of Linnæus, which Geoffroy had miscalled *Cynips*, and Fabricius had placed either with *Ichneumon* or *Cynips*.

In 1796, in the "*Precis des Caracteres generiques*," Latreille entirely adopted Geoffroy's improper nomenclature; and Mr. Kirby, in his *Monographia Apum Angliæ*, (1. 82. 2.) noticing the arrangement of the *Hymenoptera* in that work, observes, "6. *Cynips*, after Geoffroy: this genus takes in no genuine *Cynips*, but includes a large proportion of the *Ichneumones minuti* of Linnæus, the *Eulophus* of Geoffroy, and *Chalcis* of Fabricius; it would be a good genus without *Chalcis*, but it should have another name, as *Cynips* ought to be continued to the gall-nut insects," which in Latreille's work were generically called *Diplolepis*.

Fabricius, however, in the *Systema Piezatorum*, 1804, not aware of the establishment of *Pteromalus*, by Swederus, has, (notwithstanding the propriety of his restoring to the Gall Flies the generic name of *Cynips* imposed on them by Linnæus,) introduced considerable confusion by transposing Geoffroy's other generic name, calling all those parasitic insects which that author had miscalled *Cynips*, by the name of *Diplolepis*, with the exception of a few which he placed in his genus *Cleptes*. This was a decided failure, since it is clear, that *Diplolepis*, when properly restricted to the Gall Flies as intended by Geoffroy, is only synonymous with the *Cynips* of Linnæus, and consequently ought merely to be used as such. Had Fabricius either given a new name to these minute *Chalcididæ*, or placed them in his genus *Chalcis*, or adopted that of *Pteromalus* proposed for them by Swederus, instead of calling them *Diplolepis*, the confusion which has arisen would in a great measure have been avoided.

Latreille, in the *Histoire naturelle &c., Genera Crustaceorum &c., and Considerations generales*,* still retained the improper nomenclature of his countryman Geoffroy, by forming, in the first of these works, the true Gall Flies (under the generic name of *Diplolepis*) with the addition of the genera *Ibalia*, *Figites* and *Eucharis*, into his family *Diplolepariæ*; and the parasitic *Cynipes* of Geoffroy, (*Ichneumonones minuti* of Linnæus,) under the same erroneous generic name of *Cynips*, (but divided into different sections and subsections,) with the addition of the genera *Leucospis* and *Chalcis* into his family *Cynipsera*. The family *Proctotrupii* was separated from the latter family by this author, and has since been preserved distinct, although some of the genera have been more than once removed from one family to the other. In the two latter works no further improvement was made in the family of the Gall Flies, still miscalled by him *Diplolepariæ*, and the only remark worthy of observation in the *Genera Crustaceorum*, is that placed after the genus of Gall Flies, the synonyms of which are thus placed.

“*Diplolepis*, Geoff. Oliv. *Cynips*, Linn. Scop. De G. Schr. Fabr. Vill. Ross. Bosc. Chr. Cuv. Lam. Illig. Panz. Jur. Walck. Spinola.”!! Surely this host of celebrated names ought to have outweighed Latreille’s devoted attachment to the incorrect nomenclature of his countrymen; but he adds, in order to prove the correctness of his ideas, this “Nota—“*Nomen genericum*” (*Diplolepis*) “*his Insectis*” (the Gall Flies) “a *Dom. Geoffroi* impositum, et ab *amico Olivier* retentum, denominationi *Linnæanæ* antepono; *Cynipedes Dom. Geoffroi* nunc a *Fabricio* *Diplolepes* vocantur; *nominum hæc continua subversio scientiam occidit.*”† After stating the alterations which have subsequently been made by this author, we shall be able to ascertain in what degree this “*nominum subversio continua*” may be laid to his charge.

For the parasitic family *Chalcididæ*, the name of *Cynipsera* was still retained in his *Genera Crust. and Consid. generales*, and the divisions and subdivisions, which he had formed in the *Histoire Naturelle*, of Geoffroy’s

* It is almost needless to add that the arrangement and nomenclature of this work have been adopted in nearly every instance by Dr. Leach in the *Edinburgh Encyclopædia*, and by Mr. Samouelle in his *Compendium*.

† *Genera Crust. &c.* Vol. IV. p. 19.

miscalled parasitic Cynips were raised to the rank of genera, amongst which was adopted that of Pteromalus of Swederus, restricted, however, to the *Pter. Gallarum* and its congeners; the name of Cynips being also generically restricted to the splendid species with an elongated and exserted ovipositor in the females, (*C. Bedeguaris*, &c.)

In the *Insecta Liguriæ*, Spinola has entirely adopted the nomenclature of Fabricius, dividing, however, the parasitic Diplolepes of that author into divers sections and subsections; but in the 17th volume of the “*Annales du Museum*,” in his “*Essai d’une nouvelle Classification des Diplolepaires*,” after stating the priority of the establishment by Linnæus of the genus Cynips, the erroneous nomenclature of Geoffroy, the correct reference by Fabricius of the Gall Flies to the generic name of Cynips, and his conviction that Fabricius ought to have given a new name to the parasitic insects which he had miscalled Diplolepis, as above mentioned, he adds, that he himself would not attempt the innovation, but suggested that the parasitic family named by him Diplolepariæ (answering to the Cynipsera of Latreille) might with propriety be altered to Chalcidites, more especially as Jurine had placed all the insects of the family in the genus Chalcis, and had restricted the genus Cynips to the true Gall Flies. In the same paper Spinola also suggested that the generic name Cynips, as above restricted by Latreille in the *Genera Crustaceorum* &c., ought consequently to be set aside, proposing in its stead that of Callimone.

In the Swedish Transactions for 1820, Dalman, who does not appear to have been acquainted with the above *Essai* by Spinola, or the alterations adopted by Latreille in the *Regne Animal* stated below, has published an excellent paper on the Chalcididæ, to which (following his countryman Swederus) he gives the family name of Pteromalini; but as Fabricius had proposed the genus Chalcis previously to the proposal of Pteromalus by Swederus, the familyname ought to be founded upon the former generic name, more especially since the true Chalcides appear to be the typical species of the family. In this paper, the species having females with an elongated exserted ovipositor (Cynips of Latreille, *Gen. Crust.*, Callimone of Spinola) are formed into the genus Tormus; Latreille himself, however, convinced of the impropriety of terming them Cynips, had previously, in the *Nouv. Dict. d’Hist. Nat.*, given them the new name of *Miscampus*, but both these names must fall, since they are subsequent

to the proposal of Callimone by Spinola, which ought in justice to be regarded as the generic name for the species congenerous with *C. Bedeguaris*, &c.

In the *Règne Animal* (1817), *Dictionnaire d'Histoire Naturelle*, and the *Familles Naturelles* (1825), we find Latreille, influenced by the remarks of Spinola,* at length willing to do justice to the labours of the immortal Linnæus; and accordingly he makes considerable alteration in the nomenclatures of these families and genera, giving to the family of the Gall Flies (previously termed by him *Diplolepáriæ*) the new name of *Gallicolæ*, (why did he not at once call them *Cynipidæ*, following up his usual plan of naming families from the typical genus?), and restoring to the true Gall Flies (or the genus *Diplolepis* of all his former works) their proper Linnæan name of *Cynips*. He likewise adopts Spinola's views by calling his previously named parasitic family *Cynipsera* by the name of *Chalcidites*; so that it only now remains for him to adopt the family name of *Cynipidæ*, instead of *Gallicolæ*, and to employ Spinola's long previously proposed name of *Callimone* in the place of his new name *Misocampus*.

Dumeril, in his "*Considerations générales &c.*," with that fondness for new names which his work too plainly exhibits, retrograding at the same time very materially in the science, unites the genera *Leucospis*, *Chalcis* and *Diplolepis*, (retaining Geoffroy's incorrect nomenclature for the Gall Flies) with *Diapria*, into one family, to which he gives the name of *Abdito-larves* ou *Neottocryptes*. Although an advocate for the employment of names founded upon economy and habits, I think such ought to be restricted to the higher groups, and not employed to designate families, which cannot indeed receive a happier series of names than those now generally employed, terminating uniformly in *idæ*.

I cannot conclude this paper without expressing regret that Mr. Curtis, in his very valuable *British Entomology*, commenced in 1824, has thought it right to retain Latreille's faulty nomenclature of the Genera *Crustaceo-*

* See the *Règne Animal*, Vol. III. p. 657, note 1. p. 658, 659, 660. Addenda, whereby it evidently appears that Latreille was at length anxious to reduce the nomenclature and arrangement of the two families to a greater state of order than that in which they had so long previously been suffered to remain: much however yet remains to be accomplished with regard to their arrangement.

rum, notwithstanding it had seven years previously been corrected by the latter author in the *Rgène Animal*; consequently we have the genus *Ibalia* in the family miscalled by him *Diplolepidæ** instead of *Cynipidæ*, and the parasitic genera *Eulophus*, *Perilampus*, &c., in that of *Cynipidæ* instead of *Chalcididæ*.

No. 3.

Having thus, I hope, satisfactorily established the claim of this minute and splendid family of parasites to the title of *Chalcididæ*, and also presented the student with a tolerably accurate historical view of the family, I shall now proceed to the investigation of the characters, &c., of one of its numerous genera, *Cleonymus* of Latreille, in the course of which it will be necessary, 1st. to ascertain its actual type; 2nd. to give the generic characters of that type; and 3rd. to exhibit the degrees of relationship of the genus with contiguous genera, as well as with those insects which, from their possessing certain characters in common, have either been actually placed in it by the authors who have treated upon the subject, or which might perhaps be considered as congeneric.

Spinola appears to be the first author who separated the insects of the genus *Cleonymus* from the family group; since the divisions proposed by Latreille in the 3rd and 13th volumes of the *Histoire Naturelle* &c., were not sufficiently precise. The former author, in the 2nd volume of his *Insecta Liguriæ*, published in 1806, gave a valuable sectional table of the family, under the generic name *Diplolepis*, and we find amongst the characters of his third division the abdomen described as subsessile, elongated, and sharpened at the apex, with distinct segments, the terminal joints of the antennæ seldom forming a club, and the thorax with the first segment small, narrowed and elongated. The species given as types of this third division are *Dipl. depressa*, Fab.; *D. bicolorata*, Spin.; and *Ichn. nigricornutus*, Christ.

* Mr. Curtis refers these genera respectively to the families *Diplolepidæ* of Latreille and Leach, and *Cynipsidæ* [*Cynipidæ*] of Latr. and Leach; but I find cannot that Latreille in any of his works has adopted our uniform terminations in *idæ*, his names for these two families being in his former works "*Diplolepaireæ*, *Diplolepariæ*;" and "*Cynipsères*, *Cynipsera*."

Latreille, subsequently in the 4th volume of the *Genera Crustac. &c.* (1809), proposed the genus *Cleonymus*, which, with *Spalangia*, he placed in a section of the family whose characters are “mandibulæ bidentatæ; thoracis segmentum anticum anticè attenuatum, subconicum; abdomen ovato-conicum, vel trigonum, elongatum, subtus, terebræ excipiendæ causâ, in feminis longitrorsum canaliculatum;” adding also the following Obs. “Antennæ valdè fractæ, sensim extrorsum crassiores, articulis decem distinctis, ultimo magno, distincto.” The number of joints in the antennæ specified in this observation is, however, applicable to *Spalangia* alone. In the characters of the genus *Cleonymus* itself we find “antennæ ultra capitis marginem anticum et superum, vel oralem, insertæ.” The species given as types are “*Dipl. depressa*, Fab.; *Ichn. rufescens*, Rossi; *I. fenestralis*, Rossi; *Ichnemon*, De G., tom 2, pl. 31, fig. 22, ejusdem generis?” In his “*Considerations générales*” (1810) similar sections are adopted, but the only type of the genus which is given is the *Dipl. depressa*, Fab.

This species, therefore, we are bound to consider as our type, not only from its having evidently been considered as such by Spinola and Latreille, but also from its having been tolerably figured by Coquebert. None of the other species placed in the genus appear to have been figured, (except De Geer's,) and it would be difficult to draw generic characters sufficiently explicit from the short specific descriptions which have been given of them; and it will be seen that Latreille himself had doubts whether the only other figured species belonged to the genus, and which is, in fact, the *Eupelmus De Geeri* of Dalman; and if, upon a rigorous investigation of the generic characters of the other species placed in the genus, it shall be discovered that they do not agree with the characters of the type, although perhaps they may nevertheless fall within the previously too loosely drawn characters of the genus, I shall not hesitate in considering the *depressa* as solitarily entitled to the generic name, and that the other species must be placed in other genera.

The following is the description of the type from the *Systema Piezatorum* of Fabricius, p. 151.

DEPRESSA 13. *Diplolepis, obscure aurea, abdomine depresso, cyaneo, alis apice fuscis, maculâ fasciâque posticâ albis.*

And Coquebert's figure exhibits, "sufficiently to swear by," the peculiar clouding of its wings. Of this species I have seen three specimens, all females, and each agreeing with the above description and figure. They are in the respective cabinets of Mr. Haworth, Mr. Stephens, (taken near Hertford,) and Mr. Bainbridge, who swept his specimen into a net from clover, at Darent, at the latter end of May, 1827. The size varies a little in these three specimens; it is represented in the plate by the crossed lines under the insect. The following are more ample specific characters.

Diplolepis depressa, Fabr., Coq., ♀.

TAB. II. fig. 1. ♀.

Head and thorax rich coppery-aureous and thickly punctured; eyes and ocelli dark brown; basal joint of the antennæ fuscous, the remaining joints ferruginous, except the last, which is dark brown; postscutel shining, impunctate; the fore legs and intermediate femora ferruginous, the posterior legs and intermediate tibiæ and tarsi fuscous. The first five segments of the abdomen are of a dark, shining, cyaneous green, the remaining three tinged with dark coppery green. Wings pale hyaline, the posterior half of the upper pair stained with brown, growing paler to the tips, having a large white spot at the anterior margin, and a whitish fascia in the pale fuscous cloud, near to and running nearly parallel with the tip of the wing. The under side of the thorax and of the posterior thighs is golden green.

From this species, therefore, we must now draw our generic characters; but before I do so it will be necessary to state that I am unacquainted with its male. It is also necessary to state that I have not included amongst the generic characters any account of the Trophi. This I have avoided for three reasons; 1st. my want of specimens for dissection; 2d. the difficulty of the examination of the Trophi, arising from their minuteness, and the consequent superiority of external characters; and 3rdly. from a conviction that as the perfect insects throughout the different groups in the family appear to make but little use of their

Fig. 4.

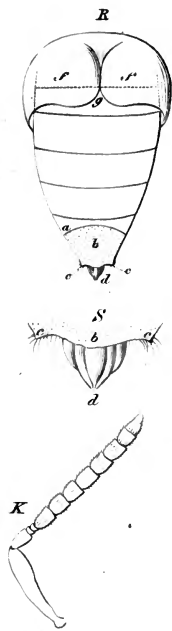


Fig. 4.

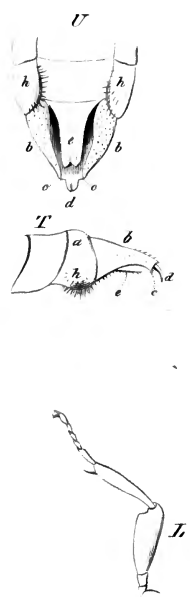


Fig. 2.

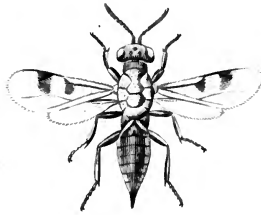


Fig. 1.

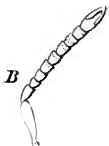
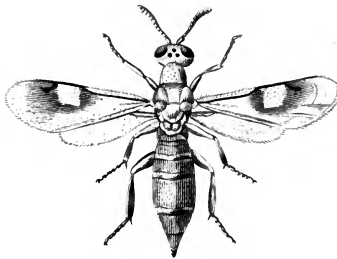
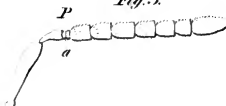


Fig. 3.



trophi, which therefore here *naturally* possess but a secondary importance, but little variation will be found in the formation of them, and hence that *fixed* generic characters cannot be drawn from them; since I feel satisfied that, having regard to such slight variation throughout the respective groups or subfamilies, the species in any one of the genera vary nearly as much inter se, in the structure of these parts, as the genera themselves.* Indeed I certainly feel inclined to adopt on this point the opinion of Mr. Curtis *generally*, since I do not see any sufficient grounds for restricting it to the Coleoptera; and although it is somewhat at variance with his more recently expressed opinions. That author, after pointing out the similarity in the trophi of *Mycetophagus* and *Tetratoma*, two genera theretofore placed widely apart and in different families, has observed, "My opinion is daily strengthened that the organs of manducation, in the Coleoptera at least, will form the most natural *divisions* for families, and that the antennæ alone will frequently supply the best generic characters."†

But if the families are thus to be considered either as characterizable or divisible into subfamilies, (for from the expression of Mr. Curtis it is not sufficiently clear which of these is intended,) from the formation of the trophi, the characters of the genera must be sought for not only in the formation of the antennæ, but also of other organs, which must necessarily be external ones. Hence this observation of Mr. Curtis may with advantage be still more generally extended, since I hold it for certain that wherever we find any set of organs, which

* Hence the folly in extensive genera belonging to such groups, of selecting one species as the type of a genus, of drawing the characters of such genus from a second species, and of figuring a third as an example of it.

† British Entomology, No. 156. After the expression of such an opinion, I should certainly have hesitated considerably, (even were it merely for the sake of consistency,) before I had united (as Mr. Curtis has done in the very genus, in his observations upon which the above opinion was expressed) insects differing so extremely as the *Mycetophagi* and *Triphylli*, the clava of whose antennæ is, as Mr. Curtis admits, respectively formed of three and five joints; more especially since the clavation of the antennæ is, (as I hope shortly satisfactorily to establish,) a character intimately connected with the economy of these insects.

for example we will suppose to be the trophi, running, with but little variation in their formation, through a certain series of groups or genera of various external appearance, each of which groups, nevertheless, possesses peculiar habits, we ought to consider the characters drawn from such organs as characteristic of the whole of that series, be it either a family or a subfamily. Now, wherever the trophi are found to be such slightly varying organs, we must of necessity resort to variations exhibited by other organs, such as the legs, antennæ, wings, or other external parts, and these will therefore be found to supply the *essential* characters of the genera. Such genera, although "they have no better claim to distinction" than these external characters, here necessarily become generic, (which Mr. Curtis has nevertheless recently thought proper to designate "mere outline, or suchlike secondary characters,") * rest upon so "solid a basis" that it will require the exertion of more than a single Entomologist to shake them from their foundation, however that Entomologist may, perhaps, at the present time be inclined to imagine that the number of genera may be diminished with impunity, unmindful that by such a proceeding the benefit to, and the advancement of, science, *that summum bonum, at least as it ought to be*, of every Entomologist, must of necessity suffer in the attempt. That the opinion which I, as an advocate for external characters and organization, have ventured to express above, is not contrary to the principles upon which modern genera are established, is evident; and I feel convinced that no one can on the one hand examine Mr. Curtis's dissections, for example, of *Colax*, *Perilampus*, and the insect which he has named *Cleonymus maculipennis*, or those of several genera of *Tenthredinidæ* figured by the same author; and, on the other hand, peruse the following remark of Mr. Stephens, "The trophi of *Platyderus* and the five following genera are so extremely similar, that the species have till lately been considered as constituting one genus only, but there are several striking external characters by which they may be advantageously separated," † and then boldly assert, that in such and many similar cases the trophi are the organs first to be investigated, and principally to be relied upon as affording generic characters, and that the

* *British Entomology*, No. 207. † *Illustrations, Mandib.* Vol. I. p. 101.

external characters, which, be it remembered, point out peculiarities in internal organization, become, or are to be deemed, secondary ones: indeed Mr. Curtis himself, in his observations upon *Cleonymus*, has shewn that he did not always consider external organs in the light of "mere outline, or suchlike secondary characters." Upon the general relative value of characters drawn from the trophi, antennæ, and other individual external parts, I hope at a future time to enlarge, referring the student in the mean time to Mr. MacLeay's introduction to the *Horæ Entomologicæ*, Vol. I.

The following are detailed generic characters of

CLEONYMUS, Latr.

The *Head* is transverse above, with the anterior rather broader than the posterior margin; nearly orbicular in front, rather convex, with two slight impressions somewhat beneath the centre of the face for the reception of the basal joint of the antennæ, (A). *Eyes* rather large, lateral. *Ocelli* three in a triangle on the crown. *Antennæ* inserted somewhat beneath the centre of the face, near each other, (A.) short, not much longer than the head, geniculated, gradually thickened to the tips, 11-jointed, first joint the longest, second as long as the fourth, third the shortest, fourth and five following of nearly equal length, tenth joint of similar size, but produced on the outside, forming a sort of bed on that side for the reception of a portion of the terminal joint, which is conical. (B. represents the antennæ seen from the outside; C. represents the three terminal joints viewed from above; and D. represents the same viewed from the inside, or from the situation of the tip of the other antenna.) I query whether this singular formation be not a sexual character.

Collar nearly square above, narrower than the head, rounded in front, a little broader behind; the remainder of the *Thorax* as broad as the head, having the scutellum rounded, and the narrow postscutel? longitudinally divided. The *manitrunk*, including its upper surface or true prothorax, is completely hidden from view above (so that the *Neck* is not apparent) by the collar or anterior portion of the mesothorax.

Fig. E. represents the under view of the manitrunk with the head of the insect removed; *b, b*, represent the sides of the collar dilated beneath;

c, c, represent the antepectus longitudinally divided in the centre by a deep groove. To the front part of this antepectus the head is attached at a, and to its posterior part are attached the basal joints, or coxæ of the fore legs, d, d.

The *Abdomen*, (upon which as a generic character I think great stress ought to be placed, inasmuch as its variations clearly indicate corresponding variations in the method of oviposition,) is longer than the head and thorax, and of equal breadth with the head near the whole of its length; the two last joints are attenuated, and rounded at their hinder margins; the upper surface, in all the specimens which I have seen, is quite flat, 7-jointed, the fourth being as long as the three preceding, the fifth about twice the length of the fourth; the tips of the organs of oviposition being just perceivable, (G. and H. e.) The peduncle is very short and rather thick, (G. and H. a.) I may here notice a singular character, namely, that the segments of the abdomen are all completely covered with minute punctures, except at the posterior margins of each segment. Fig. H. represents a side view of the abdomen, and it will be seen that it is not near so deep nor so much angulated as in some of the neighbouring genera. Fig. G. represents the under-side view of the same part, and exhibits several characters extremely worthy of notice. In this view, the rings marked respectively d, are merely continuations of the dorsal segments, and not distinct ventral ones. This formation has been partially observed by Messrs. Kirby and Spence, *Intr.* Vol. III. 707, who remark, that "in some Hymenoptera (*Cimbex*) the sides of the *last* dorsal segment turn down and become ventral; on its lower side it has in these a longitudinal cavity, which receives the ovipositor in repose;" and at p. 703, they remark of *Leucospis*, a genus of *Chalcididæ*, that "the ventral segments are replaced by a long, narrow, central plate, succeeded by a minute one." In *Cleonymus*, however, there appear to be only two actual ventral segments, independent of the dorsal ones; they are situated at the base of the abdomen, and are small, the second being the most minute (G. and H. b and c.); the dorsal segments, therefore, become in fact ventral, but they do not close; indeed the basal and apical ones are considerably asunder in the specimens which I have examined, one edge only of the fourth segment folding slightly over the other; the last segment does not even turn down. From the hinder margin of the last, or second ventral segment, the ovi-

positor appears to take its rise, and is apparently covered through its entire length, except at its extreme tip, by a thin membrane,* which does not, however, prevent its form being perceivable as represented in Fig. G. Fig. I. represents a transverse section of the fifth segment of the abdomen as exhibited in dried specimens, by which it will be seen that there is a considerable space between the edges of the under side of the dorsal segments and the ovipositor (I. a.); this space I should conceive is, however, only found in dried, shrunk up specimens, and that when alive it may perhaps be filled up by the inflation of the membrane. The *Wings* do not exhibit any peculiar characters, the nervures being similar to those of the generality of the family noticed below. The *Legs* are slender. The posterior *Coxæ* large, and the posterior *Thighs* rather thicker than the anterior. The *Tibiæ* are slender, the four anterior with a single spine at the apex and the posterior with two, the smallest of which is double. The *Tarsi* are all 5-jointed, the basal joint being the longest. Fig. F. represents a fore leg of the female. The peculiar formation of the joints of the *Tarsi* is exhibited in this figure.

Such then are the generic characters of *Cleonymus*, which it will be seen differs from Mr. Curtis's *Colax* in many characters, more especially in the formation of the antennæ, collar, and in the general structure of the abdomen. Other characters which I have noticed above will peculiarly distinguish this genus from its affinities, and as yet I have not met with a second species which will agree with the characters of the typical one. Whether those which are referred to it by Latreille and Spinola, and mentioned above, be or be not congeneric, I am not at present able to decide; I am inclined, however, to think that they are not.

Spinola, in the *Annales du Museum*, Vol. XI. p. 149, has adopted the genus *Cleonymus*, placing it in his section with twelve joints in the antennæ, inserted in the middle of the face, which has not any impression for the reception of the basal joint, and giving for its characters, "Abdomen comprimé et même concave en dessus; Fente ventrale correspondante aux anneaux antérieures et tarrière dépassant rarement l'extrémité de l'abdomen. Col acuminé plus long et plus étroit que le

* I think it not unlikely that I may have been misled as to this membrane for want of specimens to examine.

disque;" and placing the depressus (which it may be doubted whether he ever examined, since his characters of the genus do not agree with those possessed by this species,) with *Dipl. bicolorata*, Spin., and *Cleon. Cingulum*, Spin., ined., in his first section of the genus, with the "Tarrière ne dépassant pas l'extrémité de l'abdomen." His other section, "Tarrière dépassant l'extrémité de l'abdomen," is most probably the genus *Eupelmus*, and its species are named *compressipes* and *hemipterus*, Spin., ined.

In the *Regne Animal*, Vol. III. p. 658, Latreille has reunited his misnamed long-tailed *Cynips* and *Cleonymus* with the *Pteromalus* of Swederus, with the expression, "Ils n'offrent point les caractères que nous venons d'indiquer."

Dalman, in his paper in the *Swedish Transactions* above referred to, neither adopts the genus *Cleonymus* of Latreille, nor notices the depressus in his synoptic lists of the species. He has adopted the genus *Pteromalus*, containing with him no less than seventy-nine species, divided into various sections and subsections, in the first of each of which "A. Abdomen elongatum trunco longius sæpius acuminatum;" and "a. Alæ distinctè maculatæ," it is not improbable the true *Cleonymi* will find a place.

Latreille, in the *Familles Naturelles*, has again revived the genus *Cleonymus*, placing it between *Pteromalus* and *Encyrtus*.

The remaining author who has treated upon the former of these genera is Mr. Curtis, who, in his observations upon *Colax*, shortly notices *Cleonymus* as "embracing those species with clouded wings, truncated antennæ, the abdomens of the females being similarly shaped to those of *Colax*, but longer;" "from being unacquainted with their males," he could not "enter further upon the subject" of the differences between that genus and *Colax*.* Having, however, subsequently obtained male specimens of a species with clouded wings, he was induced to consider them as the males of an unknown species of *Cleonymus*, and shortly afterwards published an account of that genus in his *British Entomology*, No. 194. A daily, and I might almost say unceasing, attention to the investigation, habits, and structure of the present family for several years past,† enables me, how-

* *British Entomology*, 166.

† I have adopted the suggestion of Fabricius, who long ago remarked, (*Phil. Ent.* p. 7.) "*Pauca (i. e. systemata particularia) jam elaborata invenimus, alia*

ever, to correct the errors into which Mr. Curtis has fallen, and to state, 1st. That (although that author has admitted the depressus to be the type of *Cleonymus*) not one of the characters which he has given of that genus is applicable thereto, excepting only such as are applicable to the whole family or subfamily; since 2nd, the insect figured and described as the male of the *Cleonymus*, and from which the male characters of that genus were derived, is the male of a species not belonging thereto, but to a very distinct and new genus; and 3rd, the insect from which the female characters were derived also belongs to another distinct genus, not being a *Cleonymus*, and consequently not *Cl. depressus*, as imagined by Mr. Curtis; 4th, that the male insect in question has erroneously been supposed to be a new species; and lastly, that the formation of at least the anterior portion of the thorax or truncus of the Hymenoptera has not been sufficiently investigated by that author.

The following are the external characters of the new genus of which the misnamed *Cl. maculipennis* is the type. Mr. Curtis having described the trophi of the male of that species as the trophi of *Cleonymus*, I shall refer the student to that author's description thereof for the cibarian characters of the

Genus, *CHEIROPACHUS*,* mihi.

Type, *Diplolepis quadrum*, Fab.

Head orbicular and rather convex in front, transverse above. *Antennæ* of both sexes longer than the head, geniculated, filiform, inserted below the middle of the face, 13-jointed, pilose, basal joint long and stout, second small, third and 4th very minute, ring-shaped, fifth and remainder cup-shaped, each about as long as the second, the fifth being rather the longest, the three last forming a conical mass. The *Antennæ* of the female

desiderata Entomologis oculatis commendo. E. gr. Ichneumones, Apes, Curculiones, Tineas, aliaque."

The science of Entomology is now indeed so vastly increased that it is impossible for any one *thoroughly* to investigate every branch of it (I might almost say, scarcely more than a single branch of it) in detail. How continually do we therefore perceive the ill effects of such fruitless endeavours to overcome the whole, in the confusion produced by authors commenting upon groups with which they are not previously sufficiently acquainted!

* *Χειρ*, manus et *παχύς*, crassus.

(Fig. K.) are rather shorter than in the male, (Curtis, pl. 194, fig. 1.) and slightly thickened to the tips. *Eyes* small, lateral. *Ocelli* three in a triangle.

Neck short, apparent. *Collar* in both sexes bilobed behind, narrower than the head, the remainder of the thorax as broad as the head. *Scutellum* rounded. *Postscutellum?* longitudinally divided in the centre.* *Wings* of equal length in both sexes, pubescent and ciliated. Superior with a nervure running from the base, parallel to the costa, nearly half way, whence it is continued along the costal margin a short distance, and then becomes furcate, one of the furcations descending a little way into the disc of the wing, at an angle pointing towards its tip, the other furcation continued (gradually diminishing in strength) along the costal margin to the tip. Inferior, narrow and nerveless. *Legs* slender, the anterior and posterior thighs in the males incrassated (Curtis, pl. 194, fig. 8, a fore leg of the ♂.) Anterior thighs in the female gradually incrassated to the tips, where there is a strong indentation in the inside, (Tab. II. L. a.), posterior thighs not so thick as in the males; the posterior pair of legs appear very far behind, especially in the males, from the great length of the posterior coxæ.

Abdomen of the male sessile, obconic, depressed, polished (except the last segment), the first segment large, arched above, covering one or two segments? longitudinally divided down the centre by a deep groove and having a notch at the hinder margin in the centre (Fig. R. *ff* and *g*). The male organs of generation slightly protruded (Fig. R. *d*). That of the female requires a more minute examination. It is long, angulated in profile beneath (Fig. N.), attenuated from about half its length to the tip, and composed of seven polished joints, the third and fourth of which are the broadest, the previous joints being narrowed to the base; the first joint is arched above, with a slight notch at its hinder margin in the centre; the four following are depressed in the centre, the lateral margins being raised; the two last joints are the narrowest, and at the tip of the last the

* The general formation of the thorax of the male is similar to that of the female. My figures were taken from specimens which had not been injured by being pinned. From the incorrectness of Mr. Curtis's drawing of a portion of the thorax of the male, I should conceive that his specimens had been considerably injured,

organs of oviposition are visible, having the appearance of an eighth joint (M. and N. e). All the dorsal segments turn downwards at an angle (M. and N. d.) and become partially (or, as it may perhaps better be termed, sub-) ventral, since there are five distinct, true, ventral segments, the four basal ones being short, and reaching to about half the length of the second dorsal segment (Fig. M. and N. b b b b.) and the fifth long, reaching to the end of the fourth dorsal segment (Id. c.), and it is beneath the tip of this fifth ventral segment that the ovipositor appears to take its rise, at a considerable angle, which passes within or beneath the deflexed margins of the fifth, sixth and seventh dorsal segments. Fig. O. represents a section of the abdomen at the fourth dorsal segment, shewing its triangular form, the manner of the connexion between the dorsal and ventral segments, and the position of the ovipositor.

Species I. *Ch. quadrum*. (Dipl. quadrum, Fab.)

TAB. II. Fig. 2, ♀.

Cleonymus maculipennis, Curtis, Brit. Ent. Nq. 194, ♂.

♂. For the description of this sex see Curtis, loc. cit. The colour of the thorax varies from bright green to a dark, obscure, blackish green.

♀. Head and thorax deeply punctured, dull cupreous, slightly tinged with green; antennæ dark brown, first and second joints ochraceous. Abdomen perfectly smooth and shining, dark cyaneous black, tinged with dark green; its basal segment elevated at the sides and brighter green, the apex slightly pubescent. Wings iridescent, the superior with two dark brown spots on each, one (the smallest) near the centre, the other near the tip, passing through the furcate nerve. The spots in the wings of the females are not quite so large as in those of the males, they also vary a little in size in individuals of the same sex. Legs ochreous, the four posterior thighs shaded pitchy. The size of both sexes of this species varies considerably; I have specimens of each scarcely more than $\frac{1}{3}$ of that of others of the same sex; I have also a male even larger than the largest females.

Specimens of both sexes are in the cabinets of Mr. Stephens and myself, and specimens of the males in those of Messrs. Cooper, Curtis, and Ingpen. My specimens were taken by myself, several years ago,

at Coomb Wood in Surry, in the month of July or August, on an old rail made of a bough from which a part of the bark had been stripped. The sexes were in equal profusion, and they were all running about upon the barked part of the rail, where the sunbeams fell with great heat; when disturbed, they flew to another part of the rail without leaving it. Might they not have been watching for some internal or sub-cortical feeding larva in which to deposit their eggs? I also beat another specimen of the female from, I believe, an oak, at the latter end of August, near Ensham in Oxfordshire. Mr. Cooper's males were taken the latter end of July, on the trunk of a decayed elm, near Knight's Hill Cottage, Dulwich, and Mr. Stephens's was taken, in June last, at Ripley in Surry.

Fabricius, in his *Systema Piezatorum* (p. 152, 16.) describes this species as follows: "D. nigra, æneo-nitens, abdominis basi pedibusque ferrugineis; alis albis, maculis duabus marginalibus, atris;" and Latreille, (who in his *Histoire Naturelle* places this species in his division of Cynips, of which he says, that the abdomen is "presque rond dans les males,") thus describes it, "Vert bronzé; antennes, base de l'abdomen et pattes d'un fauve pâle; deux taches noirâtres sur les ailes superieures. Com-mune aux environs de Paris sur les ormes."

These descriptions, I need not state, are specifically applicable to Mr. Curtis's male maculipennis, and the original detailed description of quadrum in the *Entomologia Systematica* (Vol. II. p. 186) is evidently drawn from a small dark-coloured specimen of the same sex, notwithstanding the expression of Fabricius in that description, "Abdomen—aculeo brevi exserto." The mention of this aculeus was doubtless the cause which induced Mr. Curtis to suppose that the description of Fabricius was drawn from a female, and that, as his specimens were males, they would not agree with the description of the Fabrician species, and were therefore to be considered as a new species. Had Mr. Curtis, however, more accurately examined the abdomens of his male specimens, he would have perceived that they possessed a short, exserted *aculeus*, as Fabricius has misnamed it, and which is, in fact, the tip of the male organs of generation,* the structure of which I have exhibited in Figures

* De Geer has fallen into a precisely similar error. In describing the abdomen of the male of *Eulophus pectinicornis* he has observed, "Au postérieur

R, S, T, and U, and the description of which will be found in the Explanation of the Plate.

Spinola has united this species in his *Insecta Liguriæ* (Vol. II. p. 208) with his species *varians* and *pallipes*, the former of which is formed, with others, into a section of his genus *Halticoptera*, in the *Annales*, the *quadrum* being entirely omitted in the latter work, which species does not indeed agree with the loosely drawn characters of that genus.

Latreille has omitted *quadrum* in his *Genera Crustaceorum*, and Dalman has placed it as the first species in the first section of his very extensive genus (or rather subfamily) *Pteromalus*.

The observations which Mr. Curtis has made upon the affinities of *Cleonymus* being founded upon the characters of the male of *Cheir. quadrum*, may with propriety be inserted here, since it is now evident that they are not applicable to *Cleonymus*, but belong to the present genus. He says, "The trophi of *Cleonymus* are so very similar to those of *Colax*, that we should not have established the latter genus had not other characters presented themselves; it is true that the mandibles of the former are stronger and have but two distinct teeth, and the terminal joint of the maxillary palpi is shorter and more dilated; but on comparing the males of the two genera more decided characters will be found to distinguish them, and such as we trust will justify their separation. The males of *Colax* are marked by a very large head, a ring-shaped *prothorax*, an obovate abdomen and slender thighs; the same sex of *Cleonymus*, has a moderately sized head, a bilobed *prothorax*, an obconic and thick abdomen, and robust anterior and incrasated posterior thighs."

The characters which separate the females of *Cheiopachus* from those of *Colax*, although not so striking as those existing between the other sex, are sufficient to warrant the separation of the two groups. The chief are the incrasation of the anterior thighs in *Cheiopachus*, and the difference of the formation of the collar and abdomen; the latter of which in this genus, it will be seen, is not longer than in the females of *Colax*,

du ventre on voit une petite partie pointue en forme d'aiguillon, qui sans contredit est la tariere que l'Ichneumon introduit dans la feuille habitée par une chenille pour y déposer un œuf." Vol. I. p. 590.

and is here very much depressed above, instead of being slightly convex, as in the female of *Colax dispar*. (Fig. 3, Q. represents a section of the abdomen of the latter insect at the fourth dorsal segment.) The female antennæ of both genera are very similar in formation.*

The distinction between the females of the present genus and of *Cleonymus* are far more striking, and may easily be discovered on reference to the characters of each respective genus.

As to the number of species belonging to this genus, there appear to be several females in my cabinet agreeing with the female *C. quadrum*, but which I have not yet had sufficient leisure thoroughly to investigate. I have not, however, yet met with any male at all agreeing with the male *Quadrum*.

With regard to the insect which Mr. Curtis has considered as the female of *Cleonymus*, he has observed "that the abdomen is longer, more depressed, and less compressed and angulated beneath than in the genus *Colax*, and that the female antennæ (at least in the specimens before us) are thickened gradually to the apex; they have not the ring-shaped *third* joint which that genus has, nor do the three last joints form a distinct mass." The figure, indeed, which he has given of the antennæ of a female presumed by him to be that of *Cleonymus depressus*, although much more nearly resembling the antennæ of that species than the female antennæ of *Cheiropachus*, differs from the former not only in the formation of the terminal joints, but also in having a joint more than in *Cleonymus*; hence it is evident that it is referrible to some other (perhaps a new) genus; but whether the seven species contained in Mr. Curtis's cabinet, all of which he says are females, be or be not congeneric with that from which his figure of the female antennæ was drawn, I am not able to state; at all events we may be led to suppose that such is the case, or Mr. Curtis would doubtless have noticed the differences in their antennæ.

It only remains for me to notice the formation of the thorax. And one of the most conspicuous and valuable organs in the family is the collar,

* That part of the antennæ which in *Colax dispar* ♀ Mr. Curtis regards as the third joint, is, in fact, formed of two minute ring-shaped joints, more closely soldered together than in *Cheiropachus*. (See Fig. 3, P. a.)

which part Mr. Curtis invariably terms the prothorax. Upon the general formation of the truncus, or, as it is usually called, the thorax of the Hymenoptera, it is not my purpose at present to enlarge, further than to state its primary division into the manitrunk and alitrunk; I shall therefore refer the student to Kirby and Spence's Introduction, Vol. III. p. 529. Those authors have satisfactorily shewn that the said anterior conspicuous part, or collar, is a portion of the alitrunk, being attached to the mesothorax, (a portion of the alitrunk,) to which collar there is no analogous part in the Coleoptera; in the latter order, the true prothorax (or, as it is there generally termed, the thorax,) which is the upper surface of the manitrunk, is very large; but in the Hymenoptera, the whole manitrunk, including its upper surface or prothorax and under surface or antepectus, becomes diminished, and is generally hidden by the collar, only becoming conspicuous when the upper surface is elongated into a neck as in Xyphidria, or more slightly as in Cheiropachus.

Explanation of the Plate.

- Fig. 1. *Cleonymus depressus* ♀ magnified.
- A. to F. details of ditto, all more or less magnified.
 - A. Front view of the head.
 - B. Antennæ seen from the outside, or from the tip of the wing on the same side as the antenna figured.
 - C. The three terminal joints of the antennæ seen from above.
 - D. Ditto, seen from within, or from the tip of the other antenna.
 - E. Under side of the anterior part of the truncus with the head removed.
 - a. Point of attachment of the head.
 - b. b. Deflexed margins of the collar.
 - c. c. The antepectus longitudinally divided by a deep groove.
 - d. d. The coxæ of the fore legs.
 - F. A fore leg.
 - G. Under view of the abdomen.
 - a. The peduncle.
 - b. The first true ventral segment.

c. The second ditto.

d, d, d, d, d, d. The dorsal segments deflexed.

e. The tips of the organs of oviposition.

H. Side view of the abdomen.

Details as in G.

I. A transverse section of the fifth dorsal segment of the abdomen.

a. The position of the ovipositor.

Fig. 2. *Cheirpachus quadrum* ♀ magnified.

K. to O. Details of ditto, more or less magnified.

K. The antenna.

L. The fore leg.

a. A strong indentation on the inside.

M. Under view of the abdomen.

b, b, b, b. The four short ventral segments.

c. The fifth long ditto.

d, d, d, d, d, d. The dorsal segments deflexed.

e. The tip of the organs of oviposition.

N. Side view of the abdomen.

Details as in M.

O. A section of the fourth dorsal segment of the abdomen.

a. The position of the ovipositor.

Fig. 3. P. and Q. Details of *Colax dispar* ♀ magnified.

P. The antennæ.

a. The two minute ring-shaped joints.

Q. A section of the abdomen at the fourth dorsal segment.

a. The position of the ovipositor.

Fig. 4. R. to U. Magnified details of the abdomen of *Ch. quadrum* ♂.

R. The upper surface of the abdomen.

a. The penultimate segment narrowed above.

b. The apical segment, worthy of notice in being covered with minute punctures.

c, c. Its posterior margin slightly produced at the sides.

- d.* One of the male organs of generation, (the prehensor?) subcrustaceous, apparently divided by four longitudinal channels.
- f, f.* The large basal segment, divided into two arches by a longitudinal groove.
- g.* The notch in the centre of the posterior margin of the basal segment. This notch is perceivable in the female, and also in some of the contiguous genera.
- S. The apex of the last segment of the abdomen and the prehensor? noticed above, more powerfully magnified.
Details as in Fig. R.
- T. A lateral view of the last three segments of the abdomen, *a, b, c,* and *d,* as in R.
- e.* The penis? flat, horny and hairy at its outer surface.
- h.* The deflexed margin of the penultimate segment, dilated and hairy beneath.
- U. The under side of the last three segments of the abdomen.
Details as above.
- e.* The penis? flattened, broad at the base, narrower to the tip, where it terminates in two blunt teeth, hairy externally.
- h, h.* The deflexed margins of the penultimate segment.

ART. III. *Observations on the Fishes contained in the Collection of the Zoological Society.* By E. T. BENNETT, Esq., F.L.S., &c.

[Continued from Vol. III. p. 378.]

ON SOME FISHES FROM THE SANDWICH ISLANDS.

THE fishes which form the subject of the present communication constitute nearly the whole of a small but interesting collection presented to

the Zoological Society by John Fremby, Esq., R. N., who accompanied the late expedition to the Pacific Ocean, under the command of Lord Byron. They are from the coasts of the Sandwich Islands, and appear, so far as I have been enabled to ascertain, to be altogether new to science. No traces of them are to be found in the works of systematic writers, nor are they noticed by the recent travellers, whose zoological appendices I have had opportunities of consulting. It seems indeed singular that MM. Quoy and Gaimard, who collected on the shores of these islands many species of fishes, should have brought home with them not one of those which were obtained there by Mr. Fremby; and that he, on the other hand, should also have failed to meet with even a single one which had been described by the travellers who so immediately preceded him.

The zoological value of the collection rests almost entirely on the novelty of the species contained in it. It possesses no forms strikingly distinguished from those already known to us, and it is perhaps only in the two species of *Julis*, Cuv., that there occurs a variation from the usual characters sufficiently marked to induce us to suspect that they may constitute a new section of a genus. The two species of *Cirrhites*, La Cep., are interesting, as forming a considerable addition to a group of which only an equal number had previously been figured and described, although M. Cuvier has stated his acquaintance with several others. The first of the *Acanthuri*, La Cep., has also some claims to particular attention, on account of the peculiarity of its form produced by the great expansion of its fins: and the second of them will also be noticed as deviating from the type of the genus, and appearing to unite, in one of its characters, the *Acanthuri* with the *Aspisuri*.

There is, however, another point of view in which the collection possesses a very peculiar attraction: the probability that the fishes composing it, though natives of the ocean, actually become naturalized in fresh, or nearly fresh, water; and are thus preserved and improved for the use of man. It is not a little extraordinary that a fact of so much importance to the comforts, and even the necessities, of life, should have been brought but recently under the notice of the civilized people of Europe, while to the uncultivated inhabitant of the Sandwich Islands it has probably been long and practically known. Much of the subsistence of this half amphi-

bious race is derived from the seas, in which many of them almost dwell, and all of them delight; but the food obtained from this source by the common people is limited to the various species of *Crustacea* and *Mollusca*. They are strictly prohibited from appropriating the fishes to their own use, although to collect these for the benefit of the higher classes is imposed on them as a tax. It forms indeed a very important part of the employment of the common people to search among the pools left by the retiring tide for the smaller fry, which may be there retained, and to convey them to ponds, in which, in a short time, they increase to a size fit for the table. The quality of the water in the ponds will be best explained by the following quotation from Mr. Frembly's private Journal.

“ In our ramble to-day along the shore towards Whyateti,” a village on the south coast of Wahao, east of Honoruru the capital, “ our attention was directed to the several embanked ponds which lie contiguous to the beach. These we learned were the Royal Preserves for fish, by which a constant supply was obtained for the use of the King and Chiefs: the Kanakas, or common people, being interdicted the produce of them. On examination of these ponds, we observed that they received their principal supply of water by means of small canals leading from the hills immediately aback of them; but, from the lowness of the coast, it appears not improbable that at high water the sea communicates with them, as it evidently flowed into the small channels or ditches which generally separate one inclosure from another. Whether, however, there is a direct communication between these channels and the ponds, we did not determine: one circumstance adds great strength to the supposition that this is the case, which is, that the bottoms of the dried up inclosures were observed to be thickly incrustated with salt.”

“ These observations,” Mr. Frembly remarks, “ refer to the ponds situated the farthest inland in this vicinity. Others there are which extend quite into the sea, and are apparently supplied wholly with seawater: others again, as those in the Pearl Lochs, (west of Honoruru,) must, if entirely filled from the Lochs, be much tempered with fresh water, as, in some parts of the Lochs, the water is almost drinkable.”

From these extracts it is evident that in the ponds the salt water is diluted by the admixture of a quantity of fresh, varying according to cir-

cumstances. In one instance, subsequently mentioned by Mr. Fremby, the water appears to be almost, if not entirely, fresh. "The pond," he says, "from which our table was supplied, is but slightly, and probably in the rainy season not at all, impregnated with salt; it being situated at the head of a small creek, which empties itself into the bay. This pond I also know to be supplied by the natives with the small fry collected on the shore in the manner before stated."

Whether the individual species which I shall now proceed to describe are put into the ponds, Mr. Fremby is unable to state with certainty. He states, however, that "a vast number of very similar ones are; that they grow to the length of from twelve to fifteen inches; and that they are fat and well-flavoured."

Although I have given, with each description, the dimensions of the specimens, it appears probable, from this latter remark, that the individuals, which I have had the opportunity of examining, have by no means attained their full growth. Their colours are also probably in some degree changed by the spirit in which they are preserved. Only one specimen of each exists in the collection, except of the *Acanthurus flavescens*, of which there are four.

1. BLENNIUS SORDIDUS.

Bl. pinnulis superciliarum palmatis; pinna dorsali subbifida, radiis apice appendiculatis, anteriore sublibero: linea laterali deflexa, postice obsoleta.

D. 29. (11, 18.) P. 14. V. 2. A. 21. (2, 19.) C. 13.

The body is transversely wrinkled throughout, except upon the head. Its prevailing colour is dirty reddish brown, somewhat paler beneath, varied only by two or three large dark brown blotches on the back, that nearest to the caudal fin being the most deeply coloured. The fins are of the same colour as the body: the dorsal one being marked with a darker spot at its anterior part, and exhibiting faint traces of a darker longitudinal line near the middle of its hinder portion: the caudal fin is crossed by three lines or series of spots of a somewhat deeper colour.

The extremities of the rays of all the fins project beyond the membrane; those of the dorsal one have affixed to each of them a filamentous

appendage: the anterior ray of the dorsal fin is strongly curved, and is more free from membranous attachment than the succeeding ones, which it equals in length.

The *operculum* is emarginate above.

The superciliary appendage is palmate, and is about twice as long as the diameter of the orbit: a very short filament exists also immediately above the lower nostril. On each side of the *vertex* the head is swelled out by a fleshy cushion, which descends over and covers the whole of the cheeks.

The teeth are nearly uniform in both jaws, diminishing in size backwards: those of the upper jaw are rather shorter.

Length 4 inches, breadth 1 inch.

2. BLENNIUS MARMORATUS.

Bl. cirrhis superciliarum lanceolatis, verticis nariumque brevissimis: pinnis dorsalibus duabus: corpore marmorato.

D. 12, 15. P. 14. V. 2. A. 19. C. 13.

The body is transversely and strongly wrinkled; the head is smooth. The ground colour is greyish, somewhat silvery, unspotted on the belly, marbled irregularly, and dotted on the sides with fuscous, and similarly marbled on the back with an intermixture of pale blue. The fins are of the same colour as the parts of the body to which they adjoin, and are very finely punctate with fuscous; the dorsal fins have at their base several large fuscous spots, and the posterior one is also marked with two irregular rows of darker spots: the caudal fin is crossed by two similar rows of darker spots: the remaining fins are without spots.

The extremities of the rays of all the fins, especially those of the anal, project beyond the membranes.

The *operculum* is emarginate above.

The superciliary appendage is lanceolate, and is ciliated along both its margins; in length it does not exceed the diameter of the orbit: a short pedicel on each of the lower nostrils bears a stellate head, the rays of which equal in length that of the pedicel: there is also a very short filament on each side of the *vertex*.

The lateral line is deflected. The surface of the head is porous.

The teeth are in each jaw extremely numerous, slender, and curved inwards at their tips, characters which connect this species with the subgenus *Salarias*, Cuv. In the lower jaw there are also internally two strong teeth, one on each side, which are curved and directed backwards.

Length nearly 4 inches, breadth $\frac{3}{4}$ inch.

3. JULIS FLAVO-VITTATUS.

J. olivaceo-nigrescens, vittis flavis utrinque quatuor, secundâ abbreviatâ: caudâ rotundatâ: capite poroso.

D. $\frac{9}{11}$. P. 13. V. 6. A. 14. C. 14.

The ground colour is deep olivaceous inclining to black, becoming rather paler towards the under parts; it is marked longitudinally on each side with four yellow stripes, the first of which begins above the eye, and is continued along the back, almost at the base of the dorsal fin, as far as the commencement of the caudal one; the second, beginning on the nose, crosses the upper part of the orbit, and is gradually lost when on a level with the middle of the soft part of the dorsal fin; the third passes from the tip of the nose across the lower part of the orbit, and terminates at the base of the caudal fin; and the fourth, commencing at the angle of the mouth, has the same termination as the first and third: there is also a slight appearance of a fifth passing along the abdominal margin. A short yellow line passes also from the nose along the middle of the head to the commencement of the dorsal fin.

The rays of the dorsal fin are of equal length throughout its whole extent: the membrane is dark fuscous with a slender yellow margin, and marked along its middle by an interrupted yellow *vitta*: the caudal and anal fins are dark fuscous, margined with yellow: the pectoral and ventral are pale fuscous. The caudal fin is rounded.

The anterior teeth in each jaw are considerably longer than the following ones. A row of pores surrounds the eyes, and another occupies the margins of the *præ-opercula*; others are observed on the nose and towards the *vertex*. The back is regularly arched.

Length $3\frac{1}{2}$ inches, breadth $\frac{7}{8}$ of an inch.

4. JULIS GREENOVII.

J. pallidè cinnamomeus, fasciis abbreviatis utrinque tribus, maculisque nasi frontisque, stramineis, nigro-marginatis: caudâ rotundatâ: capite poroso.

D. $\frac{9}{2}$. P. 13. V. 6. A. 14. C. 14.

The ground colour is pale cinnamon of uniform intensity throughout: the markings are straw-coloured, broadly margined with black, and consist of a rounded spot which occupies the tip of the nose; a second spot on the middle of the head descending on each side to the upper part of the orbits; a *fascia* at the commencement of the dorsal fin, which it crosses, and descends in a lozenge form as low as the pectoral fin on each side; another *fascia*, much shorter than the preceding, crossing like it the dorsal fin, but rounded at its extremity; and a third *fascia*, of equal length with the second, occupying the termination of the dorsal fin, but not extending to its upper edge. The dorsal and anal fins have a very narrow black margin, and the external ray of the ventral is also black. The caudal fin is rounded and unspotted.

Length 3 inches, breadth 1 inch.

“Dedicated to G. B. Greenough, Esq., to whom, by this means, I would publicly acknowledge the sense I feel of the many obligations I lie under to him, and the friendship he has honoured me with.” *Frembly's MSS.*

This species agrees with the preceding in every respect, except in colour and markings, and in its greater proportional breadth. The regularly arched back gives to them a peculiarity of habit which may eventually lead to their distinction as a subgenus.

5. SCARUS DUBIUS.

Sc. pallidè brunneus, pinnis fusco-nigris: lineis lateralibus duabus simplicibus, inferiori caudali tantum: caudâ rotundatâ.

D. 20. P. 13. V. $\frac{1}{6}$. A. $\frac{1}{2}$. C. 13.

The rays of the dorsal fin are of equal length throughout, the spinous ones, about nine in number, being scarcely distinguishable from the soft ones which succeed them. The caudal fin is rounded. The lateral lines are two in number: they are without branches; the superior one termi-

nates at the upper part of the tail; the inferior is distinctly marked at the caudal fin, but disappears gradually in its passage forwards, and ceases to be visible when it has traversed about one-third of the length of the body. The upper jaw is divided into two equal, moveable portions; and a central line divides the lower jaw.

Length $4\frac{1}{2}$ inches, breadth $1\frac{3}{4}$ inch.

Although I have given to this fish a trivial appellation, it is not without considerable doubt as to the propriety of doing so, unless I could at the same time have furnished characters more clearly distinctive than are afforded by the specimen. At present the *Sc. dubius* must rest its claim to be regarded as a species on its locality, its rounded tail, the number of the rays of its dorsal fin, and its peculiar double lateral line. No assistance whatever, it is to be feared, can be derived from colour, a character of very considerable importance among the *Scari*, but which can never be relied on in a fish that has been long preserved in spirit: in such a case we have little on which to depend except the direction and extent of the markings, where they are strongly pronounced. In this instance the colour is uniform throughout, with the exception of the darker hue exhibited by the fins.

6. CIRRHITES MACULOSUS.

Cir. saturatè fusco-brunneus, infernè pallidior; maculis, fasciisque caudalibus tribus, ventralibusque duabus abbreviatis, subflavescentibus: operculo squamoso: cirrhis narium binis.

D. $\frac{10}{11}$. P. 14. V. $\frac{1}{6}$. A. $\frac{3}{9}$. C. 15.

The colour is deep fuscous brown above, almost nigrescent at the base of the dorsal fin, becoming much paler on the under parts: it is marked by a few indistinct large patches of a yellowish colour, which assume the appearance of two abbreviated *fasciæ* on the belly, and of three somewhat indistinct *fasciæ* on the tail: the head is deep fuscous brown above, with a yellowish blotch on the cheek and *præ-operculum*; yellowish beneath, with a blackish *fascia* across the chin, behind this a very short one, and a third at the angle of the jaw, continued downwards from the angles of the mouth. The whole of the fins are fuscous, the dorsal having the upper

part of its hinder soft portion transparent, and the anal and the middle six rays of the caudal being spotted with black.

The whole of the fins, except the spinous portion of the dorsal, are scaly at their base. The *operculum* is covered by large scales, and is emarginate above: the *præ-operculum* is furnished with small scales, and has its margin minutely serrated. The *cirrhus* over each lower nostril is margined and terminated by numerous long *ciliæ*, and reaches, when extended, as far as the eye.

The seven lower rays of each pectoral fin are undivided, the upper of these being free at the tip alone, and the remainder being free throughout about one-third of their length.

The teeth occupy only the anterior portion of the jaws: they are minute, and are disposed in several rows: in the outer row there are four larger than the others towards the middle of the upper jaw, two in front of the lower jaw, and two on each side of the lower jaw near the end.

Length $3\frac{1}{2}$ inches, breadth $1\frac{1}{4}$ inch.

7. CIRRHITES FASCIATUS.

Cir. flavescens; capite brunneo, flavescenti punctato; corpore fasciis latis brunneis quatuor: operculo squamoso: cirrhis narium brevissimis.

D. $\frac{1}{2}$. P. 14. V. $\frac{1}{6}$. A. $\frac{3}{9}$. C. 15.

The ground colour is yellowish, crossed by four broad brown *fasciæ* on the body; the head is brown with numerous small yellowish points on its upper part, and larger ones on the cheeks, *opercula*, and front, giving to these parts a tessellated appearance: the chin, throat, and base of the pectoral fins are yellowish spotted with brown. The fins are transparent: the anal somewhat fuscous, the caudal fuscous at its extremity, and the pectoral spotted with brown.

The fins are scarcely scaly at their base. The scales of the *operculum* are large, those of the *præ-operculum* moderate; the margin of the latter part is sharply serrated. The *cirrhus* on the lower nostril is very short, scarcely extending beyond the upper.

The six lower rays of the pectoral fins are unbranched, the first of these being free at the tip alone, and the others free throughout full one-half of their length.

The teeth in the upper jaw are similar to those of the preceding species: in the lower jaw there are no stronger teeth in front, but there are in the middle of each side five larger than the others, the second and third of them equalling in size the anterior ones of the upper jaw.

Length 4 inches, breadth $1\frac{1}{2}$ inch.

8. SCORPÆNA ASPERELLA.

Sc. sordidè fulva, pinnâ dorsali anticè maculâ rosèâ: cirrhis superciliorum binis: lined laterali ventreque filamentis brevibus albis sparsis.

D. $\frac{1}{2}$. P. 17. V. $\frac{1}{6}$. A. $\frac{3}{8}$. C. 12.

The prevailing colour is dull fulvous, with paler indistinct patches: the anterior half of the dorsal fin is fuscous, with a rosy spot at its commencement; the hinder half is hyaline, with the projecting tips of the rays edged with black: the caudal fin is rounded, transparent, crossed by two blackish *fasciæ*: the anal is fuscous at the base, transparent in the middle, and blackish at the tip: the pectoral is crossed by two blackish bands, and by two irregular ones composed of numerous minute white points giving to them a frosted appearance: the ventral fins are similarly coloured with the latter.

The head exhibits the asperity usual in this genus, but only in a moderate degree: on its lower parts are a few short, flattened, white filaments, and similar filaments are observed along the lateral line and on the under parts of the body, being most numerous in the latter situation: above each eye is a rosy-coloured *cirrhus*, equalling in length about three-fourths of the diameter of the orbit, and somewhat lobed along its edges; there is a shorter *cirrhus* on each nostril, and another, which is pinnately branched, on the middle of each side of the upper jaw.

Length nearly 2 inches, breadth $\frac{3}{4}$ inch.

9. ACANTHURUS FLAVESCENS.

Ac. punctulatus, sub-asperus: flavescens, liturâ longitudinali gulâque albidis: caudâ equali.

D. $\frac{4}{3}$. P. 12. V. $\frac{1}{6}$. A. $\frac{3}{8}$. C. 16.

The colour is yellowish throughout, except on the throat, the cheeks,

and in the middle of the sides, where it is white; in this latter situation the white assumes the form of an oblong blotch, varying in length, and in some individuals becoming almost vittiform. The fins are pellucid and uniformly yellowish, except the upper margin of the pectoral ones which is black. Occasionally the dorsal and anal fins are made dusky, especially at their base, by very minute blackish points which extend to the adjoining parts of the body. The dorsal fin projects considerably from the body, ascending and descending gradually. The caudal fin is nearly even, inclining to rounded. The sheath of the caudal *aculeus* is pure white.

The teeth are strong, and are serrated on their cutting margin; the middle ones are somewhat acute.

Length 3 inches, breadth nearly equalling the length.

10. ACANTHURUS STRIGOSUS.

Ac. fusco-brunneus, lineis longitudinalibus numerosis albis sub-cærulescentibus, pinnas dorsalem analemque versus deflexis: pinna caudali furcatâ.

D. $\frac{7}{3}$. P. 14. V. $\frac{1}{5}$. A. $\frac{2}{24}$. C. 16.

The ground colour is dull brown, with blotches upon the head of a pale yellowish brown, and with the margins of the scales approaching to black: it is varied by numerous pale, slightly blue, longitudinal, slender lines, which are somewhat waved, the middle ones passing directly to the base of the caudal fin, the superior ones being bent upwards, near their termination, towards the base of the hinder part of the dorsal fin, and the lower ones being bent downwards towards the anal fin. The dorsal and anal fins are pale at their base, and become blackish towards the margin, especially at the hinder part: the caudal and ventral fins are nearly black: the pectoral are transparent, their upper margin alone being narrowly bordered with black.

The dorsal and anal fins project moderately from the body at their commencement; behind they are very prominent, and slope suddenly downwards: they are covered at their base by scales. The caudal fin is forked.

The teeth are very numerous, slender, and elongated: they are in-

curved at their tips, where they are considerably dilated and crenate.

The scales which cover the body are crenate: they are larger than in the typical species of *Acanthuri*, resembling those of the *Ac. lineatus* and *Ac. caeruleus*. In another respect this species deviates also from the type of the genus; its caudal *aculeus* has a very minute point directed backwards, a character which leads off to the *Aspisuri*, La Cep., a subgenus which in fact scarcely required to be separated from *Acanthurus*.

Length 4 inches, breadth $2\frac{1}{2}$ inches.

11. CHÆTODON FREMBLIH.

Chæt. griseo-flavescens, lineis utrinque novem longitudinalibus, sub-obliquis, nigrescenti marginatis; maculâ pinnæ dorsalis, caudalique maximâ, nigris.

D. $\frac{1}{3}\frac{3}{4}$. P. 14. V. $\frac{1}{6}$. A. $\frac{3}{21}$. C. 17.

The prevailing colour is dull yellow inclining to griseous, marked on each side with nine longitudinal pale blue lines which are margined with black: the upper and lower of these pass along the extremity of the scaly portions of the dorsal and anal fins; the second is abbreviated; the four succeeding ones are directed somewhat obliquely upwards and backwards. Five of these lines are continued forwards upon the head, the lower one reaching almost to the angle of the mouth. Immediately before the commencement of the dorsal fin is a black spot, and a large black spot extends across the tail to the adjoining parts of the anal and dorsal fins, on the latter of which it is much expanded.

The spinous rays of the dorsal fin project considerably beyond the membrane, which is pale fuscous with a blue line along its centre. The caudal fin is even, inclining to crescent-shaped: it is transparent; its scaly portion is bordered by a blackish crescent-shaped line, a second slender line of the same colour and shape appearing near its extremity, which is slightly fuscous. The ventral fins are fuscous, clouded with black.

The rostrum is short; the teeth are numerous, slender, and hair-like.

Length 5 inches, breadth 3 inches.

Dedicated to John Frembley, Esq., R. N., to whom the Zoological Society is indebted, not only for the several species here described, but also for many others with which he has enriched its rapidly increasing collection.

ART. IV. *On Dichotomous and Quinary Arrangements in Natural History.* By HENRY THOMAS COLEBROOKE, Esq., F.R.S., F.L.S., F.G.S., &c.

THE distribution of natural objects into classes or orders, has been compared to a geographical chart. "Natural orders," says Linnæus, "are related to each other by so many points, that they rather resemble a geographical map than a continued series." It has, however, been remarked, that the comparison is not correct. The affinities of an object ramify in every direction, and cannot be well represented on a plane surface.

There is indeed a mode of classification, which has been aptly termed dichotomous, and which might well be represented superficially. It proceeds upon a selection of single characters, in succession; which, taken affirmatively and negatively, furnish at each step two distinctions: one for objects possessing the character in question; the other for such as want it. For example, at the very first step, organic and unorganic substances; and, thereafter, vertebrate and non-vertebrate animals. So cotyledonous and acotyledonous vegetables; and again, monocotyledonous and dicotyledonous plants. If the series, in which characters are severally noticed, be judiciously chosen, the dichotomous arrangement, well pursued, supplies a very instructive key to natural knowledge. Many professedly natural distributions have been so ordered.

But a more instructive arrangement is that, which exhibits an object in all its bearings; which places it amidst its cognates; and contiguous to them again, those which approach next in degree of affinity; and thence branching every way to remoter relations.

If we imagine samples of every natural object, or a very large group of them, to be so marshalled, we must conceive such a group as occupying, not a plane, but a space of three dimensions. Were it immensely numerous, the space so occupied would approximate to a globular form: for indefinite space, around a given point, is to the imagination spheroidal, as the sky seems vaulted.

It may be easily shown, therefore, that the simplest distribution of a large assemblage of objects, marshalled in the manner here assumed, around a select one, or that distribution, which taking one central or interior group, makes a few and but a few equidistant exterior ones, is quinary. The centres of the exterior groups will stand at the solid angles of a tetrahedron within a sphere, of which the centre is the middle point in the interior group. That is, the entire assemblage, encompassing every way one select object, around which they are clustered, is in the first place divided concentrically, at more than half the depth to which it is considered to extend: and from equidistant points being taken within the substance of the outer shell, this is divisible into four equal parts, in which those mean points are central, or as nearly so as the irregular figure of the group allows.

Rejecting the assumption of one central primary object, the division of the entire assemblage would become simpler. It would be quaternary.* The middle points of each of the four segments would stand, as those of the exterior distribution did, at the solid angles of a tetrahedron within the sphere above supposed. The whole assemblage may be conceived, first as a cluster of four balls; one resting upon three others: and then the interstices and remaining space, to complete a circumscribed sphere, are shared among the four.

But the mind is prone to fix upon some primary object of its attention, which becomes the centre of comparison for every other; and on this account it is, that the quinary arrangement is practically a more natural one than the quaternary.

I am here supposing an assemblage consisting of a single sample of every species; for species alone is in truth acknowledged by nature; and every larger group, whether genus, order or class, or family or tribe, is but the creature of abstraction.

In the middle of this great cluster, I imagine that object placed, which most fixes attention: that, with which all others are compared, or with which they are contrasted. Around it are arranged other objects, nearer or remoter, according to the degree of their resemblance or affinity to it:

* Ocken maintains that four is the determinate number in natural distribution. Linn. Tr. XIV. p. 56.

for it is the type of a group comprising such as are most conformable. It is encompassed by similar groups consisting of such as bear less affinity to it: but have in like manner relation to other objects, selected as types, one in the midst of every such exterior cluster. I say the smallest number of such surrounding groups, that can be assumed, is four; the respective centres of them being equidistant from each other, and situated at like distances (less, however, than their mutual interval) from the common centre of the intire assemblage. This then is the simplest natural arrangement: and hence it is, that the quinary distribution is that which is most affected in the classification of natural objects.

Were the utmost perfection in arrangement attainable, the chosen common centre of the whole ought to be truly in the middle; and the selected centres of exterior groups would be equally distant from it, and alike remote from each other.

There would not be greater affinity between any two than between the rest; neither between any two of the groups, nor between their assumed middle points. But, if there be any notable deviation from the greatest precision, from extreme accuracy of selection, the assumed middle point of the whole assemblage will in fact be excentric; or some one at least of the selected centres of groups will be out of the right place. Now, as the utmost precision can hardly be deemed attainable, it will necessarily follow, that the assumed common centre inclines more towards one of the exterior than towards the rest: and therefore it ordinarily, not to say invariably, happens, that, in the quinary distribution, one cluster, comprising two subdivisions or groups, is normal; and a second, comprising other three, is aberrant: that is, one of the five divisions, being typical, is nearly but not perfectly central; another is conform, being proximate; three others are dissimilar and remote.

Allusion has been made to the analogy which an indefinitely numerous assemblage of objects presents to indefinitely vast space contemplated as from a central point. It has been assimilated to the celestial sphere. Were the stars distributed throughout space at equal distances, and did they possess equal power of illumination, such a distribution would offer to the view twelve stars of the first magnitude, being those nearest to us, equally distant from each other and nearly the same from our sun. Their relative positions would make the solid angles of an icosahedron

circumscribing the solar system. In like manner, the middle points of exterior groups encompassing one interior one, and equidistant from its centre and from each other, should be twelve in number: and this, therefore, is in fact the proper number of a strictly natural arrangement of objects with relation to one common object of comparison: the normal group is one; the aberrant twelve, classed for more ready apprehension in form of subordinate clusters. The interior group is single; the exterior assemblage twelve-fold. This then appears to be the natural arrangement: and the subdivision of the inner cluster, and grouping of outer ones, whence quinary arrangements result in both instances, are properly artificial.

The tendency to the number of five in the classing of natural objects has been shewn by Mr. W. S. MacLeay in his *Horæ Entomologicæ*; and the subject has been pursued by himself and Mr. Vigers, in essays inserted in the *Linnean Transactions*. Their attention has been chiefly, but not exclusively, directed to Zoology. The same principles are applicable to Botany. But, in the present state of the science, no more could be attempted than an approach towards a general distribution of natural orders. The further researches of Botanists will cancel some of the associations now received for natural orders, and establish others; and all which could at present be looked for, would be such an approximation as might make it probable, that, in a more advanced state of the science, the indications would be confirmed. I shall not attempt that distribution; the first steps of which are easy and obvious, but the further gradations unprepared and as yet impracticable.

ART. V. *A Reply to some Observations of M. Virey in the "Bulletin des Sciences Naturelles, 1825."* By W. S. MACLEAY, Esq., A.M., F.L.S., &c. In a Letter to the Editor.

My dear Vigors,

I had originally included the following observations in a more extended paper which I had sent to a contemporary scientific publication. Circumstances, however, over which I had no controul, have delayed the appearance of that paper; and, as much time has already been lost, I have extracted my remarks from the original communication, and shall feel indebted to you if you will give them the first vacant space which you can spare in your Journal.

On the subject of analogies as distinct from affinities, I am rather curiously situated with respect to M. Virey,* a French naturalist of note, who

* *Bulletin des Sciences Naturelles*, 1825.—His character of my paper is thus somewhat ludicrously summed up.—“Tel est l'objet de l'interessant memoire de M. MacLeay; nous aurions seulement à lui faire le reproche frequemment meritè de ses compatriotes, de ne pas rendre justice aux Français; car sur ce point, toute l'Europe savante reconnait (exceptè plusieurs Anglais) que c'est à M. A. L. de Jussieu, à Adanson, à Tournefort, qu'on est redevable de la classification naturelle des plantes, et que c'est surtout aussi à M. M. de Lamarck et Cuvier que le *Règne Animal* doit ses distributions modernes les plus naturelles. C'est en France que les methodes naturelles ont été les plus perfectionnées; personne l'ignore; pourquoi donc ce jaloux silence de nos eternels rivaux? Nous osons nous croire plus equitables en exposant fidelement les vues de M. MacLeay, qui se garde bien de citer nos célèbres naturalistes en cette circonstance ou il etait si juste de la faire.”

Now, had the charge against me been perfectly true, had I even published a translation of M. Cuvier's *Règne Animal* as an original work of my own, I cannot help thinking this tirade against a nation to be uncalled for by the occasion. But I appeal to the readers of the *Horæ Entomologicæ*, whether the charge be correct, that I have been illiberal to the French school of Naturalists; I appeal to them, whether I have not cited them whenever I could: I may have failed, indeed, through ignorance, but never through intention; and M. Virey has yet

in a review of my paper "On the Identity of certain Laws observed to regulate the Natural Distribution of Insects and Fungi," has charged me with not rendering justice to the claims of the French naturalists in general, and of himself in particular. "Au reste," says he, "sauf l'arrangement, ces vues que s'attribuent MM. MacLeay et Agardh ont été publiées bien auparavant dans l'article *Animal* du Nouveau Dictionnaire d'Histoire Naturelle, des la première édition en 1803, par M. Virey, comme il est facile de voir." On this passage I have in the first place to remark, that if by "*ces vues*" he meant the views explained at length in this article of the *Bulletin des Sciences* by M. Virey, and attributed to me, it behoves me to confess, that this review is the first notice that I ever had of their existence; and moreover, that now, when I know them, I have not the slightest wish to be able to attribute them to myself. In the next place, with respect to my not having cited the article *Animal* of Deterville's Dictionary, the assertion is beyond doubt perfectly true; and as from my having alluded to this very article, page 200 of the *Horæ Entomologicæ*, it may be supposed that I had read it, I am further called upon, in conse-

to know, that I have also been blamed for giving them too much credit. As he has decided on the merits of the *Horæ Entomologicæ*, and has reviewed my papers in the *Linnean Transactions*, I cannot lay the above singular accusation against me to the account of his never having read these several works: I must rather attribute them to the circumstance either of my not having very clearly expressed myself, or of his not being very deeply versed in the English language. That, moreover, one or other of the latter suppositions must be the true alternative, sufficiently appears from his asserting, that Mr. MacLeay denies the truth of the ancient adage, "*Natura non facit saltus*." In short, so far from a faithful exposition of my views, as he kindly promises at the outset, he has given one so different from that in the *Linnean Transactions*, that I can scarcely recognize any one position to be correctly stated. If, therefore, it be true, as he says, after having given his exposition of the subject, "Ainsi prevalent a la longue les travaux des Français qui les premiers ont ouvert la carrière," I for one have not the least ambition to jostle *la grande nation* in their course. That, however, much of these cross-purposes proceed from M. Virey not reading very carefully, is clear from his other review, in the same work, of my paper on the *Oistros* of the ancients, where the value of his favourable opinion is unfortunately lost in my eyes, when I find myself proving this celebrated insect to be a *Tabanus* by the final citation from Mouffet!

quence of M. Virey's charge, to show why it was not cited in my paper in the *Linnean Transactions*.

Now it will be observed, that I am not absurd enough in that paper to attribute to myself the first distinction of the ideas of affinity and analogy; as ever since the origin of the two words, I suppose the first denoted the union between different subjects, and the latter expressed some resemblance between them in particular circumstances. I do not even profess in that paper to have been the first person who made this distinction in natural history. I mention Pallas and Desfontaines, and might have added the still more distinguished names of Aristotle and Linnæus, as having all remarked strong analogies between beings widely asunder as to affinity. I only observe, that "the nature of the difference which exists in natural history between affinity and analogy was, I believe, first discovered in studying Lamellicorn insects." Now, so far is M. Virey from displaying the least knowledge of the nature of this difference, that it was not even in my power to cite him as being acquainted with the existence of the difference;* since, throughout this very article *Animal*, which, however, undoubtedly contains a number of most valuable remarks, he considers the words affinity and analogy to be synonymous. And on referring to his long article, *Rapport*, in the same work, where we might have expected him to have separated and defined these two kinds of relation, if he really understood them when he wrote the article *Animal*, we find that he uses the one word for the other indiscrimi-

* See *Dict. d'Hist. Nat.* Vol. II. p. 30, art. *Animal*.—S'il y a des analogies bien remarquables entre les Animaux Vertèbrés, et si l'on descend sans trop d'efforts de l'organisation du Mammifère à celle de l'oiseau, ensuite au reptile et au poisson, la chaîne est au-delà brusquement rompue." And so every where he talks of analogies when he means true affinities; and whenever he alludes to what are real relations of analogy, he takes them for relations of affinity. Nay, what is ludicrous, he is so little aware, even at this day, of the nature of analogy and affinity, that in this very *Critique* in the *Bulletin des Sciences*, he says: "MM. MacLeay, Agardh, Fries, &c. reconnaissent qu'il existe des groupes naturels d'êtres ayant entre eux des ressemblances ou affinités plus ou moins parfaites, mais que ces groupes ne montrent que des analogies plus ou moins éloignées avec d'autres groupes." And this he states to be his own idea of the matter; in which respect it is not for me to contradict him. But I trust I may be allowed to say, that such ideas of affinity and analogy were never mine.

nately,* confounding both ideas so much, as not to make the distinction, so well drawn by Pallas, between bats and birds, although he had evidently read it in the *Elenchus Zoophytorum*. But M. Virey will perchance say, that he has in this article *Animal* stated the analogies between the animal and vegetable kingdoms, and those that exist between *Mammalia* and *Aves*, and consequently must have been aware of the existence of analogies as distinct from affinities. But this does not follow: for although it be true that he has stated these analogies, it is evident from the context that he considered them as affinities.† And as to the statement of the analogies themselves, they are only borrowed by M. Virey; for those existing between *Mammalia* and Birds are given as *such* by Linnæus in so well known a work as the *Systema Naturæ*; and those existing between the animal and vegetable kingdoms were first pointed out by M. Desfontaines, whom I have accordingly cited in the *Horæ Entomologicae*, and in my paper in the *Linnean Transactions*.

M. Virey will now, it is to be hoped, understand why,—with every wish to do him and his countrymen justice,—I did not, and moreover why I could not in this case, cite him as one who had distinguished affinities from analogies. Were the charge made against the *Horæ*

* One quotation from the article *Rapport* will be sufficient: see p. 36.—“ Quoque la co-ordination des familles entre elles s’opère comme celle des genres suivant les mêmes lois d’analogie, il en est cependant d’ambigües.” Now the ambiguities he alludes to are relations of analogy; and the co-ordination of families among themselves is evidently dependent on the laws of affinity. In the same way he argues as follows (p. 25). Bats and Flying-fish have some analogy with Birds; but the analogy is so small, that they cannot be placed with them. Any person understanding the distinction between the two kinds of relation, would evidently have written thus: “ Bats and Flying-fish have some analogy with Birds; but the affinity existing between them is so small, that they cannot be placed together.”

† See also article *Rapport*, p. 36, where he is clearly alluding to true relations of analogy, but calls them *concatenations latérales*, which indicate *hiatus* or *lacunes* to be filled up. So I suppose thought the ancient poets, when they imagined the existence of an animal like the griffin, having the fore part of a carnivorous bird, and the hind part of a carnivorous quadruped. It is the grand error of Hermann’s *Tabula Affinitatum*, that he also imagined analogies to indicate blanks to be filled up; that is, to be affinities.

Mr. W. S. MacLeay on some Remarks of M. Virey. 51

Entomologica by a writer of less reputation than M. Virey, I should scarcely have deemed either my opponent or myself of sufficient weight to trouble the world with this explanation: but coming from a zoologist, whose primary division of the animal kingdom has been confessedly borrowed by M. Cuvier* in the *Règne Animal*, and made the frame of that great work, it would ill become me to pass over his remarks in silence. And moreover, as these claims of priority urged by M. Virey have reference not to the *Horæ Entomologicae*, but to a paper which has had the honour of being inserted in the *Transactions of the Linnean Society*, I should certainly ere now have shown their futility, had I not last year been too much occupied with private business, preparatory to leaving England, to be able to bestow attention on scientific subjects. I need only further say, that I feel too grateful to M. Virey for the terms in which he has always expressed himself with regard to my works, to discuss this subject in any other way than as a mere question of fact. I certainly regret the general charge made against me, of being unjust to his countrymen, although I scarcely know what it means. With respect to himself, so far from not doing him justice, I have borrowed from him, with, I hope, a proper acknowledgement,† the idea of the primary divisions of the animal kingdom being dependent on the nervous system; and although I may have treated the subject in a somewhat different manner, I never indulged the least wish, still less did I ever attempt to extenuate the merit of the author of that original idea.

Ever yours, &c. &c.

W. S. MACLEAY.

Havana, Nov. 17, 1826.

* *Règne Animal*, 1. p. xxi

† See *Hor. Ent.* p. 200.

ART. VI. *Contributions to the British Fauna.* By GEORGE JOHNSTON, M.D., *Fellow of the Royal College of Surgeons of Edinburgh, &c.*

[Continued from Vol. III. p. 491.]

In a preceding communication I had occasion to mention that the *Gammarus marinus* of Leach was common in this neighbourhood; but from a subsequent examination of my specimens I am now convinced that I was in error, and that they constitute a distinct and uncharacterised species, which I proceed to describe.

GAMMARUS CARINATUS.

G. corpore maculato, atomisque flavis irrorato; dorsi segmentis valde carinatis, marginibusque posterioribus granulatis.

Hab. Mare Britannicum.

DESC. *Body* one inch long, inflected at the tail, clouded with red and horn-colour, and sometimes with white, and sprinkled on the sides with minute yellow grains. *Segments* roughish, punctured, with a row of rather distant granules on their posterior margins; each with a cuneiform process, which forms, by its junction with the others, a strong and acute keel along the back. The keel commences between the antennæ, gradually increases, and then again decreases towards the tail. *Antennæ* nearly equal, stained or annulated with red, spinous. *Superior Antennæ* with the first and second joints nearly equal, third rather shorter, the last with short articulations, each armed with a whorl of very short spines. *Seta* one-third the length of the last joint, with rather long subclavate articulations. *Inferior Antennæ* with the basilar joint very short, the second and third nearly equal, and the last similar to the superior. *Eyes* lunate, brown with a blacker centre, placed at the base of the superior antennæ. *Hands* equal, alike, obovate, monodactyle,

toothed and hairy on the inner margin, with a brush of hairs above the claw. *Claw* long, slightly curved, serrulate. *Wrist* dilated with a semi-lunar fissure: the *arm* long and straight. *Legs* monodactyle, five-jointed, spinous. The two anterior pair with the claw turned backwards; the first joint elongated, dilated outwardly, the second very short, third and fourth nearly equal in length, and the fifth longer. The other legs have the claw turned in a contrary direction, with the thigh dilated and having attached to it a broad squamose plate. They are also spinous, and the spines spring from indentations on the joints. Behind the legs are the *natatory fins*, of which there are three pairs, each with a broad stem, bearing two branches beautifully ciliated with long hairs. On the sides of the tail are the *style-processes*, three on each side, and each consisting of a stem on which are articulated two lanceolate processes, unequal in length, and spinous on the edges.


With this species I have been long familiar, and had always considered it as the *G. marinus* of Dr. Leach, until I observed that he describes that species as having the upper process of the style process *very short*; a character, which seems not at all applicable to our animal, in which, though unequal, they are tolerably long, as much so indeed as in those species which Dr. Leach places in his second section. His description is otherwise so brief that no further comparison can be drawn; but so much reliance is placed on the character adduced, that we feel ourselves warranted in considering the two species as quite distinct. Our animal inhabits the sea, and is common near Berwick. It has never been found under stones, or in pools left by the recess of the tide.

Cl. ANNELIDES	}	Lamarck.
Ord. AN. ANTENNÉES		
Fam. NÉRÉIDÉES		
Gen. PHYLLODOCE		

1. PHYLL. GIGANTEA.

Phyll. virescenti-purpurea, margaritacea; dorso obscurè maculato; lamellis branchialibus dolabriformibus.

Hab. Mare Britannicum.

DESC. *Body* 14 inches long, somewhat compressed, convex on the back, flattened below, of nearly equal thickness throughout, until within an inch or so of the tail, which tapers to an obtuse point; smooth, greenish, reflecting a metallic lustre, and changeable, with the margins of the segments purple, and a purple ill-defined spot in the centre of each. Towards the tail the green colour becomes generally diffused and deeper. Ventral surface perlaceous, tinged with green. *Proboscis* thick, short, white, cylindrical, without teeth or hard points. *Head* small, a subtriangular corneous plate, bearing *two eyes*, and *two* short conical *Antennæ* in front. On each side of the head, but arising from the body, are *four* rather short setaceous *Tentacula*, the two first shorter than the posterior pairs; of an olive green colour, and thickish. The segments are very numerous, and each bears on each side a leaf-like process, boot-shaped  placed obliquely, of a brownish colour, slightly clouded, with even smooth margins. Each *foot* consists of two sub-equal papillary processes, one of which is armed with a fascicle of short black bristles. Tail without filaments?

Obs. This fine species I found amongst the refuse of a fishing boat, and it is of course possible that the filaments at the tail may have been torn off. It does not seem to have been described by any author which I have had an opportunity of consulting, but I suspect it may have been confounded with the *Nereis lamelligera*, a species which is said to attain even a superior size, and which is readily distinguished by its heart-shaped acutely pointed branchial processes.

2. PHYLL. PULCHRA.

Phyll. corpore maculis fuscis seriatim notato; lamellis branchialibus subreniformibus.

Nereis maculata? Fabric., Faun. Groenl. 298.

Hab. Mare Britannicum.

DESC. *Body* slender, 4 inches long, depressed, tapered a little towards each extremity, capable of extension, yellowish, with a longitudinal dorsal row of dark brown spots, and the sides spotted with the same colour. *Ventral surface* whitish, with a median row of

small, rather distant spots, and a row of large ones on each side at the base of the feet. *Head* blackish in front, yellow behind, bluntly pointed. *Eyes* two, black. *Mouth* surrounded in a stellate manner with four conical white *tentacula*, and provided with a large retractile proboscis. On each side of the head there are other four white conical *filaments* or *tentacula*, of which the two anterior are the shortest. On each side of every segment is an oval or rather kidney-shaped *lamellar process* with a brown spot in its centre, and supported on a very short spotted stalk. Beneath these are the *feet*, each foot consisting of two papillary processes, the anterior bearing a tuft of fine retractile hairs, the posterior simple and conical. The *anal segment* has neither feet nor branchial process, but is terminated by two conical filaments.

Obs. This is quite distinct from the *Nereis lineata* of Montagu, and also from the *N. lamelligera* of Sowerby. It inhabits the sea shore, and was found burrowing amongst fine sand.

I have placed these species, without any hesitation, in the genus *Phyllodoce*, as I understand it to include such Linnean *Nereides* as have a leaf-like process placed over and above the feet. This is mentioned, as, in the characters of the genus given by Lamarck, and borrowed I presume from Savigny, there are several particulars which were not observed in our species, and which I am confident were not to be found. There is, indeed, some slight difference in our description of the parts about the mouth in the two species, but neither will correspond with Lamarck's characters, and the difference is too trivial to constitute any generic distinction. We have, in conformity with the language of Lamarck, called the leaf-like processes branchial, but is there any good reason for supposing them to be so? or do their assigned functions rest merely on a vague and undefined analogy?

In my last paper three species of worms referred to the genus **PLANARIA** were described; and to them I have now to add four other species which appear as yet to have escaped notice, and which belong to the same group.

1. PLAN. OCTOCULATA.

Plan. mollis, linearis, castanea, anticè oculis octo, maculâque rubrâ.

Hab. In littore sub lapidibus.

DESC. *Body* 1— $2\frac{1}{3}$ inches long, slender, soft, flattened, contractile, chesnut-brown above, whitish on the ventral surface. *Mouth* and *anus* terminal; no proboscis; intestine straight. *Eyes* 8, four placed in a line on each side of the head; and a little behind them is a reddish spot on the back. The body in some individuals appears filled with numerous whitish egg-like bodies, which are probably the ova of the animal.

2. PLAN. QUADRIOCULATA.

Plan. mollis, linearis, flava; oculis quatuor, remotis.

Hab. In littore sub lapidibus.

DESC. *Body* $1\frac{1}{3}$ inch long, soft, flattened, contractile, narrowed towards the tail, of a yellowish maculated colour with a dirty greenish intestinal line down the middle. *Mouth* rounded. *Eyes* 4, placed in a square form, and rather distant.

Obs. The maculated appearance proceeds from white oviform bodies.

3. PLAN. BIOCULATA.

Plan. linearis, mollis, olivacea; oculis duobus.

Hab. Ad radices confervarum.

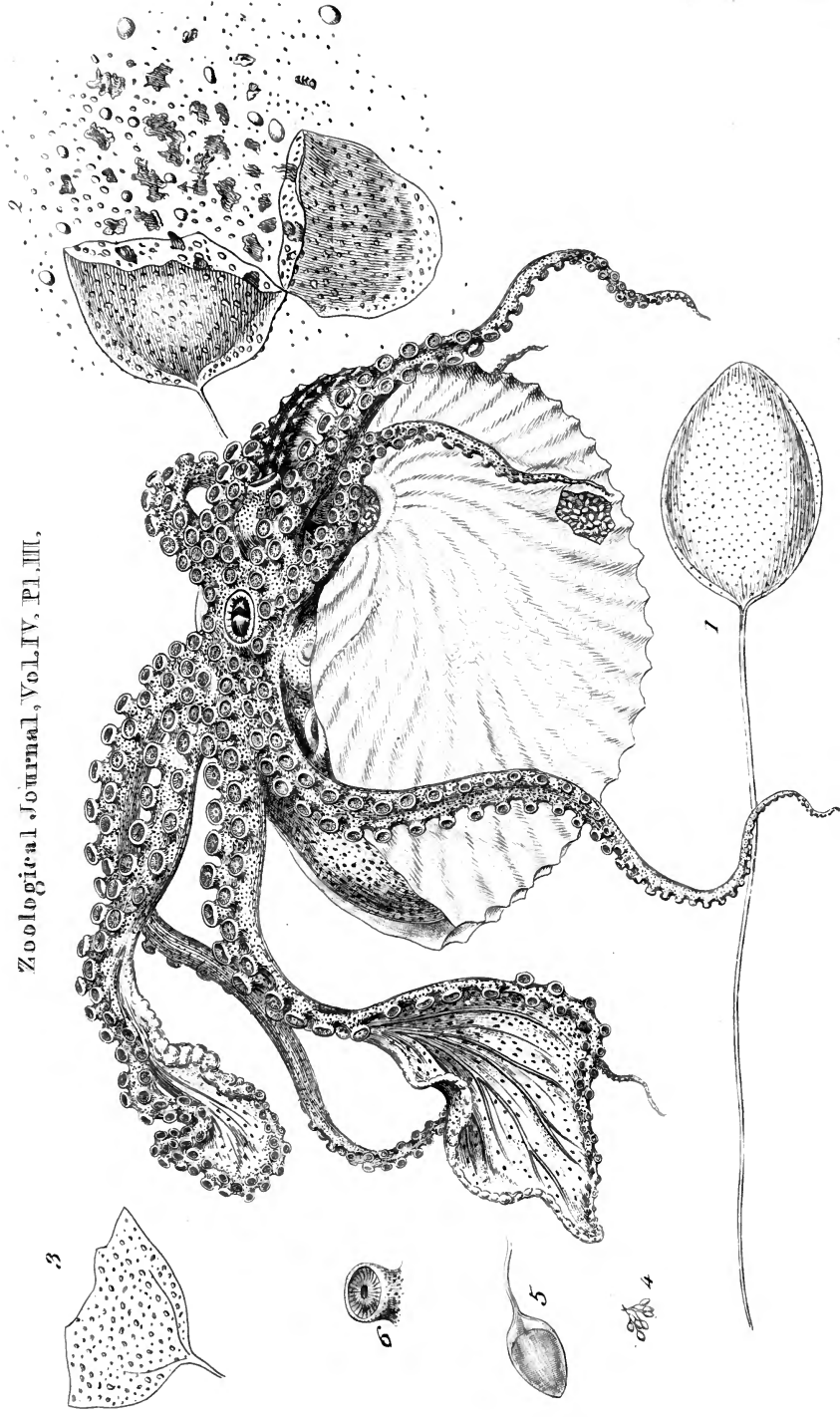
DESC. *Body* 4—6 inches long, slender, soft, compressed, narrowed towards the tail, of an uniform dull green or bottle-green colour, with paler longitudinal and transverse striæ, and sometimes irregularly marked with a few whitish dots. *Head* somewhat truncate, with two lateral rather prominent black eyes. About two lines behind the oral extremity there is in most a dark red spot.

4. PLAN. FILIFORMIS.

Plan. albida, gracilis, unicolor, sine oculis, maculisve.

Hab. Ad littora sub lapidibus.

DESC. *Body* slender, filiform, soft, very contractile, and capable of being extended to the length of 6 inches, when it appears like a sewing thread, of an uniform whitish or yellowish-white colour. *Mouth* and



anus terminal; and the former is often thrust out into a needle-like point.

In examining these animals it is necessary to compress the anterior parts between two plates of glass, in order to exhibit the eyes with distinctness. The last species has been described, I believe, by Fabricius in his *Fauna Groenlandica*, but I have not the work to refer to, and cannot remember the specific name.

[*To be continued.*]

ART. VII. *Observations on the Animals hitherto found in the shells of the genus Argonauta.* By W. J. BRODERIP, Esq., B.A., F.R.S., F.L.S., Sec. G.S., &c.

Is it not strange that it should now be a question whether the animal usually found in the shell popularly called the Paper Nautilus, is the lawful owner of its fairy boat?

From the time of Aristotle the delicacy of the bark and the habits of the sailor have afforded a subject to every observer; and we have, in addition to the descriptions, a succession of figures by Aldrovandus and others, which, though most of them afford proofs of a very lively imagination on the part of the designers, are still evidently figures of a cephalopod, which would, in the age of Linnæus, have been ranged under the genus *Sepia*, if it had been taken swimming at large and free from any shell. It is curious to observe how assertion upon assertion at last accumulates into something that is taken for positive proof, till at last we have descriptions apparently the result of actual observation. Speaking of the *Argonauta Argo*, Mr. Wood, in his *Zoography*, gives a very lively account of these creatures and their habits. "In the Mediterranean Sea, and in the Indian Ocean," says Mr. Wood, "these shell-fish are not uncommon. In calm weather they may be observed floating on the surface in a very beautiful manner, some spreading their little sails, while others are rowing with their feet. To accomplish this singular purpose, the Nautilus is supplied with eight arms, two of which are furnished at their extremity, with an oval membrane that serves for a sail, while the other six, hanging over

the sides of the boat, are employed as oars, and occasionally serve to steer by. In order to rise from the bottom of the ocean, for the purpose of sailing on the surface, the Nautilus discharges a quantity of water from its shell, by which it becomes lighter than the surrounding medium, and, of course, rises to the top. Numbers of these curious animals may be seen sailing about and diverting themselves on the smooth surface of the sea; but if any danger approaches, or the winds begin to rise, they immediately lower their sails, and, shrinking into the body of the shell, sink at once to the bottom. Their extreme timidity makes it very difficult to take them alive; for whenever any person approaches, they immediately leave the surface of the water, and although seamen have often got very near them, yet when they arrived within a certain distance and stretched out their hands to secure the fish, they constantly disappointed the person by sinking to the bottom.”* This yacht-club of Argonauts makes a very pretty picture, but there are not wanting plain matter of fact Naturalists, who deny that the animal *sails* at all.

Attention was at last attracted to the subject, examination became the parent of doubt, and M. de Blainville, among others, signalized himself by the reasons which he gave in support of his opinion, that the *Ocythoë* of Rafinesque does not belong to the shell in which it is found. Mr. Cranch's observations on the genus *Ocythoë*, made during the expedition to Congo, under Captain Tuckey, (who, with nearly the whole of his companions, paid with the forfeit of his life, for a spirit of enterprize which knew not how to yield,) were embodied by Dr. Leach in a paper published in the Philosophical Transactions for 1817, together with a paper by Sir Everard Home on the ova of the *Sepia*. It may be as well to cite the description of the habits of the animal from the first of these papers, that the reader may have before him the progress of opinion upon this subject.

“ Pliny, Aldrovandus, Lister, Rumphius, D'Argenville, Bruguière, Bosc, Cuvier and Shaw, have described a species of this genus,† that is often found in the *Argonauta Argo*, (common Paper Nautilus,) and which they have regarded as its animal; since no other inhabitant has been observed in it. Sir Joseph Banks, and some other

* Wood's Zoography, London, 1807, Vol. II, p. 579.

† *Ocythoë*.

“ Naturalists, have always entertained a contrary opinion, believing it
“ to be no more than a parasitical inhabitant of the Argonaut’s shell;
“ and Rafinesque, (whose situation on the shores of the Mediterranean
“ has afforded him ample opportunities of studying this animal, and
“ observing its habits) has regarded it as a peculiar genus, allied to the
“ Polypus of Aristotle (*sepia octopodia*, Linné,) residing parasitically in
“ the above-mentioned shell. M. de Blainville, ten months since, when
“ speaking of the Argonauta, said ‘ Animal unknown,’ and he has lately
“ informed me that he has written a long dissertation to prove that the
“ Ocythoë of Rafinesque does not belong to the shell in which it is
“ found. The observations made by the late Mr. John Cranch, Zoo-
“ logist to the unfortunate Congo expedition, have cleared from my mind
“ any doubts on the subject. In the gulf of Guinea, and afterwards on
“ the voyage, he took by means of a small net (which was always sus-
“ pended over the side of the vessel) several specimens of a new species
“ of Ocythoë, which were swimming in a small *argonauta* on the surface
“ of the sea.

“ On the 13th of June he placed two living specimens in a vessel of
“ sea water; the animals very soon produced their arms, and swam on
“ and below the surface, having all the actions of the common polypus
“ of our seas; by means of their suckers, they adhered firmly to any sub-
“ stance with which they came in contact, and when sticking to the sides
“ of the basin, the shell might be completely withdrawn from the
“ animals. They had the power of completely withdrawing within the
“ shell, and of leaving it entirely. One individual quitted its shell, and
“ lived several hours, swimming about, and showing no inclination
“ to return into it; and others left the shells as he was taking them up in
“ the net. They changed colour like other animals of the class Cephalo-
“ poda: when at rest the colour was pale flesh-coloured, more or less
“ speckled with purplish; the under parts of the arms were bluish grey;
“ the suckers whitish.”*

The dissertation above-mentioned was published by M. de Blainville in the *Journal de Physique, de Chimie, etc.*;† and in 1820, the Abate Ran-

* *Phil. Trans.*, 1817, p. 293; printed also in the Appendix to Tuckey’s *Narrative of the Congo Expedition*, p. 400.

† *Année 1818, Tom. LXXXVI*, p. 366 et 434, et *Tom LXXXVII*, p. 47.

zani published his “Considerazioni su i Molluschi Cefalopedi che si trovano dentro le conchiglie denominate Argonauti,”* wherein he enters at large into the controversy, and thus concludes—“Metto fine a questa mia memoria, conchiudendo che gli argomenti addotti dal Sig. Blainville, e da me imparzialmente esaminati, lungi dal formare, com’ egli pretende, una specie di dimostrazione, lasciano la cosa qual’ era prima, incerta cioè, e dubbia, e che quindi a decidere, se i cefalopedi trovati nelle conchiglie denominate Argonauti ne siano o nò i fabbricatori, ed i legittimi proprietari duopo è l’istituire nuove osservazioni, ed il fare nuove ricerche.” †

The next account to which our attention is drawn appeared in 1824, in the “Journal of Science, Literature, and the Arts,” ‡ and the author of that account seems to think all doubts on the point at an end, though he does not give us any authority on which he founds his description and summary judgment save that of Byron, who has immortalized the subject of our dissertation in five bright lines.

“The animal of the Argonauta,” says the author of the description in the Journal of Science, “has a fleshy body, like the octopus, obtuse below, and principally contained in a non-alated sac, formed by the mantle. The head is furnished with lateral eyes, and terminated by the mouth, around which are ranged, like radii, eight elongated pointed arms, furnished with suckers. Two of these arms have, for two-thirds of their length, a thin oval membrane, which the animal extends and contracts at pleasure. The difference between this animal and the octopus, consists principally in the singular membrane just mentioned, and in the latter having no shell.”

“The Argonauta does not appear to be attached to its shell, and it is said that it quits it when it pleases. It is asserted moreover that, when it wishes to sail on the surface, it displaces the water from the shell, in order to lighten it, extends the two membranous arms, which serve as sails, and plunging the others into the sea, they perform the office of oars. If bad weather, or an enemy approach, in an instant all is taken in; the animal ships his oars, strikes his sails,

* Memorie di Storia Naturale dell’ Abate Camillo Ranzani, Deca Prima p. 85. Bologna, 1820.

† P. 101.

‡ Vol. XVI. p. 251. No. XXXII.

“ and upsets his boat, which fills with water and goes down: but when
“ the danger is past, he returns to the surface, bends his sails again, and
“ once more rows gallantly along.

“ The tender Nautilus who steers his prow

“ The sea-born sailor of his shell canoe,

“ The ocean Mab, the fairy of the sea,

* * * * *

“ He, when the lightning-winged tornadoes sweep

“ The surge, is safe—his port is in the deep.”

BYRON.

“ Recent observations have vindicated the character of this clever little
“ sailor from the aspersions heretofore cast on it, of being a mere pirate,
“ who having killed and devoured the former inhabitant, seizes on his
“ vessel: they have proved that he is lawful owner, and his own indus-
“ trious shipwright, and beautiful is the model on which his little frail
“ bark is constructed.”

In 1825, M. de Férussac published his “ Notice sur l’animal du Genre
“ Argonaute” in the “ Memoires de la Société d’Histoire Naturelle.” *
Arguing for the legitimate title of the animal to the shell in which it is
found, he ranges himself on the side of those who are of opinion that it is
no parasite, and thus concludes his memoir, “ Les nouveaux faits et les
“ reflexions que nous avons présentées dans la note précédente nous ont
“ semblé faire pencher la balance pour l’opinion opposée à celle de
“ M. de Blainville; peut-être le parti que prend M. Ranzani est-il le
“ plus sage; il ne court du moins aucun risque, au lieu que nécessaire-
“ ment une des deux opinions extrêmes sera frappée de réprobation
“ lorsque des faits décisifs viendront mettre un terme a cette discussion
“ qui dure depuis Aristotle.” †

To this memoir is appended a note which is presented to the reader,
“ Parce qu’elle confirme par des observations directes l’opinion que nous
“ avons voulu établir, et qu’on peut regarder enfin cette longue et active
“ controverse comme terminée.” Then follows “ la traduction littérale”
of the note, which, according to M. de Férussac, is to be productive of
such happy results; but the strength of it is very much shaken by one or

* Tome II. p. 160.

† p. 173.

two unlucky comments which are appended to it. We will give the whole of this note with the exception of the two concluding sentences, which are not material.

“ Academie Royale des Sciences de Naples. Extrait du Protocole de la séance du 14 Décembre, 1824.

“ Un individu de l'*Argonauta Argo*, L. pêché il y a quelque tems sur les rives de Pausilippe, fut envoyé vivant à l'auteur avec la faculté de l'examiner soigneusement, et de faire des observations sur les particularités, absolument ignorées, de sa génération. A l'égard de ce dernier objet, le Chev. Poli découvrit la mécanique au moyen duquel les œufs, en sortant de la matrice de l'animal, s'attachent successivement à sa coque, le développement journalier de l'embryon de chaque œuf, et d'une manière précise, par le moyen du microscope, l'ébauche de sa nacelle: cette dernière découverte prouve à l'évidence que la coquille, de même et en même temps que l'animal, s'engendre dans l'œuf.”

Now here we must pause; for at the word “coque,” in the sentence last quoted there is a reference to the following note. “Ceci aurait besoin d'être expliqué. On n'a jamais vu jusqu'à present les œufs attachés à la coquille; c'est sans doute dans la coque qu'on a voulu dire.” The extract then proceeds thus, “On voit clairement par-là combien est grande l'erreur de ceux-là qui prétendent que la coquille n'appartient point en propre au Mollusque de l'Argonaute, mais qu'il se l'approprie, de même et non autrement que le *Cancer Bernardin* habite et vit dans les coquilles d'autres Mollusques: question qui, comme beaucoup d'autres, se trouve résolue par l'auteur.

“ Une autre grande question qui occupe aussi les naturalistes, est celle de savoir si cet animal est ou non attaché naturellement à sa coquille. M. Poli pose en fait et assure qu'il n'existe point entre eux de ligamens; et comme, dans ce cas, l'accroissement successif de la coquille ne saurait avoir lieu, l'auteur s'attache à démontrer et il démontre en effet, par des argumens péremptoires, comment ce même accroissement peut s'opérer.” Here we must pause again: for at the word “lieu” in the last sentence is a reference to the following note. “Ceci est une erreur: les bords de la tunique ou du manteau transudent la matière testacée, et forment les accroissemens successifs du test.

“ L'existence du muscle n'a aucun rapport à l'accroissement de la coquille.” The extract then proceeds thus, “ *Par suite de ses observations exactes et répétées*, l'auteur relève certaines erreurs qui se sont accréditées à l'égard de quelques autres parties constitutives, gratuitement attribuées au *Nautilio*. Les résultats de l'examen ont mis au jour d'autres particularités de la même nature: au total, la partie historique de l'*Argonauta Argo* ne laisse plus rien à désirer.”

Risso, who appears to be of the same opinion with M. de Ferrusac, says, “ Je n'ai jamais vu retirer cet animal de la mer sans être toujours muni de coquille.”*

I have been led to the enquiry which has produced the foregoing quotations by the kindness and liberality of my friend Professor Buckland, who, on his return from Italy last year, presented me with a very beautiful specimen of the *Argonauta Argo*, Auct., with its inhabitant *Ocythoë Antiquorum*, Leach, in the highest state of preservation. To add to the interest of the specimen, which is figured in Pl. III. the shell is more than half filled with eggs packed very closely. This animal at least could not have executed the manœuvre of “ shrinking into the body of the shell,” † for the mass of eggs must have rendered it impossible. Some of these eggs have been submitted to the examination of Mr. Bauer, and some were given for the same purpose to Dr. Roget. The results were given separately, without any communication between the observers, and the microscopes were different. Mr. Bauer examined his portion of the eggs by the same microscope as that which he used for the figure appended to Sir E. Home's paper in the *Philosophical Transactions* above alluded to. He states, that there was no trace of shell in the ovum, only yelk, and that the appearance altogether was similar to that given in the figure published in the *Philosophical Transactions*. Dr. Roget kindly sent me the following letter and a drawing, from which the figures of the ovum were engraved.

* *Histoire Naturelle des principales Productions de l'Europe Méridionale*. Tome IV. p. 4. Paris, 1826.

† Ante, p. 58.

“ Bernard Street, Jan. 23, 1828.

“ Dear Sir,

“ I have examined as attentively and as carefully as I could the cluster of
 “ ova of the Argonaut which you sent me, with the help of my reflecting
 “ microscope, made by Amici. Each ovum was in length about one 20th
 “ of an inch, and in breadth one 25th, and was connected with a matted
 “ tissue of fibres in the centre of the cluster by a fine filament, which,
 “ when the egg was drawn away from the rest, extended to six or eight
 “ times the longest diameter of the egg before it broke. After opening the
 “ outer membrane of the egg, which I did under spirits of wine, in a
 “ watch glass, the only mode in which I could examine its contents, in so
 “ minute an object, was to pick them out with the point of a fine needle.
 “ I thus obtained a number of irregular fragments of a matter which
 “ seemed to be of nearly uniform consistence. Among these fragments
 “ I could not discover by the most careful search any thing that bore the
 “ least appearance of a shell, or the rudiment of a shell. During this
 “ dissection, if so rude a method of examination deserves to be so called,
 “ an immense multitude of very minute globules were washed out and
 “ scattered in the surrounding spirit. Besides these there were also
 “ effused several globules of much larger size, which were fluid, and per-
 “ fectly transparent, and had exactly the appearance of oil. The outer
 “ membrane of the egg was a fine semitransparent pellicle, torn by the
 “ slightest touch, and apparently containing a great number of grains in
 “ its texture. Two or three opaque lines were seen extending from the
 “ point to which the filament connecting it with the cluster of ova was
 “ attached. The enclosed drawing, such as it is, shews what I have
 “ seen ; but I fear it will not afford you much instruction.

“ Fig. 1. is the entire ovum, the surface of which was dotted with
 “ points, or depressions, resembling that of an orange.

“ Fig. 2. is the ovum torn asunder, and the contents effused ; with the
 “ solid part divided into irregular fragments : the minute globules, and
 “ also the larger oily globules are seen dispersed in the fluid.

“ Fig. 3. represents a portion of the semitransparent outer case or
 “ shell of the egg, shewing the granular appearance of its texture.

“ Dear Sir,

“ Yours very truly,

“ P. M. ROGET.”

These experiments must be deemed confirmatory of those recorded in Sir E. Home's paper. To the assertion that the shell of *Argonauta* is internal I cannot so readily subscribe.

A careful selection of the very finest specimens which have found their way to this country enables me to state, that all the known species are furnished with a delicate epidermis in their natural state.

I have sometimes thought that I could observe traces of muscular impression in the inside of the involuted termination of the chamber of the shell, such, for instance, as might be caused by the insertion of parts similar to those inserted in the shell of *Carinaria*, which, by the bye, stood in the *Systema Naturæ* as a species of the genus *Argonauta*, *Animal Sepia*, before the soft parts were discovered.

The multitude of specimens of the genus *Argonauta* which are now brought home, picked up in most instances on beaches or sand banks after a storm, have given rise to the question, why, if the cephalopod usually found in the shell be a parasite, we do not sometimes find the soft parts really belonging to the shell? The safe answer to the question lies in another. Look at the multitudes of specimens of *Nautilus Pompilius*, one of the most common of shells: the muscular impressions are obvious enough, but where do you find instances of the soft parts? Now it is well known that it has been an object with Zoologists attached to scientific marine expeditions to obtain these soft parts, and, if we are not misinformed, the French Zoologists in particular have been on the alert to procure them; but none have been captured of late years. Of the two well known figures of these soft parts one represents an almost undefined mass, and the other, which has more pretension, is, to say the least, very apocryphal.

Upon the whole we cannot agree with M. de Férussac that this controversy is set at rest. The author of this memoir had the pleasure of seeing M. de Blainville when he was in England last year, and that gentleman appeared to be more than ever convinced that the cephalopod found in the shells of the *Argonauta* is parasitical. He saw the specimen which is here figured and he said it confirmed his opinion.

But it is even reported that the real constructor of the shell, an animal totally different from the *Poulpe* which is its usual inhabitant, has been

actually found in the Mediterranean, and that the specimen is now in the possession of a collector at Marseilles. If this account be well founded, it is to be hoped that no long time will elapse before it is given to the public in an authentic shape. It may be worthy of mentioning, that Mr. James Sowerby, who made the drawing of *Ocythoë Cranchii* as well as that of our specimen, informed me that the position of the tube in the former was exactly opposite to the situation of that in the latter. The tube in our specimen rests on the involuted crest of the shell. In *Ocythoë Cranchii* it was placed over the wide and opposite part of the shell. A small hole in our shell afforded the means of extracting some of the ova for examination without displacing the animal.

It would be well worthy of inquiry whether the animals found in the shells are male or female? Most of those captured appear to have been females.

It may be expected that the author should give a decided opinion on this long agitated question: but those who look for it will be disappointed. In his judgment, much more remains to be known before it is possible to come to a satisfactory conclusion. There is not, perhaps, sufficient evidence to convict the subject of our memoir of piracy, but there is quite enough to make us strongly doubt the assertion that "he is his own industrious shipwright."

ART. VIII. *Additions and Corrections to a Monograph on Cypræa, a Genus of Testaceous Mollusca, By JOHN EDWARD GRAY, Esq., F. G. S., &c.*

In the zoological part of M. Freycinet's Voyage, M. Blainville has given the description and dissection of the animals of *Cypræa Tigris* and of *Ovula oviformis*, illustrated with beautiful plates.

During the publication of the Monograph, which has been very much protracted by various causes, the following additions and corrections have occurred as necessary to be made in their respective places.

Having had the opportunity of examining the cabinet of the unfortunate but truly great Lamarck, at present in the possession of Prince Massena, I observed that

C. icterina, Lam., n., is the young of *C. moneta*; it is well figured in this state by Petiver; see Gaz. t. 97, f. 9.

C. albella, Lam., n., is a small worn specimen of *C. caput serpentis*.

C. ursellus of Lamarck's cabinet consisted of worn specimens partly of *C. Hirundo* and partly of *C. felina*. It is but just to remark that the cabinet has been partially deranged by its being moved; and the unfortunate blindness and febleness of the original proprietor preclude his re-examining it.

M. Duclos in the Bulletin des Sciences Naturelles et de Geologie (vii. 385,) has given a list of the species which had been described in this Monograph at that time, in which he has made the following remarks.

“ *C. Arabicula*.—M. de Lamarck en créant cette espèce a commis une erreur; l'individu auquel il a donné ce nom est un *C. Arabica* extrêmement petit, et a l'état complet. M. Gray en commet une plus grande encore en donnant ce nom à une variété du *C. Turdus* ou au moins à une jeune individu de cette espèce.” It is only necessary to compare the description of *C. Arabicula* and *C. Turdus*, belonging to two distinct sections, and the figures of Vol. I. t. 7, f. 3, 4, and t. 12, f. 3, 4, to discover the incorrectness of M. Duclos' observation. I can only observe with regard to M. Lamarck, that his description exactly agrees with my shell.

“ *C. controversa*.—Erreur de M. Gray; c'est un individu fort grand du *C. lurida*; nous en possédons de semblables dans notre collection.” If M. Duclos had said a large variety of *C. Isabella*, he would have probably been more correct; as I have reason to believe that what I have named *C. controversa* forms one of the remarkable variations of that species produced by climate and locality. *C. lurida*, of a much larger size than the species here figured, is common in English collections, and cannot be confounded with it.

“ *C. arenosa*.—Erreur de M. Gray. Cette figure ne représente qu’un très grand exemplaire fort usé sur le dos du *C. caput serpentis*.” This species must be unknown in France, as it has no character in common with the species to which M. Duclos has referred it; which must also be the case with the next species, *C. sulcidentata*.

“ *C. pyriformis*.—Nouv. esp. qui nous paraît n’être qu’une variété du “ *C. rufa*.”

“ *C. tabescens*.—Esp. du Mus. Gray, figurée dans plusieurs auteurs et “ qui nous est inconnu.”

“ *C. picta*.—Erreur de M. Gray, var. du *C. zonata*.”

“ *C. Listeri*.—Espèce figurée dans plusieurs auteurs, impossible à “ reconnoître, n’étant qu’un jeune individu.”

“ *C. albuginosa*. Erreur de M. Gray, var. du *C. poraria*.”

“ *C. guttata*. Var. à grosses taches du *C. Vitellus*.”

“ *C. Margarita*. Var. blanche du *C. Globulus*.”

It is most charitable to believe from these remarks, that the above new species are totally unknown to M. Duclos; for, if he had ever seen them, he never could have made such observations. To give him the opportunity of verifying his remarks before the publication of his promised Monograph, I have sent to the French Museum specimens of most of the above species. It is only necessary to consult Mr. Broderip’s beautiful figure of *C. guttata* to be convinced that it has no affinity to *C. Vitellus*.

ADDITIONS AND CORRECTIONS.

1. *C. Princeps*. The name must be changed, as it is *C. Valentia* of Perry’s Conchology,* t. 23, f. 2, where the individual specimen here described is well figured.

2. *C. Mappa*, add.

C. Alga. Perry’s Conch. t. 23, f. 1; Wood’s Cat. t. 16, f. 2.

* I have ventured to refer to this work, as I consider that it is just that every author should be quoted; and this author has anticipated Lamarck, Swainson, and Sowerby, in several species.

3. *C. Arabica*, add.

C. Nux aromatica. *Humph., Cal. Cat. No. 123.*

C. Arabica. *Perry's Conch. t. 21, f. 1.?* *Wood's Cat. t. 16, f. 3.*
Savigny, Egypte, t. 6. f. 28.

2. Junior, add.

Bulla Cypræa. *Knorr, vi. f. 27, f. 6.*

3. Incompleta, add.

C. fuliginosa. *Perry's Conch. t. 21, f. 7.*

The *C. zonata* of *Chemnitz, t. 141, f. 1342*, is perhaps a young and small *C. Arabica*.

γ. *Histrio*, add.

Cypræa reticulata. *Humph., Cal. Cat. No. 114.*

4. *C. arabicula*, add.

Icon. *Zool. Journ. i. t. 7, f. 4 and 12, f. 4.* *Wood's Cat. app. t. 3, f. 7.*

5. *C. Mauritiana*, add.

Cypræa Mauritiana, *Perry.*

Icon. *Perry's Conch. t. 21, f. 6.* *Wood's Cat. t. 17, f. 23.*

Junior. *Peribolus Adansonii*. *Blainv., Man. Malac. 421. Dict. Sc. Nat. xxxii. 219.*

Obs. I inserted, as a reference to the young of this species, the *Peribolus* of Adanson. M. Blainville, who has lately re-established that genus, observes, that Adanson positively says that he has seen the young and adult of his *Potan*; but I do not observe any such remark in Adanson, who only describes the young specimen of his *Potan* as being of a violet colour. Now this agrees with the youngest state of the shell to which I have referred it; and on re-examining the subject I am not inclined to alter the reference, as I have seen a series of specimens which most completely connect the stages. Adanson's genus *Peribolus* consists of this young Cowry and three species of *Marginella* of Lamarck; and, as he does not give any character, it is now quite impossible to know by what character he separated it from his genus *Porcellana*, the *Marginella* of Lamarck; which with the genus *Cypræa* and *Peribolus* form his family.

5*. *C. Stercoraria*, add.

C. grummulus. *Humph., Cal. Cat. No. 112.*

Icon. *Adanson, Seneg. t. 5, f. 1, A. Wood's Cat. t. 16, f. 7.*

Animal. *Adanson, Seneg. t. 5, f. 1, B. C.*

Adanson described and figured the animal of this species.

3. *distorta*, add.

C. conspurcata. *Gmel., Syst. Nat. p. 3405.*

8. *C. testudinaria*, add.

C. Talpa. *Humph., Cal. Cat. No. 135.*

C. testudinoso. *Perry's Conch.*

Icon. *Perry's Conch. t. 20, f. 1. Wood's Cat. t. 16, f. 6.*

9. *C. Exanthema*, add.

C. Argus occidentalis. *Humph., Cal. Cat. No. 132.*

Icon. *Perry's Conch, t. 22, f. 7. Wood's Cat. t. 16, f. 1.*

There is a monstrosity in Mr. Brookes's collection, injured when young, so as to produce a flat-topped keel.

The variety *cervina* is by mistake numbered as if it was intended to be considered as a species. This part was printed during my absence from England, which I hope will be taken as an excuse for several other minor errors. The numbers should consequently be altered to No. 26, inclusive.

10. *C. Argus*, add.

C. Argus orientalis. *Humph., Cal. Cat. No. 134.*

Icon. *Perry's Conch. t. 20, f. 7. Wood's Cat. t. 16, f. 5.*

Junior.

Icon. *C. constricta*. *Perry's Conch. t. 20, f. 3.?*

Shell, when young, subcylindrical, truncated behind, pale yellowish white, with three broad rather darker bands, the margin of the bands ornamented with long, darker, irregular-shaped, unequal-sized spots, forming a narrow, interrupted marginal band. Spire small, flat; whorls 3, 4, rapidly enlarging, flattened near the suture, apex mammillary; front of the columella deeply curved, white; inside rosy.

Mus. Stutchbury.

11. *C. Talpa*, add.

C. Sardonyx. *Humph., Cal. Cat. n.* 133.

Icon. *Wood's Cat. t.* 16, *f.* 10.

Junior.

Shell, when young, pale yellow, with four broad, darker, chesnut bands, broken by pale cross lines. Columella lip slightly arched in front, white; spire slightly concave, whorls gradually enlarged, suture marked by a white line.

Mus. Stutchbury.

11*. *Cypræa microdon*, n. s.

Testâ oblongo-ovatâ, anticè attenuatâ, albidâ, brunneo minutè punctatâ; basi albâ, rotundatâ; extremitatibus subproductis, roseis; aperturâ angustâ; dentibus minutis, approximatis, subæqualibus.

Inhabits Pacific Ocean. Mus. Stutchbury, nost.

Shell oblong-ovate, attenuated in front, slender, whitish, minutely dotted with brown; base rounded, white; extremities slightly produced, rose-red; margin rounded; mouth narrow; teeth minute, close together nearly equal; front of the columella concave, with the teeth extended over it.

Axis $\frac{5}{8}$, diameter $\frac{1}{3}$ of an inch.

When worn, the shell is marked with an obscure central yellowish band; the base is white; the spire flat and small, and the extremities of a pale pink colour.

12. *C. Isabella*, add.

Icon. *Perry's Conch. t.* 19, *f.* 7. *Wood's Cat. t.* 17, *f.* 28.

13. *C. pulchella*, read *pulehra*, add.

Icon. *Zool. Journ. i. t.* 7, *f.* 9, *t.* 12, *f.* 9.

14. *C. controversa*, add.

Icon. *Zool. Journ. i. t.* 7, *f.* 7, and *t.* 12, *f.* 7.

Mr. S. Stutchbury having been so kind as to furnish me with several specimens of different sizes of this shell, I am, on examination, induced to believe that it is only a variety of *C. Isabella*.

15. *C. lurida*, add.

Icon. *Wood's Cat. t. 16, f. 11.*

Junior. *C. leucogaster. Gmel., Syst. Nat. 3413.*

Icon. *Gualter, t. 13, f. F.*

γ. *Monstrosa.*

Icon. *Savigny, Mem. Coquill. Egypte, t. 6, f. 27, 1, 2, 3.*

The animal has been described by *Risso*; see *Hist. Nat. de l'Europe Merid.* iv. 237.

16. *C. cinerea*, add.

Junior.

C. translucens, Gmel., Syst. Nat. 3404?

Icon. *Gualter, t. 16, f. G.?*

Var. *subfossilis.*

Cypræa eburnea. König.

Icon. *Foss. Sect. p. t. (ineditæ.) Mus. Brit.*

16.* *Cypræa physis.*

Testâ ovatâ tumidâ, fulvâ, punctis fuscis nebulatâ; basi lateribusque incrassatis albidis immaculatis; dentibus minutis, subobsoletis, columellâ complanatâ, profundâ, lævigatâ.

C. physis. Brocchi, Foss. Subap. ii. 284. Bronn. Verz. Heidel. Min. Kompt. 2.

C. pyrula, Lamarck, Ann. Mus. xvi. 105. Hist. vii. 405.

Icon. *Brocchi, l. c. t. 2. f. 3.*

Inhabits, fossil, Placentin, Brocchi. Fiorenzola. Mus. Brit., nost.

Shell ovate, tumid, rather solid, slightly attenuated in front, pale fulvous, clouded with numerous small, unequal-sized, darker dots and spots; spire convex, covered; base and edge white and spotless, thickened and rounded, except at the sides of the front extremity, which are slightly marginated; the mouth rather narrow, front of the outer lip shelving inwards; teeth minute, close together; those of the inner lip very indistinct, only observable near the top, and at the inner part of the columella, which is very deep and nearly flat, with a slight concavity in front, where the grooves of the teeth are extended over it.

Those specimens which have lost their colours are sometimes uniform bay, and sometimes dirty white, according to the degree of exposure to

which they have been subjected.

Brocchi compares his species to *C. ventricosa*, and Lamarck to *C. adusta*; but from comparison I consider it most nearly allied to *C. cinerea* and *C. carneola*. It differs from them in colour, which in one of the specimens in my cabinet nearly resembles that of a recent shell; in the columella being deeper and not so concave in front; and also in general form, the shell being more pointed in front.

18. *Cypræa arenosa*, add.

Icon. *Zool. Journ.* i. t. 7, and t. 12, f. 6. *Wood's Cat. app. t. 3, f. 5.*

19. *Cypræa sulcidentata*, add.

Icon. *Zool. Journ.* i. t. 7, and t. 12, f. 5. *Wood's Cat. app. t. 3, f. 3.*

20. *Cypræa achatina*, add.

Icon. *Perry's Conch. t. 20, f. 6. Wood's Cat. t. 17, f. 18. Freyc. Voy. Atlas, t. , f. .*

Junior.

Above purplish, with four bright bay bands; both ends whitish; base and mouth white; upper edge of the margin dark brown; spire very small, nearly flat. Mus. Stutchbury.

22. *Cypræa gibbosa*, change the name to *C. leporina*, add.

C. leporina, Lamarck, *Ann. Mus.* xvi. 104. *Anim. sans Vert.* vii. 405. *Basterot, Mem. Soc. Lin. Par.* i. 41.

Add. concavity of the front of columella rugose and plicated.

a. sublonga.

Shell ovate-oblong.

Axis 2 inches, diameter $1\frac{3}{8}$ of an inch.

Inhabits Turin. Mus. Brit.

β. subcylindrica.

Shell subcylindrical; ends produced; base flattish.

Axis $1\frac{3}{4}$, diameter 1 inch.

Inhabits Turin. Mus. Brit.

γ. Minor.

Cypræa annularia. Brongn.

Front of the columella deeply concave, smooth, with the plaits extended over it, and denticulating the inner edge.

Mus. Brit.

22*. *Cypræa fragilis*, n. s.

Testâ ovatâ, convexâ; basi convexâ, marginatâ, extremitatibus subproductis; columellâ profundâ concaviusculâ; dentibus mediocribus approximatis.

Fossil. Mus. Brit.

Shell ovate, convex; base convex, margined; extremities slightly produced, with a pit on the side of the spire. Teeth moderate, close together; columella front deep, rather concave, inner edge denticulated.

Axis 1, diameter $\frac{5}{8}$ of an inch.

This fossil species approaches most nearly to *C. leporina*.

23. *Cypræa Aurora*, add.

Icon. *Wood's Cat. t. 16, f. 8.*

Junior.

When young, nearly globular, pellucid, dark orange, with a broad white band close to the suture; base near the mouth white. A beautiful specimen in the brilliant collection of Mr. Broderip.

24. *Cypræa tessellata*, add.

Icon. *Wood's Cat. app. t. 3, f. 1.*

25. *Cypræa Vitellus*, add. Aperturâ albidâ.

C. Dama. *Humph., Cal. Cat. No. 118.*

C. fulva. *Gmel., Syst. Nat. p. 3413.*

Icon. *Wood's Cat. t. 17, f. 21.*

Junior.

When young, the central band is broad, and often slightly divided at the ends; the front one is formed of two separate equal parts, and the hinder one is broad. These characters will distinguish it from the young of *C. cinerea*, which is ash-coloured, with three simple bands, the central one being the narrowest; and from the young of *C. carneola*, which is also three-banded, but with the central band formed of two equal

distant portions, the anterior being divided in the middle, and the posterior being broadest.

25*. *Cypræa Dama*. *Snow flecked Cowry*.

Testâ ovatâ, subventricosâ, fuscâ, guttis punctisque albis adpersâ, subtus subalbidâ; lineâ dorsali ad latus dextrum approximante, pallidâ, undulatâ.

Cypræa Dama. *Perry, Conch.*

Cypræa nivosa. *Broderip, Zool. Journal* iii. p. 84.

Icon. *Zool. Journal* iii. t. 4, f. 1. *Perry, Conch.* t. 23. f. 3.

Inhabits. Mus. Broderip, nost.

Shell oval, rather ventricose, fine bright pale bay, flecked and dotted with white; dorsal line pale, waved, placed rather on the right side; base convex, white; sides rounded, brownish towards the upper edge, and at the extremities; the extremities margined, the upper part of the margin cracked, shewing the white spots through it; the spire narrow, very slightly dilated in front, brownish white; teeth of the inner lip small, close together; front of the columella deep, concave.

Axis 2, diameter $1\frac{1}{4}$ inches.

This shell has many characters in common with *C. Vitellus*, and indeed may be simply a variety of that shell, like the diseased variety of *C. Arabica*, often found in collections. But I have seen several specimens very nearly alike.

25**. *Cypræa Camelopardalis*.

Testâ ovali turgidâ, fuscâ, obscure trifasciatâ, guttis elevatiusculis niveis adpersâ, basi lateribusque albis; extremitatibus marginatis; aperturâ violaceâ; dentibus albidis.

Purple-mouth Fallow Deer Cowry. *Humph., Cracherode Cat.*

Cypræa Camelopardalis. *Perry's Conch.*

"*Cypræa melanostoma*. *Leathes, MSS.*" *Sowerby, app. Tank. Cat.* 31, n. 2261.

Icon. *Perry's Conch.* t. 19, f. 5. *Zool. Journal* ii. t. 18. f. 3.

Inhabits, Red Sea, *Sowerby*. China, *Humphreys*. Mus. Brit., *Crach.*, nost.

Shell oval, rather ventricose, dull brown, with three very indistinct brighter bands, scattered with slightly elevated white spots; base and margin white, the base rather convex, the margin rounded, thickened and distinct at each extremity; mouth rather wide, inner lip brownish purple; teeth moderate, white; those of the inner lip the smallest; the columella front rather high and slightly concave.

Axis $2\frac{3}{4}$, diameter $1\frac{1}{2}$ inches.

27. *Cypræa Tigris*, add.

Cypræa Leopardalis, *Humph.*, *Cal. Cat. No.* 130.

Junior incompleta.

Icon. *Martini*, t. 65. f. 735.

30*. *Cypræa inflata*.

Testâ ovatâ, ventricosâ, turgidâ, subgibbosâ; extremitatibus subatenuatis; labro exteriore marginato; aperturâ curvâ.

Cypræa inflata. *Lam. Ann. Mus.* xiv. 106. *Hist.* vii. 407, not Brocchi.

Icon. *Ann. Mus.* t. 44, f. 1.

Fossil, Grignon and Piacenza.

Shell ovate ventricose, swollen out in the middle, and slightly attenuated at the ends, especially in front; mouth curved, outer lip margined, teeth short, only on the edge of the lip; columella smooth, front deeply concave, smooth; spire hidden.

This shell has somewhat the shape of *Cypræa Turdus*, to which Lamarck compares it, but it is not toothed on the edge.

There is a variety of this shell, which is longer, pear-shaped, attenuated in front; outer lip and front extremity margined; spire hidden; teeth large; front of columella flat. Axis $1\frac{1}{2}$. *Mus. Brit.*

This variety may be the *C. inflata* of Brocchi, which Prof. Bronn says is *C. utriculata* of Lamarck, but it does not agree with the latter, nor with *C. rufa*, to which it is most nearly allied in the spire.

31. *Cypræa Onyx*, add.

Cypræa umblicata? Solander's MSS., quoted in *Zool. Journ.* iii. 316.

Var. *fulva*. Testâ luteâ, pellucidâ, immaculatâ, intus roseâ.

Inhabits the Red Sea, Mauritius, *Capt. Marryat*.

This variety, of which I have seen several specimens, especially in the collections of Mrs. Mawe and Mr. Broderip, is of a most beautiful pale whitish fulvous with three darker bands; outer edge and extremities pale yellowish brown; teeth like those of the type *Onyx*; inside rose coloured or purplish. It is evidently a variety of this species.

31*. *Cypræa umbilicata*.

Testâ oblongo-ovatâ, anticè acuminatâ, posticè subrostratâ, umbilicatâ, pallidè fusco-maculatâ; basi convexo; marginibus rotundatis, albidis, fusco maculatis.

Cypræa umbilicata. *Sowerby, app. Tank. Cat. 30, No. 2260, not Solander*.

Icon. *Sowerby, l. c. t. 7. Wood's Cat. app. t. 3, f. 13.*

Inhabits. ? *Mus. Brit.*

Shell oblong ovate, anterior extremity attenuated and elongated, hinder rather beaked; spire deeply concave; centre of the body whorls ventricose, pale brownish, brown spotted; base rounded whitish; margin rounded, whitish brown, spotted. Mouth rather wider in front; teeth rather large, nearly equal, those of the inner lip short; front of the columella flat, without any distinct concavity.

Axis $3\frac{1}{4}$, diameter $2\frac{1}{4}$ of an inch.

The only specimen known of this shell is now in the British Museum. It has many characters which would lead to a belief that it is a monstrous variety of *C. tigris*, and indeed more specimens are wanted to firmly establish its right to be considered as a species.

The form of the columella has induced me to place this species in the present section. This may have been altered by the same cause which produced the sunk form of the spire.

33. *Cypræa pyriformis*, add.

Testâ decorticatâ.

Inhabits New Holland. *Capt. P. P. King. Mus. Brit.*

35. *Cypræa ziczac*, add.

Cypræa misella. Perry's Conch.

Icon. *Perry's Conch. t. 23, f. 5. Wood's Cat. t. 17, f. 16.*

36. *Cypræa clandestina*, add.

"*Cypræa ziczac*, var. *Solander's MSS.*" *Dillwyn.*

Cypræa, var. *angulo transverso elevato. Sowerby's Tank. Cat. 83, No. 218.*

Icon. *Wood's Cat. app. t. 3, f. 17.*

37. *Cypræa Asellus*, add.

Cypræa Vespa. Humph., Cat. Cat. 102.

Icon. *Perry's Conch. t. 19, f. 3.*

39. *Cypræa quadrimaculata*, add.

"*Cypræa nimbose. Soland. MSS.*" *Dillwyn. not in Desc. Cat*

Icon. *Wood's Cat. app. t. 3, f. 8.*

Inhabits Coromandel, Dillwyn.

40. *Cypræa hirundo*, add.

Icon. *Perry's Conch. t. 23, f. 5.*

Decorticata.

Cypræa ursellus. Perry's Conch. t. 19, f. 2.

Var. *pulchella. Testâ albedo-carneâ minutè fusco punctatâ, marginibus incrassatis; punctatis, extremitatibus nigro-punctatis.*

Inhabits South East coast of Africa. Capt. W. F. Owen, R. N. Mus. Brit.

Some of the specimens of this variety are so very distinct from the type shell of this variable species, that I should have been inclined to have described them as a distinct species, if there had not been some specimens brought with them that completely united them with the type, differing from it only in the band being of a reddish purple instead of a blackish colour. In the most distinct state the shell is oblong ovate, and distinctly margined all round; reddish white, without any appearance of bands, and minutely speckled with unequal sized brown dots; there are two rather larger similar dots at each extremity, in the place of the two black spots of *C. Hirundo*.

These shells were first brought to this country by Capt. William Owen,

who made a very interesting collection of shells during his late survey of the coast of Africa, a selection from which he presented to the British Museum.

41. *Cypræa stolidæ*, add.

Cypræa ferruginea. *Humph.*, *Cal. Cat.* No. 113.

Icon. *Wood's Cat.* t. 17, f. 50.

42. *Cypræa pulchella*, add.

Cypræa stolidæ. *Perry's Conch.*?

Icon. *Perry's Conch.* t. 23, f. 4.?

Inhabits Madagascar. *Perry*.

Is not this very nearly allied to my *C. pyriformis*?

43. *Cypræa punctata*, add.

Icon. *Wood's Cat.* t. 17, f. 41.

44. *Cypræa tabescens*.

On again comparing Martini's figures, on which Solander's name rests, it appears probable that his shell was only a young *Cypræa caurica*, and therefore, perhaps, *C. teres* would be the better name for the present species. Add a mark of doubt to the quotations of *C. tabescens* and *C. stolidæ*, and to Martini's figure, and add.

Cypræa cylindrica. *Wood's Cat.*

Icon. *Wood's Cat.* t. 17, f. 17. *Cop. from Schroeter.*

46. *Cypræa cribraria*, add.

Cypræa Argus minor. *Humph.*, *Cal. Cat.* No. 114.

Cypræa Comma. *Perry's Conch.*

Icon. *Perry's Conch.* t. 21, f. 5. *Wood's Conch.* t. 17, f. 42.

Var. *marginata*, *marginibus nigro-punctatis*.

Inhabits New Holland. *Capt. P. P. King*, *R. N. Mus. Brit.*, *nost.*

The variety is rather more distinctly margined, and the margin is dotted with black.

47. *Cypræa fimbriata*, add.

Icon. *Rumphius*, t. 39, f. 9. *Wood's Cat.* t. 17, f. 57.

47*. *Cypræa irrorata*.

Testâ ovato-oblongâ, albido purpurascente, punctis fulvis minutis, ad laterum extremitates copiosioribus, adpersâ; basi albâ complanatâ; aperturâ angustâ, posticè contractâ; labio exteriore acuto, dentibus parvis, interiore posticè incrassato, dentibus longis conicis.

“*Cypræa irrorata*.” *Solander's MSS. Humphreys's Cabinet.*

Inhabits South Sea. *Humph. Mus. nost.*

Shell ovate, oblong, purplish white, ornamented with numerous scattered minute fulvous dots, more crowded on the extremities of the edges; base white, flat; aperture narrow, contracted behind, rather widened and shelving inwards in front; outer lip acute, teeth small, close, except in front; inner lip thickened behind, shelving in front, with long conical teeth covering the front of the columella.

When worn, pale rose red; base white; extremities with one or more brown speckles; spire conical, mostly covered.

Axis $\frac{5}{8}$, diameter $\frac{1}{3}$ of an inch.

Mr. Stutchbury informs me that the best specimens of this shell were obtained from the stomach of *Siphunculus edulis*.

48. *Cypræa felina*, add.

Icon. *Wood's Cat. t. 17, f. 26.*

49. *Cypræa erronea*, add.

Cypræa ovata. *Gmel., Syst. Nat. 3405.*

Cypræa subflava. *Wood's Cat.*

Icon. *Rumph. t. 39, f. E.cop. in Petiver, Amb. t. 16, f. 10. Wood's Cat. t. 17, f. 32.*

In Mr. Stutchbury's collection there are two interesting varieties of this shell. One has the thickened pale fulvous margin extended half way up the back of the shell, so as only to leave a narrow speckled band; and in the second the black spot, which appears to be a coat laid on before the thickening of the margin, is extended, and forms a dark edge to each side of the shell just above the margin.

50. *Cypræa icterina*, to be erased, being the young of *C. moneta*.

52. *Cypræa pallida*. This species appears to be permanent, as I have seen many specimens in which the distinguishing characters have not varied.

53. *Cypræa zonata*. The reference to Chemnitz is doubtful.

55. *Cypræa sanguinolenta*, add.

Icon. *Wood's Cat. t. 17, f. 15.*

When young the central band is broad, waved, and interrupted with narrow paler cross-bands.

55*. *Cypræa nigro-punctata*. Black dotted Cowry.

Testâ ovato-oblongâ, albido-fulvâ, obscure quadri-fasciatâ, punctis fulvis nebulatâ; basi lateribusque albidis, punctis minutis nigro-fuscis notatis; extremitatibus nigro-bipunctatis; dentibus anticè majoribus.

Junior. Testâ purpureâ luridâ, fasciis sex castaneis ornatâ.

Inhabits Africa, *Mr. Stutchbury*. Pacific Ocean *Capt. Lord Byron*. Mus. Brit., Stutch., nost.

Shell ovate-oblong, pale fulvous, with four obscure purplish brown bands, back ornamented with numerous minute fulvous specks; the spire conical, concealed; the base and sides white, with small round purplish spots; the edge thickened, especially on the sides of the extremities, which are slightly margined, and marked with two large black spots; mouth wider, and shelving inwards in front; teeth large, distant, those on the front of the columella large and deep. When young the shell is livid purplish, with three broad dark chesnut double bands which are interrupted by small cross lines; spire conical, small. When decorticated it is nearly similar, but the base is white and minutely dotted, and the extremities are marked with two large black spots.

This species is very like *C. sanguinolenta*, but it is perfectly distinct and easily known by the large size of the teeth, by the front ones being extended over the columella, by the base being white with dark brown dots, and the extremities marked with two black spots.

56. *Cypræa lentiginosa*, add.
 “*Cypræa sabulosa*, *Solander's MSS.*” *Humph., Mus.*
57. *Cypræa Humphreysii*, add.
 “*Cypræa succincta*, *Linn., Solander's MSS.*” *Humph. Mus.*
Cypræa nivea. *Wood's Cat. app.*
 Icon. *Wood's Cat. app. t. 3, f. 12?*
 Var. When young yelk-yellow, with three narrow whitish bands.
58. *Cypræa cruenta*, add.
 Icon. *Wood's Cat. t. 17, f. 55.* *Savigny's Mem. Egypte, t. 6, f. 29,*
 1, 2.
59. *Cypræa caurica*, add.
Cypræa dentex. *Humph. Cal. Cat. No. 116.*
Cypræa elongata. *Perry, Conch.*
 Icon. *Gualter, t. 15, f. AA. and X.* *Perry's Conch. t. 22, f. 5.*
Wood's Cat. t. 17, f. 43.
 Var. 2. *Incompleta*, add.
Cypræa tabescens. *Solander's MSS.?*
Cypræa stolidia. β . *Gmelin, Syst. Nat. 3416.*
 Icon. *Martini, i. t. 294, f. 295?* Copied in *Wood's Cat. t. 17,*
f. 46?
60. *Cypræa Moneta*, add.
 Icon. *Perry's Conch. t. 22, f. 4.* *Wood's Cat. t. 17, f. 43.*
 Var. 2. *Incompleta*, add.
Cypræa icterina. *Lam. Ann. Mus. xvi. 91.* *Hist. vii. 327.* *Zool.*
Journ. i. 386, n. 50.
 Icon. *Petiver, Gaz. t. 97, f. 9.*
 Var. β . *rosea.* Shell fleshy white, with two reddish purple bands.
Inhabits, South Sea.
62. *Cypræa Annulus*, add.
Cypræa annularis. *Perry's Conch.*
 Icon. *Perry's Conch. t. 22, f. 6.*

Var. Fossilis. Incompleta, add.

Cypræa Annulus. Var. *Brocchi*, *Fos. Subapp.* ii. 253. *Brongn. Mem. Vicent.* 12. *Basterot, Mem. Soc. Hist. Nat. Par.* i. 41.

Icon. *Menard, Mus.* 209, f. 2, 3. *Brocchi, l. c. t.* 2, f. 1, a, b.

Fossil. Piedmont near Ronca, Bordeaux.

I do not know this fossil variety; but from Brocchi's figure I should think it distinct.

63. *Cypræa Caput serpentis*, add.

Icon. *Perry's Conch. t.* 21, f. 4. *Wood's Cat. t.* 17, f. 16.

Junior, add. *Adanson, Senegal. t.* 5, f. E.? F.

64. *Cypræa Mus*. add.

Cypræa Vanelli. *Humph. Cal. Cat. No.* 120.

Cypræa autumnalis. *Perry's Conch.*

Icon. *Perry's Conch. t.* 21, f. 2. *Wood's Cat. t.* 17, f. 22.

Incompleta.

Bulla ovata, var. *Schreber*.

Bulla ferruginosa. *Gmel., Syst. Nat.* 3431. *Dillw., Rec. Sh.* 477.

Icon. *Martini, i. t.* 22, f. 209, 210.

The shell when very young is short ovate, orange yellow, varied with obscure transverse darker undulations, and two very obscure pale narrow bands; spire small; suture very deep, the back part of the last partly covering the others; apex mammillary. *Mus. Stutchbury*.

Tuberculata.

When full grown this shell has a large tubercle on the back just over the spire, so as to have very much the appearance of the *C. moneta*. *Mus. Stutchbury, nost.*

64*. *Cypræa Deshayesii*.

Fossil. ——— *Mus. Deshayes*.

A very large species, three times the size of *C. Mus*. I saw it in the cabinet of M. Deshayes, at Paris; it is nearly allied to *C. Mus*, and like it has very few and obscure teeth on the lips. It has a large tubercle on the back like the last-mentioned variety of the former species. *M. Deshayes*

informed me that it had been referred to the genus *Cassis*, but it is evidently a Cowry.

65. *Cypræa angustata*.

Erase *brunneo rufescente*, and add,
Albido-fuscâ, minutè fusco-maculatâ.
Decorticata, testâ brunneo-rufescente.
Cypræa maculata. *Perry's Conch.*

Icon. *Perry's Conch. t. 20, f. 5. Wood's Cat. t. 17, f. 52.*

When complete, the back of the shell is pale whitish brown, with a broad subcentral dorsal line, and minutely freckled with brown specks.

I have only seen one specimen in this state, which is in the rich and curious collection of Cowries of Mr. S. Stutchbury.

70. *Cypræa Turdus*, add.

"*Cypræa arenosa*. Solander's MSS." *Dillw.*
Cypræa pantherina. Jun. *Dillw., Ind. Lister.*
Cypræa ovata. *Perry's Conch. t. 21, f. 3.*

Icon. *Savigny, Egypte, t. 6, f. 31.*

Incompleta. Testâ luridè plumbeâ; basi albidâ; marginibus fusco-punctatis.

When young, dull lurid lead colour, without bands; base white; margin ornamented with brown dots.

From observation of the young of several species of the dentated and ribbed Cowries, it appears that they are not so distinctly banded as the young of the smooth sections of the genus.

71. *Cypræa spurca*, incompleta, add.

Icon. *Cypræa Bandata*. *Perry's Conch. t. 20, f. 2.*

73. *Cypræa gangrenosa*, add.

Cypræa scabiosa. *Humph. Cal. Cat. No. 103.*

Icon. *Wood's Cat. t. 17, f. 56.*

74. *Cypræa erosa*, add.

Cypræa stellata. *Perry's Conch.*

Icon. *Perry's Conch. t. 22, f. 2.*

Junior.

Cypræa fasciata. Perry's *Conch.*

Cypræa similis. Gmelin, *Syst. Nat.* 3421.

In Mr. Stutchbury's collection there is a curious diseased specimen of this species: the shell is angulated in the middle, and the margin is rounded and scarcely denticulated, except in the front, which exhibits the short brown lines as in the type specimens; but the peculiarity consists in the dark spot, usually placed on the centre of each side, being diffused over nearly the whole base, and especially over the lips of the mouth, which are of a black purple colour and very obscurely toothed; the back nearly resembles the type.

Var.

"Testâ sub-albidâ, fusco purpureo lineatâ et punctatâ." Sowerby,
"Tank. Cat. 84."

75. *Cypræa ocellata*, add.

Icon. Wood's *Cat. t. 17, f. 54.*

76. *Cypræa Lamarckii*, add.

β. basi albidâ impunctatâ?

γ. Tota alba, obsoletissimè punctata.

Shell livid white, with very obscure indications of the opaque white spots only to be seen in peculiar directions. I first mistook this variety for a worn specimen of *C. eburnea*; but I have since seen other specimens, especially in the rich cabinet of Mr. Broderip, which show its true place to be with this species.

77. *Cypræa Listeri*, add.

"*Cypræa marginalis*. Solander's MSS." Dillw. *not in descr. Cat.*

Icon. Wood's *Cat. app. t. 3, f. 4.*

78. *Cypræa helvola*, add.

Cypræa stellata. Humph. *Cal. Cat.* 107.

Cypræa calcedonia. Perry's *Conch.*

Cypræa derosa. Risso, *Hist. Nat. del' Eur. Merid.* iv. 238.

Icon. Petiver, *Gaz. t. 96, f. 10.* Gualter, *t. 15, f. Z, t. 14, f. F.*
Perry's *Conch. t. 19, f. 6.* Wood's *Cat. t. 17, f. 53.*

Risso has confounded it with *C. erosa*.

I have a very curious monstrosity of this shell, which appears to have had the outer lip broken off just as the teeth were beginning to form; the teeth of the inner lip are completely formed and white, the mouth is wide, and the edge of the outer lip is simple, thick, with a very few small obscure denticulations on its inner and on the front part of its outer edge; the spire is distinct, enamelled, and slightly ribbed, like the spire of a Harp.

This shell might, in the present mania of genus making, very easily be considered as the type of a new one.

While speaking of monstrosity, I may mention that there is a specimen of *Haliotis Midæ*, presented to the British Museum by Mr. Pratt, of Bath, which is perfectly destitute of perforations. This is evidently caused by the shell having been broken, from where the holes are closed; the animal, in its haste to repair the mischief, has not stopped in his labours to form the holes, but has simply left a slight notch for the passage of the water to the gills.

79. *Cypræa citrina*, add.

Icon. *Wood's Cat. app. t. 3. f. 9.*

80. *Cypræa poraria*, add.

Icon. *Petiver, Gaz. t. 80, f. 7. Wood's Cat. t. 17, f. 55.*

82. *Cypræa eburna*, add.

Icon. *Savigny, Mem. Egypte, t. 6, f. 33?*

83. *Cypræa guttata*, add.

Cypræa Jenningsia. Perry's Conch.

Icon. *Perry's Conch. t. 19, f. 4. Wood's Cat. t. 17, f. 11. Zool. Journ. ii. t. xviii, f. 1, 2.*

Erase the reference to Gualter. All the above figures appear to be from the same specimen, now in the rich cabinet of Mr. Broderip.

84. *Cypræa Staphylæa*, add.

Cypræa granulata. Humph. Cal. Cat. 105.

Icon. *Petiver, Gaz. t. 96, f. 15, t. 98, f. 15. Wood's Cat. t. 17, f. 61.*

86. *Cypræa Madagascariensis*, add.

Icon. *Wood's Cat. t. 17, f. 61.*

87. *Cypræa Nucleus*, add.

Cypra gemmosa, *Perry's Conch.*

Icon. *Perry's Conch. t. 23, f. 6. Wood's Cat. t. 17, f. 62.*

88. *Cypræa Cicercula*, add.

Cypræa citrina, *Humph. Cal. Cat. n. 101.*

Icon. *Gualter, t. 14, f. M. Wood's Cat. t. 17, f. 65.*

Erase the reference to Bonanni, which belongs to *C. Globulus*. Add to the description, teeth whitish, base with four deep brown spots.

89. *Cypræa Margarita*, add.

Icon. *Wood's Cat. t. 17, f. 66.*

The shell which I have described was, as I have observed, incomplete; and I am doubtful, on re-examination, whether it may not be the young of *C. Cicercula*.

Mr. Sowerby having shewn me a shell which Mr. Humphreys had in his collection under the above name, which appears to be distinct, I take the opportunity of describing it.

Cypræa Margarita.

Testâ ovato-globosâ, ventricosâ, lævigatâ, albido lutescente, punctis albis irregularibus adpersâ; extremitatibus subproductis; basi albâ, convexâ; marginibus incrassatis; aperturâ angustâ productâ; dentibus minutis approximatis.

“*Cypræa Margarita. Soland., MSS.*” *Humphreys.*

Porcellana Margarita. Humphreys, MSS.

Pearl Porcelain Shell. *Humphreys.*

Icon.

Inhabits, “*Tinian, South Seas. Per Commod. Byron.*” *Humphreys.*

Shell ovate globular, ventricose, smooth, polished, yellowish white, with scattered irregular-shaped opaque white spots; extremities rather produced; base white convex, thickened, polished; edges thickened; distinctly margined on the outer side and at the extremities, with a considerably produced end, on which are two or three denticulations, as if

88 Mr. Gray's *Additions to a Monograph of Cypræa*.

they were the remains of ribs; the hinder extremities with a slight pit on the side of the spire, the front sharply margined over the groove; the mouth is very narrow, considerably longer than the shell; the teeth are minute, very close together, those of the hinder extremity with the groove slightly extending over the base; the front of the outer lip shelving inwards, grooved; the front of the columella with a broad, rather deep, grooved concavity. Smaller than *C. Globulus*.

90. *Cypræa Globulus*, add.

Cypræa Cicercula, *Perry's Conch* ?

Icon. *Perry's Conch. t. 23, f. 7. ? Wood's Cat. t. 17, f. 67.*

Add to the description; teeth extending in a brown ridge half over the base.

90*. *Cypræa annulata*, n.

Testa ovato-globosâ, ventricosâ, lævi, albidâ, punctis ocellisque luteis ornata; lineâ dorsali nullâ; extremitatibus rostratis.

Cypræa annulata, *Zool. Jour. i, 518. nom. nud.*

Porcellana Argus minor. Humphreys.

Inhabits Pacific Ocean, King George's Islands. *Humphreys.*

Shell ovate-oblong, smooth, white, with scattered yellow spots surrounded by bright fulvous; spire covered; base white, rounded, polished; extremities callous, slightly compressed and rounded; mouth narrow, lips finely denticulated; columella with a deep concavity in front.

I have referred to this species in the description of *C. Globulus*. Mr. G. Sowerby shewed me some specimens of it in Mr. Humphrey's collection, and several others have been lately brought to this country.

91. *Cypræa Childreni*, add.

Icon. *Wood's Cat, app. t. 3, f. 16.*

ART. IX. *On some new species of Pentatremitis**. By
G. B. SOWERBY, F.L.S., &c.

IN offering the following descriptions of some hitherto undescribed *Pentatremitis* I beg in the first place to present my grateful acknowledgements to Mr. Gilbertson, of Preston, who has been so obliging as to communicate them together with some observations, which I take the liberty of transcribing; and then to express a hope, that the brief detail concerning them which I am enabled to give may not prove entirely useless in the cause of Science.

Spec. 6. *PENTATREMITES angulata*.

P. subglobosa, obtusè pentagonalis, infra paululum latior. *Scapulares* maximæ, elongatæ, ferè ad centrum supernè attingentes, emarginationis interscapularis angulo obtusissimo. *Inter-scapulares* minimæ. *Ambulacra* linearia, ad basin prominentia.

This species is nearly globose, but it is rendered obtusely pentagonal by the prominence of the *ambulacra*, and it is a little wider at the lower than at the upper extremity. The *pelvis* is not sufficiently preserved, in the only two specimens I have seen, for me to describe its particular form. The *scapulars* are very large, much elongated, reaching nearly to the centre at the upper end, where the angle formed by their junction with the inter-scapulars is very obtuse. The *inter-scapulars* are very small, *ambulacra* linear, prominent at their bases.

This species may be easily distinguished from the *P. Derbyensis* by the size of the inter-scapulars, "the division of the second row of plates (inter-scapulars) being" according to Mr. Gilbertson, "very near the apex,

* The appellation by which Say has designated this genus is here, for reasons which will be obvious to the classical student, changed from *Pentremites* to *Pentatremitis*.

“ whilst in the *P. Derbiensis* it is at a very small distance from the “ pelvis.”

“ The *Pentatremites*,” I am informed by Mr. Gilbertson, “ are all from the Calamine mines belonging to the Duke of Buccleugh, near Whitwell in Bowland, on the Lancashire side of the Odder.”

Spec. 7. *PENTATREMITES inflata*.

P. subpyriformis, glabra. *Pelvis* magnus, elongatus, gradatim major. *Ambulacra* brevia, linearia, ad basin prominentia.

Unquestionably very distinct from *P. pyriformis*, which is much more nearly related to *P. florealis*; the present species has, however, nearly the same shape; it is smooth, and the *pelvis* is remarkably large, increasing in thickness upwards: as far as I can judge from the only individual I have seen, it consists of three plates, as in the other species. The imperfect state of its preservation prevents me from ascertaining the line of junction of the scapulars with the inter-scapulars; the *ambulacra* are linear, short, and prominent, which renders it pentagonal in general form when observed from above.

“ At the apex it is not perfect enough to enable us to determine “ whether it has five orifices, or whether it is differently formed from “ *P. elliptica* in that respect.” *

Spec. 8. *PENTATREMITES oblonga*.

P. oblonga; ad basin truncata, pentagonalis. *Pelvis* parvus, concavus. *Scapulares* maximæ, elongatæ, decussatim striatæ, et rugosæ, ferè ad

* Upon the subject of these orifices I here add a note of Mr. Gilbertson. “ The five orifices at the apex have hitherto escaped observation, they are very “ perfectly shown in the specimens, one of them is invariably much larger “ than the others, in this their structure approaches the *Echini*; but the mark “ of adhesion of a column and the division of the pelvis into three pieces, con- “ nect them with the *Crinoidea*.” I however beg to refer to Vol. II. p. 313 of this Journal, where it will be seen that these orifices were noticed by Say, who says, “ *Summit* with five rounded openings (ovaries).” Its name also appears evidently to have been applied from that circumstance. The fact of one of the five being invariably larger than the remaining four orifices had not, I believe, been before observed.

centrum supernè attingentes. *Inter-scapulares* minimæ. *Ambulacra* elongata, gradatim supernè latiora, ad basin prominentia.

In general form this species is elliptical, or oblong; truncated and pentagonal at the base; the *pelvis* is small and concave; the *scapulars* large, elongated, decussately striated and longitudinally rugose, reaching to within a short distance of the upper centre. The *interscapulars* are very small, and the *ambulacra* elongated, increasing in width towards the upper part, and prominent at the base.

Mr. Gilbertson observes, "the upper division of the plates" (*interscapulars*) "of this *Pentatrematite* is very near the apex, and can scarcely be distinguished without a good magnifier; one of the top plates has been removed by accident, and will direct your attention to the division of the others." The species may, moreover, be distinguished from *P. elliptica* by the greater width of the *ambulacra* at the upper than at the lower part.

Besides the three new species described above, which will be figured in the supplementary plates, Mr. Gilbertson has communicated another, which appears to be an elongated variety of *P. ellipticas*, inasmuch as it differs merely in general form from the ordinary specimens of that species.

ART. X. *Extracts from a Letter addressed by Capt. PHILLIP PARKER KING, R.N., F.R.S. and L.S., to N. A. VIGORS, ESQ., on the Animals of the Straits of Magellan.*

[Concluded from Vol. III. p. 432.]

38. A species of *Columba*.—So many species of this family have lately been described, and particularly from South America, that I hesitate in assigning this bird a new name. It is different, however, from

any species which I have hitherto seen; and I venture to characterise it, aware of course that my name will sink into a synonym, if the bird should prove to have been previously described.

COLUMBA MERIDIONALIS.

Col. brunnescenti-plumbea, subtus rufescens; colli lateribus purpureo nitore splendentibus, genis pennisque secundariis nigro maculatis, rectricibus apice griseo fasciâque subapicali nigra.

The top of the head and the lower part of the back, the sides of the *abdomen*, and the under wing coverts are of a light lead colour; the remainder of the upper parts are of a still lighter brown, and the throat whitish. The bill is black, the legs reddish yellow. The length of the body is $9\frac{1}{2}$ inches; of the bill, $\frac{5}{8}$; of the wing from the carpal joint to the extremity of the second quill feather, $5\frac{1}{8}$; of the tail, $4\frac{1}{2}$; of the *tarsi*, $\frac{3}{4}$.

39. One of the *Night Bitterns*, and much resembling the young of our own. I do not wish to say more of this bird. Much confusion already exists as to the species of the group to which it belongs; and mine being a young bird, I fear I should only add to this confusion were I to attempt to describe it. I shall endeavour to procure more information respecting it, and others of the doubtful species which I now send home, during my next trip; when I hope to have more leisure than hitherto for attending to the differences in age, and the peculiarities in habits of the birds that come in my way.

40. Is not this *Totanus fuscus*? I can see no material difference in general appearance between it and the European species. The very wide dispersion of the *Wading*, as well as of the *Raptorial Birds*, has long been a subject of interest; and the present species appears to me to be a striking example of the great range to which some species of the former order extend. I cannot, however, vouch for more than the general appearance of the bird. Our home Ornithologists will, I hope, turn their attention to this point, and decide whether my conjectures are right or not.

41, 42. Specimens of the true *Scolopax*.—These birds approach our own *common Snipe* so nearly, that I should not venture to detach them

from that species, were it not for the discrepancy that exists in the proportions of the *tarsi* of both birds. This is a strong character among the *Scolopaces*, and one upon which great stress is laid in the discrimination of the European species. As the true *Scolopax* is a restricted group, I feel less hesitation in describing our Magellanic bird as new, from there being so few points of comparison to refer to.

SCOLOPAX MAGELLANICUS.

Scol. supra brunneus, rufo fulvo nigroque maculatus undulatusque; abdomine medio albo; pectore brunneo rufoque sparso; tarsi brevibus.

The chief difference between this bird and the *Scol. gallinago* consists, as I have already observed, in the inferior length of the *tarsus* of the former. In the American bird that member scarcely exceeds an inch in length; in the European it is an inch and three-eighths. The bill also is shorter. Besides the difference in the proportions of these members there is also a perceptible difference in the markings of the two birds. Although the colours and the general disposition of them is the same in both, the American species is much less strongly marked than our native bird. The three longitudinal fulvous streaks that run from the front to the hind head of the latter are nearly wanting, or supplied only by a few fulvous spots irregularly disposed in the former. The strikingly conspicuous streaks also of the same colour that form so distinguishing an ornament along the back of *Scol. gallinago* are less frequent and considerably more narrow in *Scol. Magellanicus*. The tail feathers in this latter bird are sixteen in number. The outer feathers are lighter in colour, having no brown or fulvous markings, and they are much narrower, particularly the outside feathers, than in the European bird. The length of the bird from the front to the end of the tail is $8\frac{1}{2}$ inches; of the beak, $2\frac{1}{3}$; of the wing from the carpal joint to the end of the first quill feather, 5; of the tail, $2\frac{1}{3}$; and of the *tarsi*, $1\frac{1}{8}$.

43. A species of *Rhynchæa*, Cuv.—I consider this bird as one of the most interesting acquisitions made in our voyage. This singular and strongly marked genus has been hitherto considered peculiar to the Old World, and two species only having been discovered, an additional species from the New World is an important accession to science. The form of our Magellanic bird accords accurately with that of the Old World

species, the bill being distinguished chiefly by its inferior length. The general appearance of the plumage also is similar, although it possesses sufficiently distinctive characters to authorise us to pronounce the species distinct.

RHYNCHÆA OCCIDENTALIS.

Rhynch. supra brunnea, capite summo pectore alisque saturatoribus, fulvo undulata strigataque; abdomine, maculâ utrinque pectorali, maculisque alarum, albis; strigâ frontali brunnea.

The quill feathers of this bird are brown above, with white spots on the outer, and white *fasciæ* on the inner web: beneath they are of a light fuscous colour with similar markings. The under wing coverts are white, those nearest the outside being marked with fuscous. The sides of the *abdomen* and the under tail coverts are slightly tinged with rufous. The tail feathers are of a light brown, and are marked by several undulating narrow *fasciæ* of a fuscous colour. The legs and the base of the bill are of a lead colour, the remainder of the latter member being nearly white. The length of the bird from the forehead to the end of the tail is 7 inches; of the bill $1\frac{2}{3}$; of the wing from the carpal joint to the extremity of the first quill feather, $4\frac{1}{4}$; of the *tarsus*, $1\frac{5}{16}$; of the tail, $1\frac{3}{4}$.

44. This and the following bird are species of *Rallus*, of which I find no description. The first, or the larger species, has a number of strong black shining hairs intermingled with the front feathers of the head; a character, which I have not found noticed by any writer. These may be unimportant, perhaps temporary, appendages; they form, however, so striking a character, as the bird lies before me, that I cannot avoid drawing the conclusion, from their not having been observed upon, that the bird itself has been hitherto undescribed.

RALLUS SETOSUS.

Rall. supra brunneus, dorso alisque nigro notatis, subtus plumbeis; remigibus primariis rectricibusque fuscis, his saturatoribus; fronte setoso.

The feathers of the lower part of the back, and of the secondary quill feathers are marked with black in the centre. The bill is of a fuscous brown, red underneath at the base, and yellow at the tip. The legs are yellow. The length of the bird from the forehead to the extremity

of the tail is 10 inches; of the bill, $1\frac{1}{8}$; of the wing from the carpal joint to the end of the second quill feather, $4\frac{7}{8}$; of the tail, 3; of the *tarsus*, $1\frac{5}{8}$.

45. This small *Rail* also appears to me to answer no previous description. It partially agrees with M. Vieillot's description of *Rallus olivaceus*; but the lower parts are plumbeous instead of "gris fauve," as in M. Vieillot's bird.

RALLUS ANTARCTICUS.

Rall. supra brunneus, nigro strigatus; subtus plumbeus, femorum tetricibus crissoque atris, albo-fasciatis.

The throat is whitish. The upper wing coverts are reddish brown, sparingly marked with black and white near the wing joint. The bill is brown; the legs yellowish. The length of the body is $7\frac{1}{2}$ inches; of the bill, $1\frac{1}{4}$; of the wing from the carpal joint to the end of the second quill feather, $3\frac{3}{4}$; of the tail, $1\frac{3}{4}$; of the *tarsus*, $1\frac{5}{8}$.

46. A *Coot*.—This bird might at first sight pass for a *Gallinule*, and, from its general markings, for our British species *Gall. chloropus*. The lobated toes however mark it as belonging to the genus *Fulica*, although the lobes are not as deep as in the typical *Coots*. The species seems to form an intermediate passage between the two groups; more particularly as the narrowness of the front brings the bird nearer the *Gallinules* than the *Coots*. I find no description of any species of this latter genus which accords with my bird. Were the toes edged with a narrow membrane, instead of being festooned, I should be inclined to consider it a variety of our *Gall. chloropus*.

FULICA CHLOROPOÏDES.

Ful. capite, collo superiore, caudâque atris; corpore reliquo atro-fusco, crisso albo.

The lower feathers of the *abdomen* of this bird are slightly tipped with white. The bill is red from the base, yellow at the tip. The legs are fuscous inclining to red. The length of the body is 15 inches; of the bill, $1\frac{1}{4}$; of the wing from the carpal joint to the extremity of the second quill feather, $6\frac{1}{2}$; of the tail, 3; of the *tarsi*, 2.

47. A second species of the same genus, in which, although the toes

have the full character of the lobated membrane, the bill and forehead bring it near the *Gallinules*, as in the last species. Of this bird I find no previous description.

FULICA GALLINULOIDES.

Ful. atro-fusca, dorso saturatiore, capite atro, gula albo-notatá, crisso albo, rostro angusto, in frontem parum extendente.

The throat is partially marked with white, which character however may be but temporary, the bird being evidently a young individual. The general appearance of the bird accords closely with that of the last species; so much so as to make me hesitate in separating them were it not for the disproportion that exists in the width of the lobated membrane, and the considerably greater size of the present bird. The shape of the bills also differs: in *Ful. chloropoides* it extends much further into the forehead, and the line which the forehead forms with the bill is much straiter, than in *Ful. Gallinuloides*.

48. A specimen of the *Chionis Forsteri*. This bird flew on board our ship when about two hundred miles from land.

49. An *Oyster-catcher*, which I believe to be the *Hæmatopus palliatus* of M. Temminck.

50. This bird approaches very closely to our *Golden Plover*; but I believe it to be distinct. I cannot however compare it with the European bird, and consequently must call upon our British Naturalists to ascertain the fact.

51, 52. I find no exact description of these little *Plovers*, although they seem to approach several well known species. A great similarity of colouring and markings is found in all these species, but I cannot recognise in any descriptions of them the decided red breast, and single black collar that distinguishes our birds. I shall venture to describe them.

CHARADRIUS RUBECOLA.

Char. capite summo, dorso, alis, caudáque supra grisescenti-fuscis, thorace nucháque pallidè griseis; pectore rufo, collari subpectoralis nigro; fronte, strigá superciliari, abdomine, crisso, rectricibusque lateralibus albis.

There is the rudiment of a spur on the point of the wing of this bird. The under-wing coverts are white with a few black marks on the outside feathers. The bill is black, the wings fuscous. The length of the body is $8\frac{2}{3}$ inches; of the bill, $\frac{3}{4}$; of the wing from the carpal joint to the end of the first quill feather, $5\frac{2}{3}$; of the tail, 3; of the *tarsi*, $1\frac{1}{4}$.

53. This beautiful bird I consider to be the female of the *Anser Magellanicus*.—There appears to me to be much confusion in the description of the various alleged species of the *Geese* of this country. I have some doubts as to these species being really distinct. My bird differs in some points from the descriptions of all of them, and in others agrees with them all. The male, of which I could not procure a specimen, is pure white.

54. A beautiful *Duck*, of which I have not been able to find a description.—

ANAS RAFFLESII.

An. castaneo-rufa, capite abdomineque medio saturatioribus; notis dorsi, remigibus, caudâ supra, crissoque nigris; ptilis cœruleis, pteromatibus albis, speculo alarum viridi.

TAB. SUPP. XXIX.

The body of this bird is of a deep and shining chestnut red, the upper part of the head and the middle of the abdomen being of a much darker shade, inclining to black. The feathers of the back are marked with black semilunar spots in the centre, some of the scapulars being beautifully striated with bright buff, black, and light blue. The wing and tail feathers are black above, fuscous beneath. The under wing coverts are black at the carpal joint, and along the edge of the wing; the lower feathers are white. The bill is black; the legs yellow. The length of the bird from the end of the bill to that of the tail is 20 inches; of the bill, 2; of the wing from the carpal joint to the end of the second quill feather, $7\frac{3}{4}$; of the tail, 4; of the *tarsi*, $1\frac{3}{8}$.

I cannot let the opportunity pass by which has been afforded me by the discovery of this beautiful bird, of paying a tribute, slight as it is, of gratitude and esteem to my late lamented friend, Sir T. Stamford Raffles.

55. Another apparently undescribed species of the *Anatidæ*.---In fact all the birds of this family which I have met with in the Straits appear to me to be new, with the exception of the *Anser Magellanicus*; and they are all distinguished by their beauty. Nothing can be more brilliant than the *speculum* of the bird I am about to describe.

ANAS SPECULARIS.

An. capite summo, dorso, alis, caudâque nigris; subtus pallidè griseus, pectore brunneo undulato: speculo lato purpurascenti-aureo splendente, fasciâ atrâ alterâque albâ marginato: maculâ utrinque suboculari, mento, thoraceque albis.

A suboval spot of white marks the fore cheeks of this bird on each side between the bill and the eyes: the throat has a narrow streak of the same colour, which extends from the lower mandible to the breast, before arriving at which it spreads into a wide patch on each side of the neck, but does not surround the neck. The upper part of the back is fuscous, the feathers being edged with light gray; the lower part is shining black. The under parts of the bird are of a light gray, the breast being mixed with reddish brown, the upper *abdomen* faintly fasciated with the same colour, the middle slightly fasciated with fuscous, and the lower being quite plain. The *speculum* of the wing is broad and splendidly shining with a golden purplish lustre: a *fascia* of deep black succeeds the purple, and a narrow band of white margins the black. The under wing coverts are entirely black. The bill is black; the legs red. The length of the bird is 26 inches; of the bill, $2\frac{2}{3}$; of the wing, from the carpal joint to the extremity of the second quill feather, 11; of the tail, 6; of the *tarsi*, $2\frac{1}{4}$.

56. A second species of *Duck*, very similar to the last; but distinct.

ANAS SPECULARIOIDES.

An. capite summo corporeque supra fuscis; subtus pallidè griseus, pectore rufo-brunneo fasciato; remigibus, crisso, rectricibusque atris; speculo subangusto purpurascenti-aureo splendente, fasciâ atrâ, alterâque apicali albâ.

The general appearance of this bird is similar to that of the last; and it might at first sight be taken for the female, or a young male of the

species; the latter more particularly, as it is apparently a young bird. The bill however differs in shape, the *speculum* is narrower, and the white streak in the wing broader than in the last species; while the legs are black, not red. The colours of the under wing coverts will be seen also to differ. The front and sides of the head and neck are speckled with black. The *abdomen* is marked with reddish brown. The under wing coverts are black with white feathers in the centre. The secondary quill feathers forming the *speculum* are of a brilliant golden purple on their outside edge at the base, with a black *fascia* succeeding the purple, and a white *apex*. The bill is black above, beneath yellow; the legs are black. The length of the bird is 24 inches; of the bill, $2\frac{1}{8}$; of the wing, from the carpal joint to the extremity of the second quill feather, $10\frac{1}{2}$; of the tail, 6; of the *tarsus*, $1\frac{1}{2}$.

57; 58. Another species, approaching to our *Teal*, not uncommon, but of which I find no preceding notice.

ANAS CRECCOIDES.

An. pallidè brunneo-griseus, fusco sparsus notatusque; dorso imo, ptilisque fuscis, his apice rufo; speculo nigro, fulvo marginato.

The head and neck of this bird are finely marked with fuscous dots, those of the neck lying nearly in transverse lines, thus forming several undulating *fasciæ*. The feathers of the upper part of the back are of a brownish gray, and are marked in the centre by oval fuscous spots. The scapular feathers are similarly marked by larger central black *striæ*, which in some lights are of a brilliant green. The lower part of the back is of an uniform fuscous colour. The upper wing coverts are fuscous; the *apices* of the lowest range of feathers being terminated with rufous, which colour forms a narrow *fascia* across the wing immediately over the *speculum*. The external secondary quill feathers are black on their outside margin, and are terminated with light buff; the internal are fuscous on their outside web with a shade of deep green, and slightly margined with buff, the feather immediately following the black ones being of a brilliant green on the outside web. The under wing coverts are dark fuscous, with some white feathers in the centre. The breast and middle *abdomen* are whitish, the feathers of the former being strongly marked with round black spots in the centre, those of the latter being more

faintly marked, so as to exhibit irregular *fasciæ*. The bill is yellow with a black *apex*; the legs of a fuscous yellow, darker at the extremities. The length of the bird is $16\frac{1}{2}$ inches; of the bill, $1\frac{3}{4}$; of the wing, from the carpal joint to the extremity of the second quill feather, $8\frac{3}{7}$; of the tail, $4\frac{2}{8}$; of the *tarsus*, $1\frac{1}{4}$.

59. A gigantic species of *Duck*, the largest I have met with.—It possesses the lobated hind toe, with the legs thrown backward behind the equilibrium of the body, and other characters which distinguish the oceanic *Ducks* from the more terrestrial species of the family. It belongs to the group which M. Temminck has lately named *Hylobates*, without attending to the name long since conferred upon it by our countryman Dr. Fleming. The bird is a Patagonian in stature, according, at least, to the generally received signification of the word, as well as in station; and well deserves the name of

OIDEMIA PATACHONICA.

Oid. supra plumbeo-grisescens, abdomine speculoque alarum albis.

The gray colour that predominates over the entire of the upper parts of this bird assumes a lighter colour on the neck: the feathers also of the upper part of the back and of the breast, exhibit a lighter shade in the centre. The middle only of the *abdomen* is white, the sides being gray. The under wing coverts are gray above, white below. The bill is bright yellowish orange with a black knob; the legs fuscous yellow. The bend of the wing has a blunt spur. The length from the *apex* of the bill to that of the tail is 40 inches; of the bill, 3; of the wing, from the carpal joint to the *apex* of the second quill feather, 11; of the tail, 5; of the *tarsi*, $2\frac{3}{4}$.

60. A small *Grebe*, very like our British *Podiceps minor*.—I believe it, however, to be a distinct species, but I can say nothing decided of it from the want of materials for comparison.

61. A larger species of *Grebe*, that bears much affinity to our *red-necked* species: but the length and strength of the bill seem to me to keep them sufficiently distinct. Upon comparison I think it probable you will find other marks of distinction.

PODICEPS LEUCOPTERUS.

Pod. capite colloque superioribus nigris, gula griseo-albida, collo inferiore rufo; dorso fusco-atro; abdomine strigataque lata alarum albis.

The red patch that marks the fore neck of this bird is of a deep colour, and is strongly defined above, where it terminates in a square form at the distance of about two inches and a half from the base of the lower mandible. Below it is less abruptly terminated, the red feathers blending into the white and partially running down the sides of the abdomen. The first quill feathers are fuscous at their extremities and white at their base, which latter colour increases in the succeeding primaries, and prevails in the outward secondaries, but is gradually lost in the more internal ones. Underneath the quill feathers are chiefly white with a fuscous base; the under wing coverts are entirely white. The bill is black, light coloured at the tip: the legs are black. The length of the body is 20 inches; of the bill 3; of the wing, from the carpal joint to the apex of the second quill feather, $7\frac{1}{4}$; of the tarsi, 2.

62. A young bird, I think of the *Aptenodytes chrysocome*. The yellow feathers are beginning to show themselves on the sides of the head.

63. A species of *Corvorant*, nearly quite black, which I make little doubt is that mentioned by Azara as the *black Zaramagullon*, (No. 432 of his Birds of Paraguay.) The description accords very closely with my bird, except in a few trifling particulars relating to the bill. As I am not aware of the bird having received a scientific name, I shall describe it under that of

PHALACROCORAX NIGER.

Phal. intense niger, circulo angusto ab oculis descendente, mandibulasque circumcingente, paucisque genarum capitisque plumis albis.

The circle of white which margins the bill, does not extend to the front of the head. The narrow white feathers are rarely spread on the sides of the head and neck: the number and extent of these probably vary according to the age of the bird and the season of the year. The feathers of the upper part of the back, scapulars, and upper wing coverts

are of a less intense black in the centre than on the margins, and thus give the bird a sort of mottled appearance, as is common in this genus, when viewed in a strong light. The quill feathers underneath are pale fuscous: the under wing coverts deep black. The tail consists of twelve feathers, the shafts of which are much weaker, particularly towards the *apex*, than in the other species which I have seen of this group: the webs also are much broader, and the *apices* of them seem not at all worn. The bill, which is unusually rugged, and the legs, are black. The length of the bird is 31 inches; of the bill, $3\frac{2}{8}$; of the wing, from the carpal joint to the extremity of the third quill feather, 11; of the tail, $7\frac{1}{2}$; of the *tarsi*, 2.

64. Another species of *Corvorant*, which I also think new.

PHALACROCORAX ATRICEPS.

Phal. capite supra corporeque superiore atris, inferiore albo; rostro pedibusque flavescentibus, rectricibus duodecim.

The upper parts of this bird are entirely black, the under white; the line of demarcation being strongly marked between the two colours. The white extends very far back upon the neck, leaving a streak of black, of somewhat more than an inch in width running down the centre of the upper neck. The upper wing coverts, and tail feathers are of a more fuscous colour than the rest of the upper plumage. The tail feathers are twelve in number; the shafts are strong, the webs narrow, and much worn. The bill and legs are light coloured, inclining to yellow. The dimensions are nearly the same as those of the last bird, except those of the bill, which is a quarter of an inch longer. This member is quite smooth.

65. This appears to be a young bird of a species nearly allied to the last. It has however fourteen feathers in the tail instead of twelve. The bill and legs also are much redder than in *Phal. atriceps*. It also possesses a singular longitudinal white tuft of feathers on each side of the neck, which I have not before observed in this genus. This may be indeed but an appendage of the young bird; but it is too marked a character in our specimen to be passed over without notice. I am almost doubtful of the propriety of describing this bird; but shall venture to

do so in the hope of pointing out its characters to others who may have the opportunity of determining whether it is the young of any known species, or distinct.

PHALACROCORAX CIRRIGER.

Phal. supra fusco-griseus, subtus albidus; gula, cirroque longitudinali per collum utrinque descendente, albis; rostro pedibusque rubris; rectricibus quatuordecim.

The middle of the feathers of the back and of the wing coverts are of a lighter colour than the rest of the feather, as is usual in this genus. The tuft which descends from the throat on each side of the neck is about three inches in length. The under wing coverts are of the same griseous colour as the back. The quill and tail feathers are fuscous; the latter are rigid with narrow webs, and are much worn. The length of the body is 26 inches; of the bill, $3\frac{3}{8}$; of the wing from the carpal joint to the extremity of the third quill feather, 10; of the tail, 6; of the *tarsi*, $1\frac{3}{4}$.

66. A species of *Gull*, which the plumbeous colour of its plumage, and the deep sanguine red of the bill and legs render different from any I have ever seen.

LARUS HÆMATORHYNCHUS.

Lar. corpore plumbeo-griseo, dorso medio alisque nigris, his albo notatis; rostro pedibusque sanguineis.

The general colour of this bird, including that of the head, neck and abdomen, is of a light leaden gray. The tail is lighter. The middle part of the back is fuscous inclining to black; the quill feathers are black, the two outward ones entirely so, the third slightly tipped with white, and the rest with the white tips gradually increasing. The under wing coverts and quills beneath are of a plumbeous colour, rather darker than that which prevails on the neck and abdomen. The length of the bird is 18 inches; of the bill, 2; of the wing from the carpal joint to the end of the first quill feather, 13; of the tail, 6; of the *tarsi*, 2.

67, 68. A large species of *Gull* which I consider to be the same as our *lesser black-backed* species, *Larus fuscus*. As far as my recollec-

tion extends of that species I can discern no difference.*

69. A young *Gull* apparently in the plumage of the first year; its feathers as usual in that stage being mottled. It agrees pretty well with the last species in its general proportions; the bill is black, as I believe to be the case in the young of *Larus fuscus*.

70. Another species of *Gull*, that appears to me to be the same as our *Larus ridibundus*.

71. A young bird that I consider the same as our *Skua Gull*, *Lestris catarrhactes*.—I much wish that these four last specimens of *Gulls* should be compared with the species to which I have referred them; actual comparison only can determine whether they are the same as our species or not.

72. This large species of *Petrel* I believe to be the the young of *Procellaria gigantea*.—It is true that it is entirely of one uniform, sooty or blackish colour, while the *Giant Petrel* is described as having much white beneath. But the bird is evidently young, and may in an early stage differ from the adult in wanting the white markings.

73. This *Petrel* I think will prove to be the same as our *Fulmar Petrel*; I cannot, however, at this distance determine the point.

74, 75. Specimens of the *Pintado Petrel*, *Procellaria Capensis*.—This species seems to be spread over the whole of the Southern Hemisphere.

76. A specimen of the newly characterised species, *Procellaria Berardi*.

77. This is the *Petrel* which the Prince of Musignano has lately described under the specific name of *Wilsonii*. It is one of your genus *Thalassidroma*.

* Upon comparing Capt. King's birds with several British specimens, I find little material difference, except in the proportions of the bill; that of the Magellanic bird being much stronger. *Ed.*

78. A head and bill of the *Man of War Bird*, *Diomedea exulans*.—
The body was too bulky to transmit to you.

Upon looking back to the number of the species, which I have considered as new, in the foregoing notes, I almost fear that I am involving myself and the science in many errors, when I find how great is the proportion which they bear, in so small a collection, to those which I have set down as having been described. You will remember, however, that the country from which they come has been as yet but little investigated. You will, moreover, make allowance for the few materials which I have for comparison and reference; and take into consideration that I have had no means of consulting the works of the more recent voyagers who have touched on the Zoology of these parts. To you, therefore, I must look for the corrections of my errors.

I am, my dear Sir,

most sincerely your's,

PHILLIP PARKER KING.

ART. XI. *Observations on some of the Mammalia contained in the Museum of the Zoological Society. By N. A. VIGORS, Esq., M.A., F.R.S., &c. and THOMAS HORSFIELD, M.D., F.R.S., &c.*

[Continued from Vol. III. p. 451.]

Ord. PRIMATES, *Linn.*

Fam. SIMIIDÆ.

Gen. SIMIA, *Erxl. et Auct.*

The Museum of the Zoological Society is, comparatively speaking, rich in the department of *Apes*: a great proportion of the species of that group, and many individuals of some of them being found in the collection. For these the Society is chiefly indebted to the zeal of their Founder, who has been so frequently mentioned in these pages, as one of the most munificent promoters and patrons of science of the pre-

sent, or of any, age. Sir Stamford Raffles's long residence in the Indian Archipelago, the chief *habitat* of the group under consideration, enabled him not merely to collect them in abundance, but to exercise his usual acuteness in the discrimination of the species. To him the Zoological collection is indebted for specimens of the *Orang Outang*, *Simia Satyrus*, Linn.; for several individuals of the *Simia syndactyla*, a species which he himself first discovered and described;* of the *Simia agilis*, (*Hylobates agilis*, Desm.), a species which he also discriminates from the *Simia Lar.*, Linn., describing† it under the native name of *Ungka puti*; and of a fourth species, closely allied to *Simia Lar.*, on which we wish to make a few observations in the present Number. The Society's collection likewise contains a fine specimen of the *Simia Lar.*, Linn., and a specimen also accurately according with the description of *Simia variegata*, Desm. This latter specimen was sent from India, in spirit, in the same jar with the former, of which it was said to be the female, (with what accuracy we cannot determine,) to General Hardwicke, who presented it to the Society.

* *Linn. Trans. Vol. xiii. p. 241.*

† *Ib. p. 422.* We cannot here pass over without notice the extreme inaccuracy, to say the least of it, of the French writers in referring to the labours of Sir Stamford Raffles. In speaking for instance of the *Hylobates agilis*, M. Lesson, in his "*Manuel*," says it is "le *Simia Lar* de Sir Raffles," [p. 31.] It is no such thing.—Sir Stamford accurately discriminates between the *Simia Lar.*, to which he refers under its native name *Ungka etam*, and the *Hyl. agilis* which he describes under that of *Ungka puti*. Of this latter species he was undoubtedly the first discriminator as well as describer, although he neglected to give it a scientific name. In like manner the discovery of the *Simia syndactyla*, although the species is allowed by M. Lesson to have been first described by "Sir Raffles," is attributed to MM. Diard and Duvaucel. These naturalists were the hired collectors of Sir Stamford Raffles. They acted immediately under his orders, and were amply remunerated for their subordinate services by his liberal pay. As well might we attribute the discoveries of Capt. Cook to the sailors who worked his vessel, as the scientific discoveries of Sir Stamford to his hired dependants. Some insight may be gained as to the characters and services of these two persons by referring to Sir Stamford's exposition of their conduct in the commencement of his paper on the Animals of Sumatra in the above mentioned volume of the Linnean Transactions.

The number of species, thus brought before us, led us to the examination of this group; with the previous descriptions of which we confess we are not much satisfied. From the confusion we have found in these descriptions we conjecture that there is either much variety of colour and markings in the species themselves, or that different species have hitherto been included under the same name. Of the *Simia Lar*, for instance, the descriptions vary considerably; in some, particularly the earlier, the species is represented as entirely black, with the exception of a narrow grayish band round the face; in others, particularly where accompanied by plates, the hands and feet are represented to be gray or whitish.

It is not our intention to enter deeply at present upon the subject of this group, which would require more leisure and consideration than we can bestow upon it, however favourable is the opportunity which our numerous specimens afford us. We may, hereafter, probably return to the subject. We shall now merely refer to the species in the Rafflesian collection to which we have already mentioned our wish to call the attention of our readers, and which appears to us distinct from all the rest of the group. These are two specimens of it. One of these accords with some of the later description and figures given of the *Simia Lar*, but disagrees with the descriptions originally given by Linnæus of that animal, in which no mention is made of the white hands. It may, it is true, be a variety, or the young of that species. But we consider that by characterizing it as distinct, the attention of those who have the opportunity of observing these animals in their native countries may be drawn to the subject, and the point be more accurately determined.

SIMIA ALBIMANA.

Sim. nigra, circulo marginante faciem, manibus pedibusque albidis.

In the specimen from the Indian continent which we consider as *Simia Lar*, the whitish bordering of the face is confined merely to the forehead; in the specimen now under consideration it encircles the whole face, and is of considerable breadth. In this latter species the whitish colour of the hands extend upwards of an inch beyond the wrist. The extremities of the fingers and the nails are black. The size of the animal from the top of the head to the extreme of the back is $14\frac{1}{2}$ inches; of the anterior arm from the tip of the shoulder to the end of the middle finger, 18; of the hind leg,

15. In these dimensions our specimen falls far short of *Simia Lar*; but we understand that specimens of our animal are often found of much greater size than that before us.

The second specimen in the Sumatran collection, to which we have alluded, accords generally with that just described in its size and markings; disagreeing with it only in colour, being of a light brownish gray, where that of the other is black. This specimen may probably be the female, or the young of the same species. Its general colour is similar to that which predominates in *Simia agilis*, and in the alleged species *S. variegata*. It is a subject well worth the consideration of those naturalists who reside in the native country of these animals, to determine whether these differences of colour are, on the one hand, owing to the changes that take place in the same individuals, or to the difference in sex: or, on the other hand, whether they really indicate a difference in species. We know that a material change in colour does take place in some species. We have a series of the *Semnopithecus cristatus* now before us, in which the young is of a bright yellowish colour; a more adult individual of the same colour, but with the head and hands iron gray; and the adult of a uniform iron gray. It is to be observed, that in this last species the extreme members first assume the appearance of the adult; while, on the contrary, in the species which we have named *albimana*, the body, not the extreme members, has the adult appearance, if we suppose the animal to be the young of *Simia Lar*.

We do not feel satisfied with the generick names given to this group. The Linnean term *Simia* has been latterly entirely rejected in the subdivisions of the family. We would suggest whether this term might not with propriety be retained for the entire group of *Apes*, and without any farther subdivision. At present there are four genera proposed for this very limited group;—*Troglodytes*, Geoff., *Pithecus*, Cuv., *Hylobates*, Ill., and *Pongo*, Lacep. The *Chimpanzee* which stands singly as the representative of *Troglodytes*,—a name, by the way, which has been equally appropriated to Ornithology,—may perhaps be with propriety separated as exhibiting a strikingly distinguishing character in its short arms. The difference however between *Simia Satyrus* and *syndactyla*, and *Simia Lar, agilis, leucisca*, &c., consisting solely in the absence or presence of naked callosities, appears to us too trivial to form the ground

of generic distinction, in so restricted a group as that of the *Apes*. The syndactyle structure of the hind-foot of *S. syndactyla* might as well be selected for that purpose. We do not, it is well known, join in the indiscriminate cry raised in this country against the institution of new generic groups. We are ourselves perhaps in some measure to be considered delinquents in this respect. But we are advocates for moderation; and wish such groups to be established only where separation is necessary in consequence of excess in the number of species, or when it may serve to point out more strongly some striking modification of character. In most groups of the *Mammalia* we do not consider that this necessity exists so much as in the older groups of *Birds* and *Insects*, where hundreds of species are crowded together in indiscriminate confusion. And the minuter differences, now advanced as discriminating genera among the former animals by the Continental naturalists, certainly strike us as carrying the practice to the extreme.

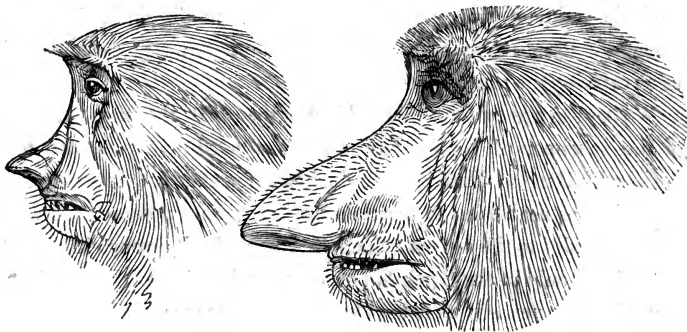
We have to add, while on the subject of the *Apes*, that the examination of the specimen of *Simia Lar*, already alluded to as presented to the Society by General Hardwicke, which was fortunately preserved entire in spirit, has enabled us to ascertain that the species possesses the vermiform appendix to the *cæcum*, which M. Blumenbach erroneously asserts* to be found only in the *Simia Satyrus* among the *Simiæ*. We conjecture that this character will be found to exist in all the true *Simiæ*.

Gen. NASALIS, Geoff.

A fine specimen of that singular species *Simia nasica*, Linn., (*Nasalis larvatus*, Geoff.) is in the Society's collection. It was brought from Borneo by a collector, who had been sent to that island by Sir Stamford Raffles during his residence at Bencoolen. Two specimens of a *Monkey* almost equally distinguished by the extension of the nose, but having that member turned up, instead of being recumbent, were brought from the same country, and in the same collection. From the difference in the shape of the nose, and more particularly from the difference in the facial angle, we are inclined to consider these latter specimens as belonging to

* See Mr. Lawrence's Translation of Blumenbach, re-edited by Mr. Coulson, 1827, p. 115.

a distinct species from *S. nasica*. It has been suggested to us that they may be the young of that animal; but we have no facts by which we can determine this point; and with so great a disproportion between the facial angles of both animals, we cannot allow ourselves to come to the conclusion that they are the same, without some stronger grounds than mere conjecture. We shall give the profiles of both these creatures; and thus pointing out the chief differences between them, we consider that we shall add as important a fact to science, even should they prove to be the young and adult of the same species, by demonstrating the change that takes place in the animal at different stages of life, as if these differences, according to our own supposition, should be found to be specifick.

*Nas. recurvus.**Nas. nasicus.*

It is to be observed that these animals were preserved in spirit, and consequently were not subject to the same contraction of the soft parts of the nose as might have taken place in dried skins.

NASALIS RECURVUS.

Nas. capite, collo, humeris, femoribusque supra rufis; abdomine pallidiore; dorso medio rufescenti-griseo; brachiis femoribusque internis, dorso imo, caudâque supra griseis; caudâ infra albidd.

The general colour and markings of this animal correspond with those of *Nas. nasicus*. The skin of the face however is reddish, where in the other species it is black. The beard is very prominent. In *Nas. nasicus* the hairs on the chin scarcely assume the appearance of a beard.

The dimensions of our animal are fully one-third less than those of our specimen of *nasicus*. On these latter points we do not wish to lay much stress: individuals of the same species in this family vary considerably in these characters. The claims of our animal to a separate specific title rest chiefly on the character of the nose and facial angle. Its teeth show no signs of being otherwise than adult. Its length from the *vertex* of the head to its heel as it stands upright is 36 inches; from the same point to the commencement of the tail, 21; the fore-foot from the heel to the end of the middle finger is 7 inches in length; the hind-foot 6.

Fam. LEMURIDÆ.

Gen. CHEIROGALEUS. *Geoff.*

The first notice, which was given of this new form among the *Lemurs*, is to be found in the MSS. of M. Commerson. Three species belonging to Madagascar are represented in the designs of that voyager, but not with sufficient accuracy in the details to enable us to recognise any decisive specific characters. Upon this authority M. Geoffroy de St. Hilaire subsequently established the genus in the *Annales du Museum*:* but no specimens of the form pointed out by M. Commerson having come under the observation of naturalists, the genus has been considered as doubtful. MM. Cuvier and Desmarest merely refer to it in their notes, and M. Lesson, although he enumerates it in the list of the genera given in his "*Manuel*," describes it as not yet authenticated.

An animal lately presented to the Zoological Society by Mr. Bell, one of the most active and liberal members of the Society, and one of the co-operators in this Journal, accords very accurately with M. Commerson's description of this genus, as detailed by M. Geoffroy. It gives us great pleasure to have it in our power to announce this fact to zoologists; which, although it does not enable us to refer the animal to any of M. Commerson's species, serves to prove the genus itself authentick. We shall not, however, enter further into the subject at present than the description of the species. The skull is perfect; but the teeth cannot be examined† with-

* Tom. 19. p. 171. pl. 10.

† The incisour teeth are conspicuous. They are four in number in each jaw. extremely regular; those of the upper jaw are unusually strong, and nearly

out the risk of injuring the specimen, unless by a more tedious process than we can at present allow it to undergo. In the next number of this Journal, we hope to be prepared to give a figure of the animal, a more detailed description, and the system of dentition.

M. Commerson's three species being but inaccurately particularised, indeed distinguished from each other chiefly by size, the largest of them, moreover, falling short of our species by at least two inches and a half, we deem ourselves authorised to consider this a new species, and to denominate it, after the name of the founder of the genus,

CHEIROGALEUS COMMERSONII.

Cheir. rufo-griseus, pectore abdomineque pallidè rufis; regione supra oculos circaque os albâ; maculâ frontali, lined utrinque ab oculis ad occiput extendente, caudæque apice nigris.

The hairs on the forehead of this animal diverge in the centre, leaving a white mark over each eye; while their extremities, being black, form a dark line on each side, which runs backward, gradually widening, to the hind head. The hairs of the body are fuscous at the base, brownish red in the centre, and black at the extremity. The red prevails along the ridge of the back, and on the base of the tail. The ears are clothed with hairs at the base inside and outside; their margins are naked. The extremity of the toes and nails are black. The length from the forehead to the root of the tail is $13\frac{1}{2}$ inches; of the tail, 17: the height from the tip of the shoulder to the wrist, 7; the length of the fore-foot from the wrist to the end of the middle nail is, $2\frac{3}{4}$; of the hind-foot, similarly measured, $3\frac{1}{2}$.

The specimen was purchased by Mr. Bell, in a preserved state, from a dealer. No note was to be obtained of its locality.

Ord. GLIRES. *Linn.*

Fam. SCIURIDÆ.

Gen. SCIURUS. *Linn. et Auct.*

The discovery of a beautiful species of *Squirrel* in the Sumatran collection, presented to the Society by Sir Stamford Raffles, gives us the cylindrical. The nails do not agree with those of M. Commerson's figures. They more resemble those of the *Monkeys*.





Sciurus Rafflesii. p. 113.

opportunity of paying another tribute to the exertions of a Naturalist to whom science already owes so many obligations.

SCIURUS RAFFLESII.

Sci. supra niger, subtus rufus; lineâ laterali ab humero extendente femoraque tegente, maculâque pone rictum albis; genis griseis.

TAB. IV.

The upper part of the head, the back and tail are of a deep black. The throat, breast, fore-legs, *abdomen*, inner part of the thighs, and hind-feet are of a deep and brilliant red. A white line runs from the shoulder along the side widening as it extends backwards, being about $\frac{2}{3}$ of an inch broad at the commencement, and $1\frac{3}{4}$ over the thighs. A large spot of white is seen at each side of the mouth, and a white border under the lower lip. The cheeks incline to an iron grey colour. The teeth are yellowish, somewhat resembling in colour those of the *Beaver*. The nails are rather light in colour. The length from the tip of the nose to the root of the tail is 8 inches; of the tail $8\frac{1}{3}$; the height from the shoulder is $3\frac{3}{4}$.

[To be continued.]

ART. XII. *Observations on the Loves of the Ants and the Aphides.* By Major Gen. HARDWICKE, F.R.S., &c.

In the course of my observations of the various habits of insects in India, I had some illustrative examples of the amusing description given by Mr. Kirby in his Introduction to Entomology, Vol. II. page 88, termed "The Loves of the Ants and the Aphides." And, I can assert, upon personal observation, that every line of page 89, is so exactly what I have several times witnessed, that it seems here unnecessary to repeat a description of the operation so correctly given in that volume. The drawing which accompanies this paper, was made at the door of my quarters, close to which was growing a strong plant of the genus *Datura*, (D. Metel); on the branches of which the Ants were busy

in the operation of milking the Aphides. The Ant is one of the largest species found in Bengal, it is common in every province, and a troublesome insect when it forms a lodgement in or near our habitations; it is about half an inch in length, the head large and obcordate, the jaws strong and many-toothed, the antennæ many-jointed, the first joint as long as all the rest: the petiole of the abdomen and the thorax nearly equal in length, and both longer than the body. Every part of the insect is of a deep black. Although a formidable insect, it never appears to offer violence to the Larva it is so busily employed among; but if a different tribe of Ants, or any other insect invades their ground, they are soon seen to be in commotion and active exertion to expel the intruders. At night they retire to their habitation, which is often about the root (as in the present instance) of the same plant;—the bite of this Ant is severe, and it tenaciously holds fast any thing into which it fixes its jaws. To the white Ants it is a formidable enemy; and whenever it comes in contact with an uncovered part of the gallery, under cover of which these depredators carry on their operations, it is quite amusing to see the havoc they make among them, each Ant of many hundreds, seizing his victim, and bearing it off to some nest of black Ants not far from the spot. In the drawing, [TAB. SUPP. xxx.] *a.* denotes the natural size of the Ant, and *b.* the same magnified.

The Larva exhibited on the leaf, is distinguished by the letter *c.*; and the perfect insect by the letter *d.*; at the letter *e.* is the same magnified. At *f.* on the petiole of the leaf are several parallel rows of cells, believed to be formed by the insect *f.*; this is a Fabrician species of *Membracis*, which we will call *Membracis tricornis*. The head, thorax, and body are black; the wings of an ash-grey colour, longer and broader than the body, and incumbent; the thorax is three-horned, two of which are placed in front behind the eyes, about as long as the thorax, strong, erect and curved outwards; the third horn rises from the posterior margin of the thorax, extending in a gentle arch the whole length of the body, and tapering to the apex. The full size of this insect is about $\frac{1}{3}$ of an inch.

On other plants I have observed the same operation going forward; but both, the Ants and the Aphides, of very different species. On some plants I have seen the under surface of the leaves covered with Aphides,

unattended by Ants; in such cases the mellifluous drops every moment produced fall on the upper surface of the leaf beneath, and which is soon covered with a shining surface, sweet and slightly bitter to the taste, and the exact resemblance of what is known in England under the name of Honey Dew. In mountainous parts of the country the abundance of this honey-like secretion, on the leaves of various trees, is very remarkable; and when dry on the leaves, it is collected and sold in the country bazaars as a sweet-meat. For more particulars of this substance, see Vol. XIV. of the Asiatic Researches of Calcutta, page 182.

THOS. HARDWICKE.

Thurlow House,
Clapham, 31st May, 1828.

Since writing the above, I have for the first time opened a box containing a specimen of the sugar described in my paper as above referred to: it has been in this tin box upwards of eight years; it was filled with some of the coarsest of the specimens I had, and by time has become a little darker, but to the taste I am not aware of any change.

T. H.

ART. XIII. *Analytical Notices of Books.*

A Descriptive Catalogue of the Lepidopterous Insects, contained in the Museum of the Honourable East India Company, illustrated by coloured figures of new Species and of the Metamorphosis of Indian Lepidoptera; with introductory Observations on a general Arrangement of this order of Insects. By THOMAS HORSFIELD, M.D., F.R.S., &c. 4to. pp. 80. Plates iv.

THE differences between a natural and an artificial system, no less in the objects aimed at than in the means employed, have been repeatedly pointed out, and have received, of late especially, the most admirable

illustration. But there is yet another point of view in which these very distinct modes of regarding the productions of the creation differ also most completely; the comparative facility of their promulgation. He who proposes an artificial system needs only that his attention should be fixed on some leading character on which to found his principal groups; on some other character by which his secondary assemblages may be distinguished from each other; on a third, a fourth, or a fifth for his minor divisions; and his work is done. Uniform principles, applied throughout the whole of her domain, enable him to give at once to the world a System of Nature, complete in all its parts, and extending from Man downwards to the *Monas*, to the *Tremella*, or to the dust.

But the investigator who aims at following Nature in the course she has herself pursued, quickly discovers that the trammels of an artificial system accord not with her infinite variations; that the character, on which in one department the utmost reliance is to be placed, becomes in another perfectly valueless; and that the minute distinctions, which may here be passed unnoticed, require elsewhere to be dwelt on with critical niceness. He finds that it is requisite not only to take into consideration the whole of the organisation, and combine with it as far as possible the habits, of the subjects on which he is engaged, but also to endeavour to detect the principles by which Nature has been guided in this particular group, and to apply them to his previously obtained knowledge. By these means alone can he hope to succeed in tracing correctly the connexions and differences impressed by her hand; and even when he has possessed himself of the *filum Ariadneum*, which may in one group be followed with certainty, in another it is found to be so repeatedly broken as to appear ravelled and confused. Hence the exposition of his views, which, from the limited faculties and knowledge of man, can probably never become perfect, is in its very commencement the result of long-continued enquiries and almost indefatigable study; its progress is necessarily slow, and years pass away before he is enabled to sketch even a satisfactory outline of a single department of Nature of moderate extent.

If the disinclination almost universally entertained to admit readily of any thing which savours of innovation, has in some measure militated against the reception into general use and study of the circular system propounded by Mr. W. MacLeay, to the obstacles opposed to its promul-

gation by the causes above enumerated some portion of the slowness with which it continues to obtain converts may also be unquestionably attributed. The very gradual manner in which this mode of viewing Nature has been hitherto developed, affords indeed an apt illustration of the difficulty, even with united labours, of bringing forward a universal system founded on natural principles. In the *Horæ Entomologicæ*, the work in which it was originally advanced, the attention of the authour was chiefly bestowed on the greater and more important groups. Embodying the reflections of a well-stored mind, energetically directed to the study of Nature on philosophical principles, that admirable work, in its larger views, rather propounded to the reader materials on which to exercise his reasoning faculties. The dictum of the master formed no part of it; it was the aspiring of the devoted student, anxious to explain the workings of his own mind, and desirous of calling into operation, for his correction or confirmation, the judgment of others. In the larger groups the views advanced were general; it was only in one family that even genera were partially adverted to; in one genus only that the sections and species were detailed as illustrations of the plan. Here then little was effected to influence those minds which require perpetual guidance even to minutiae: the land-marks alone were pointed out, but the directions for every step were purposely and necessarily omitted,

- This was succeeded by the exposition of the system as applicable to the extensive, important, and interesting department of Ornithology. In his memoir in the *Linnean Transactions* Mr. Vigors developed with the greatest clearness, and in a much more attractive form than can usually be imparted to the abstractions of science, the principles which regulate the distribution of Birds into orders, and of these orders again into families. Subsequently he further illustrated in this *Journal*, by reference to some of the families, the utility of this mode of viewing Nature, in her minor groups also. The circular succession of affinities among the *Falconidæ* was shown, and the especial prominence of five of the forms contained in the family was pointed out. Mr. Vigors has also given, in another number of this *Journal*, a table of the genera of Birds as referrible to each of his families. The *Catalogue of Australian Birds* in the collection of the *Linnean Society*, prepared by him and Dr. Horsfield, and published in the *Transactions* of that body, contains numerous most

interesting remarks illustrative of the affinities and analogies that connect together many of the lesser groups; and nearly the whole of his ornithological papers contain at least incidental notices, which partially exhibit the results of his attentive consideration of the subject even in its details.

In the *Annulosa Javanica*, Mr. MacLeay proposed to apply, on a more extended scale, to the investigation and arrangement of Insects, the principles which he had previously advanced. He selected for this purpose the collection formed in Java by Dr. Horsfield, but proceeded with them no further than the first grand division of the *Coleoptera*, to which, from the resemblance of their *larvæ* to the *Chilopoda*, he gave the name of *Chilopodomorpha*. Beyond this he was prevented by unforeseen circumstances from pursuing his task, the completion of which, in the masterly style in which it had commenced, was most sincerely to be wished for. Removed, however, from the objects to which he was then devoting his attention, others equally worthy of his determined study must daily be presenting themselves to his active mind, and be continually suggesting to him the possibility of adding to our stock of knowledge, by giving to us, ere long, even though in a different form, that *Prodromus*, as it were, of his views, as referring to the lesser groups, and even to species, which we had been led to anticipate from his *Annulosa Javanica*.

Another labourer has now presented himself in this ample field. In the work which we have at present to analyse, Dr. Horsfield has undertaken to investigate the *Lepidoptera* of Java on the same principles which were found by Mr. MacLeay to apply to the *Coleoptera* of that island. In the Introduction, which occupies the greater portion of the part now before us, Dr. Horsfield alludes, with mingled feelings of personal regret and friendly satisfaction, to the events which interfered with the completion, by the original authour, of the work of which this, although devoted to another order of insects, may be regarded as a continuation. He adverts also, with more detail than had previously been given, to the circumstances under which his Javanese collection, now in the Museum of the East India Company, was commenced and completed, dwelling particularly on the industry with which the *larvæ* of lepidopterous insects were procured on all possible occasions, and on the care with which they were watched, through their successive changes, until they assumed the form of chrysalis and finally became perfect insects. As the value of his work, so

far as regards the natural arrangement which it proposes, rests mainly on the certainty with which the larvæ can be referred to the perfect insects described in it, he states with great particularity the precautions used in taking coloured drawings of each of the caterpillars and of its chrysalis in succession, which were numbered in accordance with a ticket affixed to the imago of the same individual. He thus shows the almost impossibility of any mistake having occurred on this most important point, and establishes the authenticity of his materials: a fact the more essential as on them he has chiefly to rely, but little assistance being to be derived from published works in which information is contained relative to the metamorphoses of exotic *Lepidoptera*. After noticing the principal of these, he adverts with great and merited commendation to the *Wiener Verzeichniss*, a work which, although published upwards of half a century since, anticipated by full that period the discoveries of modern times; the families of the Linnean *Papiliones* characterized in its pages exhibiting not merely the rudiments of, but the actual, genera into which that very extensive group is at the present moment divided. The leading divisions of that work are derived chiefly from the larvæ, and accord almost precisely with those which Dr. Horsfield had proposed to himself, previously to his becoming acquainted with this excellent production of his predecessors the "*Theresianer*," Messrs. Dennis and Schieffermuller.

Of the primary sections, or tribes, into which Dr. Horsfield regards the *Lepidoptera* as naturally divisible, no characters are proposed at the commencement of the exposition of the arrangement; they are merely enumerated as the *Papilionidæ*, *Sphingidæ*, *Bombycidæ*, *Noctuidæ* and *Phalænidæ*. Each of these tribes is then made to undergo a brief review, with the object of exhibiting the sections, or stirpes, of which they are respectively composed. As the stirpes of *Papilionidæ* are noticed in a more detailed manner in an after portion of the work, they may be here passed over, until a rapid sketch has been given of those of the other tribes.

Among the *Sphingidæ* the larvæ are comparatively well-known; hence there is but little difficulty in recognising the existence of the following five types of form: 1. Larva vermiform, sluggish, somewhat hairy, with a small retractile head, and minute obscure feet; of this stirps the genus *Zygæna* may be regarded as the type: 2. Larva cylin-

dricul, slender and elongated, with a globular head, and the abdominal horn short and rigid, or instead of the latter a specular mark; typical genera, *Macroglossum* and *Sesia*: 3. Larva with a head almost triangular and acuminate above; body obliquely striated, generally with yellow, naked and somewhat rugose; abdominal horn of moderate size, smooth; typical genus, *Smerinthus*: 4. Larva with an ovate truncated head; nearly naked and even on the surface; abdominal horn lengthened, tuberculated, curved; typical genus, *Acherontia*: 5. Larva with a small globose head; with large ocelli behind it, or with pale spots along the sides of the body; abdominal horn generally simple; the typical examples are to be found in some of the species of the genera *Sphinx*, *Ochsenh.*, and *Deilephila*.

Of *Bombycidae* the larvæ, especially those of exotic species, are less generally known; their characters, as indicative of the stirpes are consequently less defined, as presented to us in the work of Dr. Horsfield, than those of the preceding tribe. The five principal forms are, 1. *Fasciculatae*, generally covered closely with silky hairs, arranged in fascicles or tufts often of unequal length on various parts of the body, and always abruptly terminated; this stirps comprises two groups, one of which is exemplified by the genus *Larva*, and the other by *Arctia*: 2. *Verticillatae*, in which the larva is either limaciform, (typical genus, *Apoda*,) or furnished with rigid spines, which are surrounded in a verticillate manner by smaller very acute spines; of these the genus *Saturnia* is typical: 3. *Pilosa*, the most strongly pronounced form of the larvæ being elongated, soft, entirely covered with fine down; *Lasiocampa* may be regarded as typical of this stirps: 4. *Lignivora*, larva naked, or with but few loosely scattered hairs; typical genera, *Pygæra*, *Cossus*, and *Hepialus*: 5. *Cuspidatae*, larva exceedingly diversified in form, but having one or more points or lengthened tubercles, either at the extremity of the abdomen or on one of the segments of the body; *Cerura*, *Notodonta*, &c., are comprehended in this stirps.

In the *Noctuidæ* the stirpes are also formed from the larvæ, which however are still more imperfectly known than those of the *Bombycidae*. They are, in some respects provisionally, pointed out as, 1. *Nudæ*, larva cylindrical, smooth, and naked, always obtuse behind, with a termination either abrupt, or prominent and rounded; this form is typical of the

tribe, and is itself typified especially in the genera *Agrotis*, *Mamestra*, *Polia*, &c.: 2. *Fusiformes*, larva attenuated almost equally towards both extremities; typical genera, *Lithosia*, *Eulepia*, and *Deiopeia*; possibly also many of the *Tineæ* may be here included on further investigation: 3. *Fasciata*, larva cylindrical, thinly scattered with short bristly hairs, abruptly terminated behind, and, as far as has been observed, uniformly marked with transverse bands of a brilliant, mostly yellow, colour; this form appears to be strictly oriental, and will be illustrated in the progress of the work: 4. *Ciliatæ*, larva with the two anterior abdominal feet by far the smallest, and with the last segment but one rising in a protuberance which is terminated by two points; many of them are fringed along the sides of the body; typical genera *Catocala* and *Abrostala*: 5. *Semigeometræ*, larva with only twelve feet, bending the back in walking; the type is the genus *Plusia*, Hübn. The passage from this to the first stirps of the succeeding tribe is most gradual and easy.

The remaining tribe, the *Phalænidæ* also exhibits among the larvæ of the insects which compose it five types of form, the precise limits of some of which require, however, more detailed and accurate investigation. They are 1. *Seminoctuales*, larva with twelve feet, agreeing in this respect with the last stirps of the preceding tribe, but approaching in the mode of undergoing its change to the next stirps: typical species, *Phalæna margaritaria*, *prasinaria*, and *fusicaria*: 2. *Geometræ*, larva with only ten feet; their movement in walking being comparable to a loop: 3. *Pyalidæ*: 4. *Tortrices*, larva with sixteen feet, contorting or rolling the leaves on which they feed, and in which they undergo metamorphosis: 5. *Tineæ*, in which the larvæ are much diversified, having sixteen, fourteen, or even eight feet; the revision of this group is absolutely required, nearly the whole of the smaller *Lepidoptera* having here been thrown together without examination. Some of its species, possessing an affinity with the *Seminoctuales*, will probably lead back again to the point in which the circle of *Phalænidæ* is completed.

The circular succession of the affinities appears therefore capable of being readily established in the last of these tribes; but Dr. Horsfield has not attempted to trace it in the three preceding; nor is it yet fully given as regards the first. The circle which embraces the whole order is shown

to be capable of completion by the union of what appear to be its extreme points, the *Tortrices* among the *Phalænidæ*, and the *Hesperidæ* among the *Papilionidæ*; the latter, in various characters of the perfect insect, but especially in the form of their larva, in its habitation, and in the mode of its metamorphosis, approaching so nearly to the former as to leave no doubt of the continuity of the series returning into itself, in which the whole of the *Lepidoptera* are naturally disposed. The location of the *Pterophori*, which, in their metamorphosis, greatly resemble the diurnal *Lepidoptera*, remains yet to be determined.

The Introduction concludes with a more developed view of the stirpes of the *Papilionidæ* than had before been given. It here becomes a leading object to point out the analogies between each type of larvæ and the ametabolous groups with which they correspond. The distinguishing characters of the larvæ of each stirps are explained; the peculiarities of the pupa are noticed; and those of the perfect insect are detailed. To follow Dr. Horsfield through this portion of his work would require almost that his very words should be copied: it is therefore at the risk of affording only a very imperfect view of the result of his labours that we attempt their analysis.

In the Vermiform stirps the larva is distinguished by an oblong body, attenuated at both ends, in some cases depressed or slightly convex, in others cylindrico-gibbous, appearing to consist of numerous scuta or shields, distinctly divided by transverse striæ, having a small retractile head, and very short scarcely perceptible feet. This larva bears a strong analogical resemblance to many of the *Vermes*, and even to the osculant group in the neighbouring circle of the *Crustacea* which comprehends *Oniscus*, &c.

The pupa is obtuse at both ends, particularly at the anterior, is nearly smooth, and is vertically suspended in the same manner as in the typical stirps, its head upwards either erect or bending forwards, fixed by the tail, and secured by an abdominal brace. The perfect insect is also comparatively simple, the whole of the stirps having been comprised in the lowest rank of the Linnean arrangement as the *Plebeii rurales*: its palpi are slender and of great length, extending in one species to the middle of the antennæ, the third joint elongate, naked, or covered only by minute scales: the antennæ are either gradually thickened towards the apex, or

terminated by a thickened compressed club abruptly inflected or bent outwards: the feet are slender, perfect, and alike in both sexes.

In the Chilognathiform or Juliform stirps, the principal of the whole tribe, the larva is long, and cylindrical: attenuated at both ends and transversely striated, as in that of *Colias*, at the confines of the vermiform stirps; distended about the fourth or fifth segment of the body, and tapering gradually towards the tail, and more abruptly to the head, in the typical group, the true *Papiliones*; acquiring tubercles, which, in the more remote genera, increase in length, and show the transition, through *Euplæa* and *Heliconia* to the Chilopodiform stirps which succeeds; the head is attached to the body by a very small articulation, and appears when exerted, separated from it; behind it is a bifid fleshy organ, or furcula. The pupa is attached as in the preceding stirps; it is naked and angulated, terminated, in the typical forms, at the upper extremity by two processes, in those near the vermiform group by one short process alone. The imago is the perfection of the whole order; an assertion which will readily be credited when it is recollected that this stirps comprehends the *Papiliones Equites* and *Danai* of Linnæus, and that his *Heliconii* stand at the immediate confines in the succeeding group; the palpi in the typical species are shorter than the head, their third joint is very minute, and they are concealed by a very dense covering of long bristly hairs; the antennæ are marked with defined rings at the numerous joints, are elongate, filiform at the base, and terminated in the typical group by a cylindrical club attenuated at both ends; the feet are generally long and robust, and the whole of them are perfect and fitted for walking.

In the typical larva of the Chilopodiform or Scolopendriform stirps, the appendages noticed as simple and fleshy on the body of that of *Euplæa* and *Heliconia* become rigid and armed with transverse spines. The pupa is naked and angulated, and is generally suspended by the tail with the head directed downwards. The palpi of the perfect insect project beyond the head, the third joint distinctly appearing and being closely covered with down: the antennæ are of moderate length with an abrupt club at the apex which is broad and compressed in the typical species: the anterior are spurious and imperfect and applied to the under surface of the thorax; *Vanessa* is typical of this stirps, which passes off into the

succeeding one by means of *Apatura*, *Limenitis*, and a new genus hereafter to be described, which is perfectly intermediate.

The larva of the Thysanuriform stirps is characterized by two rigid setæ or spines, varying in length and size, appended to the posterior extremity of the body, and pointing directly backwards. The pupa is smooth, shining, much diversified in form, and attached as in the Chilopodiform stirps. The perfect insects are remarkable for the prevalence of a brown colour on the surface of the wings, which in many species assumes a gloss of blue of transcendant brilliancy: their palpi and feet resemble nearly those of the preceding stirps: their antennæ are filiform, with a slender and very gradually incrassated club which occupies a very large portion of their entire length. The genera *Paphia*, *Morpho*, and *Hyparchia* may be mentioned as examples of this group.

In the remaining stirps, the Anopluriform, the larva is characterized by a head comparatively of excessive size, and by the abrupt posterior termination of its body without any appearance of caudal appendage. The pupa is not naked, as in the other stirps, but is concealed by a folliculus, or by a covering of a convoluted leaf, and its surface is smooth resembling that of the nocturnal *Lepidoptera*. The characters of the imago are variously modified in the *Erycinæ*, which approach the preceding stirps, in the *Hesperidæ*, typical of the present, and in the *Uranidæ*. These, however, remain for more full development hereafter.

While noticing these respective stirps, it has been attempted to convey some idea of the osculant affinities which connect them together. That which should exist between the last and the first of them is not minutely explained, yet that their connexion cannot be remote is evident from the one having been termed by Linnæus *Plebeii urbicoli*, and the other *Plebeii rurales*. The circular succession of the affinities among the larvæ is strikingly illustrated by a diagram contained in one of the plates, which exhibits the most prominent types of each of the stirpes, and some of the aberrant forms which indicate their gradual approach to each other.

At this point we must for the present stop in that detailed analysis to which we have been induced by the intrinsic value and high interest of the views advanced by Dr. Horsfield. In the general arrangement proposed in his introductory remarks, he has availed himself of information relating to his subject, collected from all quarters of the globe. The

succeeding portions of his work are directed to the application of those larger views to the Lepidopterous Insects of Java, and to the more full development of the characters of the genera as these successively fall under his notice in the Indian collection. It is by no means too much to state that exotic insects have never before been so fully and correctly illustrated as in the excellent figures and descriptions here given. The larva, the pupa, the perfect insect, perfect also in all its parts, and in a state as fine and free from mutilation as though it had only recently burst into existence, afford subjects equal to the best of those which could be procured in our own country, by the most assiduous collector. In every respect the materials are worthy of the attention bestowed on them by Dr. Horsfield, and of the talents brought forward in their display by the artists whom he has employed. To such specimens alone could we have been indebted for the admirable details and dissections which occupy so large a portion of the plates, and render the work most valuable to the scientific reader especially, furnishing to him at once the readiest means of verifying the statements of the text, and of judging of the accuracy of its deductions.

On the appearance of the second part, which is now on the eve of publication, we shall resume our analysis, commencing with the point at which the present abstract terminates.

The Genera of Recent and Fossil Shells; by G. B. SOWERBY, F.L.S. With original Figures, by J. D. C. SOWERBY, F.L.S. No. XXX.

THE four genera illustrated in the present number are *Clausilia*, *Fasciolaria*, *Murex*, and *Triton*. These names are employed with precisely the same signification as that assigned to them by Lamarck, and require therefore no particular remark. The species figured comprehend not only some of the rarer shells of each group, but also, especially in the *Tritones* and *Murices*, the most dissimilar and remarkable forms comprehended in them. Each of the last mentioned genera affords ample materials for the two interesting plates which are allotted to its illustration.

ART. XIV. *Proceedings of Learned Societies on subjects connected with Zoology.*

LINNEAN SOCIETY.

March 4, 1828.—A Communication from the Rev. Leonard Jenyns, M. A., F. L. S., was read, *On the distinctive Characters of two British Species of Plecotus, Geoff., supposed to have been confounded under the name of Long-eared Bat.*

A new Bat found adhering to the bark of a pollard willow, and which the authour names *brevimanus*, is discriminated in this memoir from the *Pl. auritus*, which, together with *barbastellus*, constitutes the genus *Plecotus* of Geoff. The specific character of the *Pl. brevimanus* is thus given, “vellere suprâ rufo-fusco, subtùs albescente: auriculis oblongis, “capite haud duplò longioribus; trago ovato-lanceolato: caudâ antibrachium longitudine æquanti, apice acuto.” It is smaller than the *Pl. auritus*, and this difference in absolute size, taken in conjunction with the difference in the relative proportion of parts, especially of the anterior extremity, in the colour, and in the apparent habits, seems to require that it should be regarded as a distinct species.

March 18. The chair having been taken by A. B. Lambert, Esq., V. P.; Edward Forster, Esq., the Treasurer of the Society, communicated to the meeting the afflicting tidings which had arrived during the day of the decease of Sir James Edward Smith, their eminent and much-beloved President; an office to which he had been appointed by the annual and unanimous choice of the Society from its first establishment in 1788, till his death. The Society immediately adjourned.

April 1.—Lord Stanley in the Chair.

His Lordship opened the meeting of the Society by adverting, with much feeling, to the great loss which had been sustained by the country and by the world, and more especially by the Society, in the death of its illustrious and beloved President, Sir James Edward Smith, who from its first establishment, in which he had taken an active part, had been called upon to preside over it by the annual and unanimous votes of its members, and had greatly contributed to place the Society in the distinguished

rank which it had attained, by his great talents, indefatigable industry, sound judgement, and enlarged views as a naturalist; by the high estimation in which he had long been held by men of science all over the world; by the excellence of those valuable and accurate works in which he had done so much to promote and improve the study of natural history; and especially by the qualities of his heart, mind, and temper, for which his memory would long be revered by those who had enjoyed the happiness of his friendship. He could not forbear expressing what he felt on the present occasion; and his anxiety that whatever choice might be made by the Society to fill the vacancy in its Chair, should be such as would contribute to its prosperity, however impossible it might be adequately to supply the loss which it had now so much to regret.

April 15.—A Letter was read, addressed to the Secretary, from Charles Lucian Bonaparte, Prince of Musignano, F.M.L.S., dated on board the Delaware, near Gibraltar, March 20, 1828, containing the following notice relative to the migration of certain birds. “A few days ago, being 500 miles from the coasts of Portugal, 400 from those of Africa, &c. we were agreeably surprised by the appearance of a few Swallows, *Hirundo urbica* and *rustica*. This, however extraordinary, might have been explained by an easterly gale, which had cut off the Swallows migrating from the Main to Madeira, only 200 miles distant from us; but what was my surprise on observing several small Warblers hopping about the deck and rigging! These poor little strangers, exhausted as they were, were soon caught and brought to me. The following short list is that of the species.

“1. *Sylvia trochilus*. 2. *Sylvia erithacus* (*Tethys*, Temm.). 3. *Sylvia Suecica*, or rather a similar species which I have already received from Egypt and Barbary. 4. A species new to Europe, and perhaps even a nondescript, having the plumage of an *Anthus*, and which I think belongs (as *Sylvia cysticola* and others) to the hitherto African genus *Malurus*. This, however, must rest undecided, my specimen missing its tail, which was pulled off by the sailor who caught it.”

A Paper was read *On the Mammary Organs of the Kangaroo*: by John Morgan, Esq., F.R.S., &c., in which a detailed account was given of a recent dissection of these parts, both in the virgin and in the impregnated animal; together with the authour's opinions respecting the

physiology of certain structures which have been hitherto unnoticed, and of others which have been incorrectly or imperfectly described by former investigators of this interesting branch of natural science.

The authour first pointed out the anatomical peculiarities which he had discovered in the dissection of the pouch and mammæ of a young and unimpregnated Kangaroo: by which it appears that, in the virgin state, the two upper nipples only are found to be developed, and that beneath each of these a minute circular aperture, resembling in appearance the mouth of a follicle, occupies the exact situation in which the lower teat is known to exist in the adult impregnated animal. The mammæ are described as consisting of double glandular structures on each side; they are situated directly behind the follicular openings already mentioned, and are closely confined to the posterior surface of the integuments. Each double mamma is composed of an upper and smaller gland, which is attached by its excretory ducts to the already developed nipple, and of a second and larger glandular substance from which no excretory duct could be traced. The follicular apertures which occupy in the pouch the situation of the lower teats, form the external openings of cylindrical membranous canals which lie imbedded in the substance of the larger and lower mammary glands. Each of these membranous canals or tubes is about three-fourths of an inch in length, and extends through nearly the whole diameter of the larger gland which incloses it; the interior of the tube is lined by cuticle, and the internal extremity is terminated by a rounded papilla which projects into its cavity.

In these papillæ the authour found a perfect miniature resemblance to the extremities of the lower teats in the adult animal, which teats he considers to be formed, during the first gestation, by the complete eversion of the membranous canals, and the consequent projection of their papillary terminations. He further states, that by artificially everting the parts, two perfect teats are produced in the precise situation of those which are found in after life. It has been, however, ascertained that this extraordinary change occurs only during the first gestation, since after being once developed the teat remains permanently formed and projected.

Having thus described the condition of the mammary glands in the virgin animal, and the developement of the lower teats, the authour gave

a particular account of his dissection of an adult female, which at the time of death was suckling a young one nearly half-grown. In this the panniculus carnosus which covers the anterior surface of the belly was of extraordinary thickness, and composed principally of perpendicular muscular fibres, which in their course from the thorax downwards surround the mouth of the pouch to which they form a sphincter muscle, and a fasciculus of its fibres descending over the symphysis pubis is inserted into the sphincter muscle of the cloaca; so that the contraction of this part of the panniculus carnosus would operate powerfully in approximating the external aperture of the vagina with the mouth of the pouch.

On removing the panniculus carnosus a pair of muscles (of which the attachments and uses have been hitherto incorrectly described) are brought into view. Each of these muscles is of a triangular shape, being attached by a narrow origin to the posterior part of the pelvis; and expanding in its course is continued transversely round the lower part of the belly, before the abdominal muscles, and immediately above the brim of the pelvis. Each of these triangular muscles encloses, between an anterior and a posterior layer of its fibres, the mammary gland, and the two muscles afterwards cross the fore part of the abdomen to unite in front of the linea alba. By this union a perfect muscular girdle is formed, by the contraction of which the mammæ are compressed against that part of the abdominal parietes in which the marsupial bones lie imbedded.

May 4.—The reading of Mr. Morgan's paper was continued, containing further particulars of the dissection of the mammary organs of the adult and impregnated Kangaroo, as well as of the muscles attached to the marsupial bones. These bones, with their ligamentous and muscular connexions, were described, and several errors in Sir E. Home's published accounts of these parts were pointed out. The authour then stated his own opinions respecting the use of these structures. He stated that the marsupial bones are formed: 1st., for the purpose of giving that firm support to the superincumbent abdominal viscera, which the narrow pelvis of the animal is incapable of affording while in the erect posture; and 2ndly., for the purpose of constituting a fixed point of resistance, against which the mammæ are squeezed by the muscular girdle already

described as inclosing those glands between its fibres. By this arrangement the female is enabled to empty by compression the excretory ducts of its mammæ, and thus to force their secretions into the mouth of the imperfectly organised young; which, during the earlier periods of its existence appears incapable of extracting a nutritious fluid from that part by the usual means.

It appears that the secretion of this fluid (milk) takes place only in the larger and lower gland, and that its ejection through the inferior and longer teat is assisted by a muscular investment which incloses the ducts throughout the whole course from the gland to the extremity of the nipple. The existence of this structure has been noticed by M. Geoffroy St. Hilaire, who has assigned to it the same use. Under this compressing muscle of the lower (or, as Mr. Morgan has named it, the true marsupial) teat, a congeries of vessels which principally consisted of veins was described as forming a plexus around the central fasciculus of ducts. These veins, together with those of the gland, were stated to occasion a considerable distension of the mammary organ during the time of suckling, in consequence of the congestion which must necessarily occur in the vessels at that period, from the pressure made upon their main trunks by the action of the compressing muscle of the mamma; for it has been found that the size of the organ on such occasions exceeds that which a loaded state of the ducts only could produce. The mammæ were found, as in the virgin animal, to consist in double glands on each side, the upper and smaller presenting the same anatomical characters as in the former instance; its excretory ducts, however, in their course towards the upper nipple were found to be inclosed in an indistinct muscular sheath, and there was a faint indication of the existence of a plexus of vessels similar to that which was found in the lower, or true marsupial, teat. This smaller mammary organ is considered by the author as analogous to the supernumerary mammæ and teats of other mammiferous animals, since the lower or true marsupial mammary glands and their teats appear to perform exclusively the office of preparing a nutritious fluid for the support of the young animal.

May 24.—This day the Anniversary Meeting of the Society took place, at which Edward, Lord Stanley, was elected President, in the room of the late Sir J. E. Smith: Edward Forster, Esq., J. E. Bicheno, Esq., and Richard Taylor, Esq., were respectively re-elected to the offices of

Treasurer, Secretary, and Under Secretary: and E. T. Bennett, Esq., Dr. Fitton, Davies Gilbert, Esq., Rev. Dr. Goodenough, the Duke of Somerset, and J. F. South, Esq., were elected to fill the vacancies in the Council.

The Executors of the late President having offered to the Society the whole of his collection and library of Natural History, at the price of £4000, a sum considerably below that at which their value was estimated by Sir J. E. Smith himself, the acquisition of this almost unequalled mass of standard and authentic information appeared so desirable to the Council, that at its recommendation a subscription was commenced, which amounted before the close of the day to upwards of £600. So liberal a contribution from less than sixty subscribers encourages the hope that a very large proportion of the amount required will be raised by the voluntary donations of the Fellows alone, who exceed six hundred in number. The loss to this country of the collections of Linnæus, which are included in the purchase, would indeed be generally regarded as a national discredit, and the most strenuous exertions will doubtless be made to prevent their being transferred to the Continent of Europe. Their chief value is unquestionably to the Botanist; but the Zoologist cannot but feel strongly interested in the preservation of the type specimens of the shells and insects described by the great restorer of Natural History, (the latter named with the assistance of Fabricius,) in a situation where they will be continually open to access for consultation and comparison.

ZOOLOGICAL CLUB OF THE LINNEAN SOCIETY.

Jan. 8, 1828.—A portion of a paper “*On the Animals of the Caribæan Islands; by the Rev. Lansdown Guilding, B. A., F.L.S., &c.*,” was read.

Jan. 22.—On the recommendation of the Committee of the Club, it was ordered that the following entry be made on the minutes, and that a copy thereof be transmitted to N. A. Vigors, Esq.

“The Zoological Club of the Linnean Society of London records its gratitude to Nicholas Aylward Vigors, Esq., its late Secretary, for his zealous and able discharge of the duties of his office since its first

“ establishment. The most active of its original promoters, he has con-
 “ tinued to advance its interests, and those of the science to which it is
 “ devoted, by the strenuous and unremitting exertion of his talents; that the
 “ opportunity of employing them in a more extended circle, and of thereby
 “ more effectually furthering the objects for which the Club was instituted,
 “ should have been the sole cause of his retirement, is a source of gratifica-
 “ tion which lessens the regret it must necessarily feel for the loss of so
 “ valuable an officer.

Mr. Yarrell exhibited a specimen of the *Emberiza hortulana*, Linn., killed near Manchester, in November last; and entered at some length into the history of our acquaintance with the *Emberiza chlorocephala*, Gm., the original specimen of which, now belonging to the Newcastle Museum, was on the table, having been forwarded to the Linnean Society by G. T. Fox, Esq. The substance of Mr. Yarrell's observations on this subject having already appeared in this Journal, in a communication from that Gentleman, (Vol. III. p. 498,) it is unnecessary to repeat it here.

A Notice on the *Axolotl of the Mexicans, considered as the type of a new order of Reptiles*: by Joshua Brookes, Esq., F.R.S., &c. was read. The subject was afterwards illustrated by the authour, who exhibited specimens and dissections of the animal, which he proposed to designate *Philhydrus pisciformis*, of the *Siren lacertina*, of the genus *Chirotres*, and of other approximating genera.

Feb. 12.—A paper on *the distinctive characters of two British species of Plecotus, Geoff., supposed to have been confounded under the name of long-eared Bat*: by the Rev. Leonard Jenyns, M.A., F.L.S., was read. Specimens preserved in spirit of each of the species were exhibited to the Meeting; as was also a specimen of *Vespertilio mystacinus*, Leisl., taken at Bottisham, Cambridgeshire, being the second instance of its occurrence in this country.

Feb. 26.—Mr. Vigors exhibited several birds sent by G. T. Fox, Esq., F.L.S., from the Newcastle Museum. Among these he pointed out particularly the Kasarka Duck, *Anas rutila*, Temm., the specimen exhibited being unique as British. From this were taken the figure of the Grey-headed Duck, given in Brown's Illustrations of Zoology, and the figure of the Ferruginous Duck contained in the last edition of Bewick's British Birds.

The reading of the Paper on the *Animals of the Caribæan Islands*: by the Rev. Lansdown Guilding, B.A., F.L.S., &c., was continued.

March 11.—Mr. Stephens exhibited a remarkable monstrosity in a specimen of *Vanessa Urticæ* which possessed five wings; the additional one being formed by a second, but smaller, hinder wing on one side.

Mr. Yarrell exhibited the skeleton of the *Chlamyphorus truncatus*, Harlan, which he had recently prepared and set up for the Zoological Society. He described in detail its various parts, and pointed out the analogies borne by them to the corresponding structures of other animals. Some further remarks on the same subject were made by the Chairman.

March 25.—In consequence of the recent death of Sir J. E. Smith, Bart., the President of the Linnean Society, no meeting was held.

April 22.—A Paper was read *On the Mammary Organs of the Kangaroo*: by John Morgan, Esq., F.R.S., &c. On its conclusion a conversation ensued on the subject in which Mr. Brookes, Mr. Bell, Mr. Clift, and Mr. Morgan took part.

May 13.—Mr. Yarrell read some *Observations on the Monkeys of India*: on which a conversation subsequently ensued among the members present.

May 27.—Mr. Vigors exhibited the remaining portion of the birds collected in the Straights of Magellan, by Capt. P. P. King, R.N., F.L.S., consisting of three Rasorial species, and of a considerable number of the *Grallatores* and *Natatores*. On this occasion he continued his remarks on each of the species, especially on those which were hitherto unnoticed by scientific writers. These were extraordinarily numerous as compared with the extent of the collection; and among them were included several interesting variations of form constituting connecting links between established genera. The Thanks of the Club were directed to be returned to Capt. King, not merely for his present exhibition, but also for the valuable assistance rendered by him at all times to Zoological Science, and especially during the expedition in which he is now engaged.

A Paper was read on a new genus of *Rodentia*: by Joshua Brookes, Esq., F.R.S., &c. In illustration of the subject, the authour afterwards exhibited and remarked on the skeleton and stuffed skin of the animal in question, the *Dipus maximus*, De Blainv., but which he proposed to

designate as the *Lagostomus trichodactylus*. He also exhibited, and compared it with, skeletons of the Marmot, Urson, Coypus, Isodon, Helamys, Rabbit, Squirrel, and Agouti.

GEOLOGICAL SOCIETY.

April 18.—A Paper was read, *On the Fossil remains of two new species of Mastodon, and of other vertebrated Animals, found on the left bank of the Irawadi*; by William Clift, Esq., F.G.S., F.R.S., conservator of the Museum of the Royal College of Surgeons.

The author having been requested to describe the fossil remains which the zeal and liberality of Mr. Crawford have transferred from the deserts of the Irawadi to the Museum of the Geological Society, confines himself strictly to zoological and anatomical details: and following the system of Cuvier, commences with the

Pachydermata proboscidifera.---The only genus of this order indicated by the remains is the Mastodon; and of this there are two species: Mastodon latidens and Mastodon elephantoides, not only commanding attention from their novelty, but from the beautiful gradation which they exhibit between the Mastodons already described and the Elephant. On comparing the teeth of Mastodon latidens with those of the Mastodon of the Ohio (*M. giganteum*) the denticules are found to be more numerous, and less distant, and the interstices less deep than in those of the latter. The teeth, in short, begin to assume the appearance of those of the Elephant. On advancing to Mastodon elephantoides, these features of similarity are more strongly developed: the many-pointed denticules are still more numerous and more compressed; and the structure, were it not for the absence of crusta petrosa, becomes almost that of the tooth of the Elephant. In both, though the teeth are formed upon the principle by which the tooth of the Mastodon is distinguished from that of the Elephant, the crown of the tooth wears away more like that of the Elephant than that of the other Mastodons.

The species are thus characterized:

Mastodon latidens.---Mastodon dentibus molaribus latissimis, denticulis rotundatis, elevatis. Palato valdè angusto.

The dentition very much resembles that of the Elephant. The molar

tooth is gradually pushed forward, and rises as the fangs are added, according to the demand occasioned by the abrasion of the exposed crown, and the consequent absorption of the anterior fang; the posterior part of the tooth not having yet cut the gum, while the anterior portion is completely worn away. Before it are seen the relics of the preceding tooth, the place of which the tooth in use was progressively supplying.

The lower jaw in this species is less square and deeper than it is in *M. giganteum*.

The tusks, judging from the alveoli, must have been of equal volume with those of the largest living Elephant.

The following is the measurement of some of the remains of *M. latidens*.

Extreme breadth of fragment of cranium (upper jaw with the greatest part of both grinders)	1 Ft. 3 In.
Length of ditto	1 8
Extreme length of right anterior grinder (6 denticuli and the spur)	0 8 $\frac{1}{4}$
Extreme breadth at third denticulus	0 4
Circumference of lower jaw, measured over the grinding surface of the tooth	2 4
Extreme length of tooth	0 11 $\frac{3}{4}$
Extreme breadth	0 4 $\frac{1}{2}$
Circumference of the lower extremity of right femur.	2 2
Same, round the condyles	2 4

Mastodon elephantoides.---*M. dentibus latis*; *denticulis numerosis*, *compressis*.

This species must have been smaller than the last. There is a fine example of the lower jaw, showing the tooth in the highest degree of perfection. The tooth is 11 inches long and 3 $\frac{1}{2}$ inches broad, has no less than ten denticules, and each of these denticules is mamillated with small points; five being the smallest, and eight the greatest number on any one denticule. In front of this tooth is seen the remnant of the preceding one, worn down and disappearing; and behind it is the cavity wherein the young tooth, intended as a successor to that in existence, was in the course of formation. The denticules are much more compressed than those in the species last described; they are closer together,

and the whole tooth approaches still more nearly to that of the Elephant, while the jaw is in unison with the appearance of the tooth.

Pachydermata ordinaria.---In this group we have the remains of the genera *Sus*, *Hippopotamus*, and *Rhinoceros*. Of the first there is only a single specimen, consisting of a small portion of the lower jaw, containing one molar tooth and the fragment of another. Of the second there are but few fragments, nor are they sufficiently characteristic to warrant a definition of the species, which must have been comparatively small. Of the third there is a portion of the upper jaw, containing two molar teeth; and portions of the lower jaw with molares, which seem to approach nearer to those of the *Rhinoceros* of Java than to those of any other living species.

Ruminantia.---In this group we have fragments of the Ox and of the Deer.

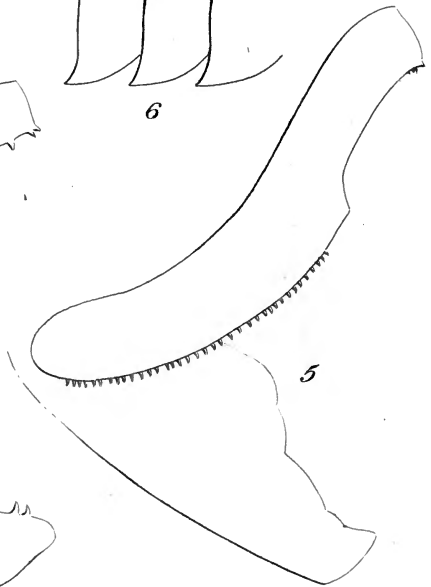
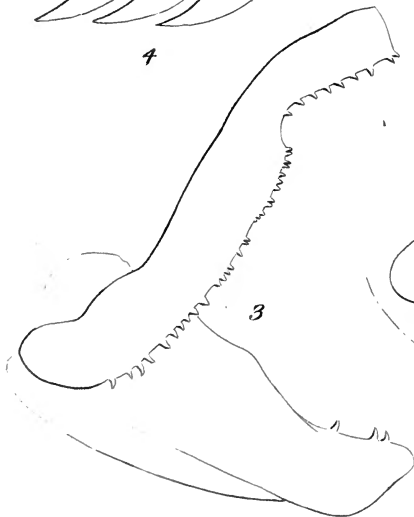
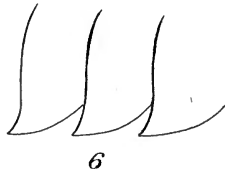
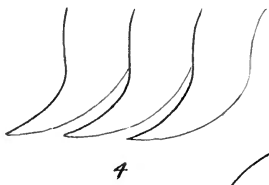
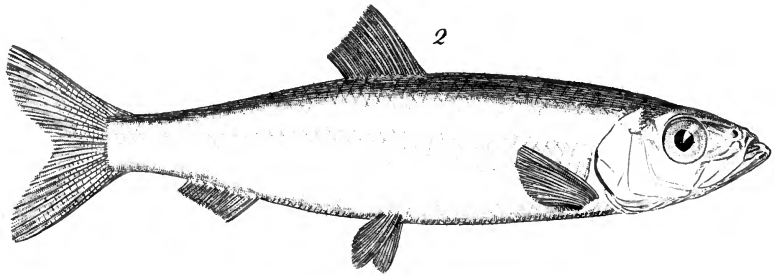
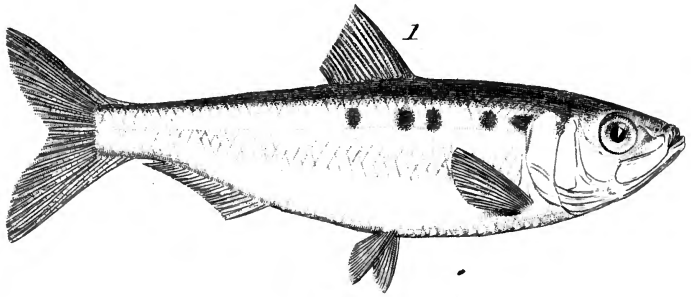
REPTILIA.

Chelonia, Cuv.---(*Testudinata*, Bell).---There are many fragments of a large species of *trionyx*, and some of an *emys*. But the remains are not sufficiently defined for specific description.

Sauria.---Fam. *Crocodylidae*.---Of this family we have the remains of two genera; viz. a *Leptorhynchus* allied to, if not identical with, the great gavia; and a crocodile resembling *Crocodylus vulgaris*. Of the former there are portions of the lower jaw and several vertebræ; of the latter, there is the anterior termination of the lower jaw, which must have belonged to a very large individual.

The specimens, in general, do not appear to have undergone any mineral change, with the exception of being abundantly penetrated with iron, and are very brittle. This last circumstance, arising from the loss of their animal gluten, indicates great antiquity, and that they have not been imbedded in any very compact soil; unlike the teeth of the mastodon of the Ohio, which lie in a strong blue clay, and have almost as much animal matter as is to be found in a recent tooth.

The bones are almost in every instance broken; and from the firmness of texture of most of them, the direction and cleanness of the fracture, and the sharpness of its edges, the injury, which must have been the result of an immense power operating with sudden violence, appears to have taken place at the period, or very soon after the period, of the destruction of the animal.



THE
ZOOLOGICAL JOURNAL.

July—October, 1828.

ART. XV. *On the supposed identity of Whitebait and Shad.* By WILLIAM YARRELL, Esq., F.L.S.

THAT the diminutive fishes called Whitebait are the young of the Shad (*Clupea alosa*) is a point so long considered to be settled, that I fear I shall be thought guilty of a crime little short of treason in Natural History by declaring for an opposite opinion; but having devoted considerable time and attention to this subject during the present season, I shall proceed to detail the facts, historical as well as anatomical, of which this investigation has placed me in possession, and which have led me to adopt a conclusion at variance with all the English authors on this point.

Mr. Pennant in his British Zoology gives the Whitebait a place as an appendage to the Bleak (*Cyprinus alburnus*), rather, as he remarks, “than form a distinct article of a fish which it is impossible to class with certainty.”

The editor of the edition published in 1812 says, “Mr. Pennant was either deceived in the specimens sent him as Whitebait, or the branchiostegous rays were injured, since he counted only three (genus *Cyprinus*) instead of eight (genus *Clupea*) of these rays, which number they certainly possess.”

Dr. Shaw in his General Zoology follows Pennant, and describes the Whitebait as a species of the Carp or *Cyprinus* genus.

Dr. Turton in his British Fauna, attached to his description of the Bleak, *Cyprinus alburnus*, has the following observation: "The Whitebait which has hitherto been considered as a variety of this fish, appears by the judicious and accurate investigation of the author of the Natural History of British Fishes, to be merely the young fry of the *Clupea alosa* or Shad."

Mr. Donovan, in his Natural History of British Fishes, treats this subject at some length, and considers that his examination affords incontrovertible evidence that the Whitebait is really the fry of the common Shad.

Dr. Fleming, in his recently published History of British Animals, follows Mr. Donovan in considering the Whitebait as the fry of the Shad.

To place this subject, upon which such different opinions have been entertained, in a clear point of view, it may be proper to commence with a short account of the habits of each of these two fishes.

All English writers agree that the Shads enter our rivers in the month of May, for the purpose of depositing their spawn, and, this object accomplished, they return to sea by the end of July. They appear during these three months in the greatest abundance in the Thames, from the first point of land beyond Greenwich, opposite the Isle of Dogs, to the distance of a mile below, and immense quantities are taken every year. Formerly, great quantities of Shads were caught by fishermen at that part of the Thames opposite the present Penitentiary, but the state of the water has driven the fish higher up the stream, and the fishing for them at this point has been almost abandoned.

Very considerable numbers of Shads were also taken in former seasons as high up the river as Hammersmith, but the deterioration which the quality of the water has suffered from various causes, has rendered the fishing for Shads in this part of the river an employment scarcely worth following: the quantity of fishes obtained in a season twenty years ago, compared with the produce of the present year, would be in the proportion of an hundred to one.

By various acts of Parliament,* the conservation of the river Thames from Staines Bridge downwards, and of the waters of the Medway, is vested

* 13 Edward I., c. 47. 17 Richard II., c. 9, and 10 Anne.

in the Lord Mayor and his Court for the time being, who, with the addition of certain other officers, make and enforce the execution of their own bye-laws for the preservation of the fishery. Their 23rd rule and order is as follows: "Shads shall be only taken from the 10th day of May to the 30th of June in every year."

By making an arrangement both at Putney and Greenwich, I was constantly supplied with Shads twice in every week during the whole, and even somewhat beyond the time they are allowed to be taken; and without going into a detail of weekly observations, it will be sufficient for the purpose to state, that not a single male or female Shad, examined during the months of May or June, had cast its milt or eggs, and this fact it is necessary to bear in mind. Two fishes examined on the 5th of July still retained their roes, but two others subjected to the same test on the 7th had passed their ova.

It is the opinion of the fishermen, who have the best opportunities for observation, that these adult fishes, having performed the office for which they visit the fresh water, take the centre of the current and return to sea. From their weak state, they may be said to drift, rather than swim, with the tide, and, as fishing against the stream is prohibited, they in this way proceed in safety to their destination.

Of the young Shad, when vivification of the deposited ova has taken place, but few examples are caught, and these only by the unlawful mode of fishing for Whitebait. Like the young of Salmon, and the fry of other salt-water fishes, instinct directs the exertion of their first efforts towards gaining the sea. The reason given by the fishermen why these young fishes are not caught in greater quantities, is, that immediately on their acquiring sufficient power of motion, they take the middle of the stream, and make for sea, and as no nets capable of stopping them are used in that part of the river, they escape until their return the next year as adult Shad.

When the preceding winter has been mild, the Whitebait make their appearance early in spring. In the present year, I first observed them in a fishmonger's shop at the West-end of the Town, on Saturday the 29th of March. Knowing the habits of the Shads, and that they did not make their appearance in the Thames till May, it was this early exhibition of Whitebait which induced me to take up, and persevere in, an

investigation, which I have pursued to the present time. I am aware it may be urged, that the periodical visits of fishes as well as other animals are influenced and varied by the temperature of particular seasons and the condition of the animal, but as all the comparative observations I shall make on this subject will be confined to the fish of the same river, and during the same season, this objection will not be valid. Whitebait continued to be procured in the month of April; more abundantly throughout May as the weather became warmer; and with the exception of occasional interruptions to the fishing, from the activity of the Water Bailiff and his deputies, the taverns at Greenwich and Blackwall, as well as several fishmongers in London, have continued to receive a supply up to the present time. The same arrangement that produced me the Shads, produced me also constant supplies of small quantities of Whitebait for weekly examination, and the additional fee which I had promised the fishermen for every young Shad that was preserved for me, produced me, as I have reason to believe, every young fish of that species, as well as any portion I pleased of other fishes, neither Whitebait nor Shads, which the parties I engaged with caught in the pursuit of their avocation. The number of young Shads however did not exceed a score, nor did I obtain one till the end of June, recognisable instantly from the Whitebait, and both species distinctly known to the fishermen. I may here also add, that no Whitebait are found in other rivers frequented by the Shad; not a single example of Whitebait is ever taken between Putney and Hammersmith, where the Shads deposit their spawn; and although Shads abound in the Severn, which affords this fish in higher perfection than any other river, particularly near Gloucester where immense quantities are taken, the Whitebait are unknown; nor do I ever remember to have seen a notice of the appearance of this fish in any other river in England except the Thames.

But it is not alone on such data as these, however conclusive they may appear, that I rely, for the distinction for which I contend. The best Zoologists of the last fifty years have taught us the value as well as the necessity of searching for, and resorting to anatomical distinctions, as the best foundation for the separation of species, and I shall therefore proceed to detail the various differences that present themselves on a close examination of the external and internal characters of the Whitebait and

Shad, premising, that in every instance I refer to the parts as they appear in a fish of each sort, corresponding exactly in size.

The tongue of the Shad is smooth and dark in colour, the lower jaw has three strong teeth, the whole edge of the upper jaw, which from its shape forms two distinct portions, is also armed with strong teeth, the snout bifid, the eye small.

The tongue in the Whitebait is rough and white, the lower jaw has no teeth on the outer edge, and differs in its form from the same part in the Shad; the upper jaw in the Whitebait possesses teeth on the lower portion only, the snout is not notched, the eye one third larger than that of the Shad, and there is also an appreciable difference in the form of the operculum. Its dorsal line is less curved.

The dorsal fin of the Shad is placed nearer the head than in the Whitebait, and differs also in being less triangular in its form. The ventral fins of both are placed in a line immediately under that of the back. There are also differences in the number of fin rays as the following comparative statement will shew.

Whitebait.

D. 17., P. 15., V. 7., A. 15. Tail 20.

Shad, according to Donovan.

D. 20., P. 19., V., 12., A. 21. Tail 26.

But I place less confidence on these variations in the number of the fin rays, as characters, than on others, not finding them invariably uniform. The body of the Shad is much deeper in proportion to its length than the Whitebait, its prevailing colour on the back, blue, without any very apparent lateral line. The colour of the back of the Whitebait is greenish ash, the lateral line impressed, distinct and straight. The serrations on the abdominal edge also differ in shape, as a reference to the accompanying magnified representations will demonstrate. The form of the stomach is similar in both these fishes, as might be expected from their belonging to the same genus, but the cæcal appendages are much more numerous in the Shad than in the Whitebait. The parietes of the abdomen in the Shad are lined with a delicate silver coloured membrane which also exists in the Whitebait, but in the latter fish this membrane is covered on the side next the viscera with a dark colouring matter resembling the *nigrum pigmentum*, not a vestige of which appears in the Shad.

There is also another difference between the Shad and the Whitebait upon which I place greater reliance, in proof of specific distinction, than on any other single anatomical character. The number of vertebræ in the Shad, of whatever size the specimen may be, is invariably 55; the number in the Whitebait is uniformly 56, and even in a fish of two inches, with the assistance of a lens, this exact number may be distinctly made out.

The value of this character as a specific distinction may be presumed by the following quotation from Dr. Fleming's excellent work on the Philosophy of Zoology, vol. II. page 311.

“ The number of the bones of the vertebral column in different species of fishes, being exceedingly various, suggested to ARTEDI the use of this character in the separation of nearly allied species. Among the species of the genus *cyprinus*, for example, a difference in the number of vertebræ has been observed to the amount of 14. In ascertaining this character ARTEDI recommends the greatest circumspection. The fish should be boiled, the fleshy parts separated, and the vertebræ detached from one another, and these counted two or three times in succession to prevent mistakes. This character is of great use, as it is not liable to variation, individuals of the same species exhibiting the same number of vertebræ in all the stages of their growth.”

From the observations made by Mr. Donovan in his History of British Fishes, it would be inferred, that the Shads visiting the Thames in the months of May and June, and appearing in immense quantities, heavy in roe, about Greenwich and Blackwall, there deposit their ova, which on vivification become the well known Whitebait. It seems not to be generally known that the Whitebait, though often caught as high up the river as Blackwall, are as frequently taken as low down the river as Erith.

The situation they are found in by the fishermen depends entirely on the state of the water. Always occupying a station which affords a mixture of the water of the sea and river, they are a salt-water fish rather than otherwise, coming upwards with the first part of every flood-tide, swimming always near the surface, avoiding the strong current, preferring the slack water at the sides of the stream that they may not be carried too far up, and returning towards the sea with the first of the ebb-tide.

The net used by the fishermen for the taking of Whitebait is illegal on more accounts than one; the mode of fishing, which is against the stream, is also illegal; the fish float with the tide, and only about two hours of each ebb and flow can be employed to advantage. The fish are most plentiful when the weather is warm, and can only be taken during day light. It would probably be difficult to ascertain the fact, but I have reason to believe that the ova which produce these swarms are deposited in shallow water on the flat shores about and below Gravesend, as I have almost uniformly received the smallest Whitebait from the lower part of the river.

The evidence printed in the report from the commissioners appointed to enquire into the state of the supply of water to this city, contains a sentence in point on this subject, communicated by Mr. Goldham, the clerk of the fish market at Billingsgate, a gentleman who has made fish and fisheries his particular study.

“ Whitebait are certainly obtained in greater abundance than formerly, by poachers (viz. fishermen who have been thrown out of their former employ) using unlawful nets; it should however be observed, that Whitebait are taken at particular times of the tide; as they are a salt-water fish, and come and retire with the water, which is partially salt; on this account they are never known above Blackwall.” See Report, page 72.

From the train of circumstances here detailed, it will be obvious that I consider the Whitebait as distinct from the Shad. I have now before me, preserved in a weak mixture of alcohol and distilled water, both young and old Shads, and nearly one hundred specimens of Whitebait of all sizes, the latter from 1 inch in length to $4\frac{1}{2}$; all taken this season, and all, as I believe, young fish of this year. By this it will be evident that their size has been much under-rated by those authors who have described the length as not exceeding 2 inches. I have also before me a fine specimen of $4\frac{3}{4}$ inches in length, an adult fish with roe, and as the fishing for Whitebait will probably continue till October, I have little doubt of obtaining others in a more advanced state as the season proceeds. I believe that these fishes deposit their spawn during the winter, that the young are slow in their first developement, as well as in their subsequent growth, and probably never attain any considerable size. The food found in their stomachs

most distinguishable, consisted of very minute shrimps.

To shew that my expectations of obtaining other adult specimens of Whitebait with roe as the winter approaches, have some foundation, I quote from Mr. Pennant's editor the following sentence, "the accurate DUHAMEL asserts that the *Franc Blanquet* (of the identity of which "with the Whitebait we entertain little doubt) is full of eggs and milt "in November and December."

The slow developement of the ova of fishes which spawn in winter may principally be referred to temperature. From the spawn of Salmon, deposited in December and January, the young fry do not come forth till March and April; while the ova of some other species, deposited in the midst of summer, become living fishes on the ninth day.

Believing that the more closely this subject is examined, the more evident the true distinction between the Whitebait and Shad will appear, I venture to propose the term *alba* for the former species, the characters of which have been already noticed in detail, and of which a correct figure by Mr. James Sowerby is annexed. The name given by Mr. Donovan to his Whitebait (*Clupea alosa junior*) may still be retained without inconvenience, since the fishes represented by that gentleman in his 98th plate, are in reality young Shads, and not Whitebait; and I have entered thus fully into the investigation with the hope of clearing up the confusion and errors at present existing on this subject, in most of, if not all, our Zoological works.

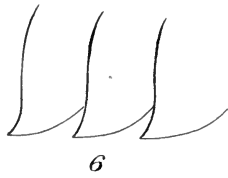
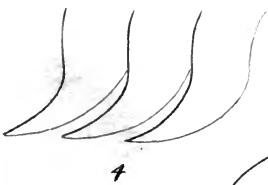
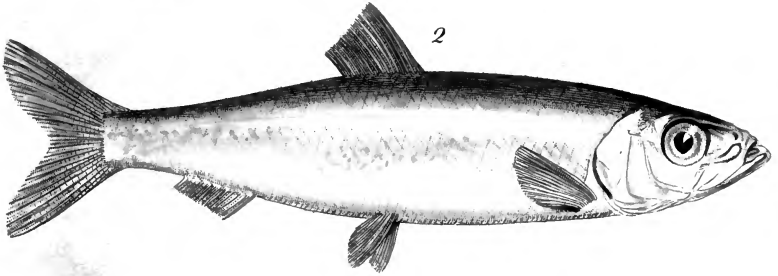
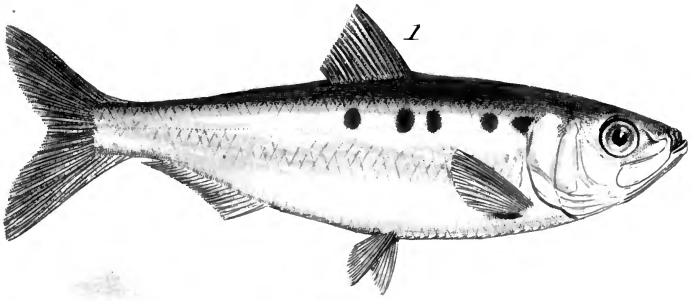
Ryder Street, St. James's.

August, 1828.

Description of the Plate.

TAB. V.

- Fig. 1. Represents a young Shad.
 2. Whitebait.
 3. Edge of the mouth of the Shad as seen when magnified.
 4. Abdominal serrated edge of the Shad.
 5. Edge of the mouth of the Whitebait as seen when magnified.
 6. Abdominal serrated edge of the Whitebait.



ART. XVI. On the recent species of the Genus *OVULUM*.*

By G. B. SOWERBY, F.L.S., &c.

OVULUM.

OVULA. Lamarck, *Hist. Nat. des Anim. sans vert.* VII. p. 366.

Sowerby, *Genera of Shells*, No. II.

OVULUS, RADIUS, CALPURNUS, ULTIMUS, Montf.

OVULA, SIMNIA, Leach.

Testa ovata vel ovato-oblonga, plerumque ventricosa, spirâ occultâ.

Apertura longitudinalis, elongata, suprâ angusta, infrâ latior; extremitatibus emarginatis et in canales plus minusve productis; labio interno edentulo; externo rarissimè tenui, acuto, plerumque incrassato, involuto, interdum lævi, nonnunquam denticulato seu crenulato.

When I prepared my account of this genus for the second number of my *Genera of Recent and Fossil Shells*, I had met with but few species, and Lamarck who had paid much attention to the species had only described twelve recent and two fossil. My acquaintance with them is at present much more extended, and I now present my readers with an account of twenty-five recent species. Still there is one species described in Lamarck's *Hist. Nat. des Anim. sans vert.*, namely, the *O. hordeaceum*, which I have never yet seen: and I am not quite satisfied about his *triticeum*: as, however, I shall at some future time be obliged to publish an appendix to this genus, I trust I shall then be able to give a good account of the former, and to state a decided opinion respecting the latter.

The animal of this genus is still unknown to Naturalists; there is, however, strong reason to believe that it is nearly related to that of *Cypræa*, all the species being more or less covered with a shining enamel-like shelly coat, evidently deposited by the bipartite mantle spreading over the two sides of the shell, though seldom extending so far over the back as nearly to meet and form a dorsal line as it frequently does in *Cypræa*. The affinities of *Ovulum* appear to be on one side to

* *Ovulum*, being a diminutive from *Ovum* which is neuter, our classical friends will acknowledge the propriety of this change in the termination.

Cypræa, and on the other to *Bulla*, to which it seems to be connected by the *Bullæ*, *Naucum* and *cylindrica*: this observation must, however, be regarded as suggested by the general similarity in form of the British *Bulla patula*, which I have here united to *Ovulum*, with the two *Bullæ* above named.

In their general form the *Ovula* are more or less ovate or oblong; most of the species are rather ventricose, a few are, however, nearly cylindrical: the spire is always hidden, its volutions being horizontal and not descending as they increase, but always preserving the same plane: the aperture is longitudinal, of the whole length of the shell, narrow at its upper part, and more expanded towards the base: both the upper and lower extremities are more or less notched, and each produced into a longer or shorter canal: the inner or columellar lip is smooth without teeth or crenulation; a fold or pliciform tooth is, however, observable in several species both at the upper and lower ends of this lip: the outer lip is very seldom thin and sharp-edged; it is generally thickened and involute, frequently quite smooth, sometimes crenulated or denticulated. In their young state the outer lip is thin and sharp-edged, and the outside is not covered with the shining enamel-like shelly coat.

Since the publication of Lamarck's *Hist. Nat. des Anim. sans vert.* (when only two were known), there have been considerable additions to the number of fossil species, several small species having occurred in the crag, in the calcaire grossier and in the contemporaneous formations, near Bordeaux, in Touraine, at Piacenza, and in Britain:* I believe the fossil *Ovula* have not occurred in any bed below the London clay.

I had prepared the above observations on the genus *Ovulum*, when I was favoured by the Rev. Dr. Goodall with the following extract from the Zoological part of the *Voyage de Freycinet*, by M. M. Quoy et Gaimard, which proves the correctness of my suggestion relative to the animal of *Ovulum*. I am not, however, induced to degrade it from the rank of a genus, because I think there are sufficient distinguishing characters.

* A large fossil shell having the form of *Cypræa Mus*, has been discovered in Holland, and referred to this genus by M. Duclos, under the specific name of *O. tuberculosa*; this shell is, however, more properly arranged with the *Cyprææ*.

“ L’animal de L’Ovule a la plus grande ressemblance avec celui de
 “ la Cyprée, comme pouvoit le faire pressentir le grand rapprochement
 “ des coquilles. Sa forme générale est tout à fait la même; son manteau
 “ est double; les cirres de la bande marginale, pédiculés et renflés en
 “ champignon à l’extrémité, sont moins nombreux et ont une autre
 “ forme que ceux des Cyprées. En avant et en arrière les deux lobes
 “ du manteau se continuent sous forme de canal, plus marqué en avant,
 “ où il présente un rudiment de tube. Le pied est celui d’une Cyprée,
 “ c’est à dire, fort grand, ovale, à bords minces, l’antérieur traversé par
 “ un sillon marginal. Il presentoit vers le milieu de cette extrémité une
 “ sorte de ventouse assez profonde, à bords assez réguliers; mais n’ayant
 “ vu qu’un individu d’Ovule, nous n’osons conclure que ce soit une
 “ disposition normale. Même identité pour la tête et la trompe qui
 “ paroît pouvoir se dilater en trompette; les yeux sont seulement un
 “ peu plus petits. Il existe un rudiment de dent labiale supérieure, fort
 “ étroite, en fer à cheval et collée à la peau de manière à n’avoir pas
 “ une grande action. La masse linguale, épaisse, ovale, en partie libre
 “ dans la cavité buccale, est armée de petits crochets comme à l’ordi-
 “ naire. L’anus est à l’extrémité d’un petit tube flottant dirigé en arrière
 “ dans la cavité branchiale; celui-ci est immense et contient deux
 “ branchies, dont l’une fort grande, en fer à cheval; enferme la plus
 “ petite dans son ouverture, qui est dirigée en avant. L’oviduc, terminé
 “ par un tube libre flottant dans la cavité branchiale, est dirigé d’avant
 “ en arrière. Ainsi, la considération de l’animal de L’Ovule exige
 “ presque la réunion de ce genre avec celui des Cyprées.” pp. 444, 445.

The following table must be considered as entirely artificial. It is pre-
 pared with a view to assist in ascertaining the names of species rather
 than as an attempt at a natural arrangement of the genus.

SPECIERUM OVULI GENERIS

CLAVIS ANALYTICA.

- | | | |
|---|---|---|
| 1 | { | Margine Labii externi incrassato 2 |
| | | Margine Labii externi tenui, acuto vel subacuto 24 |
| 2 | { | Margine Labii externi internè crenulato vel denticulato 3 |
| | | Margine Labii externi internè lævi 15 |

- 3 { Dorso rotundato 4
 { Dorso obtusè angulato 11
- 4 { Canalis inferioris margine sinistrâli rectiusculo 5
 { Canalis inferioris margine sinistrâli distinctè uniplicato 9
- 5 { Canali impresso inter labium sinistrâle canalis superioris
 et corpus testæ sp. 1 *Ovum*.
 { Columellâ supernè uniplicatâ 6
- 6 { Plicâ superiore columellari validâ, acutiusculâ 7
 { Plicâ superiore obtusâ, testâ subglobosâ . . . sp. 2 *Margarita*.
- 7 { Testâ elongato-ovatâ sp. 3 *Adriaticum*.
 { Testâ pyriformi 8
- 8 { Canali inferiore subreflexo sp. 4 *pyriforme*.
 { Testâ colore carneo-rubescente sp. 5 *carneum*.
- 9 { Testâ pyriformi sp. 6 *marginatum*.
 { Testâ ovatâ 10
- 10 { Labii externi margine lato, dorso nonnunquam
 subangulato sp. 7 *lacteum*.
 { Margine labii externi angustiore, depresso sp. 8 *breve*.
- 11 { Extremitatibus dorsi verrucosis sp. 9 *verrucosum*.
 { Extremitatibus appendiculo nullo 12
- 12 { Testâ ovali, intus roseâ sp. 10 *angulosum*.
 { Testâ oblongo-ovali 13
- 13 { Testâ subcylindricâ, extremitatibus subacutis . . . sp. 11 *triticeum*.
 { Testâ fusiformi, extremitatibus acuminatis 14
- 14 { Testâ albâ, dorso transversè striato sp. 12 *striatum*.
 { Testâ rubescente, dorso albido-cingulato . . . sp. 13 *Frumentum*.
- 15 { Extremitatibus obtusis 16
 { Extremitatibus plus minusve acuminatis seu rostratis 18
- 16 { Dorso obtusè angulato sp. 14 *gibbosum*.
 { Dorso rotundato 17

- 17 { Testâ ovatâ, albâ sp. 15 *obtusum*.
 { Testâ oblongâ, rubescente sp. 16 *Seminulum*.
- 18 { Plicâ superiore columellari obliquâ 19
 { Plicâ indistinctâ vel nullâ 22
- 19 { Testâ subcylindricâ 20
 { Testâ ovato-fusiformi 21
- 20 { Testâ minimâ, apice superiore subacuto sp. 17 *formicarium*.
 { Apice superiore mucronato sp. 18 *Secale*.
- 21 { Labio externo infrâ subangulato sp. 19 *Spelta*.
 { Dorso obtusè angulato sp. 20 *intermedium*.
- 22 { Rostris breviusculis sp. 21 *birostre*.
 { Rostris longioribus 23
- 23 { Testæ corpore fusiformi sp. 22 *longirostratum*.
 { Testæ corpore ovato sp. 23 *Volva*.
- 24 { Testâ cylindricâ, margine subacuto sp. 24 *aciculare*.
 { Testâ ventricosâ, margine acuto sp. 25 *patulum*.

OVULUM OVUM,

Sowerby's Genera, No. II.

O. testâ ovato-inflatâ, medio ventricosâ, politâ, lacted; extremitatibus prominulis, subtruncatis; fauce aurantiaco-brunnea; long. $3\frac{8}{10}$, lat. $2\frac{4}{5}$, poll.

Bulla Ovum, nonnull.

Ovula Oviformis. *Lam., Anim. sans. vert.* VII. 366.

Var. *pygmæa*, testâ incrassatâ, dorso utrinque sulco terminali cicatricoso instructo; long. exempl. minor. $1\frac{3}{5}$, lat. $1\frac{8}{10}$, poll.

exempl. majusc. $2\frac{3}{5}$, lat. $1\frac{3}{5}$, poll.

Hab. in Oceano Indico.

DESC. The largest and handsomest species of the genus. Shell brilliantly polished, milk-white, egg-shaped, both extremities prominent, slightly truncated; outer lip much thickened, irregularly crenulated on its inner edge; inside of a rich orange brown; a fold of the inner lip

forms a regular canal at the upper as well as lower extremity. The very young shell is slightly transversely striated, its surface is duller, its outer lip is sharp-edged, and not inflected; as it increases, the outer lip becomes thickened and turned inwards; and the shell attains its brilliant polish: the colour of the inside also strengthens with age; the very young shell being colourless. A dwarf variety occurs, which is less than an inch and a half long, and which has an irregular cicatrix at the back of each produced end.

OVULUM MARGARITA.

O. testâ ovali-subglobosâ, supernè obtusâ, infrâ subacuminatâ, albâ; columellâ intùs prope basin depresso-concavâ; labii externi margine rotundato, intùs denticulato; long. $\frac{1}{2}$, lat. $\frac{1}{10}$, poll.

Licium Margarita. G. Humphrey, MS. ined.

Hab. in Insulis quas "Friendly" vocamus, in Mari Pacifico.

DESC. Shell oval, nearly globular; obtuse at the upper end, and slightly acuminate at the lower; perfectly white; lower part of the columella depresso-concave within; edge of the outer lip rounded, denticulated within; canals very short, the upper one turned to the left.

Received from the Friendly Islands by Mr. G. Humphrey; all the specimens in his possession, one only excepted, were pierced and strung by the natives.

OVULUM ADRIATICUM.

O. testâ oblongo-ovali, subventricosâ, utrinque subacuminatâ, pallidè carnèâ, hyalinâ; labii externi margine angusto, intùs denticulato; columellâ supernè uniplicatâ, infrâ subdepressâ, intùs marginatâ; long. $\frac{2}{10}$, lat. $\frac{1}{10}$, poll.

Hab. in mari Adriatico; communicavit Dr. Goodall.

DESC. Shell oblong-oval, rather ventricose; somewhat acuminate at both extremities, pale flesh colour, hyaline; margin of the outer lip narrow, denticulated on the inside: upper end of the columella with one oblique plait; lower end somewhat flattened, with a thickened internal margin.

I found one specimen of this in G. Humphrey's collection, another was

given to me by the Rev. Dr. Goodall, who brought several from the Adriatic.

OVULUM PYRIFORME.

O. testâ pyriformi, albicante; canali inferiori subreflexo; dorso ventricoso; columellâ ad basin excavato-depressâ, supernè dente pliciformi valido; labio externo internè plicato-denticulato, infrâ subdepresso; long. $\frac{1}{8}$, lat. $\frac{1}{16}$, poll.

Hab. ad littora Novæ Cambriæ Meridionalis. Mus. nost.

DESC. Shell pear-shaped, whitish, with a pale flesh-coloured tinge; back ventricose, transversely striated; lower canal straightish, slightly reflected; columella with an excavated depression within, near the base, and a strong pliciform tooth at the upper end; outer lip sloping from the edge inwards, inner edge plicato-denticulated, rather depressed at the lower part.

Of this elegantly formed and rare species a few specimens were received from New South Wales, by Mr. G. Humphrey.

OVULUM CARNEUM,

Lam., Anim. sans vert. VII. 368.

O. testâ ovali, carneo-rubente; dorso gibboso, transversim tenuiter striato; extremitatibus, præsertim inferiore, acuminatusculis; labio externo intus denticulato; columellâ supernè obliquè uniplicatâ; long. $\frac{1}{10}$, lat. $\frac{1}{20}$, poll.

Bulla carnea, nonnull.

Hab.———. Mus. Goodall, nost., &c.

DESC. Shell ovate, back gibbous, transversely slightly striated; extremities, particularly the lower, slightly acuminated; outer lip arched, toothed on the inside; upper end of the columella forming a small thickish fold.

A pretty little species of a reddish flesh-colour, from the Coral Fishery on the coast of Barbary.

OVULUM MARGINATUM.

O. testâ oblongo-ovali, ventricosâ, utrinquè obtusiusculâ, albâ; labii externi margine rotundato, intus denticulato, prope basin depresso,

plicato-denticulato; *columellâ supernè dente pliciformi valido, prope basin depressâ, infrâ uniplicatâ*; *marginibus externis labiorum aurantiaco-marginatis*; *long.* $\frac{1}{2}\frac{7}{8}$, *lat.* $\frac{1}{10}$, *poll.*

Hab.———. *Mus. nost.*

DESC. Shell of a rather oblong oval form, and obtuse at both extremities, white, particularly the front; the back with a number of slightly raised transverse lines; border of the outer lip rounded, denticulated on the inner edge, depressed and plicato-denticulated near the lower end; upper part of the columella with a strong pliciform tooth; near the base it is depressed, and below it has a prominent fold or tooth; outer borders of the lips with an orange margin.

An interesting species, much resembling *O. pyriforme* in general appearance; by attention to its peculiarities noticed in the description, it will be easy to recognize it. A single specimen was found in Mr. G. Humphrey's collection, without any information respecting its locality.

OVULUM LACTEUM,

Lam., Anim. sans. vert. VII. 388.

O. testâ ovatâ, subgibbosâ, lævi, candidâ; *labii externi margine interno plicato-denticulato*; *columellâ ad basin compressâ*; *long.* $\frac{1}{2}\frac{7}{8}$, *lat.* $\frac{1}{10}$, *poll.*

Hab. ad littora Insularum Oceani Pacifici. *Mus. Goodall, Mawe, nost.*

DESC. Shell ovate, slightly gibbose, smooth, white, back with a few slight transverse angular lines; edges thickened; inner edge of the outer lip denticulated, the teeth somewhat extended outwards in the form of short plicæ; inner edge of the columella rather compressed, particularly near the base; canals very short, that at the base produced by a pliciform tooth at the base of the columella.

Rather a rare species which has occasionally been brought from the Islands of the South Seas, as well as from Haynam and Timor. It seldom reaches the size of our specimen, but its proportions are not subject to variation.

OVULUM BREVE.

O. testâ ovali, utrinque obtusâ, brevi, albâ; *labii externi margine intus denticulato*; *columellâ supernè uniplicatâ, extus marginatâ, prope*

basin depressâ, infrâ uniplicatâ; canalibus brevissimis; long. $\frac{1}{4}$, lat. $\frac{3}{8}$, poll.

Hab.———. Mus. nost.

DESC. Shell nearly oval, rather short, obtuse at both ends, white; inner margin of the outer lip toothed; columellar lip forming a strong flexuous pliciform tooth at the upper end, thickened on the outer edge, depressed near the base, and forming a tooth-like fold at the lowest end, both the canals very short. The outer lip of the only specimen I have seen is rather sharp, and a few of the teeth extend from the inner to the outer edge near the centre of the lip. I am not acquainted with its locality.

OVULUM VERRUCOSUM,

Lam., Anim. sans. vert. VII. 367.

O. testâ ovatâ, gibbosâ, albâ; dorso transversim angulato; verrucâ depressâ ad utramque extremitatem adjectâ; long. $1\frac{3}{8}$, lat. $\frac{8}{10}$, poll.

Bulla verrucosa, nonnull.

Testa junior marginem labii externi internè edentulum exhibet.

Hab. in Oceano Indico.

DESC. Shell ovate, gibbose, white, pale lilac at the extremities; the back raised into an obtuse transverse angle; outer lip when full grown much thickened, toothed on its inner edge: the glaze spread over the outer part of the shell at its maturity, does not meet in the middle of the back, the intermediate space is faintly transversely striated: two singular small, flattened, white, brown edged, wart shaped excrescences, one placed at each extremity of the back, distinguish this species from all others.

Not an uncommon species in the Indian Ocean; the Ceylon and Isle of France boxes generally containing several specimens. It is, however, rendered interesting, as being the only shell with the singular tubercular appendages noticed in its character and description. To these it is indebted for its name, and on account of them Montfort distinguished it from *Ovulum* as a genus under the name of *Calpurnus*.

OVULUM ANGULOSUM,

Lam., Anim. sans. vert. VII. 367.

O. testâ ovato-ventricosâ, albâ; dorsi medio transversim obtusè angu-

lato, lineis subprominulis cincto; intus roseo-violacé; long. 2, lat. 1 $\frac{4}{8}$, poll.

Bulla imperialis. Dillw.

Ovula costellata. Lam., *Ann. du Mus.* XVI. 110.

Hab. "Friendly Islands." G. Humphrey.

DESC. Shell ovate, ventricose, milk-white; the middle of the back transversely obtusely angular, with a few raised lines; the upper extremity is not produced into a regular canal as in *O. Ovum*, but the lower canal is rather lengthened and truncated; outer lip much thickened, crenulated on its inner edge: inside of a delicate rose colour.

I possess a dwarf variety of this beautiful species, which is of a dirty brownish white on the back. It is observable that Lamarck has very arbitrarily, and without giving any reason, changed the specific name from *costellata* to *angulosa*; I cannot help regretting this circumstance; at the same time, I adopt the latter name as being the more expressive.* He states that this species is always smaller than *O. Ovum*; I have, however, some specimens of the latter that are full grown, and yet smaller than the smallest I have seen of *O. angulosum*. This is a very rare species, and deservedly esteemed by collectors.

OVULUM TRITICEUM,

Lam., *Anim. sans vert.* VII. 368.

O. testá ovato-oblongá, lævi, rubro-aurantiacá; labio externo albicante, intus minutissimè denticulato; columellá supernè dente albido, valido, subtus compressá; long. 1 $\frac{3}{8}$, lat. 7 $\frac{7}{8}$, poll.

Hab. ———. Mus. nost.

DESC. Shell ovato-oblong, smooth, orange red; outer lip whitish, rather straight-edged, slender, sloping from the outer to the inner edge, which is very minutely denticulated; there is a tubercular fold or strong whitish tooth at the upper end of the columella, the base of which is

* For the sake of avoiding an useless synonymy, it would have been desirable to have retained Dillwyn's specific name of *imperialis*; Lamarck has, however, in this instance, as in many others, been guilty of a great oversight in describing as new a shell that had been described long before.

depressed, and straightened: aperture narrow at the upper extremity, wider and somewhat angular at the lower. In general form this species is more lengthened than *O. carneum*, and it is less gibbous; it has, however, a slight angular gibbosity rather above the middle of the back. My specimens accord perfectly with Lamarck's description; he states that it is found on the coast of Africa; my specimens, according to the late G. Humphrey, are from Japan.

O. hordeaceum, Lam., does not appear to me to differ from *O. triticeum*; my opinion is, however, formed only from the comparison of his descriptions, for I have never seen the shell described by him under the former name; and I shall be most thankful to any friend who will communicate to me an authentic specimen of it.

OVULUM STRIATULUM.

O. testâ oblongâ, dorso transversim striato et gibboso, albicante; labio externo planulato, intus denticulato; labio columellari supernè calloso, infrâ depresso; extremitatibus subacuminatis, obtusiusculis, long. $\frac{1}{10}$, lat. $\frac{1}{10}$, poll.

Hab. ad littora Oceani Indici. Mus. nost.

DESC. Shell oblong, back transversely striated and gibbous, whitish; outer lip flattened on the edge, denticulated on the inside; columellar lip callous at the upper end, depressed at the lower; extremities rather acuminate, but obtuse.

A very small East Indian species, much resembling *O. Frumentum* in general shape and characters, and differing from it only in colour and in being transversely striated. From the East Indies, according to Mr. G. Humphrey.

OVULUM FRUMENTUM.

O. testâ oblongâ, dorso transversim gibboso; rubescente, transversim albido-unifasciatâ; labio externo margine planulato, intus denticulato; labio columellari supernè calloso, infrâ depresso; extremitatibus subacuminatis, obtusiusculis; long. $\frac{3}{10}$, lat. $\frac{3}{20}$, poll.

Hab. — Mus. nost.

DESC. Shell oblong, back transversely gibbous; colour approaching

to crimson, with a whitish transverse band; edge of the outer lip flattened, inner edge denticulated: columellar lip with an oblique callosity at the upper end, depressed at the lower part; extremities rather acuminate and obtuse.

One of the smallest species I know; I have only seen two or three specimens, and am unacquainted with its locality.

OVULUM GIBBOSUM,

Lam., Anim. sans vert. VII. 369.

O. testâ oblongâ, utrinque obtusâ, albidâ seu aurantiaco-fulvâ; angulo elevato obtuso supra medium cingulato; long. $1\frac{3}{10}$, lat. $\frac{1}{2}$, poll.

Bulla gibbosa, nonnull.

Ultimus, Montf.

Testa junior labii externi margine acuto, dorso obsolete angulato.

Var. 1^a. canali superiore angustiore; long. $1\frac{3}{10}$, lat. $\frac{6}{10}$, poll.

Var. 2^a. testâ brevior, latior; long. $1\frac{1}{10}$, lat. $\frac{1}{2}$, poll.

Hab. ad littora Brasiliæ insularumque Indiæ Occidentalis.

DESC. Shell of an oblong form, obtuse at both extremities, upper extremity of the aperture rather narrower than the lower; canal at both ends nearly straight; lips a good deal thickened, inner edge of the outer lip a little irregular, not toothed: the glaze deposited by the two coats of the mantle not meeting in the centre of the back, the intermediate space longitudinally striated, generally of a lighter colour than the edges, which are mostly of a dull orange yellow, darker on the dorsal than on the ventral side. In its young state this species scarcely shows any of the angular dorsal gibbosity which so eminently characterizes it when full grown. There are two varieties, one of which is shorter and broader, the other narrower at the upper extremity, and rather paler in colour and slenderer in form than the principal variety.

A common species from the coast of Brazil and the West India Islands.

OVULUM OBTUSUM.

O. testâ ovatâ, utrinque subacuminatâ, obtusâ, lævi, albicante; aperturâ prope basin subeffusâ; labiorum marginibus levibus; long. $\frac{4}{10}$, lat. $\frac{5}{10}$, poll.

Hab.——Mus. nost.

DESC. Shell ovate, slightly acuminate towards both extremities, but obtuse; smooth all over, whitish; upper end of the aperture narrow, linear; lower end wider and rather effuse; edges of both lips quite smooth; middle of the outer lip thicker than the two extremities.

Several specimens of this very small species were among Mr. G. Humphrey's stores, but without any information concerning them; I am therefore unacquainted with its locality. It is certainly nearly related to *O. Spelta*, but I think sufficiently distinct to be easily recognized.

OVULUM SEMINULUM.

O. testá oblongá, medio ventricosiusculá, carneo-rubescente; extremitatibus obtusis; labii externi margine rotundato, edentulo; labio columellari depresso; long. $\frac{5}{30}$, lat. $\frac{3}{30}$, poll.

Hab. in Insulis Maris Pacifici. *G. Humphrey.*

DESC. Shell oblong, slightly ventricose in the middle, flesh-red; extremities obtuse; margin of the outer lip rounded, without teeth; columellar lip depressed, its inner edge sharp angled.

One of the smallest species I have seen: a single specimen was preserved in Mr. G. Humphrey's collection, labelled "Semi-Cowry, Friendly Islands."

OVULUM FORMICARIUM.

O. testá oblongá, dorso supra medium transversim subcarinato, albá; labio externo edentulo, margine subdepresso; long. $\frac{1}{30}$, lat. $\frac{1}{30}$, poll.

Hab. in Oceano Indico. *G. Humphrey.* Mus. nost.

DESC. Shell white, oblong; back slightly carinated rather above the middle, outer lip without teeth, its margin rather flattened.

The smallest species I have seen. From its resemblance to an ant's egg, I have named it *O. formicarium*.

OVULUM SECALE.

O. testá oblongá, angustá, albicante, supernè obtusè mucronatá; columellá supernè uniplicatá, subtùs depresso-sulcatá; labii externi margine rectiusculo, prope basin subangulato; long. $\frac{7}{30}$, lat. $\frac{1}{30}$, poll.

DESC. Shell oblong, narrow, whitish; upper end of the lip ob-

tusely mucronated; columella with a single fold at the upper end; lower part, commencing near the middle, depressed, with a slight groove; margin of the outer lip thickened, nearly straight, somewhat angular near the lower part.

The only specimens of this species I have seen were in Mr. G. Humphrey's collection; I am unacquainted with their locality.

OVULUM SPELTA,

Lam., Anim. sans vert. VII. 370.

O. testá oblongá, medio subventricosá, utrinquè acuminatá; aperturá supernè lineari, subtùs subeffusá; labio externo subtùs rotundato-angulato; columellá supernè obliquè uniplicatá; long. $\frac{7}{16}$, lat. $\frac{1}{16}$, poll. Bulla Spelta, nonnull.

Hab. ad littora Insularum Oceani Pacifici. *G. Humphrey.* Mus. nost., &c.

DESC. Shell oblong, slightly ventricose, pointed at both extremities, rather more at the upper than at the lower; aperture linear and narrow at the upper, and rather effuse at the lower, extremity; lower end of the outer lip rather angular, angle rounded; columella with an oblique plait at the upper end.

There is no reason to doubt the shell here given being the *Ovula Spelta* of Lamarck, and I believe also the *Bulla Spelta*, Linn.

It is related to *O. birostre*, and comes between that species and my *O. obtusum*. Lamarck states it to be a Mediterranean species; my specimens are from the South Seas and Friendly Islands, according to two tickets in the hand-writing of Mr. G. Humphrey.

Martini's (tom. I. f. 215.) and Gualtieri's (t. 15, f. 4.) figures are not sufficiently good to be referred to as certainly belonging to this species.

OVULUM INTERMEDIUM.

O. testá ovato-oblongá, utrinquè subacuminatá; dorso supra medium transversim subangulato; labio columellari prope extremitatem superiorem obliquè uniplicato; labii externi margine interno edentulo; long. $1\frac{5}{16}$, lat. $\frac{1}{16}$, poll.

Hab.———. Mus. Mawe, nost.

DESC. Shell ovate-oblong, somewhat acuminated at both ends, rather

more so at the upper than at the lower; back with a transverse raised rounded angle rather above the middle; aperture narrow at the upper end, broader at the lower; columellar lip with a single oblique plait close to the upper end; outer lip thickened, its inner edge smooth, without teeth; colour pale fulvous.

I have named this *intermedium*, from the circumstance of the principal characters of two other species, namely the *O. gibbosum* and *O. birostre*, being combined in it. I have seen only two specimens of this, one of which is in Mrs. Mawe's, the other in my own collection.

OVULUM BIROSTRE,

Lam., Anim. sans. vert. VII. 370.

O. testá oblongá, ad utramque extremitatem rostratá, medio subventricosá, levissimá, albicante; aperturá supernè angustá, lineari, infrá subeffusá; labio externo subtís rotundato-angulato; collumellá supernè obliquè uniplicatá; long. $1\frac{1}{10}$, lat. $\frac{1}{10}$, poll.

Bulla birostris, nonnull.

Hab. ad littora Insularum Oceani Pacifici. Mus. nost., &c.

DESC. Shell oblong, slightly ventricose in the middle, long pointed at both extremities, very smooth, light coloured; upper end of the aperture narrow, linear; lower end rather effuse; lower part of the outer lip somewhat angular, angle rounded; a single oblique fold at the upper end of the columella; outer lip more thickened in the middle than at the extremities.

Rather larger than *Ovulum Spelta*, from which it differs principally in having both extremities produced in a lengthened point; how far this character may be regarded as constituting a sufficient specific distinction it is difficult to decide, particularly as there are specimens of intermediate character. I have thought it desirable to consider the short beaked specimens as a variety of the present. Collections in general contain* so few specimens of this interesting genus that I am obliged to form nearly all my conclusions from the study of my own almost exclusively.

* Very few collections contain more than seven or eight species, and Lamarck describes only twelve, whereas I possess twenty-three, and have here described twenty-five.

OVULUM LONGIROSTRATUM.

O. testá oblongá, tenui, albicante, utrinquè longirostratá; dorso subgibboso; aperturá angustá, prope basin paululùm expansá; labii externi margine exteriorè subincrassato; long. $2\frac{5}{16}$, lat. $\frac{4}{16}$, poll.

Hab. in Mari Adriatico. Mus. Goodall.

DESC. Shell oblong, slender, whitish, with a slight flesh-coloured tint; the back is rather tumid, and both the terminal canals are very much elongated and sharply acumined, like the long beak of some small birds; aperture narrow, slightly widened near the base; outer lip with its outer margin rather thickened; inner margin smooth.

A most interesting, delicate, and slender species, of which I have only seen one specimen, brought from the Adriatic by the Rev. Dr. Goodall.

OVULUM VOLVA,

Lam., Anim. sans vert. VII. 370.

O. testá ovali, utrinquè longirostratá, dorso transversim striato; labio externo incrassato, margine rotundato, intùs crenulato; canalibus subflexuosis, elongatis; long. 4, lat. 1, poll.

Bulla Volva. Linn., et nonnull.

DESC. Body of the shell oval; back transversely striated; outer lip considerably thickened, not so perfectly involute as in some other species, its edge rounded, slightly crenated within; both the canals much prolonged, and somewhat flexuous, the upper longer than the lower. The outside of the body of this shell, when in good condition, is covered with transverse impressed striæ, these diverge as they approach the lip, and become oblique towards the canals, on which they gradually increase so much in breadth as rather to form the spaces between oblique raised lines, than to deserve the appellation of impressed striæ.

Not only singular, but elegant in form; when in fine condition it is of a delicate flesh-colour, darker within, and the outside of the outer lip of a beautiful pink hue; its long canals are spirally rolled, and obliquely striated on the back; the reflected lips do not spread far over the back of the shell. Lamarck mentions the coast of Brazil and the West Indies, but I do not profess to be informed as to its localities, though I am rather inclined to believe that China, Sumatra, Java, and the Islands of the In-

dian Archipelago may with more propriety claim this interesting and generally valued shell as a native of their coasts. It is the Weaver's Shuttle of English collectors, *La Navette* of the French.

OVULUM ACICULARE,

Lam., Anim. sans. vert. VII. 369.

O. testâ oblongâ, angustâ, cinereo-violascescente; labio externo, columellâque rectis; canali superiore extûs carinam obtusam efformante; labio externo vix incrassato, prope basin subangulato; columellâ infra medium subsulcatâ; long. $\frac{7}{10}$, lat. $\frac{2}{10}$, poll.

Var. 1. testâ albicante, vel flavicante, lineâ columellari violaceâ.

Var. 2. testâ violaceâ, ventricosiusculâ.

Var. 3. testâ flavicante, ventricosiusculâ.

Hab. ad littora Insularum Indiæ Occidentalis. Mus. Goodall, nost., &c.

DESC. Shell oblong, narrow, dull violaceous; columella and outer lip straight; upper canal forming an obtuse keel on the outside; outer lip scarcely thickened, slightly angular near the base, columella with a slight longitudinal groove near and rather below the middle.

We have several varieties of this species, both in colour and form: the first is white, with a violet line along the middle of the columella; another is of a sulphur colour with a similar violet line; a third is rather more ventricose and of a violet colour, and the fourth of a greenish yellow, and of the same form. It is a native of the West Indies.

OVULUM PATULUM.

O. testâ tenui, ovato-oblongâ, medio subventricosâ, supernè coarctatâ; aperturâ latiusculâ; labii externi margine arcuato, acuto; columellâ supernè uniplicatâ, prope basin longitudinaliter sulcato-impressâ; long. 1, lat. $\frac{1}{10}$, poll.

Bulla patula, Auctorum Britannicorum. Simnia patula, Leach.

Hab. in mari Britannico. Mus. nonnull.

DESC. Shell thin, ovate-oblong, ventricose in the middle, and contracted at the upper extremity; aperture rather wide, margin of the outer lip arched, acute; columella forming a single fold at the upper end, flexuous and longitudinally grooved near the lower extremity.

A species which has been long well known as an inhabitant of the British coast; we have never heard of its occurring on any other. Leach in his MSS. has elevated it to the rank of a genus, under the appellation of *Simnia*, and in my work on the Genera of Shells I have expressed some doubt as to the propriety of placing it with the *Ovula*, from which it seems naturally separated by the sharp edge of its outer lip: there is, however, another species which serves to connect it closely with the *Ovula*, namely, Lamarck's *Ovulum aciculare*, and it therefore appears desirable to give it a place among them.

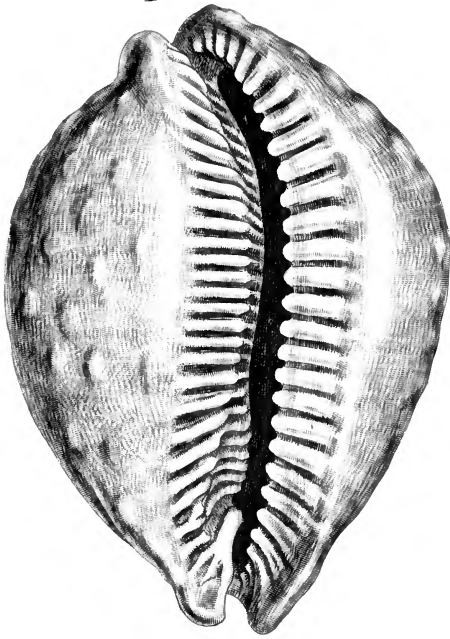
Without venturing to express an opinion respecting its proper place in a Natural System, I may still direct the attention of the reader to the similarity existing between this shell and the *Bulle Naucum* and *cylindrica*. It seems to a certain degree naturally to connect the genera.

Having nearly two years since prepared the foregoing account of the recent species of the genus *Ovulum*, as one of the genera intended for the first number of my "Species Conchyliorum," I had proposed to have preserved it until favourable circumstances enabled me to publish it in that work; but as Mr. Gray has abandoned the subject in consequence of my having expressed my intention of describing the species of this genus, I think it but justice to publish it here first. It appears in an imperfect state, because I have not yet had an opportunity of making myself acquainted with the *fossil* species. These must be given at a future time.

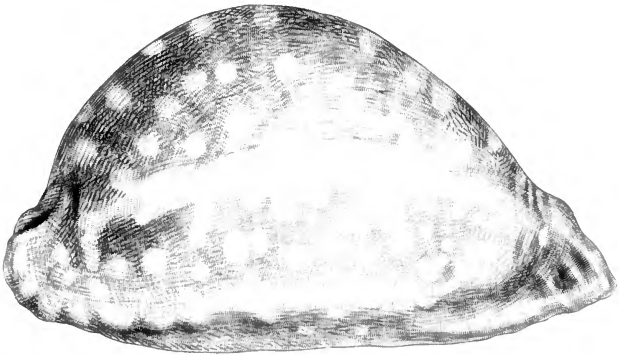
I may perhaps be permitted to add one word relative to the work above mentioned, for which this paper was originally prepared. It may have been inferred, from the circumstance of no part having yet made its appearance, that the intention of producing such a work is abandoned; this, however, is far from being the fact; it is nevertheless to be lamented that much as such a work is wanted everywhere, the risk is very great, and the encouraging circumstances but few. I beg to be allowed still to express a hope that the first number will not be a very long time before it makes its appearance; I am so confident of the excellence of its execution, and so assured of its usefulness, as to feel satisfied that it cannot fail of being successful.



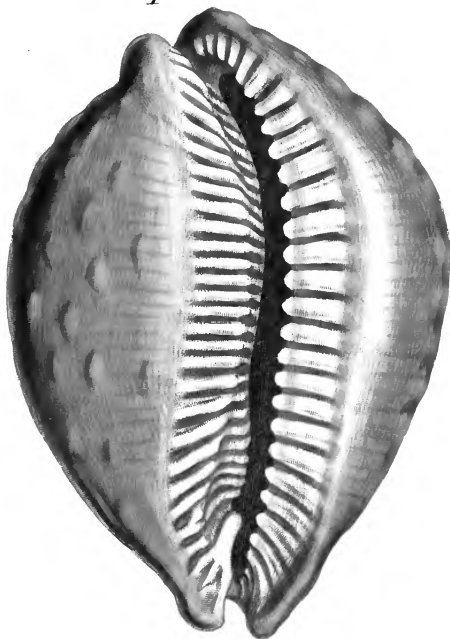
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2



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2



Cypraea Leucodon. p. 163.

ART. XVII. *Description of a new species of Cypræa.*
 By W. J. BRODERIP, Esq., B. A., F. R. S., F. L. S., Sec.
 G. S., &c.

CYPRÆA LEUCODON.

C. testâ ovato-gibbosâ, fulvâ, albo-guttatâ, lineâ dorsali ad dextrum latus approximante; subtus pallidiori, dentibus magnis, eburneis; extremitatibus prominentibus; intus albidâ.

TAB. V.

Habitat? Mus. Nost.

Shell ovate-gibbous, tawny, irregularly spotted with white blotches which are in some instances confluent at the sides, but are distinct on the back of the shell. The dorsal line is somewhat paler and approaches the right side. Beneath, the colour is less intense, and the teeth are very strongly developed, and of an ivory whiteness. The surface of the ventral disc is rendered a little uneven by pale tubercles which appear beneath it and seem to have been, originally, white spots. The thickened margin is slightly undulated, especially towards the anterior and posterior terminations of the right side, bearing resemblance to the undulation on the same part of the right margin of *Ovulum Ovum*. The interior is white, and the extremities are prominent.

This fine Cowry affords a very striking example of the development of the teeth which are most strongly marked in this species. I know of no other example of the shell which is, I believe, entirely new and figured in this Journal for the first time. Its locality is unknown to me.

It may not be uninteresting to give a few remarks on the habits of this genus which were made by an eye witness. Mr. Samuel Stutchbury, who had an opportunity of examining many individuals of *C. Tigris* at the Pearl Islands, informed me that those cowries lived there in very shallow water, and always under rolled masses of Madrepore. They never were to be seen exposed to the sun's rays. On lifting one of these masses, a Tiger Cowry was generally observed with its shell entirely covered by the large mantle which was mottled with dark colours,

the intensity of which the animal seemed to have the power of changing; for the colours varied in the same light and in the same medium, after the manner of the spots on the Cephalopodous Mollusca, or, to use a more familiar instance, somewhat in the same way that the hues of a turkey-cock's wattle vary. On touching the mantle, it was immediately withdrawn within the shell, which became exposed in all its brilliancy.

So firmly did the soft parts adhere to the shell, that, in no instance, (and the experiment was often made) did Mr. Stutchbury succeed in extracting them by force, either during life, or before decomposition took place. He was obliged to let the animal die, and suffer the soft parts to decay, in order to remove them.

ART. XVIII. *Observations on the Zoology of the Caribbean Islands.* By the Rev. LANSDOWN GUILDING, B.A., F.L. and G.S., M.W.S., &c.

(Continued from Vol. III. p. 544.)

NOTICE OF THE LIVING GUANA OF THE WEST INDIES.

The Zoologist will never, perhaps, be able in all respects to establish correctly the characters of exotic genera, until he can have an opportunity of drawing up his descriptions from living subjects. After the death of the larger animals within the tropics, the greatest changes almost instantly succeed, and mock the skill of the investigator of the works of Nature. Dried specimens suffer materially in the process necessary for their safety; and subjects preserved in spirit not only lose their colours, but often reach him in a state of decay, which prevents an accurate examination of important parts.

Hence has arisen the error handed down by so many naturalists that the gular process, (*Palear*, Guild.) in the *Iguanidæ* and the *Anolidæ*, was a pouch capable of inflation. Indeed to one of our lizards, *Anolis bullaris* of modern herpetology, (*A. variabilis*, nobis,) a specific name has been given which can by no means be retained; the dew-lap process

being, from its structure, of necessity always compressed, even when extended, and never bullate and inflated as it might seem on a lateral view of the animal.

This circumstance I long since mentioned in a paper read before the Royal Society, but as Mr. Bell has since said all that is necessary on the subject, in his admirable observations on the structure of the throat in the genus *Anolis*, inserted in the fifth number of the Zoological Journal; and has accompanied his anatomical details by a satisfactory plate, shewing the remarkable developement of the os hyoïdes by which the palæar is extended; I shall for the present only observe, that the supposition of Mr. Bell is quite correct, the skin of the sides being perfectly united. It is of a light and striking color, which is probably useful in attracting the female.* While in search of prey, the *Anolides* most common here always adapt (by some mysterious power) their color to the green tree, or the dark brown rock, on which they lie in ambush; and were it not for this organ, which they can retract at pleasure, the male might lie concealed when at a distance from the other sex, which it is not able to entice by sounds. The process is stiffly extended, and, to make it more apparent, the head and neck are moved up and down with a violent jerking motion, dum mas feminam in nuptias sollicitat. In the cognate genus *Ascalabotes*, Cuv., which preys by night, this structure is wanting.

It may be advisable to repeat the description which was added at the same time of the living Guana, as none but dead specimens appear to have been studied by Zoologists in Europe.

REPTILIA.

Ordo. SAURIA.

Divisio. TERETI-CAUDATA.

Fam. IGUANIDÆ, Bell, Guild.

Genus. LACERTA, Linn. IGUANA, Cuv., &c.

Char. genericus.

Corpus magnum, crassum, caudaque elongata, ordinibus parallelis squa-

* Perhaps, like the Caruncula of the *Gallinæ*, the organ may be principally ornamental.

mularum tectæ. *Crista squamarum productarum dorsum totum occupans, (feminæ minor.) Caput subquadratum. Lingua carnea, apice emarginata. Palear gutturale (maris) contractile, maximum, compressum; inter amores ramo filiformi ossis hyoïdis extensile; feminæ palear spurium. Aures squamâ maximâ clausi. Os parietale foramine contracto perforatum, squamâ parvulâ oblecto. Dentés apicibus triangulâribus, serrulatis. Pedes validissimi. Digiti longi, quinque. Ungues magni, recurvi. Femora subtùs ordine unico tuberculorum.**

Iguana tuberculata. Laur., Cuv.

I. corpore viridi: caudâ fasciis distinctis nigris: lateribus maculis obsoletis nigris, flavis: collo tuberculato, nigro, purpureo azureoque variegato: cristâ gulæ denticulatâ, dorsali maximâ pectinatâ: tuberculo internasali: callis femoralibus 17.

Lacerta iguana, Linn. a Gmel., p. 1062, ubi synonyma multa.

L'Iguane ordinaire. Daud.

L'Iguane. Lacep.

Common Guana, Shaw. Sloane, Hist. Jam. p. 333, pl. 273, fig. 1, male.

Habitat. longitudine 4-5 pedum frequens in Insulis Caribæis, insectis vicitans; fistulando sæpè servis nostris in laqueum allicitur. Arboribus nonnunquam dormitat vel prædam expectat. Subito capta ictus diros sanguinolentos caudâ acutâ (quasi ense) dirigit.

Animal omnino pulcherrimum. Pullus pulchrior, coloribus vividis, mox saturatoribus, obscuris.

On the western or leeward coast of St. Vincent, the Guana occurs in great abundance. While passing in my canoe, I have shot as many as eight in a single spot which they frequent, to the great joy of my negro boatmen, who value them beyond measure. The Creoles, who alone eat them, cook them as a boiled rabbit, which they are said to equal in de-

* These tubercles, or rather round sacs, have only a connection with the skin, in which they are deeply imbedded, projecting internally when it is removed. They are filled with a fatty substance, harder than suet, and may possibly answer the same purpose in this animal as the calli of the Camel, while creeping or resting on the parched sands or rocks of our coasts.

licacy; but it is a dish which, like that of the huge frog of Dominica, I have never brought myself to taste.

The covered aperture leading through the parietal bone into the cavity of the cranium, may be named *Foramen Homeanum*, after one of the most zealous comparative anatomists of the age.

MOLLUSCA.

Fam. HELICIDÆ, Guild.

Carocolla Barbadosensis.

C. nigro-fuscescens, collo fusco bilineato, tentaculis saturatoribus, pallio abdomineque nigro-marmoratis.

Testa solida, transversim plicata, ferrugineo-fusca, fasciâ angustâ flavidâ; labiis crassis, sordido-lividis; dentibus obsoletioribus.

Habitat copiosissimè sub lapidibus Barbadosibus, gregatim cum *Helicinis* aliisque *Molluscis*.

Var. β . pallida, flavida.

Junioris *testa* acuta; adultæ solida, rotundata, adiaphana.

Genus. BRACHYPUS,* Guild. CLAUSILIA et PUPA, Auctorum.

Char. gen.

ANIMAL heliciforme. *Tentacula* quatuor, majoribus oculatis. *Os* subtùs: *Pes* brevissimus, difficillimè testam elongatam trahens.

TESTA fusiformis, gracilis, anfractibus plurimis, omnibus angustis: basilari coarctato, subcarinato. *Apertura* parvula, simplex, subrotundata, edentula: *labia* reflexo-incrassata, undique connata. *Operculum* nullum.

Brachypus costatus.

B. flavescens, dorso nigrescente, oculis atris.

Testa fusca, longitudinaliter obliquè costata, anfractibus undecim?

Habitat in arboribus Barbadosibus, apice sæpe decollato.

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

Lister, t. 20, fig. 16? *Figura* rudis, dubia.

An *Clausilia collaris*? *Lam*, *Anim. sans vert.* t. 6, p. 2, 114.

* Nomen a $\beta\rho\alpha\chi\delta\varsigma$ brevis, et $\pi\epsilon\varsigma$ pes.

Obs. This generic appellation will require to be changed, as it has been already employed by Mr. Swainson to designate a genus of Birds. See *Zool. Journ.* Vol. III. p. 163.—ED.

A subgenus which may receive those *Clausilia* which are edentate, and without the Clausium or elastic operculum. I am convinced of the necessity of restricting rigidly the generic characters of the terrestrial *Mollusca*: and no apology will be necessary for the introduction of many new titles in these essays, in as much as Mr. Vigors and my friend Mr. Swainson have already in this Journal so ably silenced the clamour raised against the multiplication of genera by those who presume to call themselves the *legitimate* disciples of Linnè—the *faithful* followers of that great master, who was for nothing more remarkable than the fearless manner in which he pulled down, new modelled, and built upon, the works of those who had preceded him: and who confessedly left, after his unexampled labors, nothing but the bare walls of that edifice which he well knew would require ages for its completion.

Familia. BULIMIDÆ, Guild.

Genus. MACROCERAMUS,* Guild. PUPA, et BULIMUS?, Auctorum.

Char. gen.

ANIMAL heliciforme, terrestre: *caput* subbilobatum. *Tentacula* quatuor, duobus superioribus capitatis, oculigeris. *Pes* brevis, posticè attenuatus, simplex.

TESTA cylindrico-conica, crassa, opaca, umbilicata; *anfractibus* sensim decrescentibus. *Apertura* regularis, semiovata; *labro* subito reflexo. *Columella* lævis, simplex.

Macroceramus signatus.

M. fuscescens, collo nigro-lineato: *pedis lateribus* nigricantibus: pallio fuscescente, ferrugineo picto: *oculis* atris: *disco gressorio* pallido.

TESTA pallida, longitudinaliter subplicata: *anfractibus* undecim, literâ β seriatim signatis: ultimo brunneo fasciato.

Habitat in Insulâ Tortolâ. Communicavit Dominus Shew.

* Nomen a μακρὸς longus et κέραμος testa.

† I know not whether the use of the teeth and laminæ of the *Pupæ* has been explained; they may answer the purpose of an operculum to keep out enemies, while they afford no obstacle to the motions of the soft and yielding body of the animal.

A subgenus nearly allied to *Bulimus*, from which it differs in the gradually declining whorls of the spire, and the more contracted aperture. It is distinguished from *Clausilia* and *Pupa* by the simple and regular mouth destitute of teeth and laminae.

This animal was sent me by a friend who has taken great pains to put me in possession of the *Mollusca* of the Virgin Islands, that I may examine them for publication. I find that the terrestrial testaceous *Mollusca* will travel to a very great distance in a living state, even in the tropics, if packed in saw-dust. I have also lately dispatched tin boxes perforated on all sides, and filled with wet moss and mud, in which I hope soon to obtain alive the aquatic *Mollusca* which swarm in the waters of the mighty Oronoko, and the canals and ponds of the neighbouring colonies.

Genus. BULIMULUS, Leach. BULIMUS, Auctorum.

Char. gen.

ANIMAL heliciforme. *Tentacula* quatuor, duobus superioribus capitatis, oculatis: *facies* lobata. *Os* subtus. *Pallium* foramine communi perforatum.

TESTA vix umbilicata, oblonga, turrata, anfractus ultimus maximus: *apertura* elongata, integra; *columella* vix cavernoso-inflexa: *labrum* tenue, sæpiùs gradatim subreflexum in adultis, at nunquam marginatum.

* Labro subreflexo.

1. *Bulimulus undulatus*.

B. olivaceo-niger, tentaculis apice pallidis, pede subtus livido.

Var. β . pallidior, sordidè flavido-olivaceus.

Testa longitudinaliter plicata, anfractibus septem; tota flavida, livido-brunneo undulata; labris sæpe croceis.

Var. β . nitore cœruleo admixto.

Habitat frequens in arboribus Sti. Vincentii, ad radices montis "Bon Homme."

Testa nuper ab ovo exclusa fuscescens, ferrugineo maculata, longitudinaliter et transversè densè striata.

A very beautiful, but local species, apparently confined to the old forests which close round the foot of the Bon Homme. The remarkably delicate sculpture of the young shell (which is not continued in the additions made after the birth of the animal), is worthy of observation.

2. *Bulimulus stramineus*.

B. corpore cœrulescente-flavido ; pede subtus, tentaculis apice, pallidis : oculis atris : pallio cœrulescente : abdomine candido.

Testa subdiaphana, straminea, transversè densissimè striatula ; anfractibus 6-7 : apicali ferruginoso.

B. stramineus. *Linn. Trans.*, xiv, p. 2, pag. 340.

Habitat abundè in dumetis Sti. Vincentii. Incolâ retractâ, coloribusque confusis, virescit testa.

It abounds in rainy weather in the underwood about Fort Charlotte and other parts of this island, and when withdrawn into the shell, resembles the pale-green side of a reversed leaf, an appearance which renders it difficult to be found, and doubtless protects it from the birds.

** Labro semper simplici, tenui.

3. *Bulimulus fuscus*.

B. nigro fuscescens, collo nigro bilineato ; pallio abdomineque atromaculatis : tentaculis brevibus, nigris.

Testa nigro-fusca, subdiaphana, epidermide longitudinaliter plicatâ : striis transversis evanidis.

Habitat passim sub lapidibus insulæ Barbadosensis, societate *Helicinarum*.

The first section of the genus contains those species which creep on trees, and have a slightly reflected lip, in the adult state : the second comprehends those which hide themselves under stones during the day, and in which the lip is thin, simple, and never reflected.

 ANALECTA ZOOLOGICA.

In drawing up the characters of our *Mollusca*, I have purposely confined myself, for the most part, to the exterior anatomy, imagining that I should do a serious injury to science in attempting what can be so much better done by the celebrated anatomists of France. I have written to M. De Blainville, intreating that he will undertake the internal anatomy, and permit me to forward to him, through Mr. Sowerby, specimens of all our animals, properly prepared for dissection. I hope also to estab-

lish a correspondence likely to be useful to the interests of science, with the Baron d'Audebard de Ferussac, the author of the most splendid work which has yet appeared on the *Mollusca*.

The difficulty of preventing these animals from shrinking and withdrawing their organs when thrown into spirit, is scarcely removed by quickly dashing boiling water over the specimens; and in the testaceous genera the process is not sufficiently sudden to secure the object aimed at. Perhaps some Zoologist residing on the coast, who has a good electrical machine, will make some experiments with the view of killing the animals while in their natural attitude of creeping. A wire might be made fast round the shells, and the favourable moment easily seized for communicating the shock. The spire should be cracked or perforated to prevent putrefaction before the animal is preserved in spirit.

In the second volume of this Journal, page 497, Mr. Brayley has given an ingenious paper on those organs of the *Helicidæ*, usually regarded as their eyes, which is particularly valuable from its presenting at one view all that has been said on the subject by preceding writers.

Mr. Bauer's microscopical examination of the tentacula of the garden snail reached me after the note quoted by Mr. Brayley had been written, but has done nothing to remove my opinion that these spots are really ill developed eyes, not indeed in the *Helicidæ* capable of distinguishing objects, but certainly susceptible of the impressions of light. In the *Helicidæ* the superior tentacula are usually carried erect, and the inferior ones with the lobes of the cheeks are principally used as tactors. In *Helicina*, which has only two tentacula, they are in constant motion, touching the path in which it is gliding; while the scarcely prominent ocular points, seated at their base, can in no degree, nor under any circumstances, be employed to assist the sense of touch.

As far as the *Helicidæ* are concerned, the latter part of the note added at page 507, admits all I would contend for. In *Helicina*, &c., the eyes are perhaps somewhat more fully developed, but from the minuteness of these animals, we shall require a Bauer for their examination.

Mr. Brayley errs in supposing, page 508, that I alluded to the *Cephalopoda*, as to which no doubt could exist. Had he an opportunity of

examining the giant *Strombidæ*, which inhabit the Caribæan Sea, he would find the eyes more perfect than those of many vertebrated animals. In these he would see with astonishment a distinct pupil, and a double iris, equalling in beauty and correctness of outline, those of birds and reptiles. On dissection he would discover a vitreous and an aqueous humor, and the black pigment, which will be sought for in vain in the *Helicidæ*.

The *Strombidæ* also possess the sense of hearing: or what seems allied to it, the sense which the perplexed entomologist has termed with Lehmann Aëroscepsy. I lately suspended a number of large *Strombi* by the spire, that the animal when dead might fall from the shell. They had remained in this situation several days, till the body, weak and emaciated, hung down nearly a foot from the aperture, and the eyes had become dim. I found that even before my shadow could pass over them they were aware of my presence, and endeavoured to withdraw into the shell. I then cut off the eyes, with the thick cartilaginous tentacula in which they were lodged, but the animals still continued to be sensible of my near approach, while hanging in this mutilated and painful condition.

The locality of *Melampus* of Montfort and Bowdich, has been justly doubted: the very curious inhabitant, which shall soon be figured, is improperly said to be found in the rivers of the West Indies. It occurs in great numbers in the shallow parts of the shores of the Antilles.

There is nothing which the zoologist residing in a tropical country so much feels the want of as the boxes which are necessary for the preservation of the *Annulosa*, and other perishable animals. The number he supposed sufficient to contain the fruits of his labours are soon filled. Rare and new subjects are daily presented to his notice, and he is too often under the necessity of altogether neglecting objects of the greatest interest. Cork, which in Europe is used to cover the boxes of the entomologist, it is impossible to obtain; and melted wax becomes almost useless, however skilfully prepared.

Fortunately an admirable substitute for cork is always at hand, which

cannot fail of being highly valuable to the traveller, and which may be the means of making us acquainted with hosts of minute, but valuable, animals, which have been hitherto passed by.

The *Agave vivipara*, which grows abundantly on the barren rocks of our leeward coasts, throws up to the height of twenty or twenty-five feet its majestic scapus, the medulla of which I wish to recommend to notice.

The scape, which may be found in tolerable condition nearly at all times, is in perfection about November and December, and should be cut down as soon as the already vegetating gemmæ have fallen from the column of fructification.

It must be divided into pieces of a proper length, and when deprived of its hard woody bark, sawn into slices of the thickness of half an inch, and carefully dried in an oven. The slices are then to be neatly cut and squared with a knife ground on a coarse stone, and to be smoothed with pumice, when they are ready to be glued in the box and papered.

Thin slices at the back of which the bark has been left, form admirable razor-straps; and unslit portions of the pith, which often attains a diameter of three inches, may be used as stoppers for wide-mouthed bottles. It certainly does not possess all the firmness and elasticity of cork, but from the total absence of cavities, it is in some respects superior.

Notice of the discovery of a recent ENCRINUS.

From the mutilated state of the recent *Pentacrinites* discovered in the Caribæan Seas, it has been impossible to ascertain whether they were attached by the base to rocks, or were capable of locomotion, which the length of the pillar in some of these animals might seem to render unnecessary. The accidental capture of a small, but perfect *Encrinus*, has enabled me to settle this point, and has confirmed the suspicion which has been entertained of late, that the species of the tribe *Crinoidea* are allied to that division of the Linnean *Asteriadae* which have dichotomous and multi-articulate arms.

The sessile genera of the *Crinoidea* differ from these, in possessing clasping organs of motion (*Ambulacra*) independent of the arms for entangling the prey;* and those genera which are furnished with a multi-

* It would be very desirable, by breaking a single arm, to examine the specimen of *Alecto horrida*, which Dr. Leach described in the Zoological Miscel-

articulate column beneath the body further differ, (in the genus *Pentacrinus* at least,) in having supplementary verticillate tendril-like organs, (*Claviculæ*, Ray,) on the column, for clasping the branches of *Gorgonia*, and other bodies to which they attach themselves, while the arms are kept expanded to receive the food.

Of the tribe *Stellerida*, (all of which want the *Ambulacra* and *Claviculæ*,) some, as the solid *Asterias*, have only suckers and accompanying lateral scales for locomotion: in *Ophiura* the pediform arms, few and multi-articulate, are adapted for walking, but not for the capture of its prey: in *Gorgonocephalus*, Leach, they are infinitely dichotomous and ramulose, and suited for both purposes.

In all the stomach is central, and either concealed, or submembranaceous and fixed between the brachia. In the *Stellerida*, the surface of articulation in the joints is simple, and the perforation rude: while in the *Crinoidea* the surface is beautifully radiate or stellate, and the muscular foramen well defined.

The following short characters may for the present serve for the genus before me, which comes near perhaps to the stag's-horn Encrinite of Parkinson. I shall forbear publishing any figure or detailed description of this most interesting animal, until I have received an answer from Mr. Miller, from whom I hope to ascertain into what families and genera he has divided these multiform beings in his work on the *Crinoidea*, which I have no opportunity of consulting here.

Genus. ENCRINUS? Miller.

Char. gen.

Corpus liberum, crustaceum; basis solida, subtus suffulta, ambulacris 18, multi-articulatis, prehensoriis; articulis uniformibus, apice uncinato, uncinulo adjuncto. *Brachia* superna, quinque, longissima, citò bipartita, multi-articulata, articulis difformibus; articularum facie subcirculari, radiatâ; foramine parvo, simplici: intus digitata. *Digit*i subulati, articulati, numerosi, basi carne nidulantes. *Abdomen* membranaceum, inter brachiorum basin situm. *Os* superum.

lany from the collection of the British Museum. I suspect, from the supplementary basal articulated organs terminated by a hook, that this genus will be found to have a radiated surface of articulation, and to belong rather to the *Crinoidea*.

Encrinus Milleri.

Habitat in profundis maris Caribæi, Gorgoniis adhærens.

Det nomen Dom. Miller, horum animalium investigator peritissimus.

ART. XIX. *Anatomy and Monograph of the genus Dentalium.* By M. G. P. DESHAYES. (*Abstracted from a Memoir read before the Société d'Histoire Naturelle, March 18, 1825.**)

AT the commencement of those labours which have at length enlarged themselves into the admirable memoir on the genus *Dentalium*, of which we are about to offer an abstract, the object proposed to himself by M. Deshayes was, to determine to which of the classes of the animal kingdom it ought to be referred. Linné, as is well known, assigned to it a situation among his *Vermes Testacea*, next to *Patella*, placing immediately after it the *Serpula*. On the subsequent dismemberment of the immense class *Vermes* of the great Swedish naturalist; of the genera which in his system immediately preceded and followed *Dentalium*, the one was included among the *Mollusca*, and the other among the *Annelida*, of M. Lamarck. The genus *Dentalium* remained thus as it were isolated, and it became questionable with which of these two classes it ought to be associated. Lamarck himself, deceived probably by the erroneous information furnished to him by M. Fleuriau de Belle Vue, decided on including it among his *Annelida*; and in this arrangement he was supported by Cuvier, and by the whole of the modern naturalists. With this location M. Deshayes was, however, unsatisfied. The mere examination of the shell alone of *Dentalium* would have sufficed to shew that it was perfectly symmetrical, while those of the *Annelida* are never so. But the anatomical investigation of the animal, hitherto only known by the very imperfect figure given by D'Argenville, has rendered it still more evident that it can no longer remain in the situation assigned to it by Lamarck. According to M. Deshayes it is evidently referrible to the

* Quarto, pp. 58, plates iv, containing figures of all the species.

Mollusca, and in this view of the subject he is joined by M. de Blainville, who regards its natural position as next to *Patella*, a striking illustration of the correctness of the views of Linné, a correctness so much the more wonderful when we consider the insufficiency of his materials.

The species anatomically examined by M. Deshayes is the *Dentalium Entalis*, L., a species common to the English and French coasts. His specimens were forwarded to him in spirit, and were consequently much contracted. The animal is conical and elongated, like the tube which it inhabits, its dorsal surface corresponding with the convexity of the shell, and its ventral with the concavity. It is smooth, and is obliquely truncate in front, the centre of the truncation exhibiting a small pyramidal process, which is the extremity of the foot. Posteriorly it is less muscular, and is usually terminated by a funnel-shaped expansion, (firm and well developed in some individuals, while in others it is scarcely perceptible,) which is separated from the rest of the body by a strongly marked contraction. Above this contraction is a muscular ring, broader on the ventral than on the dorsal surface, by which the animal is attached to the shell; this latter exhibiting on its inner surface, at about one-fifth of its length from the posterior extremity, a corresponding horse-shoe-shaped impression, the interruption being on the concave side.

On the dorsal surface, at about one-third of its length from the anterior part, a slight elevation is seen, indicating the situation of the head. Below this the whole extent is occupied by two muscles on each side, which may be distinctly observed through the transparent parietes of the abdomen. They are symmetrically placed, flattened, and directed obliquely from the lateral parts of the foot towards the dorsal surface and the posterior extremity of the animal, giving origin to, and becoming confounded with, the muscle of attachment.

On the abdominal surface, also at about one-third of its length from the anterior extremity, there are visible on each side two perfectly similar organs, which are deeply lacinated and of a deep brown colour, constituting the liver. Below this organ, nearly the whole of the abdomen is seen through its transparent parietes to be filled by granulations contained in a very large ovary, and by the intestine descending in a straight line and terminating at the expanded extremity of the animal in a median anus.

The whole of the anterior part of the animal is inclosed in a fine membrane which is fixed posteriorly to the origin of the foot, and is free in front, where it is thickened in its circumference and perforated in its centre: this M. Deshayes regards as the mantle. The thickening is formed by a circular sphincter, which during its contraction wrinkles the skin, and closely embracing in its opening the extremity of the foot, thus prevents any communication with external objects. According to M. d'Orbigny, jun., who has supplied a drawing of the living animal while expanded, in this state the dilated lobes of the foot resemble a flower, the undulated and small corolla of which supports in its centre a pistillum thickened towards its middle, and pointed at its free extremity.

Such are the parts externally visible of the animal of *Dentalium*. To reach the other organs the mantle may be slit down the middle of its dorsal surface, and separated from its insertion to the right and left, for the purpose of turning it downwards and to the right. We have then before us the foot, the head, and the branchiæ.

The foot is elongated, subcylindrical, slightly conical, and flattened from above downwards; it is fleshy throughout, and is situated at the inferior and anterior part of the head, having its upper and under surfaces depressed in their middle into a slight groove. Its anterior extremity is the largest, having its centre occupied by a kind of conical nipple, which is broader at its base, being there partly covered by two small crenate lateral lobes, their notches corresponding with the grooves of the foot. The posterior extremity has an appearance of bifurcation, owing to the attachment it affords to the retractor muscles; its middle part projects slightly into the abdominal cavity, supporting the stomach and the other principal viscera.

The head, which consists only of a mouth, is situated superiorly at the hinder extremity of the foot. It is bell-shaped, and flattened from before backwards. On its sides appear two black points, which might be mistaken for eyes, but are actually the jaws placed within the mouth, and visible through the thin substance composing it. These jaws are spherical, horny, rough on their outer surface, and cleft in the middle, strongly resembling a very small bivalve shell. The lips are also two, deeply cleft at the margin, or rather furnished each with three pair of labial tentacula, those of the posterior lip, and especially the middle pair, being consi-

derably larger than those of the anterior. In the centre of the anterior lip is a naked space indicating the opening of the mouth, which contracts into a short fleshy œsophagus, terminating quickly in a pyriform thick stomach, supported by, and firmly adhering to, the extremity of the foot, and containing in its interior, near the cardiac opening, a rather complicated dentary apparatus. The stomach receives directly by a distinct vessel from each of the symmetrical lobes of the liver already noticed its secretion, and terminates inferiorly in a slender transparent, straight, median intestine, opening at the dilated posterior extremity.

Of the general circulation little has yet been observed. The heart is symmetrical, and is placed above the stomach, being contained in a pyriform pericardium. Issuing from the anterior extremity of this sac is seen a vascular trunk, passing in the direction of the neck, and dividing into two large branches, one of which is distributed to each of the branchiæ. These latter organs are two in number, and are symmetrically placed on the lateral and posterior parts of the neck, being supported on a divided pedicel, or rather on a branchiferous membrane. They are formed by a multitude of very fine, soft, flexible, tentacular filaments, the terminations of which are club-shaped, and appear from their position equally adapted to direct the nutritive matter towards the mouth, and to fulfil their more important office of supplying oxygen to the blood.

The organs of generation are still less known; no male organ having been discovered, nor any female one except the large ovary, which fills nearly the whole of the abdominal cavity, but of which even the external opening remains yet to be discovered.

The nervous system, so far as it has yet been traced, appears to be ganglionic; at least there exists, according to M. Deshayes, no longitudinal knotted marrow. The cerebral ganglion, the only one yet observed, is small, quadrilateral, much elongated, and placed longitudinally on the middle of the posterior surface of the head. From its inferior angles issue two very minute filaments, which pass to the œsophagus, beyond which they have not been traced.

Such are the anatomical materials furnished to us by M. Deshayes. Confessedly imperfect as they are, they are still extremely interesting, as demonstrating, if the account of the nervous system be correct, that the genus *Dentalium* can no longer be referred to the Annulose type of the

animal kingdom. It must, however, be admitted that the almost perfect symmetry of its organs by no means accords with the irregularity universally exhibited by those of the *Mollusca*, not one of which even approximates to it in this respect. For the present, at least, and until further and more complete dissections, especially of the larger species, found in the Indian seas, shall have thoroughly developed its organisation, its precise situation must be regarded as doubtful.

DENTALIUM.

ANIMAL. *Body* elongated, conical, truncate anteriorly, inclosed in a mantle which is terminated in front by a sphincter-like, fringed or plaited, incrustation. *Foot* anterior, probosciform, terminated in front by a conical appendix received into a kind of calyx with festooned margins. *Head* distinct, pedicelled. *Lips* furnished with tentacula. *Eyes* or eye-bearing tentacula none. *Branchiæ* cirrhus, in two cervical symmetrical bundles. *Jaws* two, horny, lateral, oval, cleft. *Anus* terminal, median, in a kind of funnel-shaped enlargement at the posterior extremity, capable of protrusion from the shell. *Organs of generation* unknown.

SHELL, regular, conical, elongated, symmetrical, more or less curved; concavity ventral, convexity dorsal; open at the two extremities; anterior opening larger, simple, usually oblique; the posterior one smaller, sometimes lengthened by a slit which is generally median and dorsal.

OBS. In the succeeding descriptions, M. Deshayes supposes the shell under examination to be placed with its larger extremity or base in front, its small extremity or apex posteriorly, its concave or ventral surface downwards, and its convex or dorsal surface upwards; the large opening of the shell which occupies its base thus becoming anterior, and the smaller one of the apex posterior, and the shell presenting four surfaces, an inferior or ventral, a superior or dorsal, and two lateral, one right and the other left.

The *D. corneum*, Linn., the *D. pellucidum*, Linn., and the *D. nigrum*, Lam., are rejected from the genus as the cases of the larvæ of *Phryganææ*; as are also the *D. Radicula*, Lam., and the *D. deforme*, Lam., which are evidently *Serpulææ*.

L. Shell not cleft at its posterior extremity.

A. Striated or ribbed longitudinally.

1. *D. ELEPHANTINUM*, Linn. *D. testá duodecim costatá, angulatá, subrectá, albidá; costá minore unicá inter alias.*

D. elephantinum, *Auct.* (haud Lamarck vel Sowerby.)

D. rectum, *Gmel.* p. 3738. n. 12.

Habitat in mari Indico, necnon in Mediterraneo.—*Foss.* in Italiá et Austriá.

Shell large, tubular, rather broad at its base, nearly straight or very slightly curved, white with transverse zones or pale green; constantly presenting at its apex twelve symmetrically placed ribs, between each of which a small one is soon interposed, which becomes at the base nearly as thick as the primary ones, thus giving at the thicker extremity the appearance of twenty-four ribs. In the fossil variety from Austria, the ribs are all equal from their origin.

Length from 3 to 3½ inches. Diameter of the base from six to seven lines.

2. *D. ARCUATUM*, Linn. *D. testá albo-virescente, tereti, arcuatá, decem costatá, costis inferioribus majoribus; striá unicá inter costas.*

D. elephantinum. *Lam., Anim. sans vert.* v. p. 343, n. 1. *Sowerby, Genera of Shells*, No. XV. f. 1.

Habitat in Mari Indico.

Shell large, arcuated, green at its base, whitish, or yellowish green at the apex. Ribs prominent, generally ten, occasionally only nine; the dorsal ones flattened as though broken down, the ventral ones much more prominent; between each of the ribs is generally seen a slightly marked stria. Apex not very acute. Margins of the opening thin, cutting, festooned on the inside by the notches in each of the ribs.

Length upwards of 3 inches. Diameter of the base 5 lines.

3. *D. SEXANGULARE*, Lam. *D. testá tereti, arcuatá, subulatá, duodecim costatá; costis sex eminentioribus; striis transversis minimis.*

D. sexangulum. *Gmel.*, p. 3739, n. 21.

D. elephantinum. *Sowerby, Genera*, No. XV, f. 2.

Var. *a.* *Testá minore, costis minus eminentibus.*

Var. *b.* *Testá minore sex costatá, striis binis vel tribus inter costas.*

Foss. Placentiæ et in Austriâ.

Very large, slender, considerably curved, constantly exhibiting twelve ribs, six of which are more prominent, and are prolonged to the apex, while the other six do not reach so far, and usually continue smaller. In the older individuals the ribs become striated, and disappear insensibly towards the opening. Very fine and irregular transverse striæ indicate the growth; the apex is constantly hexagonal; the opening is oblique, with cutting and simple margins.

Length from 4 to $4\frac{1}{2}$ inches. Diameter of the opening scarcely five lines. Length of the first variety 2 inches; of the second 1 inch 6 lines. In the latter the six intermediate ribs are each replaced by two or three strongly marked striæ.

4. *D. APRINUM*, Linn. *D. testá virescente, tereti, subsulcatá, decem costatá, striis transversis nullis; apice acuminato.*

Var. *a.* *Testá duodecim regulariter costatá, albidá.*

Var. *b.* *Testá undecim costatá: striá unicá inter costas.*

D. striatulum. *Gmel.* p. 3738, n. 13.

Habitat in mari Indico, necnon in Mediterraneo.

Resembles *D. arcuatum*, but is slenderer and more curved, its green colour is less deep, and extends equally to the apex, which is less acuminated. Ribs varying in number from ten to twelve, symmetrical, narrow, placed at regular distances, and equally prominent on the concave and convex surfaces, extending from the apex to the base. Transverse striæ, indicative of the growth, few and irregular, generally accompanied by zones of a deeper green; the remaining space between the ribs being entirely smooth.

Length 2 inches 7 lines. Diameter of the base $2\frac{1}{2}$ lines.

5. *D. OCTOGONUM*, Lam. *D. testá albidá lacteá, subarcuatá, octogoná; costis octonis; duabus tribusve striis inter costas.*

Var. *a.* *Testá septem costatá.*

Habitat in mari Sinensi.

White, subdiapnalous, moderately curved, with eight regular ribs, extending from the apex to the base, which are narrow, rounded, and perfectly symmetrical; between them are two, or sometimes three, fine striæ. Transverse striæ none, except occasional indications of growth. Apex pointed, with a very small hole: opening regularly octagonal, cutting, slightly oblique.

Length 1 inch 9 lines. Diameter of the opening $2\frac{1}{4}$ lines.

6. *D. ABBREVIATUM*, Desh. *D. testâ minutâ, abbreviatâ, subrectâ, extremitate recurvâ, septem angulatâ, crassâ; aperturâ rotundâ, rectâ, incrassatâ.*

Foss. apud Suessones.

Intermediate between this and the fourth section, the margins of its opening being thickened, but no contraction existing below it. When young it is straight, or nearly so, becoming, as it advances in age, more curved, especially towards its posterior extremity, which is very acute and perfectly smooth: a little above this commence the seven symmetrical prominent angles, the median one of which is on the back; they terminate at the margin. Opening round and straight. Shell thick.

Length 5 lines. Diameter of the opening about $\frac{1}{2}$ a line.

7. *D. VARIABLE*, Desh. *D. testâ tereti, subarcuatâ, albidâ luteolâve; quinque ad novem costatâ; striis exiguis interpositis.*

Habitat in mari Indico?

Small, slightly arched, generally not very acute, usually milk-white, but rarely pale yellow. Ribs from five to nine in number, usually more prominent on the concave than on the convex surface; always most prominent towards the apex, sometimes continuing to the larger extremity, at others gradually disappearing, especially the dorsal ones, the ventral, one, three, or five in number, remaining. In recent specimens the ribs exhibit series of greyish white spots on the milk-white ground of the shell. Striæ, variable in proportion to the number of the ribs, being more numerous when there are few, and *vice versâ*: at first very fine, becoming afterwards almost or quite equal in thickness to the ribs; always continuing as far as the opening.

Length from 1 inch to 1 inch 2 lines.

8. *D. DENTALIS*, Linn. *D. testâ tereti, subarcuatâ, costellatâ, rubrâ; costellis octodenis aut viginti; alternis minoribus.*

Var. *a.* *Testâ majore, costis majoribus planulatis.*

Var. *b.* *Testâ duodecim ad sexdecim costatâ.*

D. attenuatum. Say, *Journ. Acad. Phil.* iv, p. 154, pl. 8, f. 3.

Habitat in mari Mediterraneo.

Foss. a. in agro Pedemontano; *b.* in Marylandiâ.

Shell red, curved, subulated, with eighteen or twenty closely set, regular, prominent, rounded ribs, between each of which is a smaller one. Ribs usually continued from the apex to the base, occasionally diminishing insensibly, and disappearing towards the opening. Apex acute, subulate, with a very small hole. Opening rounded, rather oblique, its margins very thin and cutting.

Length 2 inches. Diameter at the base, 2 lines.

9. *D. SULCATUM*, Lam. *D. testâ subarcuatâ, subulatâ, costatâ; costis regularibus, continuis, sexdecim.*

Foss. apud Grignon, &c.

Resembles *D. Dentalis* in the disposition of the ribs, but differs from it in their number, as well as in size and curve. It is small, pointed, slightly curved, elegantly and regularly covered with sixteen obtuse ribs, continued from the apex to the base, (not varying from twelve to fifteen, as stated by Lamarck, who confounded other species with the present); in the anterior half a slight stria is visible between each rib. Opening very thin, cutting, festooned by the termination of the ribs.

Length

10. *D. FOSSILE*, Linn. *D. testâ vix arcuatâ, longitudinaliter striatâ; crebris striis regularibus, obtusis, æqualibus.*

D. costatum? Sowerby, *Min. Conch.* pl. 70, f. 8.

Foss. apud Siennam et Lauretum.

Size middling, slightly curved, broader at the base than *D. Dentalis*, and less acuminate at the apex. Apex smooth; striæ commencing insensibly a little above it, and increasing in size towards the opening, numerous, closely set, rounded, separated only by a narrow groove. A few transverse striæ indicate the growth.

Length 1 inch 9 lines. Diameter at the base more than 2 lines.

11. *D. BOUEI*, Desh. *D. testâ tereti, subarcuatâ, longitudinaliter tenuissimè striatâ, striis transversalibus decussatâ.*

D. decussatum? Sowerby, *Min. Conch.* pl. 70, f. 5.

D. interruptum? Linn., *Gmel. ed.*, p. 3739, n. 19.

Foss. prope Viennam.

Large, slightly curved, narrow, subulated, attenuated at the posterior extremity ; covered with fine, slightly prominent, closely set, striæ, which are more elevated at the posterior extremity than towards the opening, near which they sometimes disappear. These striæ are transversely intersected by others equally fine, and more closely set, forming a very minute net-work. Other coarser transverse striæ indicate the growth.

Length from 3 inches 2 lines, to $3\frac{1}{2}$ inches. Diameter of the base from 3 to 4 lines.

12. *D. NOVEM-COSTATUM*, Lam. *D. testâ subarcuatâ, rosâ albidâve, novem-costatâ, basi sublævigatâ.*

D. fasciatum. Lam., *Anim. sans. vert.* v. p. 344, n. 7.

Var. *a.* *Eadem albida decem costata.*

Habitat prope Rupellam, et in Mari Mediterraneo.—*Foss.* in Turoniâ.

Size middling, slightly curved, with nine slightly prominent ribs, extending from the apex for about two-thirds of its length, diminishing insensibly, and disappearing towards the opening. When in fine condition, its colour is rose, with transverse deeper zones, which generally accompany the striæ indicative of growth ; at other times it is of a uniform greyish-white colour, and occasionally rose-coloured at the apex, and white at the base. Apex usually truncate, with frequently a small tubular prolongation.

Length 1 inch 6 lines. Diameter of the base scarcely 2 lines.

13. *D. LESSONI*, Desh. *D. testâ subrectâ, tereti, albido-grisâ, octo ad decem costatâ, costis obtusis, depressis, ad aperturam evanescentibus.*

Habitat in mari Papuensi.

Allied to *D. novem-costatum*, but distinguished by its form, curve, and the disposition of its ribs. It is narrow, longer, less curved, constantly of a uniform yellowish white, without transverse zones. Ribs eight, nine, or ten in number, meeting at the base, moderately raised and

rounded, more prominent near the apex, diminishing insensibly, and disappearing near the opening, interrupted by a few striæ of growth. Opening narrow relatively to the length of the shell.

Length 2 inches. Diameter scarcely 2 lines.

14. *D. ACUTICOSTA*, Desh. *D. testâ tereti, subarcuatâ, subulatâ, duodecim ad sexdecim costatâ ; costis tenuibus angustis, acutis, ad aperturam evanescentibus.*

D. striatum. Sowerby, *Min. Conch.* pl. 70, f. 4.

Foss. in Angliâ, prope Barton.

Elongated, narrow, pointed, smooth towards the opening, covered with ribs in the remainder of its extent. Ribs varying in number from twelve to sixteen, small, narrow, slightly prominent, acute, rather distant from each other, diminishing insensibly from the apex to the base, where they disappear altogether. Striæ of growth rather frequent.

Length 3 inches. Diameter at the base scarcely 2 lines.

15. *D. PSEUDO-SEXAGONUM*, Desh. *D. testâ tereti, subulatâ, subarcuatâ, griseâ, tenuiter striatâ, extremitate posticâ sex angulatâ.*

Habitat——— ?

Greyish-white, semitransparent, slightly curved, pointed ; apex with six regular, prominent angles, between each of which are numerous striæ which cover the shell, the angles disappearing quickly at about one-fourth or one-third of the length of the shell. The striæ of growth are very fine, and frequently regular, intersecting transversely the longitudinal striæ.

Length from 1 inch 9 lines to 2 inches. Diameter of the base scarcely 2 lines.

16. *D. MULTISTRIATUM*, Desh. *D. testâ tereti, subrectâ, albidd, multistriatâ, striis tenuibus, confertissimis, aliquantisper seriatim submaculatis.*

D. fasciatum ? Gmel., p. 3737, No. 10.

Habitat in mari Indico ?

Small, narrow, generally slightly curved, white, yellowish, or greyish ; entirely covered with fine closely-set striæ, continued from the apex to

the base. Striæ equal, rounded, sometimes regularly spotted with grey or translucent white upon a dull-white ground ; occasionally the striæ are rather larger, less closely set, and with a very fine stria between each of them. Apex usually worn : opening rather oblique ; its margins very cutting.

Length 1 inch 2 lines. Diameter at the base little more than 1 line.

17. *D. PSEUDO-ENTALIS*, Lam. *D. testâ tereti, subarcuatâ, acuminatâ, anticè lævigatâ, posticè costulis sulcatâ.*

Foss. in Galliâ, apud Grignon, &c.

Resembles *D. Entalis*, but besides being smaller and narrower, it is always ribbed at its extremity, while the other is never more than striate. Ribs variable in number, acute, and more prominent at the apex, diminishing insensibly, and becoming lost at about one-third, rarely one-half, of the length of the shell. Opening perfectly round, rather oblique, with very sharp edges. Posterior extremity never cleft, as stated by M. De-france.

Length from 1 inch to 1 inch 2 lines.

B. Neither ribbed nor striated longitudinally.

18. *D. ENTALIS*, Linn. *D. testâ tereti, subarcuatâ, lævigatâ, continuâ, albâ vel rubescente.*

D. Entalis, *Auct.* (*Sowerby, Min. Conch.* t. 70, f. 3.?)

Var. *a.* *Eadem apice rubescente.*

D. Tarentinum. *Lam., Anim. sans vert.* v. p. 345, n. 14.

Var. *b.* *Eadem albida, rubescensve, apice subtilissimè striato.*

Habitat in mari Europæo, necnon in Mediterraneo.—*Foss.* in Galliâ, apud Grignon, &c.; et in Italiâ.

Size middling, curvature rather strong ; moderately large at its base, white or greyish, often tinged with rose-colour at its apex : entirely smooth, except occasional transverse striæ of growth, and in the variety *b* very minute longitudinal striæ, visible only under a magnifying glass, at the posterior extremity. The posterior extremity, which is generally acuminate, is sometimes truncated, forming a plane surface, from the opening of which issues a small tube. Opening at the base rather large and perfectly circular, with cutting margins.

Length 1 inch 9 lines. Diameter of the base more than 2 lines.

19. *D. POLITUM*, Linn. *D. testâ tereti, subarcuatâ, continuâ, albidd, politâ, striis annularibus confertissimis, tenuissimis.*

Habitat in mari Indico.

A large and beautiful species, rather strongly curved, pointed, polished, shining, subdiaphanous, milk-white. Very numerous transverse striæ, scarcely visible to the naked eye, cover the whole of the shell, from the base to the apex; they are not placed at regular distances, and some of them are coarser than the others, shewing that they depend on the growth. Apex very acute, constantly destitute of longitudinal striæ. Opening oblique, with very thin and sharp margins.

Length 2 inches 8 lines. Diameter of the base 3 lines.

20. *D. DUFRESNII*, Desh. *D. testâ tereti, arcuatâ, lævigatâ, continuâ, acuminatâ.*

Foss. in Burgundiâ.

Regarded by Lamarck as the analogue of his *D. nigrum*, which is to be rejected from the genus as being probably the case of some larva. Size middling, strongly curved, pointed, smooth, perfectly free from striæ, whether longitudinal or transverse; narrow. Base not large; opening perfectly circular, with the margin thin and sharp.

Length 10 lines. Diameter of the base 1 line.

21. *D. TRANSLUCIDUM*, Desh. *D. testâ tereti, subrectâ, translucidâ, hyalinâ, glaberrimâ, nitidâ, subviridulâ.*

Habitat———?

Size middling. Shining, transparent, greenish yellow, perfectly free from striæ. It is neither elastic, flexible, nor corneous, but is calcareous and solid.

Length 1 inch. Diameter of the base rather more than 1 line.

22. *D. LACTEUM*, Desh. *D. testâ tereti, subarcuatâ, lævigatissimâ, nitidissimâ, albidd, lacted, subtranslucidâ.*

Habitat in mari Indico.

Smooth like *D. Entalis*, but smaller and narrower, and invariably milk-white and subtransparent. Shell thin, never exhibiting any appearance of striæ at its apex.

Length 1 inch 2 lines. Diameter of the base rather more than 1 line.

23. *D. INCERTUM*, Desh. *D. testá tereti, angustá, subarcuatá, apice acutissimá, lævigatá, nitidá.*

D. nitens ? Sowerby, *Min. Conch.* pl. 70, f. 1, 2.

Foss. in Galliá.

Resembles in form the *D. pseudo-entalis*, but is without its striæ, being smooth like *D. Entalis*, but much narrower, more curved, and pointed. From the preceding species, of which it may eventually prove to be only a variety, it differs in its greater curvature, its larger size, its more acute apex, and the greater thickness of its shell.

Length 1 inch 6 lines. Diameter of the base $1\frac{1}{2}$ line.

24. *D. RUBESCENS*, Desh. *D. testá tereti, subarcuatá, translucidá, rubescente, lævigatá, acuminatá; extremitate intus sulco dorsali.*

Habitat in mari Mediterraneo ?

Intermediate between this and the succeeding section in which the species are cleft at the posterior extremity of the shell; but in this the shell is only marked on the interior by a short median dorsal groove, which does not penetrate through to the external surface. Colour red. Shell transparent, very smooth and very shining; curvature not considerable; opening rounded, rather oblique, with very sharp margins. There is no appearance of striæ, whether longitudinal or transverse.

Length 1 inch 2 lines. Diameter of the base $1\frac{1}{2}$ line.

25. *D. DUPLEX*, Def. *D. testá tereti, angustissimá, subcylindricá, extremitate duplicatá.*

Foss. in Galliá.

Shell very narrow, acicular, subcylindrical, generally truncated at the apex, from the opening of which constantly projects a short tube, much smaller in diameter, and appearing to issue from the larger one; entirely smooth, little curved, and diminishing very slightly from the base to the apex.

Length 9 lines. Diameter of the base $\frac{1}{2}$ a line.

26. *D. BICARINATUM*, Desh. *D. testá tereti, angustissimá, subrectá, ovato-subcylindricá, intus duabus carinis oppositis instructá.*

Foss. in Galliâ.

A most singular species. Small, very slender, almost as large at the apex as at the base; curvature scarcely any. Shell smooth, shining, slightly marked by the striæ of growth; not rounded, but oval: furnished in the interior with two opposite keels, corresponding with the flattening of the sides; these keels are most prominent near the posterior extremity, and diminish insensibly towards the opening, where they altogether disappear. Opening oval, oblique, very thin, with the margin sharp.

Length 8 lines. Longest diameter at the base $\frac{1}{3}$ a line.

II. Shell cleft at its posterior extremity.

A. Ribbed or striated longitudinally.

27. *D. STRIATUM*, Lam. *D. testá albidá, longitudinaliter costatá, costis crebris, obtusis, subæqualibus; extremitate posticá profundè fissá.*

Habitat———.

Shell large, white, nearly straight, with from twelve to fourteen rounded ribs, continued from the apex to the base; between each of these is a smaller one, or a slightly prominent stria. Apex rather pointed, having on its median and dorsal part a broad and deep cleft, which is broader anteriorly than behind, its edges being cut obliquely inwards. Opening large, rather oblique, its margin being by no means sharp. A few transverse striæ of growth.

Length 2 inches 10 lines. Diameter of the base more than 2 lines.

28. *D. GRANDE*, Desh. *D. testá magná, tereti, subarcuatá, striatá; striis numerosissimis, confertis, tenuibus; fissurá posticali profundá, angustá.*

Foss. in Galliâ, apud Grignon, &c.

The largest species known. Shell very slightly curved, entirely covered with fine and numerous striæ, which become flattened towards the opening, where they are always less prominent than at the apex; no transverse striæ except very distant ones indicative of the growth. Apex

not very acute, but rather more so than in the preceding species; having a deep median dorsal cleft, which is narrow, and of an equal breadth throughout. In some specimens of this and the other species an appendix to the posterior opening is seen similar to that noticed under *D. Entalis*, but in these it is cleft above in the same manner as the shell itself. Opening rather oblique, with very thin and sharp edges.

Length 4 inches 4 lines. Diameter of the base 5 lines.

29. *D. BREVIFISSUM*, Desh. *D. testá tereti, subrectá, posticè costatá, anticè levigatá; costis tredecim ad sexdecim obtusis, extremitate eminentioribus; rimulá angustá abbreviatá.*

Foss. in Galliá.

Large, very little curved, rather broad at the base: apex rather pointed, with from thirteen to sixteen prominent ribs, which become insensibly broader and flatter, disappearing altogether in the anterior part of the shell; the ribs are smooth, rounded, and obtuse. Transverse striæ of growth very fine, scarcely visible to the naked eye, scattered irregularly, but becoming much more numerous towards the opening as the ribs vanish. Cleft dorsal, very short and narrow.

Length 2 inches 4 lines to 2½ inches. Diameter of the base 3 lines.

30. *D. SUBSTRIATUM*, Desh. *D. testá tereti, subrectá, anticè levigatá, posticè leviter striatá; striis minutissimis; rimá abbreviatá, subangustá.*

D. Fissura. Sowerby, Genera of Shells, No. XV, f. 3, 4.

Foss. in Galliá, prope Parisios.

Shell large, very slightly curved, slender, entirely smooth in the two anterior thirds of its surface, the remaining portion being occupied by fine scarcely prominent striæ varying in number and in length. Cleft median dorsal, broader and rather deeper than in the preceding species.

Length from 3 inches 2 lines, to 3 inches 4 lines. Diameter of the base upwards of 3 lines.

31. *D. SEMI-STRIATUM*, Desh. *D. testá tereti subarcuatá, extremitate posticá recurvá, striatá; parte anticá levigatá; fissurá subprofundá, angustá.*

Foss. in Galliá, prope Parisios.

The form of this species is peculiar, being nearly straight in its anterior part, and strongly curved towards its apex. Striæ eight to ten in number, very fine, slightly prominent, disappearing near the middle of the shell; between each of these may be seen through a strong magnifier two or three much finer ones, which are lost with them or in some instances are prolonged to the opening. Opening rather large, somewhat oblique, with very thin and sharp edges. Cleft median dorsal, rather deep, but very narrow; apex pointed and fragile; when this is broken off, the shell resembles *D. pseudo-entalis*.

Length 1 inch 7 lines. Diameter of the base more than 2 lines.

32. *D. SECTUM*, Desh. *D. testâ tereti, angustâ, subrectâ, albidâ, subtranslucidâ, posticè tenuissimè striatâ, obliquè sectâ; rimâ angustâ in sectione.*

Habitat in mari Indico?

Slightly curved, slender, nearly cylindrical, white, translucent, smooth anteriorly, very finely striate posteriorly; striæ numerous, closely set, hair-like, invisible to the naked eye. Hinder extremity not pointed, obliquely cut on the dorsal surface, and very slightly so on the ventral. Cleft not exceeding in length that of the two sections, seen indistinctly on the ventral surface, because the cut is very short, more prolonged on the dorsal one where the cut is longer. Opening narrow, with a thin and cutting margin.

Length 1 inch. Diameter of the base 1 line.

B. Neither ribbed nor striated longitudinally.

33. *D. EBURNEUM*, Linn. *D. testâ tereti subarcuatâ, nitidâ, acutissimâ; striis annularibus regularibus, plus minusve remotis; apice fissurâ tenuissimâ prælongâ.*

Var. *a.* *Testâ angustiore; striis annularibus creberrimis; fissurâ longiore.*

D. circinatum. Sowerby, *Gen. of Shells*, No. XV, f. 5.

Habitat in mari Indico.—*Foss.* in Galliâ apud Grignon, &c.

Shell rather large, curved, shining, polished, pointed, rather slender, milk-white, subdiaphanous, composed of a series of nearly transverse oblique rings, separated from each other by a rather deep stria. Apex

very acute, very deeply cleft, sometimes to one-third of the whole length of the shell. Cleft capillary, scarcely visible to the naked eye. The variety is slenderer, its rings are narrower, and much more numerous, and its cleft rather deeper.

Length 2 inches 2 lines. Diameter of the base 2 lines; in the variety barely $1\frac{1}{2}$ line.

34. *D. FISSURA*, Lam. (haud Sowerby.) *D. testá tereti, subarcuatá, angustá, subulatá, lævissimá, fissurá tenuissimá, dorsali, posticá.*

Habitat in mari Indico?—*Foss.* in Galliá, apud Grignon, &c.

Size middling. Shell throughout smooth, shining, slightly curved, very acute, slender, subtransparent, without any appearance of striæ of growth. Cleft median dorsal, deep and narrow. Opening small, rather oblique, very thin and fragile.

Length 1 inch 3 lines. Diameter of the base $1\frac{1}{2}$ line.

35. *D. ACUMINATUM*, Desh. *D. testá tereti, minutá, subrectá, acutissimá, lævigatá; fissurá capillari, profundá.*

Foss. in Galliá, prope Parisios.

Shell small, very smooth, shining, pointed posteriorly like a needle. Base broader in proportion than in the larger species. Apex very slender. Cleft median dorsal, deep, but very narrow and capillary, invisible to the naked eye.

Length 7 lines. Diameter of the base $\frac{3}{4}$ of a line.

36. *D. NEBULOSUM*, Linn.? *D. testá albidá, lævissimá, subarcuatá; extremitate posticá maculatá, viridulá, subtilissimè striatá; maculis albidis, opacioribus; fissurá posticá laterali.*

Habitat in mari Indico?

Shell milk-white, subdiaphanous, slightly curved, smooth, shining; apex marked with exceedingly fine striæ, visible only under a powerful magnifier. Colour of the apex usually light yellowish or greenish, marked with dull-white, more or less regular, zig-zag spots, which become larger, and are insensibly lost towards the middle, or on the anterior half of the shell. Opening not very large, with very thin and cutting edges. Cleft on the right side; the shell being in this respect intermediate be-

tween the preceding ones, in which it is dorsal, and the following one in which it is ventral.

Length from 1 inch 4 lines to 1 inch 7 lines. Diameter of the base $1\frac{1}{2}$ line.

37. *D. INVERSUM*, Desh. *D. testâ tereti, subarcuatâ, subulatâ, angustâ, hyalinâ, posticè tenuissimè striatâ, rubescente, anticè lævigatâ, albidd; fissurâ angustissimâ, profundâ, ventrali.*

Habitat——— ?

Shell slender, rather strongly curved, subdiaphanous, milk-white at the base, insensibly becoming towards the middle pale red. From the junction of the colours extend towards the apex very numerous extremely fine striæ. Apex very acute. Cleft ventral, deep, but narrow.

Length 1 inch 4 lines. Diameter of the base 1 line.

III. Opening contracted ; two clefts at the posterior extremity.

38. *D. COARCTATUM*, Lam. *D. testâ minutâ, subarcuatâ, lævissimâ, tenui, in medio inflatâ; aperturâ coarctatâ, non marginatâ; extremitate posticâ bifida.*

D. Gadus. (Montagu.) Sowerby, Gen. XV, f. 7, 8.

Var. *a. Testâ majore.*

D. minutum ? Linn., ed. Gmel., p. 3737, n. 9.

(Habitat in mari Anglico.)—*Foss. in Galliâ, apud Grignon, &c. Var. a, in Italiâ.*

A very remarkable species. Shell small, thin, fragile, very smooth, polished, perfectly free from striæ ; slightly curved, rather pointed, gibbous in the middle, diminishing insensibly towards the apex, but more rapidly towards the base, by which the latter is sensibly contracted. Opening very oblique, thin, fragile. Apex in fine specimens exhibiting two lateral clefts.

Length 4 lines ; of the variety nearly 6 lines.

IV. Shell thickened at the margin : without clefts at the posterior extremity.

39. *D. STRANGULATUM*, Desh. *D. testâ tereti, subarcuatâ, cinereâ, interruptâ, opacâ, aperturâ coarctatâ; tubi margine antico inflexo.*

D. corneum. Lam., *Anim. sans vert.* v. p. 345, n. 15.

D. coarctatum. Brocchi, *Conchyl. Subap.* p. 264, n. 9, pl. 1, f. 4.

D. incrassatum. Sowerby, *Min. Conch.* pl. 79, f. 3, 4.

Habitat in mari Australiæ?—*Foss.* in Angliâ, Galliâ, et Italiâ.

Shell slightly curved, ash-coloured, becoming thinner towards its posterior extremity, contracted at the opening, which is furnished with a more or less obtuse thickening, its edges being sometimes worn, at others sharp. Transverse striæ closely set, very fine, more or less regular, occasionally becoming coarse.

Length 1 inch 2 lines.

40. *D. SUBULATUM*, Desh. *D. testâ tereti, arcuatâ, angustâ, subulatâ, acuminatâ, albido-fuscâ, maculis nebulosis fuscis; aperturâ coarctatâ.*

Habitat———?

Resembles the preceding, but is longer, narrower, more curved, and pointed; the thickening of the contracted opening is not so short, and beyond it the lip, instead of being reflected, becomes thin and sharp; the apex is much more acute, and its hole smaller; its colour is also different, being white at the apex, and light fulvous in the remainder of its extent with deeper clouded irregular spots. External surface perfectly smooth, without either longitudinal or transverse striæ.

Length 1 inch 3 lines. Diameter of the base rather more than 1 line.

41. *D. CRASSUM*, Desh. *D. testâ arcuatâ, abbreviatâ, crassâ, septem costatâ; aperturâ coarctatâ.*

Foss. in Galliâ.

Shell short, curved, thick, solid; base broad, but rather owing to the thickness of the shell than to the size of the opening. Ribs seven, the odd one median dorsal, prominent, coarse, perfectly symmetrical, attaining their greatest development near the opening, where they are lost in the marginal thickening. Marginal thickening considerable, narrow, separated from the remainder of the shell by a slight depression; becoming thin anteriorly, and terminating in a sharp margin. Striæ of growth irregular.

Length 10 lines. Diameter of the thickening upwards of 3 lines, of the opening scarcely $1\frac{1}{2}$ line.

42. *D. CLAVA*, Lam. *D. testâ tereti, clavatâ, subarcuatâ, crassâ; striis transversis inæqualibus; aperturâ anticâ strictiore.*

Foss. in Galliâ.

Shell thick, but less so in proportion than that of the preceding species, rather strongly curved; apex not very acute, its opening small. Transverse striæ irregular, unequal, more or less numerous. Opening contracted, with a marginal thickening, which becomes straight and sharp at its anterior edge.

Length 1 inch 6 lines. Diameter of the base upwards of 3 lines, of the opening nearly 2 lines.

It is almost needless to observe to the English reader, that several additional species to the above are noticed as inhabitants of our seas by British writers, with whose works *M. Deshayes* seems to be entirely unacquainted. Indeed, of the authours of this country he refers only to Lister, J. Sowerby, and G. Sowerby. These species it has, however, been deemed advisable to abstain from inserting, lest confusion should result from the impossibility of comparing them with the materials employed in the present Monograph.

ART. XX. *Some observations on the "Account of the genus Dentalium, by M. G. P. Deshayes," of which the foregoing article is an abstract. By G. B. SOWERBY, F.L.S., &c.*

Among the friends of science who must be reciprocally gratified by indulging an opportunity of acknowledging and praising the *general correctness and utility* of the work which calls for the following observations, I still cannot permit the abstract of the last article to appear in the *Zoological Journal* without offering to the editor and conductors of that

work, an explanation of such facts and circumstances as have occurred to me, the tendency of which is to correct its errors and to add to the number of species and consequently to the published information upon the subject. However, before I proceed I beg to remark that it is not my intention to enter upon an account of those species that are given in English authors, but omitted by Deshayes.

Spec. 1 and 2, *D. elephantinum* and *arcuatum*.

It is unfortunate for the justly celebrated *Linné* that he is frequently called to answer for the errors of others, and particularly of *Gmelin* the editor of the 13th. edition of *Systema Naturæ*, and it is equally unfortunate for Deshayes that he should have consulted this very 13th. edition and thus have lost sight of the true characters of the *Dentalium elephantinum* of *Linné*. Upon referring to *Linné*'s 12th edition I find "*Dentalium elephantinum, testa decem-angulata, subarcuata, striata*; and the two principal figures he quotes, are *Gualtieri*, tab. x. f. i. and *Rumphius*, tab. xli. f. i. the description agreeing perfectly with Deshayes's *D. arcuatum*, and the figures being both quoted by Deshayes under that species. It is true that *Linné* also refers to *Petiver*, Amb. t. xvi. f. xxxiii. and *Pet.*, Gaz. t. xiii. f. ix. as well as to *Bonan*. Recr. 1. t. viii., all which figures are by Deshayes referred to his *elephantinum*: which proves evidently that *Linné* did not distinguish the two species: nevertheless as the description is decidedly that of Deshayes's *D. arcuatum*, the Linnean name of *D. elephantinum* must be restored to that species, and the *D. elephantinum* of Deshayes might with propriety be called *D. rectum*.

3. *D. sexangulare*.

One observation made by M. Deshayes under this species shows, either that he does not understand the English language, or that he has committed a very gross mistake. In order to show this, I shall transcribe the observation, together with the English passage which has elicited it:—
 "On doit être surpris que M. Sowerby ait confondu cette espèce avec le
 "RECURVUM * dans son GENERA, car elle est très facile à distinguer."
Deshayes, p. 30.

The following passage, transcribed from my *Genera* will, however,

* M. Deshayes evidently intends his own *D. arcuatum*, the true *elephantinum* of *Linné*.

show that I have not confounded them, but considered them as distinct.

“The London clay and the calcaire grossièr swarm with several sorts not easily distinguishable from the recent species, among which we may particularly remark the fossil species from Piacenza which so nearly resembles *D. elephantinum* that Brocchi has not hesitated to refer it to that species,” Sowerby, Genera No. XV. and in the description of the plate.

“Fig. 2. *D. elephantinum*, fossil, according to Lam. and Brocchi.”

4. *D. aprinum*.

It does not appear to me certain that Deshayes's *D. aprinum* is the same as Linné's, however, as the only difference consists in the colour, and as Deshayes's *D. aprinum* might lose its colour and become white by long exposure, no confusion will be created by the adoption of his species as the true *aprinum*.

5. *D. octogonum*.

As far as I am able to judge from a very extended collection of *Dentalia*, the proportions must be considered as important in drawing up their distinguishing characters: should this prove to be the case, another octogonal species, whose proportions differ very materially from those of *D. octogonum*, will be added to the list.

7. *D. variabile*.

The late Mr. G. Humphrey possessed many individuals of this beautiful little species, which he distinguished as the “Chain-ridged *Dentalia* from the East Indies.”

18. *D. entalis*.

From the careful examination of many specimens, I am convinced that Lamarck's var. B. of his *D. Tarentinum* should be considered as distinct from *D. entalis*, and might, without impropriety, be called *D. Tarentinum*; there is also a variety of *D. entalis* with a reddish apex.

19. *D. politum*.

Linné's descriptions of *D. politum* and *D. eburneum* accord so precisely with my *D. circinatum* and *D. eburneum*, (Genera of Shells, No.

XV.) that I have but slight reason for doubting their having been taken from those two species. Deshayes's *D. politum* is a very distinct species, but as it also accords with Linné's description of *D. politum*, and as we cannot now be certain to which Linné's description actually refers, it is advisable to leave Deshayes's species in possession of this specific appellation.

21. *D. translucidum*.

I possess at least 1000 specimens of this species, of which a necklace was composed which was brought from the Sandwich Islands.

33. *D. eburneum*.

The characters by which the species of *Dentalia* may be distinguished are so few and difficult to seize, that among others it appears quite necessary to recur to the characters which may be taken from the proportions. It was this circumstance that induced me to give as a distinct species, the one which I have called *D. circinatum*; in mentioning this subject, although Deshayes only gives this as a variety of *D. eburneum*, he furnishes us with three characters by which it may be distinguished; surely it ought therefore to remain in the list as a distinct species, and the more so, as these characters are not found only in one or two specimens, but are invariable in a multitude of individuals.

38. *D. coarctatum*.

The species described under this name is, I believe, distinct from that published under the name of *D. Gadus*, by Montagu and Sowerby. It cannot be the *D. minutum* of Linné, not agreeing with his specific character.

Not being able to compare my specimens with those of Deshayes's collection, I can only venture here to add two new species to the list, which are as follows:

D. opacum.

D. testâ subrectâ, attenuatâ, rapidè majori, 17 vel 18 costatâ, fissurâ posticâ brevi, dorsali; long. $2\frac{3}{8}$, diam. $\frac{3}{10}$, poll.

Shell nearly straight, attenuated at the apex, its diameter increasing much more rapidly than in the other species, with 17 or 18 rather blunt longitudinal ribs, with a smaller one between each: all the ribs nearly obsolete at the wider extremity; posterior fissure short, dorsal.

A few specimens were preserved in Mr. G. Humphrey's collection with the following label, "white striated Elephant's teeth, per S. Sea ships, supposed New Zealand."

D. annulare.

D. testâ tenui, elongatâ, lævi, striis annularibus tenuissimis, confertissimis, annulis subprominentibus, distantibus; long. $2\frac{6}{10}$, diam. $\frac{3}{10}$, poll.

Shell slender, much lengthened, smooth, with close-set very slender striæ; and somewhat prominent distant rings.

From the East Indies, according to G. Humphrey. In my collection, and in the Brit. Mus.

In conclusion I take the liberty of copying a sentence from page 17 of Deshayes's Monograph, where, speaking of *Dentalium corneum* of Linn., he says "Sowerby, *trompé* comme le plus grand nombre de ses devanciers, a figuré dans son '*Genera of Shells,*' deux de ces etuis d'insectes parmiles Dentales; il est *vrai qu'il ne les y place qu'avec doute.*" In reply to this observation, I shall only copy my own words on the same subject; naturalists will then judge whether or not I was *deceived* and will acquit me of giving these *etuis d'insectes* a place in the genus *Dentalium*, even with doubt. "We do not venture to assert that these also are *Dentalia*, but we have given a drawing of them in our plate, because of their great similarity in form; they are of a corneous, not a shelly substance, closed at the larger end and attached to each other by a similarly corneous ligament; *what they are we do not even dare to guess.*"

ART. XXI. *On the habits and structure of Paguri and other Crustacea.* By W. J. BRODERIP, Esq., F.R.S., F.L.S., Sec., G.S., &c.

I make no apology for the publication of the following letter: because an account of the habits of any animal is interesting, and because information touching the Natural History of any of the Islands of the Antilles is highly acceptable.*

* A. De Humboldt says in the twentieth page of his Treatise De distributione Geographicâ Plantarum "Nulla exstat regio inter tropicos sita, cujus plantæ sponte crescentes accurate adhuc enumeratæ sint. Ex majoribus insulis Antillarum, montibus et sylvis obtectis, nullius Florula rite explorata est, et nostra ætate fere quotidie peregrinatores in Hispaniola, Jamaica vel insula Cubæ arbores inveniunt proceras et nova genera efficientes." What is here said of the Botany, may be with equal truth affirmed of the Zoology. Sloane and Browne did a good deal towards the elucidation of the Natural History of Jamaica but much more remains to be done. The region of arborescent Ferns appears not to have been searched either by the botanist or Zoologist, and, if an uninitiated traveller has been led by curiosity to invade it, he speaks of plants, insects and humming birds such as are not to be seen in the more cultivated parts of the Island, such as he never saw before, and such as, unfortunately, he cannot accurately describe. Browne, in his preface, after dwelling on the importance of Jamaica both in a private and national point of view thus proceeds "Yet how small a part either of those who inhabit it, or of those who by one means or other draw the principal part of their subsistence, wealth and affluence from this fruitful spot; know any thing of the Island in general, its productions, advantages, or inconveniencies; or give themselves any pain in considering whether the former may be improved, or by what means the latter may be remedied or removed. And, indeed, were any disposed to do either, what grounds have they at present to proceed upon? For, though many amongst those who have resorted thither, have been distinguished for their talents and learning, for their curiosity and abilities, the arts of government, or the means of acquiring wealth and power, have generally occupied their thoughts; or the love of ease and pleasure, to which the climate but too much disposes even the most determined minds, has dissipated the best established resolutions; and in consequence, scarcely anything has been attempted towards exhibiting a just idea of this Island considered both in a civil and natural light, except what bears the evident marks of imbecility, inattention, or erroneous information." This reproach, it is hoped, will, at

August 1, 1828.

MY DEAR SIR,

When I was in Jamaica, about three years since, some of the persons on my estate at Halse Hall, brought me specimens of Paguri which, they said, they had obtained from a savannah, distant about a quarter of a mile from the house. This savannah is a plain formed of what I have elsewhere termed * savannah sandstone and conglomerate. It is very dry and covered for the most part with log-wood, green ebony, lignum vitæ, the Cashaw tree—and, here and there, with patches of grasses and other plants. After heavy rains the surface of the ground is nearly covered with herbage: but, after dry weather, a considerable portion of the soil is exposed. The savannah which is of great extent (my portion consists of at least two thousand acres) is about thirty feet above the Rio Minho, which runs round the border of it, and about two hundred feet above the level of the sea from which it is distant at least ten miles. The tide only penetrates just within the mouth of the river and rises there about eleven inches at the height of the springs, so that there is not even brackish water at a nearer point than ten miles. When the Paguri were brought to me they were alive, and I observed they were housed in marine shells, and at first thought that they must have been brought from the sea. Upon enquiry, however, I found that these animals, under the name of "soldiers," were frequently taken alive for food in the savannah, to which I immediately proceeded. On its northern side and at its junction with the hill which rises above it, I found in the little hollows of the white limestone several of these Paguri, all in marine shells, and in full health and activity. I afterwards learnt that they were by no means uncommon in such situations all over the Island. When I saw them there had been a good deal of wet weather. They were in moist places but there were no pools of water.

—last, cease. The spirit of useful inquiry seems to be awakened in the Island, and some gentlemen in London connected with the West Indies have already set on foot a plan for investigating the Natural History of Jamaica and the capabilities of its soil and climate. They deserve the thanks and co-operation of every lover of science, and, if they succeed, they will confer a benefit upon their country.

* Geol. Trans. Vol. II. p. 182, new series.

Upon my return to England, I gave directions that a collection of these "soldiers" from the savannah, and some specimens of the large fresh-water prawn of the Rio Minho should be forwarded to me in spirit. This has been done, and I now send you the barrel containing this collection, of which I beg your acceptance, hoping that you will examine the contents, and, if you think fit, make public this letter, with any remarks which may occur to you. While on this subject, I think it right to inform you, that the Land Crabs, so very well known, are found very far inland. I have them on an estate in the mountains, at least fifteen miles from the sea, and I have heard of their occurrence still further in the interior of the island. In addition to these there are other crabs which may be considered decidedly terrestrial, though their residence is always in banks on the borders of the sea. These last are very common at different points round the shores of the island, and are caught by pouring sea-water into their holes—an operation which renders them completely inactive and defenceless in a very short time; and they are pulled out without resistance, in a half-drowned state. I have never seen this species elsewhere than in the immediate vicinity of the sea; but I never observed them run into it when disturbed like the marine crabs, which come out, apparently to bask, and take to the sea again the moment they observe the approach of an enemy.

Believe me,

My dear Sir,

Your's very sincerely,

H. T. DE LA BECHE.

W. J. BRODERIP, Esq.

The barrel contained a few specimens of the fresh-water prawn of Jamaica,* and several Paguri. These last were of two species, viz. *Pagurus Diogenes* and one somewhat resembling *Pagurus Prideaux*† (Leach)

* *Palæmon carcinus*, (Fabr.) Sloane's Jamaica, vol. II. tab. 245. Leach Zool. Miscel: t. 92.

† The species accords, in some points, with the description and figure but I am not satisfied of its identity. Desmarest truly says "Les espèces de ce genre sont très-difficiles a caracteriser," Considerations generales sur la classe des Crustacés, p. 177.

of the first there were forty-two of various sizes, and they were housed in the following marine shells, which were in every instance well adapted to the bulk of the inhabitant. Two were housed in *Turbo Pica*, two in *Natica Canrena*, and one in *Bulla striata*. There were eight in *Fasciolaria Tulipa*, and twenty-nine in *Pyrula Melongena*. Of the latter species of *Pagurus* (the common soldier of Browne*) there were ten. One was housed in *Fasciolaria Tulipa*, and nine in *Pyrula Melongena*. The shells chosen by these last were large in proportion to the bulk of the inhabitant, so large indeed, that some of the *Paguri* were scarcely visible. Another gentleman who resided some time in the West Indies, informed me that he has seen the first-mentioned species about his house, when he lived at Port Henderson, and that he had also observed them about the houses at Spanish Town, a place about six miles distant from the sea. Westmoreland, I am informed, swarms with them. The habits of these animals, as described by Mr. De la Beche, form a practical illustration of the observations and experiments contained in the fourth memoir of M. M. Andouin and Milne Edwards "De la respiration ærienne des Crustacés, et des modifications que l'appareil branchial éprouve dans les crabes terrestres," lately read to the French Academy of Sciences. The authors of that interesting paper shew that, in all the crustacea, the branchiæ are fitted to perform the functions of respiratory organs, in the air as well as in the water—that the more or less rapid death of the aquatic species exposed to the air depends upon various causes, of which one of the most direct is the evaporation from the branchiæ, which produces their desiccation—that, consequently, one of the conditions necessary to the support of life in animals which have branchiæ, and live in the air, is the having these organs defended against desiccation—and lastly, that these dispositions actually occur in the *Tourlouroux* and other land-crabs, which all possess various organs destined for absorbing and keeping in reserve the quantity of water necessary for maintaining a suitable degree of moisture in the branchiæ.†

* Nat. Hist. of Jamaica, p. 424.

† There will be found, I apprehend, an analogous structure in some of the Cirripeda, particularly the pedunculata. These, from their habits of attaching themselves to floating bodies, are very liable to be stranded and require some provision in the organs of respiration to enable them to live till the returning

It may not be unimportant hastily to trace the history of the remarkable genus of crustaceous parasites, called Paguri, and afterwards to add a few observations on them and on the other crustacea mentioned in Mr. De la Beche's letter.

Aristotle describes three species of Paguri under the name *καρκίνιον*.* Oppian, Ælian, and Galen mention them under the name *καρκινας*. Pliny† seems to confound them with the Pinnotheres or Pinnophylax, as is noticed by Aldrovandus. Rondeletius, Bellonius, and Gesner describe them; the latter very particularly. Jonston's account is little more than a compilation from the foregoing authors. Charlevoix, in the History of Hispaniola,‡ says, "Ce qu'on appelle soldat est, aussi-bien que les crabes, une espece d'ecrevisse, ou de ce qu'on appelle *cancellus marinus*. On le trouve par tout le long de la mer, et il est bon à manger. Son nom vient de ce qu'il est armé par tout le corps, excepté à l'extrémité d'en bas, ou il est nud, et où il paroît être d'une sensibilité extrême; aussi se fourre-t-il, dès qu'il est né, dans la première coque, qu'il rencontre, mais pour l'en faire déloger, il ne faut qu'en approcher le feu."

None of these writers speak of these animals as being at any time terrestrial.

In Labat we find the following passage :§—"C'est une regle generale

tide may lift them again into the sea. In July last, a friend sent me from Brighton a beautiful group of Cirripeda, principally consisting of *Pentelasmis Anatifera*, which had attached themselves to a floating champagne bottle. They arrived by the mail packed in a basket with hay, and with cabbage leaves immediately over and under them. I received them about twelve o'clock in the day; they were alive and I procured from the Adelphi baths some sea-water, in which they were not placed till near four o'clock. At five I saw them in high vigour, and was enabled to make some observations on their habits: a regular supply of sea-water would I doubt not have kept them alive for some time. Before they were put into the vessel of sea-water they must have been without any moisture, save their own, for many hours.

* The Pagurus of Aristotle is not a hermit-crab.

† Nat. Hist. Lib. IX. cap. 31.

‡ Tome. II. p. 23.

§ Nouveau Voyage aux Isles de l'Amerique. Tome. II. p. 224. ed. 1742.

“ que tous les animaux que je vais nommer, sçavoir les Tourlouroux, les
 “ crabes, les Ecrevisses, les serpens, les Lezards et les *Soldats descend-*
 “ *ent tous les ans à la mer pour se baigner, et changer de peau ou de*
 “ *coquille.*” In the old Encyclopedie* we find the following definition
 of “ Bernard-l’Hermitte”—“ *cancellus*, animal du genre des crustacées,
 “ aussi appelé *le soldat.*” And after a very particular description, there
 follows this account of the habits of the animals:—“ Il y a dans les
 “ îles de l’Amerique des *bernards-l’hermite* qui ont trois ou quatre pou-
 “ ces de longueur. On rapporte que cet animal vient une fois chaque
 “ année sur le bord de la mer, pour y jeter ses œufs et changer de co-
 “ quille ; car il est obligé de quitter la coquille dans laquelle il s’etoit
 “ logé, parce qu’ayant grossi pendant l’année, il se trouve gêné dans
 “ cette coquille. Alors il se transporte sur le rivage, et il cherche une
 “ nouvelle coquille, qui puisse lui convenir. Dès qu’il en a rencontré
 “ une, il sort de l’ancienne, il essaye son nouveau logement ; et s’il est
 “ convenable, il s’en empare et y reste : mais il est souvent obligé d’en-
 “ trer dans plusieurs coquilles avant que d’en trouver une qui lui soit
 “ proportionnée. S’il arrive que deux bernards-l’hermite s’arrêtent à
 “ la meme coquille, ils se la disputent ; le plus foible est contraint de la
 “ céder au plus fort. Cet animal fait un petit cri lorsqu’on le prend.
 “ Il faut éviter qu’il ne saisisse le doigt avec sa serre ; car il fait beau-
 “ coup de mal, et ne lâche que très-difficilement. Les habitans du pays
 “ le mangent, et le trouvent très-bon : mais on dit qu’il est pernicieux
 “ pour les étrangers. *Voyez Hist. gén. des Antilles, par le P. du*
 “ *Tertre.*”

Sloane‡ thus describes the subject of our memoirs:—“ This small
 “ lobster or crab differs in very little from the European Souldjer or
 “ Hermit Crab. It hath two large forked claws like those of an ordinary
 “ lobster, one of which is bigger than the other, both rounder, more
 “ tumid, less prickly, and of a paler red than that of Europe. The
 “ legs are four in number, long, not forked, but single toed. It hath
 “ two antennæ, and two eyes which stand on a long cylindrical pedicle.
 “ They fit themselves with any shell which they find empty, whether it be

* Paris, 1751.

‡ Nat. Hist. Jamaic. vol. II. p. 272.

“ of the land* or sea, and cover themselves almost over in it, carrying it on
 “ their backs wherever they go, like a snail. It is not possible to
 “ believe how quick the land-crabs and this crab will run upon the least
 “ appearance of danger. Till they are turned up, nothing appears but
 “ a dead shell, the mouth of which lies undermost, out of which some
 “ little part of the crab appears after it is taken up.”

Hughes† speaks more pointedly of the terrestrial habits of the Soldier Crab :—“ This is amphibious. Sometimes it is caught upon the rocks
 “ at a considerable distance from the land ; but they are most com-
 “ monly seen upon the shore. These are often found cleaving to rocks
 “ in the sea, but oftener in granaries on shore, where they destroy much
 “ corn.”

Catesby gives a figure of *Pagurus Diogenes* in the shell of *Turbo Pica* ; and thus describes the habits of the animals :‡—“ They crawl
 “ very fast with their shell on their back ; and at the approach of dan-
 “ ger draw themselves within the shell ; and thrusting out the larger
 “ claw in a defensive posture, will pinch very hard whatever molests
 “ them. They frequent most those parts of the sea-shores which are
 “ covered with trees and shrubs, producing various wild fruits, on which
 “ they subsist ; though I have seen them feed on the fragments of fish
 “ and other animal substances cast on shore. They being roasted in the
 “ shell are esteemed delicate. I do not remember to have seen any of
 “ them go into the sea.”

Browne § mentions both species under the names of “ The Soldier” and “ The common Soldier,” and says of the latter, “ It is very common
 “ in all the harbours of Jamaica.”

Linnæus|| says of the *Diogenes*, “ Habitat in oceano Asiatico, Ameri-
 “ cano, intra testas varias Cochlearum.”

Cuvier, speaking of the genus *Pagurus*, (Fabr.) after mentioning uni-
 valve shells as their usual coverings, says, ¶ “ Quelques espèces se logent

* At tab. 240, Sloane gives four figures of these animals in land-shells.

† Nat. Hist. of Barbadoes, p. 265, et seq.

‡ Carolina. vol. II. p. 33, t. 33.

§ Nat. Hist. of Jamaica, p. 424.

|| Syst. Nat. p. 1049.—58.

¶ Règne Animal, Tome III. p. 29.

“ dans des serpules, dés alcyons, etc. Il parait même qu'il y en a de terrestres.”

Lamarck is silent as to the habits of the Paguri.

Passing over Herbst, Fabricius, Olivier, Latreille, Leach, Dumeril, Brisson, Bosc, Risso, and other authors, whose labours have been principally confined to classification, we come to the able and interesting work of M. Desmarest,* who says of the Paguri,† “ Ordinairement on les rencontre sur les plages, a peu de profondeur, et on les voit se trainer sur le fond à l'aide de leur serres et des autres pattes libres. Leur démarche, comme on le juge bien, est lente et irrégulière. Ils vivent comme les autres crustacés, de petits animaux de la même classe, ou de mollusques, qui passent à la portée de leurs pinces et qu'ils parviennent à saisir. Les Naturalistes font mention de plusieurs espèces de pagures qui vivent à terre, à une assez grande distance du rivage, et qui se logent dans des trous. Il est vraisemblable que ces animaux doivent rentrer dans le genre suivant, qui comprend un pagure également terrestre.”‡ This account of their slow moving powers does not agree with the rapidity of motion attributed by eye-witnesses (Sloane and others) to the Pagurus Diogenes.

In pursuing my enquiries upon this subject I have been struck by two beautiful provisions in the animal œconomy of these Paguri. Their backs are towards the arch of the shell, and their well armed nippers and first two pair of feet generally project beyond the mouth of it. Their two short pair of feet rest upon the polished surface of the columella, and the outer surface of their termination, especially that of the first pair, is most admirably rough-shod to give “ the soldier” a firm footing when he makes his sortie, or to add to the resistance of the crustaceous holders at the end of his tail when he is attacked, and wishes to withdraw into his castle. On passing the finger downwards over the termination of these feet they feel smooth; but if the finger be passed upwards the roughness is instantly perceived. The same sort of structure (it is as rough as a file) is to be seen in the two smaller caudal holders. The second provision I observed in a very fine and large species of Pagurus from the Mauritius (*Pagurus guttatus*

* Considérations générales sur la classe des Crustacés. Paris 1825.

† P. 177; ‡ *Birgus latro*.

of Olivier, I am inclined to believe.) Two specimens are in my possession; one of which is housed in a very large young shell of *Pteroceras truncatum*, the other (nearly a foot long) is naked, and on examining the under side of the tail of this, a great number of transverse rows of acetabula are to be seen even without the aid of a glass. My friend Dr. Bright has another naked specimen in which the same formation, which must very much assist the hold of the Pagurus, is visible.

Of the other crustacea mentioned in Mr. De la Beche's letter I can at present say nothing decisive. Some of them are evidently the common land crabs: but that species which is described as haunting the borders of the sea, almost within reach of the spray, but never entering it, and to which submersion in water appears to be fatal, seems to be a beautiful link between the sea crabs and those of the land. The periodical visits of these last to the sea are well known as well as the distance which they will travel, regardless of any obstacle, to attain their object.† Almost all

† Mr. Thompson in the interesting paper where he gives his important discovery that the Crustacea Decapoda undergo a metamorphosis, shewing that Zœa is not a perfect animal but the larva of the common crab (*Cancer Pagurus*), says, "In their first and tender stage, they, (the crustacea decapoda) are essentially and purely natatory animals, and no doubt possessed of corresponding habits, swimming about freely and without intermission in search of appropriate food; in their perfect state, the greater number can no longer avail themselves of the power of swimming, but are furnished with pincers and feet almost solely adapted to crawling, so that they are now under the necessity of confining their excursions in pursuit of prey within more narrow limits. This curious piece of economy, explains what has ever appeared paradoxical to Naturalists, viz. the annual peregrinations of the land-crabs to the sea-side, which, although acknowledged to be true by several competent observers, could never before be satisfactorily accounted for." *Zoological Researches and Illustrations*, by John V. Thompson, Esq., F.L.S., Surgeon to the Forces. *Memoir I. p. 9.*—Most of the authors cited in the text knew that the objects of the land-crabs (*Gecarcinus*) in so pertinaciously going to the sea at their appointed time was the business of laying, or, as some of them term it, washing off their eggs. Labat thus describes the process:—"Les Tourloux y vont encore pour faire leurs œufs, ce qui leur est fort aisé, car comme ils sont déjà hors de leurs corps attachés seulement aux poils de leur queue, ils ne font que la secoüer dans l'eau où ils se baignent, et ces œufs un peu plus petits que ceux des carpes, se détachent des poils qui les retenoient, tom-

the authors cited give interesting information on this head: but, in the Narrative of the late Bishop Heber, an account is given of some land-crabs living at so great a distance from the sea, and obstructed by such obstacles in their way to it, that I cannot forbear inserting the passage to the manifest disadvantage of my own style. “The plain of Poonah is very bare of trees, and though there are some gardens immediately around the city, yet as both these and the city itself lie in a small hollow on the banks of the river Moola, they are not sufficiently conspicuous to interrupt the general character of nakedness in the picture, any more than the few young trees and ornamental shrubs with which the bungalows of the cantonment are intermingled. The principal and most pleasing feature, is a small insulated hill immediately over the town, with a temple of the goddess Parvati on its summit, and a large tank which, when I saw it, was nearly dry, at its base.

“All the grass land round this tank, and generally through the Deckan, swarms with a small land-crab, which burrows in the ground, and runs with considerable swiftness, even when encumbered with a bundle of food almost as big as itself. This food is grass, or the green stalks of rice, and it is amusing to see them sitting as it were upright, to cut their hay with their sharp pincers, then waddling off with the sheaf to their holes as quickly as their sidelong pace will carry them.” *

When we call to mind the position of Poonah, and read of the neighbouring river and tank, we cannot help remembering the “*Variæ palustres variæ magnitudinis cancri*” of Piso,† and feel inclined to ask whether the river and the tank might not be the scene of ovipositing? It is not improbable that there may be a race of land-crabs appropriated to continental or even insular situations out of reach of the ocean: and

“bent dans la mer où ils s’éclosent et s’attachent aussitôt aux rochers, et quelques tems après sortent de l’eau, se retirent sous les premières herbes qu’ils trouvent, et montent ensuite avec leurs meres à la montagne.” Nouveau Voyage, Tome second, p. 225. Paris, 1742. Of the metamorphosis all naturalists, before Mr. Thompson, appear to have been ignorant.

* Narrative of a Journey through the Upper Provinces of India, by the late Rev. Reginald Heber, D.D., Lord Bishop of Calcutta. Vol. 2, p. 207.

† Hist. Nat. et Med. Ind. Occident., p. 76.

freshwater may be as necessary to their re-production as sea-water is to the land-crabs of the West Indies. Such a supposition is in unison with the bountiful provisions of nature for the general diffusion of animal life.

ART. XXII. *Observations on the Tapir of America.*

By WILLIAM YARRELL, Esq., F.L.S.

THE animal which afforded an opportunity for the following remarks was presented to the Zoological Society, in the month of July last, by Lieutenant Maw of the Royal Navy, but unfortunately for the interests of science, as well as of the society, it was so far reduced by disease on its arrival in the river, as to survive its removal to the garden in the Regent's Park only a few hours; but little therefore could be ascertained of its disposition, beyond that of its submitting without any resistance to the applications that were made for its relief.

When dead, the whole length of the animal from the nose to the root of the tail was 48 inches; the girth 35 inches; and it was said to be about 12 months old. Its colour was a rusty reddish brown, with indications of lighter spots and horizontal lines on the ribs, flanks and thighs. These fawn-coloured spots and stripes are common to both species of *Tapir* while young; that of Sumatra not exhibiting, till it is six months old, any appearance of the well defined black and white colour which afterwards distinguishes the adult animal. The shape is well known. The incisor teeth $\frac{6}{6}$, very much used, the edges coming into close contact when the molars act. The canines $\frac{1}{1}$, those of the upper jaw small, and removed a short distance from the lateral incisor, to admit the interposition of the larger canines of the lower jaw. The molars in this young animal were $\frac{4}{4}$: of those in the lower jaw, the first has three lobes, with five points; the second and third two lobes, with four points. Of the four in the upper jaw, the first has two outer, and one inner point; the other three molars have each two lobes with four points; all the parallel points or tubercles are connected transversely by a slight triangular ridge; each of these triangular ridges, with their connected tubercles, shutting into similarly shaped cavities in

the teeth opposed to them, throughout the whole length of their continuous surfaces. The second, third, and fourth molars of the upper jaw have each a small additional, but less elevated, point on the external anterior angle, increasing somewhat in size from the second tooth backwards. On cutting through the palatine bones for the more complete removal of the brain, the crown of another molar tooth was found on each side, posterior to, and somewhat within the line of range of the last exposed molar. This tooth is represented in the plate annexed, and exhibits the fifth tubercle of yet increased magnitude.

The skin having been taken off for preservation, the cartilage of the *septum narium* was observed to be thick and strong, and the central ridge of the *cranium* very much elevated. The *ligamentum nuchæ* consisted of three strong cord-like portions, two of which passing, in a parallel direction, from the elongated spinous process of the first dorsal *vertebra*, were inserted together upon the extreme superior posterior angle of the central ridge of the *cranium*, supporting the whole length of the elevated crest and mane. The third portion of this strong ligament passed beneath the other two, to be inserted into the most elevated part of the elongated spinous process of the *vertebra dentata*.

The anterior portion of the *sternum* projected forwards, keel-like in form and rounded. The ribs were twenty in number on each side, the lumbar *vertebræ* four. The tracheal cartilages were firm, but the rings were incomplete throughout; the lungs consisted, on the right side, of one large and one small lobe; on the left, of one large and two small lobes, bearing evident marks of inflammation.

The *pericardium* was loaded with fat, and appeared of unusual thickness; the heart presented nothing remarkable, but the arteries were particularly thick and firm in their coats.

The *æsophagus* was narrow, the stomach a single cavity, and rather small, measuring, when moderately distended with air, but eight inches from right to left, and $15\frac{1}{2}$ inches in circumference; the *parietes* thickened about the *pylorus*, but as it was considered desirable to preserve this organ entire, its internal surface was not examined. The stomach contained a loose mass of tow, hair, string, and shreds of cloth.

The spleen was narrow, thin in substance, and 12 inches in length.

The liver was distinctly divided into four lobes, two of which, one

large and one small, were placed on the right side; and two large equal lobes occupied the left side, the inferior one of these being partly divided and notched on the edge. The Tapir, like the Rhinoceros, has no gall bladder.

The small intestines were uniform in size throughout their whole length, and measured 21 feet; they also bore marks of inflammation.

The *cæcum* was capacious compared with the stomach, and measured 14 inches in the line of its long axis, and 24 inches in the girth at the largest part, having two deep, and several smaller, circular indentations externally, and marked with one strong longitudinal band on each surface; tapering somewhat to a point at its closed extremity, but without any *appendix vermiformis*. The precise form of the *cæcum* will be best understood by a reference to plate vii, fig. 4.

The *colon*, at the distance of two feet from its commencement, suddenly doubled upon itself, forming a fold of 16 inches in length, the inner surfaces of which were closely connected. The whole length of the large intestines was seven feet.

The sexual organs were those of a female, and from the degree of vascularity which pervaded the *uterus*, *cornua* and *ovaria*, it is probable the animal was approaching that period of her life at which she would have commenced breeding.

In the Philosophical Transactions for the year 1821, Sir Everard Home, Bart., has pointed out the differences that exist in the *crania* of the Tapirs of Sumatra and America; and has also described part of the *viscera* of the former. On comparison, some differences will also be found in the soft parts. In the Tapir of Sumatra the stomach is large, the intestinal canal very long, the *cæcum* small; in the American species the stomach is small, the intestines of moderate length, the *cæcum* large. The den-
tition of the two animals is similar.

Of the species described;

The length of the Tapir of Sumatra is eight feet.

Whole length of its intestinal canal 89 feet 6 inches.

Proportion as 11 to 1.

Length of the American Tapir, 4 feet.

Whole length of its intestinal canal, 28 feet.

Proportion, as 7 to 1.

Description of the Plate.

TAB. VII.

- Fig. 1. Fifth molar tooth, upper jaw, seen from the outside.
 2. The same, seen from below.
 3. The stomach: a. the *æso-phagus*; b. commencement of the *duodenum*.
 4. Part of the intestinal canal; a. the *ilium*; b. the *cæcum*; c. the *colon*.

ART. XXIII. *Index to the Species of Cypræa described in Mr. GRAY'S Monograph of the Genus.*

Mr. Gray's monograph on the genus *Cypræa* having been rendered somewhat inconvenient for consultation and reference, in consequence of its having appeared in detached portions in various numbers of the Journal, it has been thought advisable to prepare an Index to the whole, with the view of facilitating the research after the species described, and the synonyms referred to in it.

The names printed in the *Italic* character refer to synonyms.

Cypræa achatina i. 148—iv. 73	Cypræa Arabica i. 77, 378
<i>acicularis</i> i. 502	Arabicula i. 78—iv. 69
<i>adusta</i> i. 370	<i>arctica</i> iii. 366, 367
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ART. XXIV. Notes on MR. GRAY'S *Additions and Corrections to a Monograph on Cypræa*, (*Zoological Journal*, IV. p. 66,) in a Letter addressed to W. J. BRODERIP, Esq., by G. B. SOWERBY, F. L. S., &c.

DEAR SIR,

I feel convinced that you will excuse the liberty I take of addressing to you the few observations which I think myself called on to make on the above-mentioned paper; while I am also fully assured that your love of science will induce you to coincide with me in the propriety of my observations, and satisfy you of the necessity of making such remarks on this paper as may prevent its misleading those who are not so fully informed on the subject on which it treats as yourself. I wish it had fallen to the lot of any other person to have prepared these observations, because, coming from me, they may be deemed invidious; I must therefore disclaim all personal feeling, and declare that I am only actuated by a wish to render as correct as possible the information contained in the pages of the *Zoological Journal*.

Before I proceed any further, I must, however, assure you that I entirely concur with Mr. Gray in his remarks on the observations of M. Duclos: and I am fully satisfied that as soon as M. Duclos shall become acquainted with the various species in question, he will be convinced of Mr. Gray's correctness.

My first observation is on the subject of *C. Princeps*, the name of which Mr. Gray says, "must be changed, as it is *C. Valentia* of Perry, "t. xxiii, f. 2, where the individual specimen here described is well figured." I shall content myself, as far as regards the name, with observing, that "*Valentia*," as a specific name, is incorrect, and should be "*Valentiana*," which would be englished by "Lord Valentia's Cowry." However properly this name might be given to this particular species of Cowry, as having been first obtained by Lord Valentia (the present Earl of Mount-norris) and however entitled his Lordship may be to such an honour, as having formerly stood forward as a noble patron of science, I am persuaded his Lordship cannot consider himself honoured

by the incorrect application of his name by such an author of absurdities as Perry.* As to the individual specimen being figured by Perry, I do not think his daub can have been taken from the specimen now in my possession; if it be, it is not only very incorrectly drawn, but much

* It will be obvious that the propriety of these remarks depends, in a great measure, upon the title that can be shown for Perry to be regarded as an author worthy of credit. If the incorrectness of his descriptions and figures, or his random and unprincipled nomenclature, or the vanity of his pretensions throughout, which can only be equalled by his ignorance and the absurdity of his observations, if any or all of these can entitle an author to any further notice than would be conveyed by a contemptuous silence, Mr. Perry would certainly be deserving of citation; but the following observations upon his writings and figures will, it is presumed, go far to show that he must be struck out of the list of authors worthy of notice. Among his names, the following are to be found:—" *Murex bandatus*, and *M. bandarius*, *Biplex rubicola*, *Triplex flavicunda*, *Triplex abortiva*, *Distorta acuta*, *Distorta rotunda*, *Septa Parkinsonia*, *Helix pictoria*, *Aculea magnifica*, *Cypræa Jenningsia*, *C. Chalcedonia*, *C. Bandata*, *Conus bandatus*, *Buccinella canulata*, *Scalaria Pallas*, *Melania Nonpareil*, *Cassidea bandata*, *Cerithium spicatum*, *Pomacea orbata*, *Bulla cinctoria*, *Harpa grandiformis*, *Patella Cypridium*, *Pyrula australasia*, *Venus furbellata*, *Venus disjecta*, *Mytilus lycophagus*," (the Wolf-eating Muscle.)

For a specimen of his descriptions I need only cite one or two passages, for instance, that which appears under his account of pl. 61, "*Mytilus lycophagus*, shell of a bright purple, and richly barred with *transverse longitudinal bands*." —The Genus *Argonauta* possesses little beauty in its colours, but a symmetry exists in its form which is highly pleasing to the eye. It strongly resembles the well known fossil shells called by the name of *Cornu Ammonis*, and it is not improbable that it is of the very same genus and character."

To show the incorrectness of his figures, I need only mention that, in his figure of "*Cypræa Alga*," (which by the bye is *Cypræa Mappa*,) he has placed the irregular mark formed by the edges of the bilobate mantle, and which he compares to an Alga, on the wrong side of the shell. Let me, however, draw your attention for a moment to his *Buccinella cærulea*, a *Turbinella*, according to Lamarck, which he has painted of a *sky-blue* colour, observing that "it has been described, but not very well figured, by the German Conchologist, Martini." I must remark that this observation appears to me to be intended to hide his own plagiarism, for bad as Martini's figure is, Perry's is infinitely worse, and moreover, so bad a copy of Martini's that it is indeed scarcely recognizable. This, however, is not his most glaring plagiarism, several others

more incorrectly coloured, every part being by far too dark. I think, therefore, that the name of *C. Princeps* ought to be retained.

may with ease be traced; Perry having only increased the size, and heightened the colouring. But there are some figures in Perry that can only have been drawn from imagination, such as his *Pholas* and *Mya*. I think he has been dreaming of extraordinary shells, and immediately upon waking has committed them to his "Conchology."

I really fear I shall fatigue you with the length of this note, my patience is very nearly exhausted in preparing it; I shall therefore immediately conclude it, after giving you a few instances of his inattention to established nomenclature. Thus it will be seen that some of the Lamarckian *Fusi* and *Pyrulæ* he has called *Murex*; *Triton* has with him the generic name of *Septa*; *Turritella* that of *Aculea*; *Bulimi* are changed into *Melania*; *Achatinæ* and *Phasianellæ* are joined together under *Bulimus*; *Ampullariæ* and *Helices* are called *Pomacea*; *Purpuræ* are called *Haustrum*; some Lamarckian *Murices* are denominated *Ara-nææ*, and we are told that "their spines may assist their rotatory motion at the "bottom of the sea." *Fasciolaræ* are *Pyrulæ*; a *Carocolla* and two *Cyclostomata* form his *Planorbis*, a genus which he says he *invented* and adopted himself; *Crepidula* is called *Proscenula*, and we are favoured with the information that it is "now described for the first time," and that "its species are very "numerous, which makes it rather extraordinary that no one should have de-scribed it before;" a tale which can only be matched by another, in which our author figures as a principal performer. Mr. Bullock, some years since, received several letters from Mr. Perry, requesting, as a particular favour, that he would permit him to draw and describe a certain *extraordinary and beautiful new bird*, which he saw in Mr. B's museum; Mr. B., wishing to oblige Mr. P., searched for the bird, but could not ascertain which Mr. P. meant; meeting him, however, some time after, he walked back to the museum with him, and Mr. P. pointed out this *wonderful bird*, which proved to be no other than a *common magpye*, in very fine plumage; a fact, however, of which Mr. P. would not be persuaded.

Note by the Editor.

I cannot let the opportunity pass by of expressing on my own part, and on that of the other conductors of this Journal, our entire concurrence in the foregoing observations of Mr. Sowerby. It is our unanimous opinion that Perry's *Conchology* is not a work worthy of being cited as authority.

We have further to declare our conviction that the cause of science would be considerably benefited by naturalists of a higher order uniting in a general resolution to discountenance all works of mere pretension. Natural History unfortunately includes among her followers as great a proportion of quacks

The next subject that particularly attracts my attention, is No. 25*, *Cypræa Dama*, which is the identical species described by yourself in the third volume of the Zoological Journal, under the name of *C. nivosa*. It is indeed lamentable to observe how completely Mr. Gray suffers his fondness for Mr. Perry's absurdities to overcome his better judgment; for, thinking he has identified your *C. nivosa* with a miserable figure in Perry of *C. Vitellus*, under the name of *C. Dama*, he has adopted that name, and given yours of *C. nivosa* as a synonym; after which he observes, "This shell has many characters in common with *C. Vitellus*, and indeed " may be simply a variety of that shell, like the diseased variety of *C. Arabica* often found in collections." I will not take up your time, or that of the readers of this Journal, by an extended comparison of the two species, it is sufficient for me to state that, in my opinion, no two species can be more truly distinct than your *C. nivosa* and the well-known *C. Vitellus*; that they have scarcely any characters in common; and that *C. nivosa* may be readily known by its sublateral dorsal line,* by its wanting the lateral sand-like lines so strongly characteristic of *C. Vitellus*, and by its remarkably produced anterior extremity. *C. nivosa* ought, therefore, to stand as a well-established and perfectly distinct species.

Mr. Gray's No. 25**, *Cypræa Camelopardalis*, next requires notice, and this is another species for which Mr. Gray has adopted Perry's name in opposition to that cited from the MSS. of a scientific gentleman; it is

and pretenders as any other science or profession. And were we to adopt the rule of indiscriminately quoting every writer as authority, on the sole ground of his having written and published, we should frequently confer upon the mere compiler, or the flippant intruder whose aim is to anticipate the discoveries of others, that credit which is due alone to the true labourer in the science. On our own part we do not hesitate in declaring our general intention of endeavouring, as far as our influence extends, to draw a line of distinction between the man of education and knowledge and the ignorant pretender. Our judgment, in short, in regard to the authority of a work shall be founded, not upon its date, but upon the talent, the industry, and the information of its author. *Ed.*

* The edges of the mantle in *C. Vitellus* do not approach each other sufficiently to form a dorsal line.

published by me in the Appendix to the Tankerville Catalogue, under the name of *C. melanostoma* of Leathes's MSS. Upon this I shall only observe, that as Perry must be entirely rejected as authority, and as his name is not in any wise applicable to the shell, Mr. Leathes's name of *C. melanostoma* must stand, and particularly as Perry's *description and figure* are so much at variance with each other, that it is not possible to identify them both with the shell in question.

No. 31*, *Cypræa umbilicata*, requires only a few words. The specimen which Mr. Gray has described is not the only one known, and Mr. Gray has seen the individual which I have stated in the Appendix to the Tankerville Catalogue to exist in my own collection. It is much the worse of the two, but it helps to establish the species; which, by the way, is more nearly allied to *C. pantherina* than to *C. Tigris*.

No. 42, *Cypræa pulchella*. I do not at all comprehend Mr. Gray's reference under this species to *C. stolidia*, Perry, t. xxiii, f. 4, which is only a bad representation of the true *C. stolidia*.

No. 64*, *Cypræa Deshayesii*. A lithographed plate of this has been published by M. Duclos, who has named it *Ovula tuberculosa*: it is so nearly related to *Cyp. Mus*, that, under the specific name of *tuberculosa* it ought most certainly to be placed next to that species wherever it may eventually be thought right to arrange it.*

No. 83, *Cypræa guttata*. It is only necessary to refer to the figure in Martini, or to that already referred to in Mr. Gray's paper, to prove that Perry's *C. Jenningsia* cannot have been drawn from a specimen of this species, much less from the specimen now in your cabinet. What it has been drawn from it is indeed more difficult to determine; I think it is a very bad magnified figure of a specimen of *C. Staphylæa*.

I am, dear Sir,

Yours, &c.

G. B. SOWERBY.

Regent-street, July 25, 1828.

* Two views of this, copied from Mr. Duclos' plate, are given in the XXXth supplementary plate.

ART. XXV. *Description of a new Land-shell from South America, together with an additional Note on Argonauta.*
By W. J. BRODERIP, Esq., F.R.S., F.L.S., Sec. G.S.

* BULINUS LABEO.

B. testâ ovato-productâ, fusco-castaneâ, apicem versus rubrâ fusco variâ ; anfractibus sex, ventricosis, ultimo fasciis 2 nigris, hâc mediâ, illâ suturali, penultimo fasciis 2 nigris, suturalibus ; columellâ dente obtuso

* The substitution of the letter "n," instead of "m," in this word, will not, it is hoped, be considered an innovation. It is never too late to correct an error, and I will endeavour to shew that there is one in the word "Bulimus."

We constantly hear, among conchologists, the question, "What is the meaning of Bulimus?" The author of the article intituled "Lamarck's Genera of Shells," thus derives the word "*βελιμος*, *insatiable hunger*. What title this genus has to so strange a name, we know not."* It may not, then, be unacceptable to give a plain statement of the origin of the word. Swainson observes that "the genus Bulimus was long ago formed by Scopoli, out of the heterogeneous mixture of shells thrown together in the Linnean genus *Helix*."† Let us now turn to Scopoli's account of the source whence he derived the name. "Proprium," says Scopoli, "itaque ex his constituo et duce celeberrimo Adansonio Bulimos voco, ut eo facilius agnoscantur. Solam testam, nec animal inhabitans vidi, quod diversum esse a Limace affirmat Adansonius."—*Deliciæ*, &c. p. 67. Now Adanson has no such genus as Bulimus, but he has such a genus as Bulinus. At Plate 1, fig. G. 2, in his *Natural History of Senegal*, will be found "Le Bulin, Bulinus," but the letters "n" and "u" are so confusedly engraven, that, at first sight, the word looks like Bulimus. In the text (page 5.) the word is printed Bulizus very plainly; but neither Scopoli nor any of his successors appear to have noticed it. Till the time of Lamarck, who confined the genus (still calling it Bulimus, after Scopoli and Bruguière) to the land-shells with a reflected lip, which now range under it, many land and fresh-water shells, which have not a reflected lip, such as *Achatinæ*, *Melaniæ*, *Physæ*, *Limnææ*, and *Succinææ*, were also congregated under the name of Bulimus. The Bulinus of Adanson was a fresh-water shell, apparently a *Physa* or *Limnæa*.

* *Journal of Science*, &c. vol. xv, p. 240, n.

† *Zool. Illust.* vol. i. *Bulimus melastomus*, pl. 4.

insigni ; labio crassissimo, reflexo, supra pallidè castaneo, infra nigro ;
 aperturâ intus albidâ.

Tab. supp. XXXI.

Mus. Soc. Zool.

Habitat in sylvis Peruvianis.

Shell stout, long oval, of a brown chesnut colour, changing to red at the apex and on the upper whorls, which last are longitudinally striped with reddish brown towards the suture. Whorls six, ventricose ; the last has a narrow black band across its middle, and another of the same colour close to the suture, which is white ; the last whorl but one has two narrow black bands, both near the sutures ; the lower bands on the last and penultimate whorls are each thrice interrupted. On the last whorl, near the base, which is very dark, is a faint, broad, lighter coloured band. The columella is remarkable for its obtuse white tooth, surrounded by the rich dark colouring of the aperture. The right lip is of huge thickness, and much reflected : above, it is of a light chesnut colour ; below, of a rich brownish japan-like black, which, particularly where it is shading off into the chesnut, gives, when the light is thrown full on it, the same kind of iridescent appearance as is seen in the Lumachella, or Fire-marble. The lower edge of this rich lip is punctured pretty thickly with dots, resembling those of *Cypræa testudinaria*, which seem filled with a whitish opaque substance, and the formation of which has given an irregular, and almost fungus-like appearance to the reflected border of the lip, on its upper side. The interior of the aperture is white. Length three inches ; breadth, measured across the body whorl, and including the lip, one inch and six-eighths.

This fine shell, of a much firmer fabric than most land-shells, was obtained by Lieut. Maw, R.N., in a rancho (farm-house) at Toulea, about nine leagues to the eastward of Chachapoyas, in Peru, on Christmas-day, 1827. It had been taken on the chacra (farm) to which the rancho belonged. The chacra is situated at the highest limit of the montana, or woody district, on the eastern side of the Andes, at an elevation of about 8000 feet above the level of the sea. The species was frequently seen by Lieut. Maw in the woods between Chachapoyas and Moyabamba. Two of a much larger size than the individual here described, were found by him alive, and given in charge to the ariero (muleteer), with a special

injunction to take care of them. The ariero, supposing that they were to be prepared for breakfast, roasted them, and thus destroyed the shells.

Spix has not mentioned this shell, and I have reason to believe that there is no other specimen in this country. Whether the species is confined within narrow limits in the almost untrodden district traversed by Lieut. Maw, will be an interesting subject for future inquiry. This enterprising traveller is the first European who has performed a journey across the continent of South America in the line of the Marañon, or Amazon River. After passing from Truxillo across the Andes to Chachapoyas he embarked upon the river in Peru, and proceeded throughout its course to Para. In the course of this expedition he collected several animals, which he has liberally presented, together with the subject of this memoir, to the Zoological Society.

Addenda to ARGONAUTA.*

IN the paper on the animals found in the shells of Argonauta in the last number, there is an omission which I wish to supply. Bontius in his twenty-seventh chapter De Nautilo pisce, Sepiis et Holothuriis † after citing part of Pliny's description, proceeds "Hactenus Plinius; quæ verba
 " tam naturaliter hujus Nautili formam exprimunt, quam si ipse in eo
 " habitasset. Ac paulo post. Ita vadit alto, liburnicarum ludens imagine,
 " et si quid pavoris interveniat, hausta se mergens aqua." Then comes the testimony of Bontius, and, as a piece of natural history and pharmacy, it should not be overlooked. "Hæc quia ipse sæpius vidi, et
 " cum damno meo expertus sum, verissima esse novi: nam dum talem
 " pisciculum in mari captum imprudenter manibus meis contrectassem,
 " tantus ardor manum invasit, tanquam si aqua ferventi suffusa esset, et,
 " nisi apposito statim alio contuso cum aqua mihi ipse subvenissem,
 " procul dubio præ dolore in febrim incidissem: unde ego ipsum piscem
 " de Holothuriorum esse genere contenderim, ut quæ omnia in mari
 " fluctuantia, tam acrem calorem attractantibus inurunt, quod et falla-

* Ante p. 57.

† Hist. Nat. et Medic. Ind. Orient. p. 79.

“ cissimi omnium mortalium Chineses noverunt, qui illa oryzæ miscent,
“ ut liquorem suum destillatitium (quem Arac nos hic vocamus) tanto
“ calidius reddant, pernicioso invento, quod hinc miseri nostri socii na-
“ vales, sanguinis sputum, Pthisin, Marasmmum denique, et ipsam tan-
“ dem mortem incurrant.” This is rather hard upon the Argonauts, as
well as the Socii Navales. The worthy Bontius seems to have been particularly unlucky in his fishing for the cephalopoda. Speaking of the cuttle-fish, and its power of ejecting an inky fluid, he, with great naiveté says, “ Quod adeo in me ipso expertus sum : dum enim Sepiam curio-
“ sius contemplerer, effuso illo Pliniano atramento suo totam faciem mihi
“ infuscavit, non sine risu astantium.”

ART. XXVI. *Observations upon the Genus Scaphura, K, with Descriptions of two new Species. By J. O. WESTWOOD, F.L.S., &c.*

AMONGST the most interesting of the various and contradictory opinions of naturalists of the present day, with regard to questions connected with natural science, may be ranked those which relate to the existence or non-existence of isolated groups of objects, of higher or lower rank ; in other words, *First*, Whether every object in nature is not referable to some group or collection of objects of a similar structure, entirely separated and distinguished from all other groups ; or, *Secondly*, Whether such groups are not, although so insulated, connected with each other by means of intervening and generally smaller groups, which, although partaking of the characters of the groups between which they intervene evidently possess characters peculiarly their own, and sufficient to shew that they cannot be inserted in the groups they connect, and therefore are themselves insulated ;* or, *Lastly*, Whether the great chain of nature is

* With reference to this plan it may be remarked, that the admission of the existence of osculant genera tends to establish it as the plan of the creation.

not imperceptibly and gradually filled up, and her groups united by intervening objects, partaking in a greater or less degree (according to the nearness or remoteness of such intervening objects) of the characters of the thus connected groups, but with which intervening objects we may be, in many cases, unacquainted. Whether, in fine, nature (to adopt and enlarge the simile of Linnæus) may be said to leap from group to group, placed unconnectedly at distances from each other, or to walk step by step by means of groups placed connectedly, but at short distances from each other, or, lastly, to slide along from form to form by means of the gradual intervention of objects connected with and related to each other.

The remarks of Mr. Kirby upon this point are worthy of considerable notice. He evidently feels inclined to adopt a middle course, and says, with reference to the latter plan, "Were this really and strictly the case, " it seems to follow, that every group or individual species must on one " side borrow half its characters from the preceding group or species, " and on the other, impart half to the succeeding," adding, nevertheless, the question, "Whether every real species or group has not some " one or more peculiar characters, which it neither derives from its pre- " decessor, nor imparts to its successor in a series ?"*

The peculiarity of character alluded to must necessarily be variation in structure, and therefore if it be proved that precisely the same peculiarity of structure obtains in more than an individual species, it follows that neither of the above ideas suggested by Mr. Kirby as indications of an imperceptibly gradual course of nature, are consistent with nature, and therefore that a further proof is here adduced, that "varying, though not " violent intervals," do naturally exist in the plan of the creation, which cannot, consequently, be said to slide along in the manner above alluded to. Without, however, professing to offer any decided opinion upon this abstruse, yet interesting question, I cannot help remarking, that the little experience which I have had in natural history, has had the effect of inducing me to believe, that nature does not adopt the last of the above plans; and nothing has tended to produce this belief in a greater degree in my mind, than the knowledge, *First*, That numberless groups of greater or less value, do actually exist in nature, possessing a simi-

* Kirby and Spence, *Introd.* v. 4, p. 358.

larity of structure, and thereby forming themselves into natural groups; and, *Secondly*, That there are numbers of such groups, of varied degrees of rank, which (having regard to their comparative value, as well as to their relative characters,) do exhibit such wide distinctions from the nearest allied groups with which we are acquainted, that I cannot but think that our minds must be influenced by a very considerable degree of fancy, ere we arrive at the conclusion, that such groups are but the effects of *accident*, and that other unknown groups do exist, or have existed in nature, by means of which a gradual and uninterrupted passage can be maintained without the intervention of any hiatus.

In the present day, an object possessing a peculiar formation is, without hesitation, formed into a genus; subsequently other objects are discovered, presenting precisely the same structure, but varying perhaps in size, or merely perhaps in colour. This cannot otherwise be regarded than as establishing the validity of the genus, and the propriety of its formation, and that it must, for the present, at least, be regarded as an insulated group.

And such has been the genus *Scaphura*, established and described by Mr. Kirby in a preceding volume of this work, to whom a single species was only known, subsequently, however, several others have presented themselves, possessing the same singularities of formation, and differing from each other scarcely otherwise than in colour.

With regard to the generic characters of *Scaphura*,* of which Mr. Kirby has given such very accurate and valuable details in the second volume of this Journal, (p. 10.) I may be permitted to add, that the Antennæ, (of which the length is doubtfully mentioned by Mr. K.) are at least twice the length of the body in my specimen of *Sc. Kirbii*; and, which is the only specimen which I have seen possessing perfect Antennæ (this, however, may easily be accounted for, from the very delicate structure of their terminal capillary portion). The incrassation of the basal joints is not, as might perhaps have been anticipated, a sexual character, since the male, of *Sc. Edwardsii*, at least, possesses a similar formation.

* I am inclined to consider this genus as synonymous with that of *Penni-corne*, of which Latreille merely says, (Fam. Nat. p. 413.) "Saturelles du Brésil, à antennes garnies inferieurement de poils."

The anterior tibiæ of both sexes present a curious formation, similar to that described by Messrs. Kirby and Spence, as distinguishing the anterior tibiæ of both sexes of *Gryllus Campestris*, domesticus, &c. "At the base there is an aperture, which passes through the joint, anteriorly it is oval, and posteriorly elliptical, and much larger, and on both sides is closed by a tense membrane."† In *Scaphura* the excavation is oblong ovate, and being larger than in the Crickets, the base of the tibiæ is necessarily dilated, as may be observed in the figure of *Sc. Vigorsii*. This formation also exists, in a modified form, in Mr. Kirby's *Acridæ*, but it is not found in the Locusts. The tegmina of the male are formed precisely similar to those of the female, wanting the talc-like spot at the base, which sexually distinguishes the males of the Grasshoppers with long antennæ.

The abdomen of the female is furnished on each side, above, with an hirsute bristle, broader at the base, and terminating in a point, about a line long, and which appears to be a modification of the long anal setæ of the Crickets. This, however, appears to be wanting in the males. The latter do not exhibit any other material or striking variation in structure from the female, with the exception of the organs of generation. I may also notice, that this genus exhibits an instance of the prevalence of colour existing in certain groups, the species being adorned either with a brick-red or black colour, more or less tinged with blue; but this prevalence of tints is more particularly observed in peculiar parts of some of the Organs; thus the few joints of the antennæ connecting the incrassated with the capillary portion, are in all the species of a fulvous tint, while the incrassated portion is black. The upper portion of the four posterior femora of all the species is also adorned with a triangular pale spot, peculiarly beautiful in *Sc. Kirbii*; and again in two of the species the anterior portion of the tegmina is adorned with several short diagonal pale lines. The colour of the tegmina becomes paler towards their tips, and the anal portion of the wings is paler than the exterior.

The geographical situation of this group appears to be South America, where it also appears to be of rare occurrence.

I may lastly notice, that the species vary but slightly in size.

† Kirby and Spence, *Int.* 3, 674.

Notwithstanding the opinion of so high an authority as Mr. Kirby, with reference to the osculant situation of this group, between the Grasshoppers with long antennæ and the Locusts, I am induced to consider that it possesses very little relationship with the latter. Its general habits and the formation of the tarsi approach the former, but the long antennæ, the formation of the anterior tibiæ, and the anal fillets present affinities with the Crickets. It differs, however, from both these groups in the absence of the talc-like spot at the base of the tegmina of the males, in which respect (alone) it agrees with the Locusts.

Vigorsii. Sp. 1.

Kirby, Zool. Journ., v. 1, 432 and v. 2, 11, pl. 1, f. 1—6.

A specimen (♀) of this insect is now before me, from the cabinet of my friend, T. W. Edwards, Esq., F.L.S., &c., which exhibits the following appearances:—The four posterior femora are adorned, near the centre, with a triangular spot, not extending in the intermediate pair either to their under or inner surface, nor in the posterior (in which the spot is much larger) to the under surface of the femora. The tegmina are red-brown, dark at the base, and gradually growing paler to the tips; * transversely marked on the anterior margin with several short diagonal pale lines. In the coloured figure the palpi of the insect are introduced, but with somewhat the appearance of forming two triangular white lateral lobes to the prothorax, more especially since that part is described as trilobed, the word *postice* introduced into the generic character of the prothorax before the word *trilobus*, would, however, explain the formation.

Mr. Kirby describes his specimen as being 14 lines long, Mr. Edwards' is 11 long, and the expansion of the tegmina is 1 inch and 11 lines.

The following specific character may be inserted, the better to distinguish this species from the two following.

Sc. atra, abdomine cœrulescenti, femoribus 4 posticis maculâ mediâ albidâ, tegminibus fusco rufis, apice pallescentibus, alis fuscis.

* In the figure the tips are incorrectly coloured darker than any other part of the tegmina, which induced me at first to consider Mr. Edwards' specimen as distinct.

Kirbii. Sp. 2. Sc. fulvo-rufa, abdomine basi nigro-cœruleo, in medio fulvo, apice rufo—femoribus 4 posticis maculâ mediâ viridi albidâ, antennarum articulis 3—10 nigris.

Long. Corp. (ovipos. incl.) $10\frac{1}{2}$ lin. Exp. tegm. 1 unc. 10 lin.

Long. antenn. $1\frac{3}{4}$ unc (feré.)

Habitat in Brasiliâ. In Mus. nost.*

Head fulvous red, face with a diamond-shaped black spot, extending from the nose to the insertion of the antennæ, and with a small black spot beneath each eye. Nose and lip paler at the base of each; jaws and palpi fulvous red; antennæ, with the two basal joints, fulvous; the eight following black, the remainder fulvous, terminating in brown.

Prothorax rufous, with an extremely slender, black border, edged with a very delicate yellow line, another very slender yellow central line extending from the base to the tip, above, and edged half its length with a slight black line on each side. Metathorax and mesothorax fusco-rufous.

Legs fulvous red, anterior femora with a slender yellow dash at the base above, intermediate femora with a small yellowish triangular spot before the centre, and the posterior with a beautiful triangular greenish white spot near the centre. Tegmina reddish, paler at the tips and at the anal margins, and having four short diagonal pale lines at the anterior margins. Wings pale fulvous red, darker at the exterior margin.

Abdomen, with the three basal segments blue-black, the third with a rufous transverse line at the base, the three following segments fulvous, each with a very slender black line at the posterior margin; the remaining segments, with the ovipositor, fulvous red.

The medipectus, postpectus, and ventral segments of the abdomen yellow. This, by far the most elegant species, I have named after the celebrated founder of the genus. I was only able to procure a solitary female specimen out of a large collection of Brazilian insects recently arrived in England.

Edwardsii. Sp. 3. Sc. atra, abdomine cœrulescenti, femoribus 4 posticis maculâ mediâ pallidâ, tegminibus atris, alis nigro-fuscis.

* A specimen, apparently of this species, is in the cabinet of Mr. Haworth, but in consequence of not having had an opportunity of examining the individual, I am unable to speak positively upon the subject.

Long. corp. $10\frac{1}{2}$ lin. Exp. tegm. $1\frac{3}{4}$ unc.

Habitat in Brasilia? In Mus. Dom^o Edwards—Haworth.

Velvety black, and subpubescent.

Head black, with the face, nose, and upper lip tinged with blue, the terminal joints of the palpi with a pale reddish line beneath, at the base. Eyes grey. Antennæ with the eleven basal joints, and the base of the twelfth black, the tip of the twelfth and the four following fulvous, the remainder brown.

Prothorax black, the deflexed posterior lobes or sides blue-black; legs black, intermediate femora with a small dull pale spot in the centre; posterior femora with a larger and brighter yellowish triangular spot.

Tegmina velvety black.

Wings brownish black, darker at the anterior margin.

Abdomen black, tinged with greenish blue, which is most conspicuous at the apex.

Beneath—the basal portion of the legs and the belly are of a greenish black, tinged with violet.

The above description I have drawn from a male specimen kindly lent to me by Mr. Edwards, with whose name I have inscribed it, as a slight token of regard, and in return for his repeated liberality and kindness to me in my entomological pursuits. He is uncertain of its locality, and he informs me that he possessed a second male specimen, now in the extensive Orthopterous Cabinet of A. H. Haworth, Esq.

This species might, on the first glance, be mistaken for one of the large black-winged exotic species of *Sphex*, which it much resembles in general colour and appearance.

Chelsea, September, 1828.

ART. XXVII. *A Note upon the Impregnation of the Arachnida.* By J. O. WESTWOOD, F.L.S., &c.

IT is an observation which cannot be too strongly impressed upon the minds of modern entomologists, who, far too generally consider that their

exertions are sufficiently extended in detailing the minute distinctions of species, or in describing the various appearances observable in the structure of different groups (without reference, in the generality of cases, to the habits and method of life which such variation of structure has undoubtedly been destined to perform, and for the support of which it has been bestowed upon the creature), that every fact, however slight, connected with the natural history or economy of any group, is worthy of consideration, as tending to afford confirmation of the great assertion of our celebrated Ray, that "uses made things, and not things uses."

The facts related below are connected with the Arachnida, a group whose manners of impregnation and propagation are extremely singular.

From what has hitherto been observed, it would appear that the nuptial embraces of this group are almost momentary, and from the circumstance of the bride being truly

" ——— etiam in amoribus sæva,"

it not unfrequently happens, that the bridegroom meets with an untimely death from the fangs of his partner, unless he takes the precaution of retiring with the utmost alacrity.

The following quotation from the third volume of the truly valuable *Regne Animal*, contains a brief, but excellent summary, by Latreille, of what has been previously recorded upon the subject, and is here introduced by way of contrast with, and explanation of the subsequent observations, which vary so materially from all previously recorded statements, that I feel confident that no apology is wanted in offering them, notwithstanding their crude and unpolished form.

"Plusieurs de ces animaux sont si cruels, qu'ils ne font pas même grâce à leur propre espèce, et que les mâles, craignant d'être dévorés par leurs femelles, ne s'en approchent, au tems des amours, qu'avec une grande circonspection, ou après beaucoup de tâtonnemens.

"Les organes sexuels sont doubles. Ceux des mâles, ordinairement très-compliqués et composés de différentes pièces écailleuses, sont généralement renfermés dans une cavité du dernier article des palpes qui forme pour ces individus un sorte de massue ou de bouton. Ceux des femelles consistent en deux conduits tabuleux plus ou moins rapprochés, et cachés dans une fente transverse située à la base du ventre entre les organes de la respiration. Le male y introduit alternativement l'or-

“ gane fécondateur de chacune de ses parties sexuelles, mais si légèrement, et d’une manière si instantanée qu’il n’y a presque qu’un simple contact. La position respective qu’ont alors les deux individus, varie selon les genres.”

During the autumn of 1827, I one day observed, in the corner of an outbuilding, at Chelsea, the somewhat uncommon occurrence of two small sized spiders, near to each other, in the same web, and my attention being thereby attracted, I was induced to attend to their motions. The web was formed about two feet from the ground, and placed horizontally from wall to wall. The two spiders were standing on the under surface of the web, about the centre, consequently their backs were towards the ground, and I was the better enabled to notice every circumstance connected with the impregnation of the female which I anticipated would take place. On slightly disturbing the web, they both retreated to a short distance ; in a short time, however, the slenderer insect, and which I correctly judged was the male, grew bolder, and again returned, step by step, stopping between each movement, during which time it extended its clavate palpi, which were then considerably agitated. On approaching his companion, the latter slightly moved towards the male, which continued carefully feeling about with his long legs until they at length came in contact with those of the female, his feelers then becoming more intensely agitated. From their position on the web I was then enabled to see that the female lifted her fore-feet from the web, and that the male was thereby enabled to creep between her intermediate pairs of legs, and underneath her body, until his head reached as far as the under side of the basal part of the thorax of the female, which, together with her head, were consequently hidden from my view, from above, by his head and thorax. The palpi of the male were then extended, and a drop of clear liquid ejected from the tip of each club, where it remained attached, the tips themselves immediately coming in contact with a transverse fleshy kind of teat or tubercle protruded by the female from the base of the under side of the abdomen.

After watching them in this position for several minutes, and the female not exhibiting any signs of anger, nor the male attempting to retreat, I left the outhouse ; but having occasion to return about half an hour afterwards, I was greatly surprized to find that they still remained in pre-

cisely the same position in which I had left them, and I have not the slightest doubt that they had not moved during my absence. Being anxious to secure them as specimens for my cabinet, and being obliged to leave home on the instant, I was reluctantly compelled to disturb the happy pair. They still, however, remain side by side in my cabinet, as an instance and singular example of the "Loves of the Spiders."

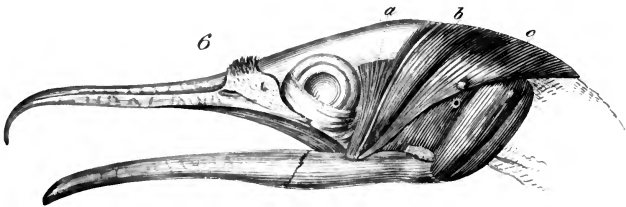
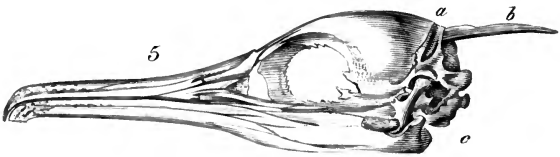
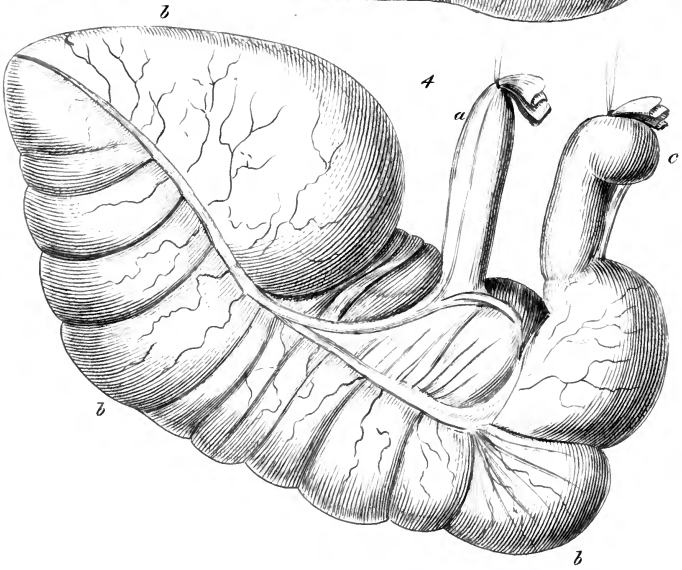
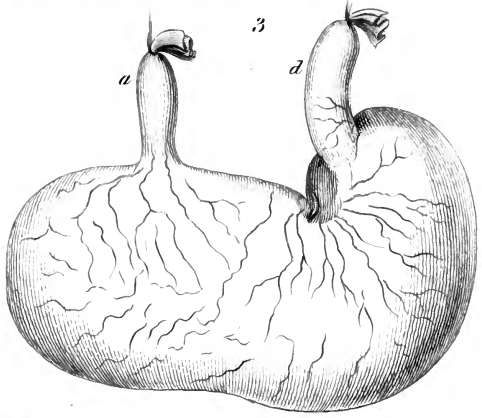
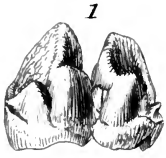
P.S. The species appears to be an *Epeira*. The eyes are thus (: : : :) It is of a light brownish gray colour, with a row of dark spots down the sides of the abdomen. It is nearly a quarter of an inch in length when alive, and appears to be a common species in my neighbourhood. It generally remains on the under side of the web, in the centre, and it does not appear that they form cells of retreat in one of the angles of their webs, like many other species. The web is irregularly constructed.

ART. XXVIII. *On the use of the xiphoid bone and its muscles in the Corvorant, (Pelecanus carbo, Linn.)* By WILLIAM YARRELL, Esq., F.L.S., &c.

OF the different modes by which the study of Natural History in its various branches is pursued, none afford greater gratification to the inquirer, or are attended with more solid advantages than a close examination of those multiplied peculiarities of anatomical structure, from which all classes of animals derive their varied and extraordinary powers.

This department of Natural History has the additional recommendation that neither rare nor costly specimens are necessary for its pursuit. The wisdom and power of the great Creator pervades every species. The most beautiful examples of organic structure, peculiarly adapted to the exigencies of the animal, are to be found in many of those of the most ordinary occurrence; and the anatomical and physiological views of those Naturalists who have preceded in the inquiry may be confirmed, rejected, or probably be found capable of still further illustration, according to





the varying perceptions of the different minds of those engaged in the pursuit.

Most of those authors who have written on the comparative anatomy of birds, agree in describing an additional bone as peculiar to the back part of the head of the Corvorant; but the muscles attached to this bone, and the services they are destined to render the animal by their united action, have been either overlooked or misconceived.

Plate VII, figure 1, represents the head of the Corvorant, somewhat reduced in size, with the peculiar bone attached.

This additional bone is about one inch in length, triangular in shape, somewhat grooved on its surfaces, and from its articulation with the *occiput* tapers gradually to a point. The mode by which this bone is articulated to the *occiput* is similar to that observed in the ribs of serpents, in which the condyle is situated upon each *vertebra*, and the cavity is at the end of the rib; so in the Corvorant, the condyle is upon the occipital bone, the cavity at the triangular end of the xiphoid bone: the joint is therefore hemispherical: admitting great extent of motion, the advantages of which will be hereafter pointed out.

Another subject deserving notice is the great length of the *os quadratum* (letter c, same figure) from above downwards in this bird, and in all others accustomed to feed on fishes. The articulation of this bone both with the *cranium* itself as well as with the lower mandible admits also great latitude of motion; it moves with facility backwards, forwards, outwards and inwards by the action of the numerous muscles attached to it, thus increasing the capacity of the *pharynx* for the more easy passage of any unusually large fish that happens to become the prey.

The plates of bone forming the *rami* of the lower mandibles in all the species of the genera *Colymbus*, *Alca*, *Uria* and *Larus* are much deeper and thicker in proportion to the size of the different species, than in the Corvorant, in which bird these parts will be found slender, weak and elastic, and hence the value to him of the additional pair of muscles now to be described, and which are not possessed by any of the other birds before mentioned.

I have before stated that this additional sword-shaped bone in the Corvorant has three surfaces each slightly concave, forming together an isosceles triangle, the base of which is downwards. From the upper edge

of this bone to its lateral angle throughout its whole length from the extreme point to the *occiput*, there arises on each side a triangular-shaped long muscle, the fibres of which are directed forwards, downwards and outwards to be inserted by a strong tendon upon the upper edge of the lower mandible, immediately behind the the insertion of the tendon of the temporal muscle. The muscles of the upper part of the neck, giving motion to the head, are inserted upon the occipital bone and its elevated crest, over which these additional muscles slide with every movement of the head, the particular articulation of the xiphoid bone only permitting it to become a fixed point of support to its own particular muscles, when both act simultaneously as additional elevators of the lower mandible, thus assisting in prehension, and materially increasing the power of the bird in securing a slippery prey. I may here also observe that the various other species of fish-feeding birds before referred to as having their lower mandibles so much stouter and stronger than the Corvorant, have also much deeper *fossæ* and more elevated ridges for the origin and attachment of their temporal muscles, and are in this way the better able to prevent the escape of their natural food, without the additional muscles of the Corvorant.

From these comparative remarks it will be perceived that the Corvorant does not possess the same strength of bone in the mandibles with the other oceanic fish feeders, though not less inclined than they are to pursue and take fish of large size. The dilatation of which the lower mandible is capable from its elasticity, the length and freedom of motion of the *ossa quadrata*, the great size of the *æso-phagus* which when distended measures 10 inches in circumference, all afford facilities for the swallowing of prey, which, but for his additional muscles he would probably be unable to hold. This peculiarity of structure is most likely to be found in other species of the genus *Pelecanus*, but it is only in our common Corvorant that I have had opportunities of ascertaining the fact.

One misfortune attending the promulgation of error is, that the evil increases in exact proportion to the weight of the authority with whom the mistake originates; and if any apology be considered necessary for thus occupying a portion of the Zoological Journal with a description and representations of a small part only of the anatomy of so common a bird as the Corvorant, I trust that apology and excuse will be found in the following quotations; and that the view of the structure and its uses

entertained in the foregoing observations will be considered the correct one.

Leçons d'Anatomie Comparée de G. Cuvier, tom. I, p. 229.

“ Dans le cormoran, la protuberance occipitale supporte un os allongé, triangulaire, qui paroît provenir de l'ossification du ligament cervical.”

A manual of comparative anatomy translated from the German of I. F. Blumenbach with additional notes, by William Lawrence, Esq., the second edition, revised and augmented by William Coulson, Esq., p. 56.

“ A peculiarity, which seems to be confined to the cormorants, must be here mentioned. There is a small sabre-shaped bone at the back of its *vertex*, which is supposed to serve as a lever in throwing back the head, when the animal tosses the fishes which it has taken, into the air, and catches them in its open mouth. But the same motion is performed by some other piscivorous birds, who are unprovided with this particular bone.”

Traité complet de l'anatomie de l'homme, comparée dans ses points les plus importans a celle des animaux. Par H. Cloquet, Paris, 1826, p. 200 and 201. “ Chez le cormoran (*Phalacrocorax carbo*) comme l'a noté M. Cuvier, la protuberance occipitale supporte un os allongé, triangulaire, et qui parait être le resultat de l'ossification du ligament cervical.”

Fife's outlines of comparative anatomy, and the more recent publication of Mr. Gore's translation of the comparative anatomy of Carus, contain no notice of this structure.

Ryder Street,
August, 1828.

Description of the Plate, lower part.

PL. VII.

- Fig. 5. Cranium of the Corvorant, reduced in size. *a*, the occipital crest; *b*. the xiphoid bone; *c*. the os quadratum.
6. Cranium of the Corvorant, with the muscles moving the lower mandible. *a*. and *b*. muscles aswering to the masseter and temporal. *c*. the muscle arising from the xiphoid bone.

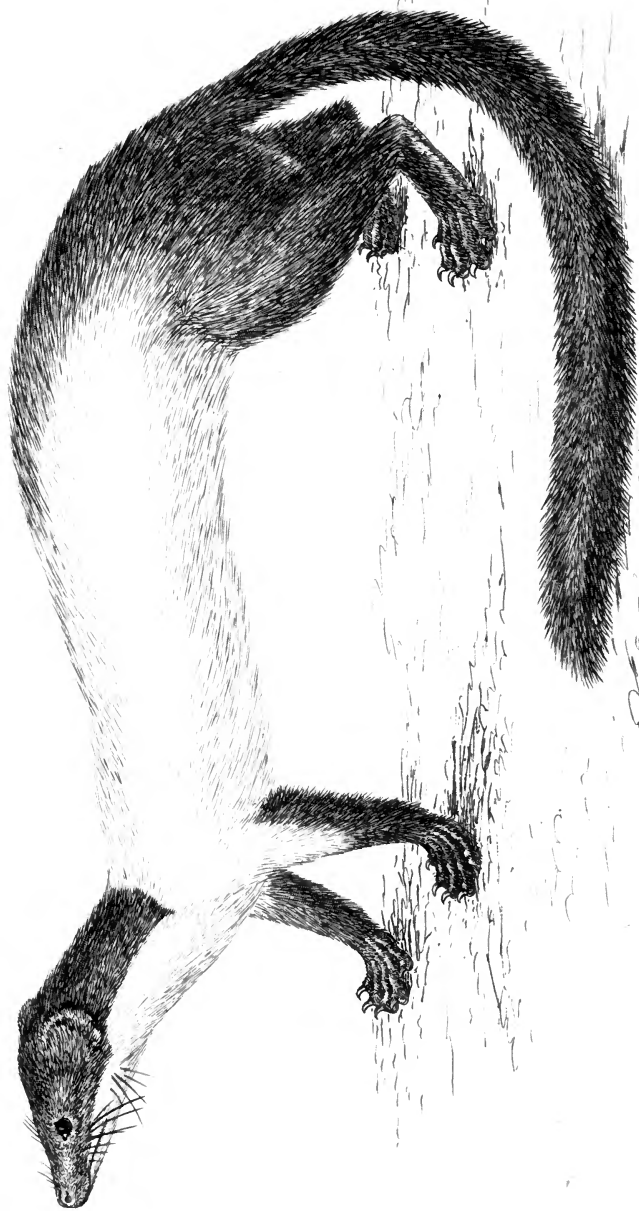
ART. XXIX. *Notice of a new species of Mustela, found in India, by Major-General Thomas Hardwicke, F.R.S., F.L.S., &c. By THOMAS HORSFIELD, M.D., F.R.S., L.S., G.S., &c.*

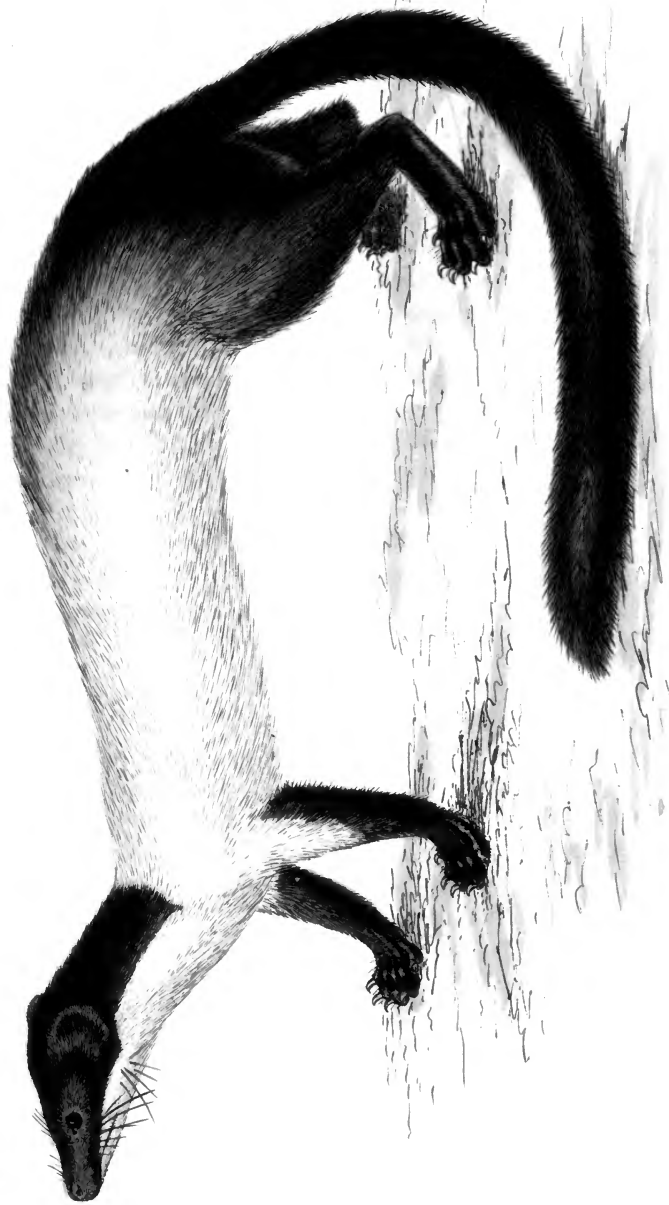
THE animal, of which a concise notice is now offered to the public, was presented to the Museum of the East India Company, with many other objects of Natural History, by Major-General Thomas Hardwicke, soon after his last arrival from India. When mounted and placed in our collection, the name of *Mustela Hardwickii* was assigned to it; since that period I have been confirmed in my opinion that the animal still remained unknown to naturalists, and was new to our catalogues. Although its history cannot be completely illustrated at present, since the specimen is not perfect in all its parts, the skull having been removed in the preparation, yet I considered it incumbent on me, not to withhold from the public a concise notice of the external character of this beautiful quadruped. On communicating my intention to the liberal donor, he has not only very kindly approved of it, but he has also favoured me, very politely, with the remarks he made in India when he first obtained this animal, as they are recorded in his manuscripts. Little further therefore remains for me, than to prepare these remarks for the purpose of a communication to the editor of the Zoological Journal.

I embrace this opportunity with particular satisfaction of bearing a public testimony of the distinguished liberality of General Hardwicke to the Museum of the East India Company. I might perhaps feel some uneasiness on account of the loss which the collection of this disinterested patron of natural history has suffered by his liberal donation, were I not assured that the gratification afforded to many visitors of our Museum, the satisfaction of the Honourable Court of Directors of the India Company, together with that of many private friends who have witnessed the labours of General Hardwicke in India, at least in some degree compensate the privation which his private collections have sustained by his public munificence.

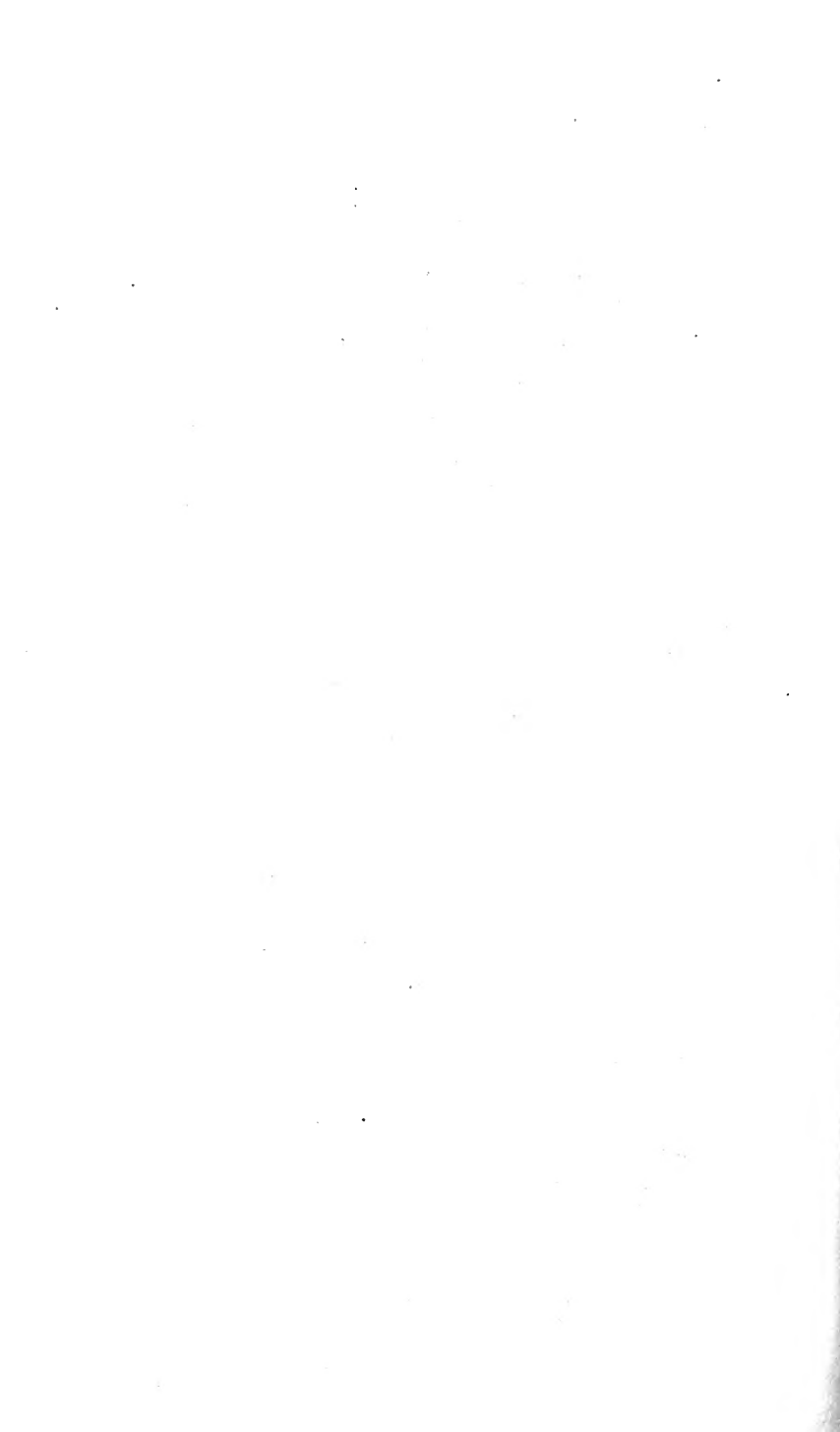
Size about one-third above that of the *Mustela foina*, or Pine Martin ;







Mustela Hardwickii. p. 239.



habit similar to that animal; the tail however is proportionally longer, and more regularly cylindrical. Body long and slender, being more robust and elevated at the rump, gradually tapering towards the shoulder; neck slender; head conical, of moderate length, somewhat compressed above, abruptly terminated at the muzzle; ears short, truncated above, orifice large, open, and bordered anteriorly by a thick semispiral tuft of hairs, forming a convoluted entrance to the organ of hearing; eyes intermediate between the muzzle and ears; whiskers few in number, short, slender, and closely applied to the head; a few short, lax, white, bristly hairs, in a tuft at the gape of the jaws; fur on the body, extremities and tail long and lax, on the head and neck soft, delicate, and closely applied; tail equal in length to the body and neck conjointly, cylindrical throughout, bushy or covered with long, lax, rather bristly hairs; posterior legs proportionally long, thighs remarkably stout; claws long, strongly curved and compressed, semiretractile.

MUSTELA HARDWICKII.

M. capite et collo supra pedibus caudaque nigris, corpore toto colloque subtus sordide testaceis, gula albidá.

TAB. VIII.

The head and neck above, the extremities, tail and posterior part of the rump are black; the neck underneath, and the whole of the body, are of a sandy yellow or testaceous colour, exhibiting in a certain disposition to the light a slight glossy reflexion, the dark is more intense on the head and neck, and the upper parts are here separated by well-defined lateral and posterior boundary-lines from the under parts and nape; on the feet and on the root of the tail the colour partakes of the testaceous tint of the body; the two colours gradually pass into each other at the union of the extremities with the body; the rump and thighs are clouded, tawny hairs being loosely scattered among the blackish hairs of the hinder parts; many of the separate hairs have likewise alternate dark and tawny bands; the throat and muzzle underneath are nearly white; the ears are entirely comprised within the dark upper parts, the truncated boundary of the lobe above is beset with a line of tawny hairs; the claws are rather pale, inclining to white; the soles of the feet are naked, prominent, and black.

Our animal is a native of the mountains in Nepal; it is of rapacious habits, living in forests, and destroying birds and small quadrupeds. In the Nepal or Newar language, it goes by the name of "*Mull-Sámprah*," pronounced with a nasal sound.

The disposition of our animal in the genus *Mustela*, is at present only conditional; it remains to be confirmed by the dental structure. With the exception of the skull, the specimen examined is in a very perfect state of preservation. As far as regards external character, our animal agrees with several *Mustelæ* in physiognomy and habit. It has the conical and depressed head, and the short open ears of the Martin; the character of the claws is also truly musteline; the tail is open and bushy, but rather more lengthened than in the other *Mustelæ*.

DIMENSIONS.

	ft.	in.	lin.
Length of the body and head, from the extremity of the nose to the root of the tail	2	2	0
Length of the tail	1	7	6
Length of the head	0	4	0
Height before, at the shoulder	0	7	6
Height behind, at the rump	0	9	0

ART. XXX. *Notes on some species of Fishes and Reptiles, from Demerara, presented to the Zoological Society by JOHN HANCOCK, Esq., Corr. Memb. Zool. Soc. In a Letter addressed to the Secretary of the Society.*

MY DEAR SIR,

I feel great pleasure in complying with your request of sending you some observations on the Demerara animals which I have lately transmitted to your Society. I regret that I have not leisure to extend my observations to the whole of the species, nor to give those I do send somewhat

more of a scientific form. At present you must be content with a few extracts from my notes, written during my residence in the colony, which relate to some of the animals, whose characters and habits appeared to you and some other members of the Society, while we were looking over the collection, to possess most novelty and interest.

We appear to have in Demerara several nondescript fishes belonging to the nearly allied genera, *Silurus* and *Loricaria*, Linn. Among these are two species, specimens of which are in your Museum, belonging to that division of the former genus, which by their mailed or plated covering approach most closely to *Loricaria*.

These species are distinguished by the negroes under the titles of the *Flat-head* and *Round-head*; and are also called *Que Que*, from the noise they make when taken out of the water, which much resembles the cry of a rat. They are the *Hassar* of the Arowaks.

The first of these, or the *Flat-head Hassar*, is a species of *Doras*, Lacep., closely allied to the typical one, the *Silurus costatus*, Linn.; from the figure of which, as given by Bloch, it differs chiefly by the tail not being so deeply forked. The fishes of this group appear, however, to resemble each other so nearly, as to render it unadvisable to characterize the present as new, without possessing the opportunity of comparing it with other and numerous specimens. I shall therefore content myself, for the present, with describing it, premising only that the number of large plates on each side is twenty-seven, while, according to Lacepède, in the *Doras costatus* it is about thirty-four. The same author also states, that the rays of the branchiostegous membrane are five, while I have never been able to detect more than four in my species.*

* The paucity of rays in this organ is a curious circumstance generally observable in the fish of South America. I have never met with any one with more than five rays in the gill membrane. Another singular anomaly remains to be noticed in the fish of the Tropics, viz. the large brain-bones, which in northern latitudes are either wanting, or are so small as to have escaped common observation. They appear, indeed, to be without a name, or entirely unnoticed by naturalists, as far as I know.

Specimens of these bones have been presented to the Zoological Society to shew the development of this character. In the *Siluri* they are remarkably conspicuous. In the species called *Gilbagre* they weigh, in the full-grown fish, about 20

DORAS COSTATA.

Dor. brunnescenti-grisea, lamini lateralibus circiter 27.

D., $\frac{1}{8}$. O. P., $\frac{1}{5}$. V., 7. A., 9. C., 20.

This species has six *cirri* at the mouth. The head is depressed; the whole body mailed, excepting at the *abdomen*, with strong bony costiform plates in a single longitudinal series, in the centre of which appears a single row of spines, curved backwards, and extending from the head helmet to the root of the tail. The *abdomen* is flat, and destitute of bony plates. A large and remarkably strong bony arm constitutes the first ray of each pectoral fin. This arm is strongly serrated on both its anterior and posterior edge. The mouth is small; the *opercula* of the gills small and close, requiring dissection to examine the gill membrane, which consists, as I have before observed, of four rays; the first ray of the anterior dorsal fin is a strong serrated spine. The posterior dorsal fin is small and fleshy without rays. This fish frequents only the fresh water of pools, lakes, and rivers, lives by suction, and on aquatic insects, and grows to about a foot in length. The colour of the body inclines to brownish gray. It has no proper teeth, but the lips are beset with minute sharp points.

This species is one of those fishes which possess the singular property of deserting the water, and travelling over land. In those terrestrial excursions large droves of the species are frequently met with during very dry seasons, for it is only at such periods that they are compelled to this dangerous march, which exposes them as a prey to so many and such various enemies. When the water is leaving the pools in which they commonly reside, the *Yarrows*, (a species of *Esox*, Linn.,) as well as the second species of *Hassar*, to which I shall presently refer, bury themselves in the mud, while all the other fishes perish for want of their natural element, or are picked up by rapacious birds, &c. The *flat-head Hassars*, on the contrary, simultaneously quit the place, and march over land* in search of water, travelling for a whole night, as is asserted by the

grs. each. They consist of two pearly bones, which are loose in the cavity of the skull, and without any attachment whatever, each being inclosed in a thin and very delicate tunic, which lies in contact with the brain.

* In an excursion made by my friend, Mr. Campbell, of Sparta Estate, Essequibo, with his family to the Sand Reefs, a spot situated about six miles

Indians in search of their object. I have ascertained, by trial, that they will live many hours out of water, even when exposed to the sun's rays.

Their motion over land is described to be somewhat like that of the two-footed *Lizard*. They project themselves forward on their bony arms by the elastic spring of the tail exerted sideways. Their progress is nearly as fast as a man will leisurely walk. The strong *scuta* or bands which envelope their body must greatly facilitate their march, in the manner of the plates under the belly of serpents, which are raised and depressed by a voluntary power, in some measure performing the office of feet. It is said that the other species, the *round-head*, has not been known to attempt such excursions, although it is capable of living a long time out of its element; but as I before observed, it buries itself in the mud in the manner of the *Yarrows*, when the water is drying up.

The Indians say that these fishes carry water within them for a supply on their journey. There appears to be some truth in this statement; for I have observed that the bodies of the *Hassars* do not get dry like those of other fishes when taken out of the water; and if the moisture be absorbed, or they are wiped dry with a cloth, they have such a power of secretion, that they become instantly moist again. Indeed it is scarcely possible to dry the surface while the fish is living.*

aback of the sea coast, they fell in with a drove of these animals, which were on their march over land to a branch of the Pomeroon. They were so numerous that the negroes filled several baskets with those they picked up.

* On inspecting an old Journal, which was kept during a tour to the Parima, in 1810, I find that another species of these mailed fishes inhabits the rapids of the Essequibo (interior of Guiana) one of which was caught by the Indians whilst employed in hauling our canoes over the falls of that river, and attracted my attention by its curious structure and vivid colouring; it is remarked in the note alluded to, that this fish is not only furnished with the common appendages for swimming, but also with four strong bony supports, one attached to each of the pectoral and belly fins (i. e. constituting the first ray of each) by which the animal creeps on the bottom of the river, and perhaps where there is little or no water also, being, as it seems, partly amphibious; for although it had received a severe wound on the head, it did not expire till it had been many hours out of the water. It has no proper teeth, but short, flexible, curved spines (or *setæ*) on the lips; one row on the upper, and two on the under lip (the upper jaw short and moveable?) The pectoral fin has six *radii*, besides the leg, if I may so term it, or ambulatory spine. The

The second species of *Hassar* to which I have referred, or the *round-head*, appears to be a new species of *Callichthys*, Linn., differing from the *Silurus Callichthys*, (Ejusd. Syst. Nat.) and from the *Call. asper*, Quoy and Gaim., by its forked tail; and from the *Cataphractus punctatus*, Bloch, by its thicker form, the slighter emargination of its caudal fin, and its uniform colour. From the new species indicated by M. Cuvier, it may also be distinguished by the first ray of its pectoral fins not being dentated, but merely rough and rasp-like.

CALLICHTHYS LITTORALIS.

Call. caudâ bifidâ; corpore crassiore: pinnae pectoralis radio primo aspero.

D. $\frac{1}{8}$, 1. P. $\frac{1}{5}$. V. 6. A. 7. C. 14.

TAB. SUPP. XXXII, fig. 1.

The whole body is covered with a coat of mail, with a double series of costiform plates, and a single narrow row on the back; they are all so fastened together by intervening muscular bands as to admit of motion in every direction. The tail is forked, the head covered with a very hard and strong shell, the eye small, with golden *iris*, the mouth has two *cirri* at each corner.

head, and whole body, except the *thorax*, are guarded as it were by a coat of mail, consisting of strong bony plates, supporting four longitudinal rows of curved spines on each side; colour of the body bright reddish yellow, elegantly variegated with black spots; the fins red at the extremities. It grows to about a foot in length.

Gill membrane four-rayed. Anterior dorsal fin $\frac{1}{8}$, second dorsal fleshy. Pectoral $\frac{1}{8}$, ventral $\frac{1}{2}$. Caudal 17. This may be identical with the *Locaria plecostomus* of Bloch, on the colouring of whose plates implicit reliance cannot be placed. Its arms were more strongly developed than in Bloch's figure, but in general form, colour, and disposition of its plates, it appears nearly identical.

Another fish, approximating to the present genus, I had an opportunity to observe, at the Portuguese Fort of St. Juaquin (the site of the fabled lake of Parima). It was there called *Baco*; whole length three feet; body angular, enveloped in strong, bony, angular plates, studded with a single row of spines on each side, hooked backwards; colour uniform dark gray. This fish exhibits a striking union of characters of two genera; in respect to form, of the head and breast especially, it is a *Silurus*; in its mailed body a perfect *Loricaria*; head flat, and sloping in a straight line from the dorsal fin; first ray of the dorsal and pectoral fins a very strong spine, the other fins fleshy.

The gill membrane is four-rayed ; the under jaw arched ; the lips retractile. Teeth none. The intestine about two lengths of the body, contains nothing but mud and very minute black cockles, some of them scarcely visible without a lens ; nothing like a sound or natatory bladder can be perceived. The after fin or second dorsal consists of one strong spine and a web. The first ray of the pectoral is a strong bony spine, or arm, beset with a multitude of minute sharp points ; it is curved upward and forward at the end, which facilitates the walking of the fish at the bottom of the pool.

It is asserted by naturalists, that no fishes are known to take any care of their offspring ; both the before-mentioned species of *Hassar*, however, make a regular nest, in which they lay their eggs in a flattened cluster, and cover them over most carefully. Their care does not end here. They remain by the side of the nest till the spawn is hatched, with as much solicitude as a hen guards her eggs ; both the male and female *Hassar*, for they are monogamous, steadily watching the spawn, and courageously attacking any assailant. Hence the negroes frequently take them by putting their hands into the water close to the nest ; on agitating which the male *Hassar* springs furiously at them, and is thus captured.

The *round-head* forms its nest of grass ; the *flat-head* of leaves ; both at certain seasons burrow in the bank ;* they lay their eggs only in wet weather. I have been surprized to observe the sudden appearance of numerous nests in a morning after rain occurs, the spot being indicated by a bunch of froth, which appears on the surface of the water, over the nest ; below this are the eggs placed on a bunch of fallen leaves, or grass, if it be the littoral species, which they cut and

* The flesh of this *Hassar* is yellow, firm, and very savoury, especially esteemed by the Creoles in their soups, which they prepare with the addition of several vegetable articles, such as the *Okra*, *Calaboo*, and *Fou-fou*, (i. e. *Hibiscus esculentus*.) *Arum*, and plantains, boiled and pounded into a sort of plain pudding. The whole is seasoned with pepper, salt, and lime-juice, and forms in reality one of the best dishes of the country, although many Europeans, out of a most ignoble pride and affectation, pretend to dislike it, for no other reason, however, than its being a common dish amongst the slaves and lower orders.

There are Creoles also who affect the same dislike or disgust to the *Fou-fou* and *Okra soup*, and yet swallow it enormously in private.

collect together. By what means this is effected, seems rather mysterious, as the species are destitute of cutting teeth. It may possibly be by the use of their serrated arms, which form the first ray of the pectoral fins.

A third species is the *Watawata*, or *Watwata*, of the Creoles. This is found on the sea-shores. It may be a new species of *Loricaria* of Bloch, or of *Hypostomus* of Lacép.

HYPOSTOMUS WATWATA.

Hyp. cinereo-griseus, pinnae dorsalis 1-mæ radiis 8.

D. $\frac{1}{8}$, 1. P. $\frac{1}{7}$. V. $\frac{1}{6}$. A. $\frac{1}{5}$. C. 16.

The length is generally eight inches; the body is completely mailed with angular strong rough scales; the head rough, depressed, sloping; mouth sucker-like, round, retractile, with one *cirrus* on each side. Gill membrane five-rayed; aperture of gills very small, and close to each pectoral fin. There is a strong collar-bone under the throat, behind this the *thorax* and belly are not mailed. The body is ash-grey, lighter under the belly. It sometimes grows to a foot in length. The body is somewhat octagonal, tapering to the tail, and flattened at the belly and breast. Tail forked. The stomach is oblong, ending in an intestine, which in a specimen that I examined myself, measured twenty-four feet in length; this intestine was most accurately coiled like a rope in a great number of convolutions, with the liver disposed in the centre of the coil. Nothing but mud was found within.

The fourth species which I shall particularise, is a new species of *Hypostomus*, Lacép, differing from that just described chiefly by the number of the rays of its first dorsal fin, which amounts to fourteen instead of eight.

HYPOSTOMUS MULTIRADIATUS.

Hyp. ferrugineo-griseus, pinnae dorsalis 1-mæ radiis 14.

D. $\frac{1}{4}$, 1. P. $\frac{1}{7}$. V. $\frac{1}{6}$. A. $\frac{1}{5}$. C. 16.

TAB. SUP. XXXII, fig. 2.

The colour is somewhat of a ferruginous gray. The scales are very strong, disposed in eight longitudinal series, with as many rows of sharp points along the body, directed backwards. The species is called by the Spaniards *Corroncho*, by the Warrow Indians, *Guasiquitu*. It frequents

lakes, living on the slime ; it grows to the length of eight inches, and lays its eggs in holes which it forms in the borders of the lakes.

A fifth fish to which I would call your attention, is a species of *Loricaria*, a generic name which I employ in the restricted signification given to it by M. Lacépède. This fish appears to differ from the two species hitherto described (with which, however, I am acquainted only through the medium of the representations contained in the noble work of Bloch,) by the form of its intermediate sub-thoracic plates. In the *Loric. Cataphracta*, Linn., the whole of the sub-thoracic plates are small, and have the form and appearance of scales ; in the *Loric. maculata*, Bloch, the larger and variously shaped anterior plates are succeeded by several rows, each of which extends across the under surface, and is divided into a middle and two lateral plates, so as to form three nearly longitudinal series ; in my specimen these last-mentioned plates pass completely across the under surface of the thorax, and are undivided ; the only mark which they exhibit being a slight line traversing the middle of each.

LORICARIA BRUNNEA.

Loric. brunnea: ore haud barbato : laminis pectoralibus intermediis indivisis.

D. $\frac{1}{6}$. P. $\frac{1}{6}$. V. $\frac{1}{6}$. A. $\frac{1}{6}$. C. 12.

The body is long, flattened, tapering from head to tail, enveloped in a quadruple row of strong dense scales, the lateral ones angular, with a double row of barbs on each side, pointing backwards the whole length. The colour of the body is brownish, the length ten or twelve inches. The head flat. The mouth under the snout is of a sucker form.

It is found in the branches and lakes of the Orinoko.* It is called *Corroncho* by the Spaniards, equally with the last, and *Guasiguaru* by the Warrows. Its habits are the same as those of the last.

* I take this opportunity of stating that I am indebted for much information respecting the animals of the Orinoko, as well as many of the specimens which I have brought to England, to Don Jose Estevan, of Santa Catalina, on the Orinoko, a gentleman who has paid considerable attention to Natural History, and particularly to the habits and œconomy of animals. Mrs. Hancock also, being fond of those researches, has supplied me with many local names and translations from her native language, the Spanish.

(To be continued.)

ART. XXXI. *Analytical Notices of Books.*

Zoological Researches and Illustrations; or Natural History of nondescript or imperfectly known Animals, in a series of Memoirs, &c. By JOHN V. THOMPSON, Esq., F.L.S., &c. Cork, 1828. No. I. pp. 36, plates iv.

The non-existence among the *Crustacea* of a metamorphosis analogous to that of insects, has been regarded as so incontestable, that many writers of the highest eminence have employed it as part of the character which they have assigned to the former group, and have considered it as furnishing one of the essential differences between the classes. To prove the incorrectness of this assumption, in one instance at least, is the chief object of the first memoir in the present number. After some general remarks on the luminosity of the sea, and on the immense number of minute animals with which the ocean teems, the authour proceeds to review briefly the history of our acquaintance with the genus *Zoea*, Bosc. To Slabber we are indebted for the earliest description and figure of an animal of this group, and it is curious to remark that that observer stated that the *Zoea* underwent a metamorphosis, and gave a figure of another crustaceous species as that into which it was transformed. Mr. Thompson observes, however, that this new animal was probably introduced accidentally among the sea-water, which it was necessary to renew occasionally, and that the original *Zoea* having been lost by want of care, the former was mistakenly regarded as a new state of the latter. To this conclusion he is led by the circumstance that the form of Slabber's new animal bears no resemblance to that which was produced in his own experiments; but it should be recollected that the species of *Zoea* which fell under his particular observation, was probably different from that which engaged the attention of the early describer.

The species in which the metamorphosis was observed by Mr. Thompson, was obtained in considerable abundance in the harbour of Cove, near Cork; and a large specimen having been selected with the view of veri-

fyng the statements of Slabber, it was daily supplied with fresh sea-water during a month, at the expiration of which time it died while in the act of changing its skin, and of passing into a new form, entirely different from that which it previously exhibited, as was evidently shown by its disengaged members, which were changed in number as well as shape, and corresponded with those of the *Decapoda*, consisting of five pairs, the anterior of which was chelate. The metamorphosis not having been completed, no knowledge of its general form could be obtained, and a second experiment subsequently made, failed equally in determining this point; the animal in this instance also dying while undergoing the change, the result of which was perfectly similar; the members from being natatory and deeply cleft, having become simple and adapted for crawling only.

A further evidence of the existence of metamorphosis among the *Crustacea* is afforded by the fact that Mr. Thompson has succeeded in hatching the *ova* of the common Crab, (*Cancer Pagurus*,) the young of which were found to be similar in form to the *Zoea Taurus*. Hence he concludes, perhaps too universally from such limited observations, that the *Decapoda* generally undergo metamorphosis, being in the first stage of their existence essentially natatory, and the greater number of them becoming afterwards, in their perfect state, incapable of swimming, and being then furnished with *chela*, and with feet almost solely adapted for crawling.

That the whole of the *Crustacea*, however, are not subject to metamorphosis, is shown by the second memoir, "On the genus *Mysis*, or "Opossum Shrimp," in which the history of one of the species is traced *ab ovo*. From this it is evident that the only changes which take place in the animals of this group consist in the successive and gradual development of parts. During their growth the young are contained in a pouch, composed of four concave valves, which is attached to the posterior part of the under surface of the thorax of the female. An analogous structure, it may be remarked, is observable in many of the *Crustacés Hétérobranches* of Lamarck, of which the *Onisci* and *Gammari* afford familiar instances.

The descriptions of *Zoea* and of *Mysis*, and of all the known species of the latter, are given at considerable length, and their habits, so far as

they have yet been ascertained, are particularly noticed. The figures are numerous, and furnish representations of all the species of *Zoea* hitherto described; of two new ones discovered by Mr. Thompson in the Atlantic Ocean; of that which forms the subject of his observations, including so much as could be seen of the change which it underwent; and of the supposed metamorphosed animal of Slabber. The various parts of the Cove species are given with much detail, as is also the progressive growth of *Mysis vulgaris*, of which, and of the *Mysis Chamæleon*, the dissections are very extensive and minute. Both the latter are regarded as new, although they approach very nearly to two species described by Dr. Leach.

The authour need not be reminded that his principal discovery is one of high interest, and that as such it requires strong confirmation from repeated researches and experiments extended throughout the whole of the Decapodous *Crustacea* within his reach. His exertions cannot be better directed than to the collection of facts, for the accumulation of which he possesses such favourable opportunities.

*Nova Acta Physico-Medica Academiae Cæsareæ Leopoldino-Carolinæ Naturæ Curiosorum. Tomus XIII.—
Bonnæ 1826—7.*

THE two parts of the transactions of this learned Academy which we have now to bring under the notice of our readers, are fully equal in zoological interest to that which preceded them, an analysis of which will be found at p. 249 of our last volume. We shall proceed at once and without preface to give such an account of the memoirs which compose them as our restricted limits will permit, arranging them as usual in systematic order.

The highly important anatomical essay, “*De animalium quorundam, per hyemem dormientium, vasis cephalicis et aure internâ,*” is dedicated by its intelligent and industrious authour, Dr. A. G. Otto, to the illustrious Blumenbach, on the occasion of his being presented with the diploma of the Academy, in honour of the completion of the fiftieth year

of his zealous perseverance in the career of science. Dr. Otto passes over the opinions of the older writers as to the cause of the hybernation of some among the *Mammalia*, and mentions those only of Mangil and Saissy. The explanation of this phænomenon given by the former was founded on the statement that in these animals the anterior or carotid cerebral artery was entirely wanting, the whole supply of blood received by the brain being furnished by the posterior cerebral alone: hence he concluded that the irritability of the brain was diminished, and that consequently a longer period of rest was required by them than by other quadrupeds to renovate its exhausted vigour. The foundation of this theory gives way at once before the fact established by the repeated dissections of Dr. Otto, that in all hybernating quadrupeds, without exception, both these arteries exist, the carotid cerebral being however of small size and liable to escape the notice of an inattentive observer on account of its unusual course through the cavity of the *tympanum*. The number and capacity of the cerebral vessels in general, he asserts to be fully equal to those of other animals of equal size. The theory of M. de Saissy on the other hand rests on his recorded observations that the heart and internal vessels in hybernating animals were more capacious, while the external were less so, and the cutaneous nerves larger in proportion, than in other *Mammalia*: hence he concluded that the former were more obnoxious to the influence of cold. But the fact here assumed is positively contradicted by the observation of Dr. Otto, who declares that no appreciable difference exists in either respect between the animals in question and the rest of the class. He details with great minuteness a long series of dissections, principally of the cerebral vessels and internal ear, of more than fifty quadrupeds, mostly of the order *Rodentia*, to which the hybernating species almost exclusively belong. The most striking and uniform result of these investigations is the fact, that in all such animals the carotid cerebral enters the *cranium* through the *foramen jugulare*, or in its immediate neighbourhood, and passes across the cavity of the *tympanum*, and through the *stapes*, in its singular and tortuous course to the brain itself. But although this peculiar structure obtains thus universally in hybernating animals, our author is by no means of opinion that it can be considered as the cause of their propensity to continued sleep; on the contrary, he regards this ex-

traordinary deviation of the artery as a consequence of their general organization, and more particularly of the very great development of their internal ears, which renders this change of its usual course absolutely necessary. The paper is terminated by some cursory remarks on the advantages to be derived from consulting the structure of the internal ear, in determining the character of certain genera, and their place in the series.

The "Bemerkungen ueber ein paar Schlesischer Säugthierarten," by Constantin Gloger, are the first production of a young zoologist, of whose future labours in the field of science Dr. Gravenhorst, in his prefatory observations, augurs most favourably; and the paper itself, so far as it goes, appears to justify the eulogium pronounced upon its authour. Neither of the animals described in it are positively new; but the indications on which they have hitherto rested, although supported in both cases by the weighty authority of Pallas, were so imperfect as to have given rise to doubts of their actual existence as distinct species. These doubts are now, however, completely removed. Of the first, the *Sorex pygmaeus* of Laxmann and of Pallas, the smallest quadruped hitherto discovered, weighing, when full grown, no more than thirty-six grains, and measuring, in the largest specimens, only one inch and ten lines, from the tip of its elongated snout to the origin of its tail, M. Gloger obtained a single specimen, which had been killed by a cat, fortunately without injury to its skin. From the description of this animal, which is given at length, compared with that of Pallas in his excessively rare work, the *Zoographia Rosso-Asiatica*, it is clear that the Silesian animal is identical with the Siberian; and a review of the history of the species, from the period of its discovery to the present day, proves that it is also the *S. minutus* of Laxmann and Linnæus, the *S. exilis* of Gmelin, and in all probability the *S. minimus* of M. Geoffroy St. Hilaire. Much of the confusion in the synonymy appears to have arisen from the circumstance of Pallas having first described it in his journey without a name, and as distinct from *S. minutus*, with which latter, however, he identifies it in the work above quoted, where he also applies to it Laxmann's original name of *pygmaeus*. The extreme scarcity of this work, as M. Gloger observes, will in all probability account for the continued propagation of the original error, which has in various ways pervaded the writings of

Gmelin, Geoffroy, Oken, and Desmarest. From some additional remarks in the Appendix to the volume, we learn that Professor Gravenhorst has since had the good fortune to meet with two specimens, both more or less injured, but sufficiently entire to exhibit all the characteristics of the species, in the Duchy of Mecklenburgh; it may therefore fairly be concluded that this interesting little creature, which has now been found at such distant parts of the old continent as the banks of the Yenisei and those of the Elbe, is far from being in reality so uncommon as its very rare occurrence would otherwise lead us to suppose. The authour's researches also induce him strongly to suspect that there is no real difference between the species lately described by Professor Savi, under the name of *S. Etruscus*, and the *S. leucodon* of the German writers, with which he connects, besides, the *S. Guldenstädtii* of Pallas.

With regard to the other animal, now for the first time discovered to be a native of Silesia, the *Lutra Lutreola* of Illiger, and *L. minor* of Erxleben, restored by Cuvier to its old Linnæan station in the genus *Mustela*, between which and the true Otters it appears to form a connecting link, M. Gloger also furnishes some valuable notes. From the review of its characters and history it appears extremely probable that there exists no true ground of specific distinction between this animal and the *Mustela Vison*, Linn., the distant localities of the two, the north of Europe and the north of America, being fully sufficient to account for the trifling difference on which their separation has hitherto been founded. The authour concludes his paper by expressing his astonishment that M. Cuvier should still continue to class the *Lutra marina* of Steller along with the Otters, when the most superficial examination of the animal proves that it approaches much more closely to the genus *Phoca*, Linn. He refers to its establishment as a genus, by Oken, under the name of *Pusa*, for which he proposes, but apparently without sufficient reason, to substitute the more ancient designation of *Latax*.

In an earlier memoir, "Iconem Ursi longirostris illustravit Dr. Reichenbach," chiefly with the view of giving a more accurate figure of that singularly mistaken animal than had hitherto been published, as he freely admits that he has little to add to the excellent description of it by Tiedemann. Even as regards the figure, however, we cannot consider the present engraving as sufficiently characteristic of the general habit of this

curious bear ; although in some respects, the exhibition of the teeth, for example, and the delineation of the remarkable spot on the breast, it is certainly superior to any of its predecessors. A brief notice of, and extracts from, the earlier accounts of this animal by Catton and De Lamertherie, occupy nearly the whole of a very short paper.

Dr. H. C. L. Barkow's Essay "Ueber den verlauf der Schlagadern am "Kopfe des Schafes" forms, as we are told in a note, the commencement of a series of valuable memoirs on comparative and pathological anatomy, the continuation of which is deferred till the next volume. In the present article the arteries of the head of the sheep are described with much minuteness, and their peculiarities of course and distribution carefully noted. A work so purely anatomical, and embracing such numerous details, it is obviously impossible for us to analyse in a satisfactory manner ; we cannot therefore do better than refer such of our readers as feel an interest in the minutiae of comparative anatomy to the paper itself.

The last article relating to *Mammalia*, is a "Commentatio de Uro "nostrate ejusque Sceleto," by the industrious anatomist, Bojanus, in which the authour takes a review of the various opinions advanced by Cuvier and others concerning the Urus, or Bison, of Eastern Europe, and the fossil remains of the different races of the bovine genus, and gives a detailed account of the habits and structure, and more particularly of the bony skeleton, of the celebrated breed, which is at present restricted to a single forest in Lithuania, containing about six hundred head. These have been of late years taken under the special protection of the emperor, the hunting of them being strictly prohibited, and winter food being provided for their subsistence. M. Bojanus is decidedly of opinion, that the Urus and Bison of the Greeks and Romans, and of later European authours, are one and the same animal. He refers the fossil remains of the genus to two distinct types ; the one, which he denominates *Urus priscus*, and of which several *crania* are extant in different museums, being closely allied to the living Bison ; and the other, the *Bos primigenius*, approximating, but in a less degree, to the domestic Ox. Of the latter of these antediluvian animals, besides numerous *crania* and other fragments accumulated in collections, there exists in the Jena Museum a nearly perfect skeleton, a figure of which accompanies the present paper. The Lithuanian Urus is described from two specimens of different

sexes, granted to the University of Wilna by the Emperor Alexander, with the view of enabling that body to add to their collection the stuffed skins and prepared skeletons of an animal so desirable both on account of its scarcity and its magnitude. Our authour's illustration of the skeleton is most complete in all its parts, not only in the text, where every bone is carefully passed in review, but also in the accompanying plates, which exhibit most of the separate bones in various positions and points of view, as well as the whole of them united into an entire skeleton, constructed on the admirable plan, first adopted by Camper, of bringing the animal himself and his osseous support into the same field.

The only other article which has reference to the vertebrated division of the animal kingdom is entitled "Versuchte herstellung einiger Becken "urweltlicher Thiere aus dem trümmern der gerippe derselben." The object proposed by the authour, Dr. Ritgen, is the restoration of the *pelves* of three species of animals from the fossil fragments of their skeletons; and an outline plate, which accompanies the paper, exhibits at one view the broken portions of each in the state in which they were found, and the manner in which the authour professes to re-unite them into a perfect *pelvis*. The first of them is the *Lacerta gigantea* of Soemmering, *Mosasaurus* of Conybeare and Parkinson, for which Dr. Ritgen, without assigning a single reason for the change of name, is pleased to adopt the more than sesquipedalian title of *Halilimnosaurus crocodiloides*. This appellation, however, may serve in some degree to explain his views of its affinities and original habitation, inasmuch as it shews that he regards it as a lacertine animal resembling a crocodile and inhabiting salt-water marshes, intermediate therefore between the extinct *Enaliosauri*, or sea-lizards, and the living crocodiles of fresh-water streams. It is, moreover, the *Geosaurus* of Cuvier's *Ossemens Fossiles*. The second animal is the *Ornithocephalus brevirostris* of Soemmering, a name which also appears obnoxious to our authour's taste, for he changes it without hesitation to *Pterodactylus Nettecephaloides*; while the third and last species here illustrated, the well-known *Ornithocephalus longirostris* of the same indefatigable Zoologist, is unmercifully designated by the breath exhausting appellation of *Pterodactylus crocodilocephaloides*. Surely these German dodecasyllabists have no pity for the unyielding jaws of us poor monosyllabic English! To speak seriously, we see no advantage,

but on the contrary much positive mischief, in this continual change of names, which appears to have been made for no other earthly reason than because the authour imagined that he could invent more appropriate and expressive designations than those by which the objects to which they are applied had been previously known: a degree of license in the alteration of the received phraseology which, if once admitted as a sufficient justification, would speedily lead to the utter confusion of all scientific nomenclature, and render it almost impossible to identify the subjects of our investigations with those of our predecessors in the same career. The paper before us, however, we must in justice observe, evinces considerable ingenuity in its details, which combine much conjectural acumen with the numerous facts in comparative osteology on which it is founded. The position of the two latter animals in the scale of nature is nevertheless left in the same doubtful state of suspense between the three great classes of Quadrupeds, Birds, and Amphibia, in which the authour found it. As for his conjectures on the order in which animals were originally created, beginning with the clumsiest and most bulky, and passing gradually, as the creative power diminished, to the smaller and more active, of the lowest grade of which he imagines that the earth may still daily produce new forms, we may safely leave them to be dealt with by his own countrymen, convinced that, here at least, such startling paradoxes would meet with few believers.

A paper by Professor Rapp, "Ueber das Molluskengeschlecht *Doris*," may be regarded as a valuable supplement to M. Cuvier's excellent memoir on the genus *Doris* in the *Annales du Muséum*. All the species of this genus, as limited by Cuvier, are briefly enumerated, with occasional remarks upon such as have fallen under the notice of the authour, and six new ones are added to the list, which is thus made to consist of no fewer than twenty-seven. All these additions, with one exception, the *D. pseudo-argus*, Rapp, which had already been represented in Pennant's British Zoology, under the name of *D. Argo*, are well-figured; as are also the true *D. Argus* and the *D. tuberculata*, Cuv., both of which the authour found in abundance at Naples. The five entirely new species, which he describes under the names of *D. grandiflora*, *luteo-rosea*, *setigera*, *pallens*, and *gracilis*, are also natives of the same coast. In Dr. Carus's "Neue Beobachtungen über das drehen des Embryo im

“*Ei der Schnecken,*” we have the continuation of a series of observations by that skilful and minute anatomist on the rotatory motion of the embryo in the *ova* of land and fresh water spiral shells. The principal results deduced from the microscopic examination of the eggs of *Limnæa stagnalis*, *Helix Pomatia*, and *Paludina vivipara*, in various stages of growth, consist in the following facts. First, that the embryo floating in the albumen possesses, up to a certain period of its developement, a distinct rotatory motion. Secondly, that this motion is produced by the impulse of the fluid, which is constantly propelled into a sort of sinus on the right side of the animal, corresponding to the branchial aperture. Thirdly, that the motion of the fluid is derived, in a great measure, if not entirely, from the impulse which it receives from the embryo itself. In the *ova* of *Paludina* the motion was observed to continue for some minutes after the transparent shell had been ruptured, and the fluid containing the embryo suffered to escape, and to mix with the water upon the stage of the microscope. In this situation, however, it became gradually weaker and less regular, and was soon altogether lost, although the embryo still continued to live. Within the unbroken shell, Dr. Carus has seen the rotatory motion continue without intermission and with perfect regularity for an hour together.

M. Risso’s “*Observations sur quelques nouvelles espèces de Crustacés de la mer de Nice,*” require but a brief notice at our hands. The new species consist of one *Peneus*, four *Alphei*, and one *Palæmon*, of which the first, and two of the second, are figured.

As little need be said of the “*Gryllorum Hungariæ indigenorum species aliquot (quas) illustravit Franciscus Liber Baro de Ocksay.*” The “*species aliquot*” are two in number; the one, *G. crassipes* of our author, already published in M. Charpentier’s *Horæ Entomologicæ*; and the other, *G. brachypterus*, altogether new. The illustration extends no farther than a brief description.

The next article which comes under our notice is one of considerable extent, occupying no less than 238 pages of the volume; and is distinguished by patient research, minute investigation, careful comparison, and original views. It is the work of Dr. Karl Ernst von Baer, and is entitled, “*Beiträge zur kenntniss der niedern Thiere,*” being, however, chiefly devoted to the class, or rather, according to the principles laid

down by the authour, the chaotic mass of animals confounded by naturalists under the common name of *Entozoa*. It consists of seven distinct memoirs, the first six of which have for their object to illustrate particular individuals or groups, while the last is intended to convey a summary idea of the authour's opinions with regard to the affinities and classification of the lower animals.

The first of the series relates to a new genus of these animals, inhabiting the various species of fresh-water muscles (*Anodonta* and *Unio*) and belonging to Rudolphi's order *Trematodæ*. It is described by Dr. von Baer under the name of *Aspidogaster*, and with the following characters:—"Ore et ano oppositis, lamina clathrata sub ventre;" the latter of which, he observes, is fully sufficient to distinguish it from every other genus of intestinal worms, the former being only added because he is convinced that naturalists will ere long cease to consider these worms as forming a distinct and separate class. Of the minuteness with which the single species has been investigated, some judgment may be formed from the fact that the mere technical description occupies more than fourteen pages.

The second memoir completes the series of the authour's observations on the parasites of the fresh-water Muscles, and contains the history of a curious species of *Distoma*, which in consequence of its singular structure he names *duplicatum*; and of a new and very remarkable genus, approaching to the *Infusoria*, and even in some respects to the lower forms of vegetable organisation, to which, by an apt comparison, he assigns the designation of *Bucephalus*, the species described being so excessively variable as to merit *par excellence* the epithet of *polymorphus*. It furnishes moreover a brief indication of a species of *Filaria*; a notice of a new *Hydrachna*, *H. concharum*; and some interesting observations relative to a "chaotic swarm," composed of living creatures of various forms and degrees of organisation, which appears to pervade in a greater or less degree every part of the animals under consideration.

In his third memoir the authour illustrates in a similar manner the history of the parasites which infest the fresh-water univalves, and more particularly the *Paludinæ* and *Limnææ*. These consist of several species of *Distoma*; of a new genus, *Chætogaster*, approaching very nearly to the *Nais* of authours, and comprehending, besides the animals now

first described, one or two species hitherto referred to the latter type; and of another *Filaria*. In addition to these the whole body of the inhabitants of fresh-water univalves appears absolutely to swarm with *Cercariae*, in the sense in which that genus is now re-established and restricted by Nitzsch; a fact the more remarkable as these supposed *Infusoria* had never before been detected in the interior of the living animal, from which they now appear to derive their origin. Numerous forms of these singular creatures are figured and described with the greatest minuteness; and Dr. von Baer enters into a long and profound investigation of all the appreciable circumstances connected with their origin, organisation, and affinities, as well of those still more difficult and abstract considerations which bear upon the general question of the apparently spontaneous production of animal life in its very lowest degree of development.

The fourth memoir relates to a parasite found upon the gill-covers of the sturgeon, and referred by Oken (who knew it only by a miserable figure and description published by Abilgaard in the Transactions of the Copenhagen Society, under the name of *Hirudo Sturionis*,) to his genus *Phylline*. Dr. von Baer compares this animal with the other species of which Oken composed his genus, and with those which constitute the genus *Tristoma*, Cuv.; and concludes that *Phylline* is susceptible of being divided into two subgenera, for the one of which, comprehending the species noticed by Cuvier, he retains the name of *Tristoma*; while he dedicates the other, containing the present species, to which he assigns the name of *Nitzschia elegans*, and in all probability also the *Hirudo Hippoglossi* of authors, to Professor Nitzsch of Halle, one of the most indefatigable and successful observers of these paradoxical animals.

A description of *Polystoma integerrimum*, Rud., occupies the succeeding portion; which concludes with a comparative examination of M. Otto's genus *Cyclocotyle*. These two genera Dr. von Baer considers as very closely related to each other.

The *Planariæ* form the subject of the sixth essay; and their zoological history, physical characters, and natural habits are discussed at considerable length and with much critical acumen. In treating of the first branch of his subject our author shews how entirely ignorant naturalists were with regard to these animals until the time of Müller, and how

little has since been added to the labours of that accurate and indefatigable observer. He asserts, however, that the Danish naturalist, skilled as he was in minute observation and in designing and describing the objects of his study, had not the smallest idea of the true principle of classification; and that consequently, in the present as in many other instances, he brought together animals widely distinct from each other in every essential character, and belonging to very different degrees of organisation. Dr. von Baer contends that the genus *Planaria* should be restricted to those species which are flattened and furnished with two openings beneath on the posterior half of the body; and arranges this group along with the *Trematodæ* of Rudolphi, to which he considers them properly to belong. As for the remaining species enumerated by Müller, he maintains that they form several distinct genera, occupying different and distant places in the natural system. He describes at length, so far at least as the extremely delicate texture of their bodies would admit of examination, the organisation of four species of true *Planariæ*; and notices a species of *Cyclidium*, and another animal, probably the *Vorticella hamata*, Müll., as parasitic on the animals of this genus.

In his concluding memoir Dr. von Baer enters more fully into the question of classification, to which he had only cursorily referred in his previous articles. He contends that the classes of *Infusoria* and *Entozoa* require to be altogether banished from the natural arrangement of animals, inasmuch as they are established on no common, exclusive, or intelligible characters, and consequently admit of no real or scientific discrimination. He further maintains that the leading types of animal organization have their origin in its lowest grades, from which each of them proceeds in a distinct and uninterrupted series, through the gradual developement of its organs, to its highest or central point of existence, giving off by the way numerous branches which frequently anastomose with similarly aberrant forms of the neighbouring types. Thus for instance he considers *Lineola*, the name by which he designates the simplest form of *Vibrio*, the mere animated filament, as the representative of *Annulosa* among the *Protozoa*. From this he ascends through *Vibrio*, which he characterizes as a living tube producing *ova*, to *Filaria*, *Gordius*, and *Nais*, in which there is a gradual developement of skin, vessels, and nerves. The simple form begins in these to

take on a disposition to repeat itself, and the animal at length becomes compounded of a series of joints, each of which is a repetition of the whole. The *Nematoidea* again pass into the true *Annulata*, the uniform character of the joints being finally lost in the union of several into distinct segments, of various forms, and each endowed with its own proper and peculiar functions. The same graduated scale of development from the analogous form among the *Protozoa*, to the most perfect animals of their respective type, is also followed up by our authour through the two grand divisions of *Radiata* and *Mollusca*; and the branches which each type gives off towards its fellows are cursorily noticed. Other tribes of animals are again spoken of as forming intermediate series between two of the principal types; as for example the astomous *Paramæciæ* are indicated among the *Protozoa* as intermediate between *Annulosa* and *Radiata*, and as forming the commencement of a series, which is continuous with the *Trematodæ*, the latter leading through the *Planariæ* to the true Leeches, and thus connecting themselves with the *Annelida*.

In this necessarily rapid and consequently imperfect sketch of a few only of the leading points treated of in the very remarkable series of papers now before us, we have found it impossible to offer even a faint outline of the mass of facts and reasonings which it embraces: it cannot therefore be expected that we should enter into a discussion of the authour's views, or a critical examination of the theory on which they are founded. We must, however reluctantly, rest contented with having directed the attention of our readers to the volume in which they are contained; and with observing that, although fairly open to many and weighty objections, they are still highly deserving of that consideration which is always due to new and original views, when those views are, as in the present instance, based on apparently accurate, and certainly careful and minute, investigations.

The only remaining paper at all connected with zoology is one which hardly falls within our province, but which, relating as it does to a subject of no little interest, it may be as well not to pass over in silence. This is an account of the metamorphoses, or, as we should rather be inclined to say, the supposed metamorphoses, of the *Ectosperma clavata* of

Vaucher, a species of *Conferva*, which has within the last twenty years been repeatedly stated, on the authority of very respectable observers, to produce *sporæ* endowed with animal life, and capable of reproducing the plant from which they derived their origin. These statements are confirmed, as far as the casual and not very guarded observations here detailed can be regarded as confirmatory of so delicate a fact, by the testimony of M. Unger, the authour of the present paper; who has seen the animated particles separate from the *coniocystæ* of the parent plant, perish in the course of a few hours by a conversion into globules of vegetable matter, which sent forth processes and became, after a few days growth, *Confervæ* perfectly similar to the individual from which the supposed *animalcula* were originally produced. In this new plant he has seen the *coniocystæ* again form, and the *animalcula* again separate, the whole cycle of animal and vegetable existence being completed in less than twelve days. Such is the substance of M. Unger's observations: but we repeat that they do not appear to us to have been made with sufficient minuteness, or with that degree of caution which is absolutely necessary to ensure success in so delicate an investigation. At all events we cannot consider this extraordinary fact as by any means clearly ascertained and placed beyond the reach of doubt.

Histoire Naturelle des Mammifères: par MM. GEOFFROY-SAINTE HILAIRE et F. CUVIER. Livraisons, 57ème et 58ème.

NOTWITHSTANDING the long delay which has taken place in the appearance of the present numbers of this valuable and important work, their contents afford nothing of high or peculiar interest. Their novelties are limited entirely to species, and even these are not advanced without the expression of some doubt as to whether the two animals which are so represented may ultimately prove entitled to the rank which has been assigned to them provisionally. The first of these is an Antelope, to which the appellation of Kevel gris is affixed, and which is closely

allied to the Kevel and the Corine of M. F. Cuvier, (*Antilope Kevella* and *Ant. Corinna*, Pall.,) scarcely differing from these Gazelles, and especially from the former, except in the colour of its covering. The second is the Chat du Brésil, a Cat which, from its size, its markings, and its geographical situation, would readily be referred to the Ocelot, *Felis Pardalis*, Linn., were it not probable that several species have been confounded together under that common name. Its colour is considerably lighter than the usual appearance of the Ocelot, and its markings, although evincing in parts a tendency to assume the longitudinal direction, are nearly all broken into roses of a comparatively large size. Still, as only one specimen appears to have been yet seen, complete reliance can scarcely be placed upon these differences as evidences of its being a distinct species, and we therefore abstain, for the present, from giving a full description of what may eventually be shewn to be merely a variety.

While noticing the Skunk, *Mephitis Americana*, Cuv., (a variety of which, with the tail black, is here figured,) M. F. Cuvier gives an extract from a communication addressed to him by M. Lesueur, to whom the Menagerie Royale was indebted for the individual represented. M. Lesueur obtained it when it was not more than a month or six weeks old, in company with another individual of the same family and age. The latter was black, with a white band, commencing narrow at the tip of the nose, acquiring its greatest breadth between the ears, and continuing of the same breadth to between the shoulders, where it divided into two longitudinal stripes extending along the sides to the tail, which was almost entirely white; the intervening black line being narrow along the middle of the back, and reaching to about one-half of the length of the tail. In the individual figured, the median dorsal black line was much broader, and did not extend beyond the base of the tail, which was black, intermixed with a few white hairs, which disappeared at the end of two months, the tip of the tail alone remaining white; the white lateral stripes were also interrupted by a space of black on the haunches. A third individual possessed by M. Lesueur was perfectly white, except on the limbs, the under surface, and the median dorsal line; the latter, however, did not extend beyond the loins; and even on the limbs the white was present in the form of a bundle of hairs extending on the anterior from the elbow to the articulation of the *metatarsus*, and forming on the posterior a line occupying the whole length of the hinder part of the leg.

From the extent to which the variation in colour was carried in these individuals, M. F. Cuvier concludes that the species may include all the Skunks in which there exist two lateral lines, whatever may be their breadth, or the colour of the tail; the only circumstance which would induce him to suspend his judgment as to the specific identity of the Conepatl of Hernandez, the Moufette du Chili of Buffon, the Chinche of the same author and of Feuille, and the Yagouare of D'Azara, being the very different climates which some of them inhabit. That the whole of the Skunks of North America hitherto described belong to one species, he considers to be satisfactorily established.

The possession of a living specimen, sent from Egypt with the Giraffe, has enabled M. F. Cuvier to ascertain the identity of the *Ant. Addax* of Ruppel and Lichtenstein and the *Ant. suturosa* of Dr. Otto, the probability of which had been before suspected, (Zool. Journ. iii. p. 251, 591.) It is here figured in its usual state, in which it is the *Ant. Addax*, and in its winter coat, in which it had been described as the *Ant. suturosa*. The latter name is rejected, notwithstanding its priority, and the preference is given to that of *Addax*, not merely on account of its having been employed by Pliny, but also because it is almost identical with the appellation by which the animal is known to the Arabs at the present time. M. F. Cuvier regards it as constituting a new type among the Antelopes, distinguished by its heavy and thick-set body, its rather slender head and thick neck, its short legs and broad hoofs, its long, bent, and twisted horns, its dewlap and its mane, forming a union of characters hitherto met with in no other species: it is, however, possible, he remarks, that others already inscribed in our catalogues, may be found to resemble it, when naturalists shall possess opportunities of observing living animals, and not be restricted to the study of skins set up by unskilful preservers.

The remaining figures are of the *Ateles Belzebuth*, Geoff., of the *Rhinolophus bihastatus*, Ejusd., and of the adult *Felis rufa*, Guild., a representation of the latter, in its young age, having been published in a former number, as the Chat à ventre blanc. Figures are also given, but without descriptions, of three species of *Delphinus*, and of the Marsouin du Cap.

Beitrag zur Monographie der Gattung Crania. Von F. W. Hoeninghaus. Crefeld, 1828. 4to, pp. 14. With one plate.

THE present *brochure* is little more than an extract from the unpublished portion of the extensive work undertaken by Dr. Goldfuss, the *Petrefacta Musei Universitatis Regiæ Borussicæ Rhenanæ Bonnensis, necnon Hoeninghusiani Crefeldensis Iconibus et Descriptionibus illustrata*. It furnishes figures, characters, and descriptions of thirteen species of the genus *Crania*, Retz., contained in the well-known cabinet of M. Hoeninghaus; ten of these being fossil, and the remaining three actually inhabiting our present seas. The latter had been confounded together by previous writers under the common name of *Crania personata*, and are now, for the first time, satisfactorily distinguished from each other. They are thus characterized:—1. *Crania personata*, Lam., Cran. valvâ inferiore ovato-orbiculari posticè retusâ, cicatricibus posterioribus obliquis subreniformibus, anterioribus in unam orbicularem confluentibus tuberculosus, rostello nullo, disco palmato-radiato, limbo anticè incrassato. This species, the one originally described by Retzius, is an inhabitant of the Indian Ocean. 2. *Crania ringens*, Cran. testâ inferiore suborbiculari posticè retusâ, cicatricibus posterioribus subtriangularibus transversis, anterioribus in unam transversalem confluentibus, rostello nullo, disco pedato, limbo anteriore incrassato. It is the *Crania personata*, De Blainv., and the *Anomia turbinata*, Poli, and inhabits the Mediterranean. 3. *Crania rostrata*, Cran. testâ inferiore suborbiculari posticè retusâ, cicatricibus posterioribus suborbiculatis, anterioribus in unam confluentibus, rostello acuto, disco sinuato, limbo anticè irregulari incrassato. The *Crania personata*, Sowerby, the *Anomia craniolaris*, Chemn., and the *Patella distorta*, Mont., are referred to this species, which inhabits the Mediterranean, and also, it may be added, the British Seas.

The figures, which occupy a large folding plate, afford good representations of the inner surface of the lower valve of each of the thirteen species described, of the natural size, and also considerably magnified, so as to exhibit in a striking manner the variations in the form of the

muscular and ligamentous impressions, from which the specific characters employed by M. Hoeninghaus are chiefly derived.

ART. XXXII. *Scientific Notices.*

Proposed Investigation of the Natural History of Jamaica.

IT is acknowledged and regretted by men of science, that the Flora of the greater islands of the Antilles has not been properly examined; that their Geology and Mineralogy should be but partially known; and that the History of their Quadrupeds, Birds, Fishes, Reptiles, Insects, Mollusca, &c. should have been almost entirely neglected. The knowledge of this imperfect state of our acquaintance with the natural productions of these islands, has suggested to a few persons the expediency of an attempt to investigate the Natural History of Jamaica, as affording the most extensive field for studying the productions of a climate common to all.

Relying on the known spirit of philosophical research which exists in this country, they have ventured to hope that it may be possible to raise, among those more closely connected with the colonies, as well as among those who are influenced by a general attachment to the cause of knowledge, such a sum as may enable them to send out scientific men, well fitted for examining the Natural History of the country. They have in consequence addressed circulars, intimating that a meeting of such persons as may be inclined to support this plan, would be held towards the close of the present year, in order to take into consideration the best means of effecting so desirable an object.

Correction of an Error occurring in Vol. III, p. 495.

Mr. Fox begs to correct an error in his paper on Rare British Birds, in the last volume of this Journal, where, at page 495, he stated that the

specimen of *Procellaria Leachii*, in the Manchester Museum, did not appear to be known there as such: as he is informed by Mr. Barrow, that "the individual was found dead in a ploughed field, about four years ago, near Wilmslow, thirteen miles from Manchester, the morning after a severe gale of wind from N.W., and being brought to the Museum, was recognized as *Leach's Petrel*, from Temminck's description." This account confirms Mr. Fox's conjecture of the specimen having been killed in Great Britain.

Ligament of Productus.

M. Höninghaus has recently circulated among his friends figures of casts of several species of this curious genus of fossil shells, for the purpose of exhibiting clearly the internal structure of the valves. The species figured are the *Producti punctatus?* and *antiquatus*, Sowerby, and the *Anomites thecarius*, Schloth. In the former the ligament of the convex valve is composed of two triangular portions, each of which is applied on its longer side to the margin of a line passing at a right angle with the hinge about two-thirds across the shell, and is completely, though somewhat irregularly, pinnate: that of the concave valve is formed by two oblong irregularly pinnate portions, which diverge as they approach the hinge. The ligament of the convex valve of the *Prod. antiquatus* resembles that of the *Prod. punctatus*, but the triangular portions are nearly equilateral and the *pinnæ* are much less deeply cut; the oblong portions of that of the concave side being parallel, and merely dentate on their edges. It should be added that in another figure, given by M. Höninghaus as that of a cast of the convex valve of *Prod. antiquatus*, the two portions of the ligament appear to be united so as to form but a single one, nearly straight towards the hinge, with which it lies almost parallel, and assuming in its remainder a somewhat semi-circular form, lying obliquely, dentated on its edge, and marked by a few deep sulci. Can this shell really be of the same species as the preceding? The spreading out of the valve is much more considerable, and in an opposite direction to that of the other figure. In the convex

valve of the *Anomites thecarius*, which alone is figured, the ligament takes its origin near the centre of the shell from the middle line by a broad pedicel on each side, which is directed outwards and towards the hinge and expands considerably on its outer edge so as to form an irregular oval, toothed on its margin. These foliaceous marks of the ligament are all in relief upon the casts, and consequently must, as M. Höninghaus remarks, have been depressions in the shell, which was probably thicker in this part than elsewhere. Figures are also given of the interior of *Terebratula rosea*, for the purpose of exhibiting its bony apparatus, which varies in other species in its mode of branching, but has never been observed to be depressed as in *Productus*.

THE
ZOOLOGICAL JOURNAL.

October, 1828—January, 1829.

ART. XXXIII. *Notes on the genus Capromys of Desmarest, by W. S. MACLEAY, Esq., A.M., F.L.S., &c., in a Letter to the Editor.*

Havana, Sept. 12, 1828.

MY DEAR VIGORS,

I have lately been fortunate enough to become possessor of the oldest and at the same time one of the rarest and best books on the Natural History of the West Indies; I allude to the "*Historia general de las Indias*," by Gonzalo Hernandez de Oviedo y Valdes, published at Salamanca, in May, 1547. This very rare book, neither Jean de Laet nor Robertson* appear to have seen, nor any noted writer that has treated of America physically, except Herrera, who has compiled from it without much judgment or criticism, probably on account of his never having been on the spot, and above all from his being ignorant of Botany and Zoology, in both of which sciences Oviedo is wonderfully correct.

Some idea of the amusement afforded by Oviedo's work may be derived from the following few particulars concerning this earliest of writers on American Natural History. Columbus discovered America, or rather the Island of San Salvador, one of the Bahamas, on the 12th October, 1492. Perhaps one of the most extraordinary circumstances in the history of man is the rapidity with which the Spaniards of that

* Robertson appears to have known the work only by the Italian translation in Ramusio's collection of voyages, printed in 1565, at Venice.

day overspread and settled the islands and continent of America. Oviedo was born at Madrid in 1478, and was sent out to the New World by Ferdinand of Arragon, in 1513, as his inspector of the gold ore works on the Costa Firme. From this time he served for several years in various parts of America and the West Indies, either in a military or civil capacity. In 1525 he wrote his very curious work, which was first printed at Seville in 1535. We consequently have in Oviedo's History the account by an eye witness of the state of the Spanish settlements thirty-three years after the first discovery of the New World by Columbus. When to this it is added that our author gives very detailed accounts of the manners and customs of the indigenous inhabitants of Cuba, St. Domingo, and Jamaica, a race now extinct; of the natural history of these islands; and of the state of the Spanish plantations of sugar, cassia, &c.; I am sure I need not say more on the value of the work as a book of reference.*

Having now three species of *Capromys* alive in my garden, and ready to be sent by the first opportunity to the Zoological Society, I shall avail myself of the information to be found in Oviedo, to correct some of the absurd errors which have been lately propagated on the subject of this genus. The history of the *Hutia*, as lately detailed by Desmarest in the "*Mémoires de la Société d'Histoire Naturelle*," and of which a translation appeared in the first volume of the Zoological Journal, is subject to the charge of inaccuracy, which proceeds however from his not having been able to refer to this work of Oviedo, from which all the accounts of the *Hutia* by other writers are borrowed.

M. Desmarest says "Je trouvai d'abord dans le dictionnaire de Bonmare que '*l'Utias est une espèce de lapin de la grandeur d'un Rat qui habite les Indes Occidentales, et que l'on chasse la nuit en s'éclairant avec un insecte lumineux nommé Acudia*:' sans doute," says M. Desmarest, "*l'Elater noctilucus* que M. Fournier a rapporté très abondamment de Cuba." This marvellous story of a quadruped being hunted at night by the light of an insect,† excited my curiosity, and as, since

* Mr. Washington Irving considers Oviedo in the historical parts of his work to be partial; but however this may be, it in no way affects his description of the country and its productions.

† See Zoological Journal, Vol. I, p. 81.

my residence in this island, I have seen and killed many *Hutias*, I can venture to assert that not one word of it is true, for the *Hutia* is not hunted by night, and still less at any time is it hunted by the light of an insect. Instead of giving credit to a compiler like Bomare, M. Desmarest ought to have laid more stress on the quotation he gives from the Italian translation, in Ramusio's collection, of Oviedo's work, where it is said that the *Hutia* is hunted by little dogs, which M. Desmarest makes *goitreux*, upon what authority I know not. Oviedo, who particularly describes these dogs of the Aboriginal Indians, and which like their masters are now probably extinct, says nothing of their being *goitreux*. Their most remarkable characteristic in his eyes was their being quite silent and never barking. The native West Indian dog seems indeed to have been a distinct species.* As for Desmarest's description *goitreux*, I suppose it has had its origin in the Spanish word "gozques" which is the name that Oviedo applies to them.

It may be worth while to enquire how the wonderful story of the *Hutias* being hunted at night by the light of beetles has arisen; for this purpose I shall cite a passage from the learned work of Jean de Laet, published in Leyden, in 1640, and entitled "*Histoire du Nouveau Monde*." Speaking of Hispañola or the island of Hayti, he says, "Tout ce bestail y a esté amené d'Espagne, car auparavant l'Isle ne nourrissoit que fort peu d'espèces d'animaux à quatre pieds; comme le *Hutias*, petite beste, peu dissemblable de nos Connils mais un peu plus petite et qui a les oreilles plus courtes avec une queue de taupe; apres le *Chemi* presque de la meme forme mais un peu plus grand; et le *Mohuy* petite beste un peu plus petite que le *Hutias*; et le *Cori* pareil en grandeur aux Connils, ayant la gueule comme une taupe, sans queue, les jambes courtes et grandement delicat; ils sont par fois blancs, aucune fois noirs et le plus souvent messés des deux; c'est un animal domestique et grandement privé; ils avoyent en outre une sorte de Chiens assez bons mais du tout muets desquels ils se servoyent à la chasse; il y a pour le jour huy fort peu de ceux animaux veu l'accroissement qu'y ont fait ceux qu'on

* Columbus found that the inhabitants of the south side of Cuba were in the habit of fattening these dumb dogs as an article of food.

“ y a apportés d'ailleurs. Encore qu'il y ait en cette Isle de Coulevres
 “ et diverses serpens, toutefois on tient pour certaine qu'il y en a peu
 “ ou point de veneneux ou dangereux ; mais on y trouve aussi bien
 “ qu'ailleurs une certaine sorte de vermisseeux grandement nuisibles
 “ aux hommes (on les appelle *Niquas*) qui se cachans dans la poussiere
 “ et sautans à la façon des puces apportent une tres grande incommo-
 “ dité a ceux qui vont nuds pieds ; car se fourrant dans les Orteils entre
 “ cuir et chair, ils y jettent leur semence d'une telle abondance qu'a
 “ peine peuvent ils estre arrachés du lieu où ils sont une fois placés, et
 “ souvent ne peuvent-ils estre destruits que par le cautere ou en coupant
 “ le membre. C'est une chose comme incroyable ce que Oviedo et
 “ plusieurs autres racontent du Cucuyo [*Elater noctilucus*] espece
 “ d'escarbot duquel les yeux et les costés d'ou il meut ses aisles, rendent
 “ une telle lumière qu'ils esclairent de nuict comme une chandelle,
 “ fournissant aux hommes pour escrire et lire d'une suffisante clarté ;
 “ les naturels de l'isle se servoyent autres fois de cet animal, non seule-
 “ ment pour s'esclairer la nuict, mais aussi pour chasser les *Niquas*.”

Here then we have the fountain from which M. Desmarest's authority Bomare derived his marvellous story, by means of the very trivial mistake of putting *Hutias* for *Niquas*. The whole passage above cited from Jean de Laet, which is taken from Herrera who compiled it from Oviedo and others, holds perfectly good as a description of Cuba, and we see that there was no talk of hunting *Hutias* by the light of the *Cucuyo*, but only the insect called *Niqua* (*Pulex penetrans*, Fab.) which may possibly have been done. Oviedo, however, in his account of the insects of the West Indies, makes no mention of the *Niqua*, although he gives the best account extant of the *Elater noctilucus*. It is still a common practice with the inhabitants of this island to collect numbers of phosphorescent *Elateres*, such as *E. noctilucus*, *E. luminosus*, and *E. cucujus*, and to enclose them in wicker cages made for the purpose. They thus form a very pretty kind of lamp, but which scarcely affords light enough for the extraction of the troublesome *Niqua*, or as we call it in the British West Indies the *Clujoe*. For the purpose of hunting *Niquas*, I should infinitely prefer the light of a candle, and still more that of day. However, there is no accounting for taste, and I can only confess that I never have seen either *Utias* or *Niquas* hunted

by the light of beetles, although I consider the latter species of sportmanship the most possible of the two. The *Cucuyo* is certainly an interesting insect, but it seems doomed to give rise to wonderful stories. It has never, for instance, fallen to my lot to see those Havana evening parties mentioned in a late number of the Zoological Journal by my friend Mr. Curtis, where "terrestrial stars shine forth with all their beauty from amongst the ringlets of the ladies." A negro girl will, when walking the streets at night, sometimes stick one or two of these insects in her ebon breast or woolly head; but I must assure my friend who proposes to import them for ladies dresses, that as an ornament these insects will never answer, because their light is only beautiful when it is too dark for the features of the fair wearers of them to be seen; and moreover, because at a time when the ladies features can be seen, I question much, whether they would conceive themselves much decorated by a beetle that has nothing handsome about it except its two spots of green light.* As Mr. Curtis seems to have had his curiosity excited by these insects, I beg to refer him to Oviedo where he will find many curious particulars stated concerning them.

I shall now return to the more immediate purport of this paper, namely, the genus *Capromys* of Desmarest. I believe there are four species in the island of Cuba, all known by the inhabitants under the generic name of *Utia*. Oviedo writes the word *Hutia*. Three of these species appear to be confounded at this time by the Spaniards, under the general appellation of *Utia Congo*, and the fourth is known by the name of *Utia Carabali*, names evidently taken from the Negro Nations.

The whole of the species of the genus rest during the day tranquil, but watchful, in the thickest part of the foliage, near the trunk, or large branches of the tree. In this situation it is that they are discovered by the negroes, who are remarkably partial to them as food. So well do they lie concealed, that I confess it is in general difficult for me to perceive them even when pointed out. I have, however, often shot them, since

* Washington Irving in his life of Columbus, vol. I. 270, repeats this absurd story of the ladies of the Havana being dressed on gala occasions with live beetles. However, I can assure him that they would think it as extraordinary so to ornament themselves as the New York belles.

the negroes will follow a sportsman in order to point out the *Hutias* to him, knowing full well that it is a game that will be abandoned to them when killed. At night these animals are lively, moving about in search of their food. They are almost all destroyed about the Havana,* but in the interior they are still very common.

I have little to observe on what Desmarest says of the only species known to him, the *Capromys Fournieri*. The account is drawn up with his usual accuracy. He is wrong, however, in saying that the species has a repugnance to animal food. I soon found that the animal in my possession was very fond of Lizards of the genus *Anolis*, which he caught in my garden with very great dexterity, eating off the feet first, to prevent the reptile's escape, and then beginning at the head and devouring the whole body, leaving only the skin. Observing this, I tried him with meat, and I found him to prefer it even to his favourite mangos. In fact, this species is as omnivorous as a Rat. Desmarest is wrong also in saying that it never bites. Two of the other species are very savage, and bite severely, and the *Capromys Fournieri* will bite when it is incommoded or handled carelessly by a person it does not know. In other respects M. Desmarest's description of the only species he knew is excellent. The animal indeed is one of the most entertaining sagacious little quadrupeds I know. Full of courage, and quite plantigrade, it is a bear in miniature, at least much more like a bear than a boar, to which M. Desmarest compares it. But I leave the accurate description of the several species to you and Dr. Horsfield. In the mean time I shall translate for you what Oviedo says on the three species which I have now alive. It is truly singular that these animals should have remained for so many centuries until now unknown, in spite of such excellent descriptions by Oviedo, and notwithstanding their being so celebrated in the early voyages of Columbus as the principal animal food he found used by the Indians of Hispaniola, Cuba, and Jamaica.

Oviedo, in his Twelfth Book, says, "The present book shall be short in what relates to this and the other islands, for there are very few quadrupeds in them; but in the second and third parts of my work,

* Columbus found the *Utia* in the Bahama Islands on his first arrival, but I believe the species is extinct there now.

“ where I shall have to treat of the animals of the Continent, there will be much more to write, as on the *Costa firme* there are many quadrupeds very different from those of Spain. As to this island (St. Domingo), all the old Christian emigrants agree that it has only five native quadrupeds,* which are called *Hutia*, *Quemi*, *Mohuy*, *Cori*,† and a small kind of terrier dog.”

Of the animal called *Hutia*.‡

“ There is in this island an animal called *Hutia*, which is a quadruped like a rabbit, but somewhat less, and with smaller ears, indeed its ears and the tail are somewhat like those of a rat. They are killed with a small kind of native terrier dog, that the Indians domesticate, and which is mute ; but the sport is still better with the greyhounds and dogs that have lately been brought from Spain. These *Hutias* are of a grey mixed colour, as I have been informed by many persons who have both seen and eaten them, and who praise them much, as being excellent food. These animals begin already to get rare.” (Oviedo, Lib. XII, fol. 98.)

Original Synonyms of the Hutia.

CAPROMYS FOURNIERI, Desmarest, Mem. d'Hist. Nat. Vol. I, p. 43.

Of the animal called *Quemi*.§

“ There is another animal in this island, Hispañola, called *Quemi*, which I have not yet seen, nor indeed at present is it to be found, but according to many persons who have seen it, it is a quadruped as large as a middling-sized hound or beagle. It is of a grey colour, like the *Hutia*, and exactly of the same form and proportions, only much larger. Many persons in this island and city, who have both seen and eaten them, approve of them much as food ; but the truth is, that, according to what I have already said of the toils and privations which

* Probably Oviedo did not consider Bats to be quadrupeds.

† The *Cori* is, without doubt, from the description of Oviedo, no other than the Guinea-pig (*Cavia Cobaya*).

‡ Not *Hutias*, as the careless compilers have made it.

§ Not *Chemi*, as the negligent compilers have corrupted the name.

“ the first emigrants underwent in this island, we may presume that every thing eatable must have appeared to them good and savoury, even though in reality it may have been much the reverse.” (Oviedo, Lib. XII, fol. 98).

Original Synonyms of the Quemi.

CAPROMYS ——— ?

MUS subfuscus maximus caudâ oblongâ pilosâ ultra trientem albidâ. (*The Spanish Raccoon.*) Browne's Jamaica, p. 484.

The distinctive character of the white termination to the tail, mentioned by Browne, does not seem very evident in my animal, but I have no doubt it is identical, particularly as he says the animal is a native of Cuba. The young of the Quemi are very like the Hutîa, only their fur is much coarser, and their nose not so blunt and like that of a bear. The affection of the male and female Quemi for their young, particularly that of the former, is very remarkable.

Of the Animal called *Mohuy*.

“ The Mohuy is an animal about the size of an Hutîa. Its colour is more clear, but it is likewise gray. This was the most esteemed and precious food of the Caciques and Chiefs of the island. In appearance it is very like an *Hutîa*, but the hair is stronger and stiffer, very sharp, and raised straight upwards (y muy agudo y levantado derecho para suso). I have not seen this animal, but they say there are yet in those parts many witnesses who have seen it, and some who have eaten this species praise it as better flesh than either of those mentioned above.” (Oviedo, Lib. XII, fol. 99.)

Original Synonyms of the Mohuy.

CAPROMYS PILORIDES. Bell, Zoological Journal, Vol. I, p. 230.

Isodon pilorides. Say, Journal of the Acad. Nat. Sciences, Philadelphia, Vol. II, p. 330.

MUS MAXIMUS pullus caudâ oblongâ pilosâ dorso subsetoso. (*The large brown Indian Coney.*) Browne's Jamaica, p. 484.

This is now become the most common species of *Capromys* in the island of Cuba. It is easily distinguished by its long hairy tail. Its eyes

are large and prominent. Its habits nocturnal, and movements slow. It is exceedingly impatient of confinement, and as the only specimen I have been able to keep alive is waxing thinner and thinner every day, I fear much it will never arrive alive in England. With me it will eat nothing but orange leaves, the bark of the young shoots of the Mango, and the fruits of this last tree, which appear to be its favorite food.

I will not describe these several species, knowing how much better it will be done by you, when you get the animals alive. My object at present is merely to point out some passages respecting these animals in an author to whom you may not find it very convenient to refer, from his work being now so rare.

There is in Cuba, I believe, a fourth species of *Capromys*, intermediate in size between the *Hutia* and *Quemi*, but of a more reddish grey, and very like a rabbit. Browne also, in his History of Jamaica, seems to describe a fifth species as a native of that island. His description is as follows:—" *Mus Major fusco-cinerescens caudâ truncatâ.* (The "small Indian Coney). It is a native of Jamaica,* and smaller than "either of these two (the *Quemi* and *Mohuy*), differs but little from "them in form or method of living; except the tail, which is short and "stumped, being seldom above two inches and a half in length."

All the species of *Capromys* have a strong smell, particularly the *Hutia* and *Mohuy*, and therefore I am still a little inclined to think, on comparing the *Histoire Générale des Antilles* by the Pêre Dutertre and Rochefort's *Histoire Naturelle et Morale des Antilles*, that the *Pilori* or Musk Rat, of the early French writers, was also another species of *Capromys* probably now extinct in the Caribee Islands. The *Castor caudâ lineari tereti* of Browne's Jamaica, which Gmelin makes the same as the *Mus Pilorides* of Pallas was, according to Browne, an aquatic animal, and therefore could not be a *Capromys*. It is very possible, however, that Brisson's habitat for the *Mus Pilorides* may have been wrong, and that his animal was in fact a *Capromys*. However, as this circumstance must

* That *Hutias* were at all events at one time to be found in Jamaica, is proved by Columbus having victualled the famous canoe expedition of Diego Mendez with them. (See Washington Irving's *Life of Columbus*.)

always remain doubtful, perhaps it would have been as well if Say had not adopted the trivial name of *Pilarides* for the Mohuy of Oviedo.

Believe me, ever yours,

W. S. MACLEAY.

P. S. By the bye, how is it that none of your naturalists have observed that the new genus of *Mollusca*, described and figured in the eighth number of your Zoological Journal, under the name of *Peripatus Juliformis*, is an annulose animal, connecting the *Julidæ* with the Worms among the *Ametabola*? There is a specimen in my father's collection. I have been waiting to allow Mr. Guilding, or some other person, to correct this error, but as no person has yet done it, perhaps this notice may be acceptable. I leave Mr. Guilding to follow up the hint, and give us an accurate microscopical dissection of this interesting animal.

ART. XXXIV. *A Description of the Anatomical structure of Cyclostoma elegans.* By the Rev. M. G. BERKELEY, M.A., Christ's College, Cambridge.

THE genus *Cyclostoma* differs so widely from other *Pulmonifera*, (from those at least whose animals have been described,*) in having the sexes distinct, in distinct individuals, that a knowledge of the internal structure of the animal appears very desirable. I am not aware that any detailed account has hitherto been published, and am therefore willing, though ill qualified for such a task, to offer the result of my own observations. Cuvier seems to have considered the anomaly of its structure in the particular point above stated, as sufficient to exclude it from the *Pulmonifera*, and has arranged it amongst his *Pectinibranchia*, though no pectinated branchiæ exist.

* Possibly, such land-shells as have been arranged under the genus *Auricula*, e. g. *Carychium minimum*, *Acme lineata*, &c., may also have the sexes distinct.

The *foot* is an oval disk, obtuse before and behind, reticulated above, with roundish reticulations, its edge smooth; its frontal margin without any groove.

Tentacula two, subulate, somewhat compressed, transversely annulated, their apices somewhat inflated, obtuse, opaque.

Eyes placed at the thickened external base of the tentacula.

Muzzle probosciform, notched in front, with a narrow border, transversely annulated, having the mouth in its disk.

Mantle, not united to the neck of the animal, but perfectly free, as in the *Pectinibranchia*, its edge crenulated.

Operculum ovate, spiral, calcareous.

When the animal is taken out of the shell the different internal parts may be pretty distinctly traced through the outward integuments; as at fig. 1, where a male individual is represented, the penis, sac of viscosity, pericardium, intestine, stomach, lobes of liver and testicle are readily discernible.

If an incision be made along the left side through the muscular process by which the animal is attached to the shell, so as to expose the branchial cavity, the vena cava will be seen running on each side; on the right, near to and parallel with the muscle and rectum; on the left, between the muscle and sac of viscosity: these are met on each side by a vein running parallel with the edge of the mantle, and then become obsolete: from these the venous blood is carried through the ramified pulmonary veins, which are spread over the upper surface of the cavity, and all tend to a common trunk, by which the aerated blood is carried into the auricle. This is nearly of the same size with the ventricle, but of a paler color; its inner surface clothed with an intricate web of anastomosing fibres; at the orifice of the ventricle is a bilobed valve opening inwards: the inner surface of the ventricle is also furnished with fibrous cords, but these are not so intricate, and are in most cases nearly perpendicular to its surface. The pericardium is situated on the left side, below the sac of viscosity, which is dark, with a minutely lobed exterior, and inwardly composed of small intricate plates.

The mouth consists of an oblong fleshy mass, somewhat bilobed behind, from the centre of which above proceeds the œsophagus, and beneath this the tongue, which is flat, ligulate, obtuse at the apex, and

curved over the œsophagus ; its surface with a groove down the center, and armed with regularly disposed bristly points, as in the *Pectinibranchia*. The salivary glands take their origin on the back of the œsophagus, almost immediately after it leaves the mass of the mouth : at the point of their origin they are united, and from thence ascend on each side for a short distance obliquely, but soon are curved downwards, and again upwards, when, by means of a slightly flexuous attenuated canal, they pass beneath the former portion of them into the mass of the mouth, on each side of the œsophagus.

At this point is the nervous collar surrounding the œsophagus ; on each side of which is the cerebral ganglion : on the right side the lateral ganglion is approximated to the cerebral ganglion, but on the left side it is situated beneath the œsophagus. From the right lateral ganglion a nervous cord passes *above* the tongue and œsophagus, and forms a ganglion at the point where it meets the lateral surface of the cavity of the neck ; from the left ganglion a nervous cord passes *beneath* the tongue and œsophagus, and forms a ganglion on the opposite side.

The œsophagus runs laterally into a linear oblong sac, which is obtuse at one end, and confluent with the intestine at the other. This sac, when accurately examined, is found to be of a very curious structure. Outwardly it *appears* to consist of two distinct sacs, of which the lowest is nearly elliptic, broader and more muscular, with a constriction at the very top ; and above this an irregular elongated sac, which has towards the base two constrictions, and above the first constriction, on the left, a few longitudinal striæ are discernible, pointing out, as it should seem, the situation of a small pouch.

The whole is, however, pervious, and the appearance above stated is caused by a muscular process, which takes its course through the whole length of the sac. When the sac is opened, and its* contents carefully removed, the lower portion is found to be furnished with a thickened raised muscular rib, which follows the outer or sinistral margin of the

* When the animal has been kept without food for some time, and killed by immersion in scalding water, the sac is filled with a somewhat flesh-coloured substance, of a firmish consistence, which, if carefully removed, is a perfect cast of the interior of the sac.

sac nearly half way, and then curves over, on the upper surface, to the opposite side, where it meets a short, raised, pale, cartilaginous edge, situated on the under surface of the sac; thus forming, *when closed*, a distinct pouch, into which the food enters, (with the bile by means of the biliary duct immediately beneath the orifice of the œsophagus,) and is prevented from returning in the direction in which it entered, by means of the muscular rib; the cartilage acting as a valve to regulate its progress into the next portion of the sac. On each side of the rib, are a few longitudinal narrow folds, especially on that side nearest the entrance of the œsophagus, towards which they diverge slightly; perpendicular to these on each side, transverse streaks are discernible. Above this, corresponding to the two apparent constrictions above noticed, are two small cavities, which are likewise furnished with folds, the upper one, however, more conspicuously so, one edge of which is muscular, being indeed a continuation of the rib; and from the upper of these proceeds a muscular line, parallel with the margin of the sac, and a similar one in the under side of the sac, which at its origin just above the orifice of the œsophagus, and close to the upper cavity, is furnished with a small obtuse cartilaginous projection.

The intestine, as soon as it is given off from the top of the sac, takes a bend beneath it, and again almost immediately resumes its former direction, and then, after running parallel with the sac through its upper half, takes another turn, running in the female along a groove in the matrix, and above the vas deferens in the male.

The fæces are elliptic. The intestine is nearly enveloped in a white granulated mass, composed of very unequal globular granules; which is perhaps an omentum. The liver envelops the under side of the stomach, and from thence runs to the top of the spire, of a yellowish brown, consisting of minute obtuse lobes, dotted with black. It is not easy to develope it in so small an animal.

Until the liver passes under the stomach, the testicle is confluent with it, exactly following the form of the shell, but at that point it gives off a very fine thread, which gradually thickens, and passes many times from right to left, and from left to right, it then becomes gradually attenuated, till it passes laterally into a subglobose mass, which is composed inwardly of parallel thin plates, and again gives off laterally the vas deferens;

this is at first thick, but soon becomes attenuated, and enters the base of the penis, after having taken a short flexuous course above it. The penis is a flat, ligulate, transversely wrinkled, pointed process, lying when at rest parallel with the rectum, and folded up in the middle upon itself.

The ovary is too indistinct to be clearly developed ; from this proceeds the oviduct, which is a flexuous thread, very fine at its origin, but gradually becoming thicker, till it enters into the matrix. The posterior half of this is smooth, and grooved for the reception of the rectum ; the anterior half deeply plicate on each side externally, and internally furnished with complicated folds, as in *Helix*. I could find no trace of the organ which Cuvier calls "vessie."

The most remarkable circumstance in the structure of the animal, and apparently the most anomalous, is the lateral insertion of the œsophagus : whereas the entrance to the stomach is generally at one extremity, and the orifice by which the food passes into the next organ of digestion, at the opposite extremity.

If, however, we regard the lower portion as the rudiment of an extremely transversely dilated gizzard, we shall approach very nearly to the structure of some *Pulmonifera*. This may perhaps at first sight appear unwarrantable : but if we imagine the flexuous muscular line to be adnate with the lower portion of the sac through its whole length, and perforated to receive what passes from the œsophagus and biliary duct, we should then have arrived (at no very great distance) at the structure of *Onchidium*, in which the first stomach is in reality very much transversely dilated.

In the structure of the seminal secretory organs, it almost exactly resembles *Planorbis* and *Limnea*, except that the filamentous portion of the testicle is so much longer, approaching, in this latter respect again, the structure of *Onchidium*.

The structure of the matrix and heart bear a very close resemblance to that of *Helix* ; so that with the exception of the free border of the mantle, and the long, armed tongue, in addition to the circumstance of the sexes being separate, there is nothing in its structure which can make us hesitate about its real affinity with other air-breathing *Mollusca*.

TAB. SUPP. XXXIV.

Explanation of the Figures.

N.B. All are more or less magnified.

Fig. 1. Male removed from the shell.

2. Represents the upper surface of the branchial cavity.

a. a. the muscle of attachment divided.

b. b. the edge of the mantle.

c. rectum.

d. anus.

e. sac of viscosity.

f. pericardium.

g. g. vena cava.

h. trunk of pulmonary veins.

i. auricle.

k. ventricle.

Fig. 3. Auricle and ventricle divided to shew their internal structure.

i. auricle.

k. ventricle.

Fig. 4.

l. oesophagus.

m. lower portion of sac, the liver being removed.

n. upper portion.

o. first turn of intestine.

p. second turn.

c. rectum.

d. anus.

q. portion of testicle confluent with liver.

r. filamentous portion.

s. subglobose portion.

t. vas deferens.

u. penis.

Fig. 5.

v. oviduct.

w. posterior portion of matrix.

x. anterior portion.

c. rectum.

d. anus.

Fig. 6.

- y.* tongue.
- l. l.* œsophagus.
- z. z.* salivary glands.
- α.* mass of the mouth.
- β. β.* cerebral ganglions.
- γ.* right lateral ganglion.

Fig. 7. *y.* tongue.

- l. l.* œsophagus.
- β. β.* cerebral ganglions.
- γ.* right lateral ganglion.
- δ.* left ditto
- ε.* ganglion from cord running from *γ.*
- η.* ditto from *δ.*

Fig. 8. The stomach opened.

- α.* orifice of œsophagus.
- β.* orifice of biliary duct.
- γ.* cartilage at the apex of lower portion of the sac.
- δ.* the projection at the commencement of the muscular line
in the lower surface of the upper portion of the sac.

ART. XXXV. *Experiments and Observations on the casting off and reproduction of the Legs in Crabs and Spiders.*
By C. HEINEKEN, M.D., &c.

TO THE EDITOR OF THE ZOOLOGICAL JOURNAL.

SIR,

SHOULD the following observations prove acceptable, I shall perhaps be allowed to resume the subject at some future period; and if I happen unwittingly to have repeated experiments which have before been tried, and to have drawn conclusions which have already been arrived at, it should be borne in mind, that a sojourner in a foreign country has ne-

cessarily but few books of reference of his own to have recourse to, and that it has been my lot to spend several years in a land luxuriant in the gifts of nature, but barren in the works of art—a land far richer in vineyards than in museums, or libraries, or scientific institutions.

I am, Sir,

Your obedient humble servant,

C. HEINEKEN, M.D.

Funchal, Madeira, August 2, 1828.

In one of the Edinburgh Journals of Science was published, some time ago, (I think as long as two or three years,) a paper by Dr. M'Culloch, giving a minute and most interesting account of a peculiar suture, and a muscular apparatus belonging to it, by which Crabs were enabled to throw off their limbs, as occasion might require, at that particular part, and that alone. He also, if I am correct, (for I quote from very imperfect notes, made at the time, and have not the number to refer to,) stated that reproduction invariably took place from this part; that they had not the power of reproducing an extreme joint; and that when such is mutilated the limb will always be parted with at the suture. Upon several of a species of *Grapsus*? abundant here, but new to me, I tried the following experiments. It is necessary to remark, that in these, and also in those on Spiders, I have used the terms first, second, and extreme joints, instead of *femur*, *tibia*, and *tarsus*, as being more general and less technical.

1.

Threw off two legs at the suture, upon the extreme joint being confined.

2.

Threw off three under similar circumstances.

3.

Threw off two at the instant their second joints were being divided by a strong sharp pair of large scissors. The division was somewhat tardy.

4.

The same.—The division with the scissors was momentary.

5.

The same.

6.

Failed to cast them, but seemed to make a muscular effort towards it.
The extreme joints were here divided.

7.

The same.—Seemed for the moment as if galvanised.

8.

Very young.—Cast them at the suture.

9.

Extreme joint of one leg only divided—not thrown off.

In no instance could I take off a joint at the articulation; the limb was invariably cast. Cutting into the articulation, or through a joint, evidently gave pain, but voluntary dismemberment at the suture never appeared to do so; the difference is very marked: from the amputated surface fluid flows abundantly, from the suture little or none. All these Crabs died within eight-and-forty hours, although they had food and seawater. None of those which retained the limb during the act of amputation parted with it afterwards.

These facts (I thought it useless to multiply them) fully bear out Dr. M'Culloch's assertion, as far as detention goes; but when instantaneous amputation was had recourse to, four availed themselves of the suture, three did not. It therefore occurred to me, that as a limb with either the second or extreme joint mutilated could be retained, the joint or joints could also be reproduced; and that in a state of nature nine in ten would perhaps part with the whole limb, because in nine cases out of ten the accidents to which the extreme joints were liable implied detention, not because the sole reproductive power resided in the suture. From the difficulty of readily procuring, and the inability of keeping alive, Crabs, I substituted Spiders. I do not recollect whether Dr. M'Culloch mentions that they possess a similar appa-

ratus. In appearance, situation, and functions, it is the same, but I have not been able to dissect it, and must therefore assume its internal similarity.

1.

A large *Lycosa* dropped into boiling water instantly parted with six legs at their sutures.

2.

A full-grown *Epeira fasciata* had the left hind leg divided in the middle of the second joint, on the 1st of November. The limb was *not thrown off*. On the 13th of February it was *in statu quo*. The first joint of another leg was then removed, and with a similar result. On the 18th it died.—*Never moulted*.

3.

Nov. 1. A ditto ditto, extreme joint of hind leg removed at the middle, and the limb *retained*. November 2nd, extreme joint of fore-leg taken off—*retained* this limb also, but died on the 3rd.

4.

———— Extreme joint removed at the *articulation*—2nd, *thrown off* at the suture—4th, died in the *act of moulting*.

5.

———— *Salticus* —? Right hind-leg divided at the middle of the second joint—limb *retained*. December 28th.—Has moulted, and *reproduced* two small, slender, pallid, but *perfect joints*—the sound portion of the limb remaining the same in size, colour, &c., as before the moult, in this and *all similar instances*.

6.

———— A ditto : extreme joint of fore-leg, and second of the next, divided—limbs *retained*.—10th died. When caught, had lost two legs at the suture.

7.

Oct. 14. *Lycosa* —? On being held by the right hind-leg, instantly

threw it off. November 2nd, *in statu quo*—left hind-leg divided at the middle of extreme joint—*retained*.—Feb. 12th.—No alteration—right fore-leg divided at the middle of the first joint from the body.—*Cast at the suture*.—Soon after second left leg divided at the extreme joint.—*Not cast*—14th has deposited a sack of eggs.—May 11th, eggs hatched.—August 16th, removed into a box out of doors, and escaped—*never moulted*.

8.

Mar. 16. *Aranea domestica*—caught by the second leg on the right side, which was immediately cast. The extreme joint of the opposite hind-leg was then divided in the middle, and the limb *retained*.—17th, died.

9.

Dec. 14. *Salticus* — ? Extreme joint of second left leg divided and *retained*.—19th. Has not been examined since the 14th; the limb has been *cast at the suture*.—Feb. 12th. No change—left fore-leg divided at the middle of the second joint—*retained*.—13th, has been cast. July 4th, died—*never moulted*.

10.

Feb. 24. *Epeira* — ? Extreme joint of left hind-leg divided, and limb *retained*.—March 26th. *Has moulted*, and reproduced a small, slender, *perfect* joint.

11.

Sept. 20. *Lycosa* — ? Extreme joint of right hind-leg divided and *retained*.—24th. *Has moulted*, but *not* reproduced the joint.—Oct. 13th. *Has moulted* again—*joint reproduced*—small, but *perfect*.

12.

Sept. 15. A ditto. Right hind-leg divided at the middle of the first joint from the body—limb *not cast*.—Oct. 21st, *in statu quo*—held by a hind-leg, which, after considerable strug-

gling and difficulty, it *threw off*. March 20th, (following year) died—no attempt at reproduction. *Never moulted*.

13.

Mar. 16. A young spider (species not noted) had the right fore-leg divided in the middle of the second joint.—June 6th. *Has moulted*, and reproduced two small *perfect* joints.

14.

July 26. Caught with extreme joint of left hind-leg *already off*.—*Has moulted* and reproduced it.

I could add several more instances, but fear that already I have been too diffuse. A sufficient number, too, have been given to prove that *Spiders*, and by analogy I would infer *Crabs also*, can *not only retain* a mutilated *extreme* joint, but *reproduce* it. Numbers 2, 6, 7, and 12, *failed in the reproduction*, but then they *never moulted*, and it will hereafter be found that as soon as the *period of moulting ceases*, *reproduction ceases also*, *even from the suture*.

Numbers 3, 4, and 8 died too early to prove more than the power of *retaining* the mutilated parts. Numbers 7 and 12 are instances of *detention* inducing the casting of the limb, and *amputation* failing to do so, in the *same individuals*. Number 7 would imply the power of *choice* on the part of the animal, for almost at the same time, and under similar circumstances, one limb was thrown off, another retained. Numbers 5, 10, 11, and 13, are unequivocal examples of the *reproduction of extreme joints*, and number 14, of the loss of one while *at large*, and in a *natural state*, and its subsequent reproduction.

It did not occur to me until a few days back, to try the effect of *crushing*, instead of *dividing*, a joint. *Three* individuals upon which I experimented immediately cast their limbs at the sutures, *four* still retain them; but I intend to pursue the enquiry, and also to endeavour to ascertain whether *adults* do not cast at the suture more reluctantly and less frequently than the *young*. Should a *crushed* joint be retained, it must either be repaired by the simple process of adhesion, or by the more complicated and tedious one of partial ulceration, sloughing, and granulation.

I suspect, therefore, that where it can be accomplished by the former, it *will be retained*, but when only by the latter, *thrown off at the suture*; of the power of *selection* on the part of the animal, there can, I think, be no doubt; the spiders which cast off the crushed limbs were *hunters*; those which retained them, *web-makers*: the former, perhaps, have a stronger inducement to the act, as an inert and powerless joint would be a greater inconvenience to them than the loss of the whole limb; indeed, under all circumstances, probably (but it requires to be substantiated by experiment) such is the case; a *web-maker* being of stationary habits, and generally concealed, is less liable to accidents than a *hunter*, (which is constantly on the move, and as generally exposed,) and therefore, perhaps, less prompt when they occur.

It has not, as far as I am aware, been generally supposed that the power of reproducing limbs in Spiders is restricted to certain periods of their lives, but the following experiments will, I think, lead to the conclusion, that as soon as the animal ceases to moult its skin, or in other words, becomes an adult, its limbs cease to be reproduced,* and a solitary example,† as far as it goes, induces me to think that *after that period*, but at a very protracted interval (for it never took place within the time that I succeeded in keeping them alive) the stump becomes attenuated by absorption, so as to be a tolerable substitute for a perfect joint, but does not acquire claws, &c. which all the reproduced limbs or extreme joints possess immediately they appear. For the sake of brevity, and to avoid the appearance of wishing to multiply the examples of reproduced joints (as I shall use some of those already quoted for that purpose, in substantiating the facts regarding *moulting*) I shall merely state

* Finding that in some reproduction took place very readily, and at a reasonable period, but that in others it altogether failed, although the animal lived for months, was healthy, and even produced young, I was long completely at a loss how to account for it; at last I observed an individual to go into its concealment maimed, and come out whole, *leaving a sloughed skin behind*; it immediately occurred to me that there was a *connexion* between the *processes*, and therefore probably between the *periods* also, and the result has proved, in my opinion, quite satisfactory.

† An adult *Epeira fasciata* caught with such a stump as is described.

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in the following experiments, "mutilated," without noticing the mode, or situation, (at least half were at the suture,) and here, as well as previously, I have paid no attention to the regular sequence of dates. They happen, from the mode in which the notes were registered at the time, to be mixed; and as the only thing of consequence is, that each experiment should be consistent in its own individual dates, I have not taken the trouble of further arrangement.

1.

- Nov. 1. *Epeira fasciata*.—one leg mutilated.
Feb. 18. (14 weeks) died, *without having either moulted or reproduced* the joint.

2.

- Oct. 1. *Salticus* ——— ?—two limbs mutilated.
28. *Has moulted and reproduced* both limbs.

3.

- Oct. 30. *Salticus* ——— ?—one limb mutilated.
Dec. 28. *Has moulted and reproduced* the joint.

4.

- Oct. 18. *Lycosa* ——— ?—one limb mutilated.
Nov. 2. ——— ——— —another.
Feb. 12. ——— ——— —two ditto.
Aug. 16. (10 months) escaped, after having hatched a large brood of young, but *without moulting or reproducing* the limbs.

5.

- Dec. 2. *Segestria cellaria*—one limb mutilated.
Feb. 12. ——— ——— —another.
Aug. 16. (8 months) died, (had been neglected latterly.) *Neither moulting nor reproduction* had taken place.

6.

- Mar. 19. *Salticus scenicus*—one limb mutilated.
April 16. (following year), (13 months) escaped, *neither moulting nor reproduction* having occurred.

7.

Mar. 19. *Salticus scenicus*.—two limbs mutilated.

Dec. 29. (9 months) died, *neither moulting nor reproduction*.

8.

The same in every respect as No. 7, but the period of its death is not noted; it was however alive in July.

9.

July 26. *Salticus* ——— ?—one limb mutilated.

Sept. 2. *Has moulted and reproduced* the joint.

10.

July 12. *Pholcus phalangioides*.—one limb mutilated.

Feb. 7. (7 months) it is not noted how long this spider was kept, but she was alive on the 7th February; had reared a brood; but had *neither moulted nor reproduced* the limb.

11.

Jan. 4. *Aranea domestica*.—when caught both fore-legs were off at suture, and the second on the right side was a small but *perfect* reproduced limb.

Feb. 23. *Has moulted and reproduced* the two fore-legs.

12.

Feb. 24. *Epeira* ——— ?—one limb mutilated.

Mar. 26. *Has moulted and reproduced* the joint.

13.

Sept. 4. *Lycosa* ——— ?—one limb mutilated.

19. *Moulting and reproduction* took place.

14.

Sept. 15. *Lycosa* ——— ?—one limb mutilated.

Oct. 21. ——— ——— —another.

Mar. 28. (6 months) died; *neither moulting nor reproduction*.

15.

- Feb. 7. *Segestria cellaria*.—one limb mutilated.
June —. (5 months) *neither moulting nor reproduction.*

16.

- Mar. 16. One limb mutilated.
June 6. *Has moulted and reproduced it.*

17.

- April 30. *Tetragnatha extensa*.—caught wanting two legs.
June 6. *Has moulted and reproduced them.*

I need scarcely add that although the different experiments are given with as few details as possible, yet that each particular was constantly noted down at the time, in many instances daily, in others at moderate periods. Most of the spiders which had reproduced either limbs or joints were killed before the growth had been completed in order to show the process better as preparations, but in a few which were allowed to live until the growth was perfected, it appeared that but little increase took place *between* the different *moult*s, and the *act* of *moult*ing two or three times seemed to accomplish the full formation of the limb. Up to the period of the first *moult*, the stump or suture (whichever it might be,) remained *positively unchanged* in any way; the animal retired within a covering which it had woven, for a day or two, and then came forth with the limb or joint renovated: in *one instance only* (No. 11 of the second series of experiments) was there a deviation from this course—but there the *moult* succeeded so *quickly* to the injury, that the system had probably been prepared for it (the *moult*) *previously* to the mutilation, and the reproductive act had not (if I may use the term) been contemplated by it: the *second* *moult* at once accomplished it.

From this intimate connexion between the renovation of the integuments and limbs, it is I think but fair to assume that the latter have much more the character of *appendages* to the body in at least this class (and probably others) of animals possessing reproductive powers, than in those of a higher grade, and that it is not therefore so wide an exception to a general rule as it has hitherto been supposed. The subject is both an

interesting and instructive one, and I regret that I have not had the means which health and favorable circumstances might have supplied, for pursuing it more satisfactorily.

C. HEINEKEN.

P. S. Since closing the above communication, the *larva* of a *Blatta Maderæ* has reproduced both antennæ, moulting into its *pupa* state at the same time. I had long ago endeavoured in vain to bring about the reproduction of one or both antennæ in *Blattæ*, *Forficulæ*, *Acrydia*, and some other insects, (with the *Oniscides* it is readily accomplished, but as they conceal themselves, I cannot ascertain whether it be connected with moulting;) they had all, however, reached their *perfect state*. Lately I amputated both the antennæ of several *larvæ* and *pupæ* of the *B. Maderæ*, and one *larva* has moulted and reproduced them, (small, short, but perfect,) as stated above; at a future opportunity I hope to enter further upon the subject.

ART. XXXVI. *Facts relating to the Natural History of the Cuckoo.* By JOHN BLACKWALL, Esq., F. L. S., &c., in a Letter to the Editor.

IN the Gentleman's Magazine for April, 1806, two instances are recorded of young Cuckoos having been occasionally fed by large numbers of birds of the same species as their foster parents. It is stated that one of these nestlings was sometimes supplied with nourishment by upward of twenty Titlarks, and that the other frequently received similar attentions from forty-eight Wagtails. From these facts the writer of the article concludes that birds which have the care of young Cuckoos are not always able to provide them with a sufficiency of food, and that on such occasions they procure the assistance of their neighbours of the same kind as themselves.

Colonel Montagu, in the Supplement to the Ornithological Dictionary,

calls in question the accuracy of these observations, and conjectures that the object of birds in thus assembling about nestling Cuckoos is not to administer to their necessities but to assault and persecute them.

I have been recently favoured with a communication from Mr. Eaton of York, which places the subject under consideration in a somewhat different light from that in which it has been viewed by any preceding Ornithologist. Mr. Eaton informs me that in the summer of 1827, Captain Porter, who resides near the city of York, discovered a Hedge Warbler's nest in his garden, containing a young Cuckoo only, the nestling Hedge Warblers, all of which had been ejected by this formidable intruder, being found dead near the spot. The nest and its occupant were taken by the Captain and put into a cage which was placed on the summit of a pole in the garden. In this situation the foster parents speedily visited their captive charge, and resuming their attentions, continued to feed it with great assiduity; but their most strenuous exertions failing to satisfy its increasing voracity, a third Hedge Warbler was induced to co-operate with them in the arduous undertaking. As the young Cuckoo advanced in growth, a still more ample provision of food became requisite, and a Spotted Flycatcher lent its assistance also in supplying the urgent demands of its appetite.

It may be here remarked, that the purpose of these birds in visiting the young Cuckoo, from the numerous observations which were made upon them, and the favourableness of the situation and circumstances for ensuring accuracy, could not be mistaken.

I shall now proceed to notice the most novel and important fact detailed in Mr. Eaton's interesting narration, namely, the assistance afforded by the Spotted Flycatcher. "How," Mr. Eaton inquires, "could a pair of Hedge Warblers prevail upon a bird of a different species to contribute to the support of their supposititious offspring?" Were the case as the question necessarily supposes it to have been, it certainly would present a great difficulty; for the feathered tribes, though capable in some instances of connecting vocal sounds with the ideas intended to be signified by them, do not possess an artificial language: but I am inclined to think that the Hedge Warblers did not intentionally exercise any influence whatever over their coadjutor.

Nestling Cuckoos, it is well known, are extremely clamorous when

powerfully stimulated by hunger ; indeed their cry for food is so incessantly repeated on such occasions, that it frequently leads to their discovery. Now this I believe is the exciting cause which, by calling into operation the parental affections of birds so circumstanced as to be influenced by it, impels them to succour the young of strangers, even when they have not been placed under their immediate care ; and the most probable reason which suggests itself why so many individuals of a kind are sometimes associated together in the performance of the same task is, that they are attracted by each other's calls.

The following anecdotes support these opinions.

A nestling Greenfinch was placed in the same cage with an adult Lesser Redpole, which brought it up with the utmost care.

Several young Sparrows, whose nest had been destroyed, were put into a small basket by a lady who pitied their helpless condition, and the basket was then conveyed to the grass-plot in front of her house. In this situation they soon became clamorous for food, and a great variety of birds hastened to the spot, many of which were observed to supply them with nourishment, but unfortunately they soon perished, probably from a deficiency of warmth, as they had not been hatched many days, and were almost destitute of covering.

“ The sons of Mr. Lord, of Ramsey, Essex, took four young Ravens from a nest, and put them into a waggon in a cart-shed. About the same time they destroyed the young of a Magpie which had its nest near the cart-shed, and the old Magpies, hearing the young Ravens crying for food, carried them some, and constantly fed them till they were disposed of by the boys.” Trans. Linn. Soc., Vol. XV, p. 10.

I have thus attempted to shew, contrary to the opinion of Montagu, that the author of the article in the Gentleman's Magazine is perfectly correct in asserting that young Cuckoos are occasionally fed by a more than ordinary number of birds ; but that it is erroneous to suppose that these numerous purveyors are invariably of the same species as the foster parents of the Cuckoos, and that their proceedings are influenced entirely by the latter.

The belief that the Cuckoo sometimes constructs a nest, and brings up its own young, has been maintained by several intelligent Naturalists, and is at present entertained by that excellent Zoologist, Dr. Fleming,

as is evident from the following passage, extracted from the remarks on that bird given in his recently published History of British Animals. "In some cases, however," he observes, "it appears that the Cuckoo constructs its own nest. Thus, in a manuscript of Derham's, on Instinct, communicated by Pennant to Barrington, it is stated, that 'the Rev. Mr. Stafford was walking in Glossop Dale, in the Peak of Derbyshire, and saw a Cuckoo rise from its nest, which was on the stump of a tree, that had been some time felled, so as much to resemble the colour of the bird. In this nest were two young Cuckoos, one of which he fastened to the ground, by means of a peg and line, and very frequently, for many days, beheld the old Cuckoo feed these her young ones.'"

In my observations on the Cuckoo, printed in the Memoirs of the Literary and Philosophical Society of Manchester, Vol. IV, new series, I have pointed out several circumstances which completely invalidate Mr. Stafford's account, to which, unfortunately, so much importance has been attached. "That Mr. Stafford," I quote from my paper, "must have been mistaken needs scarcely to be insisted on, since Mr. Jenner has shewn, that when two young Cuckoos happen to be hatched in the same nest, the stronger invariably turns out the weaker. The nest which Mr. Stafford found, from the number of young it contained, most probably belonged to a Goatsucker, as I know that this species, which seldom lays more than two or three eggs, breeds in the neighbourhood of Glossop; and it might easily be mistaken for a Cuckoo, by a person not very familiar with birds, who had only an opportunity, of observing it at a distance. If this gentleman had been a good Ornithologist, would he not have endeavoured to remove every possibility of doubt in a matter which it is evident greatly excited his interest, by examining and describing the structure of the feet of these young birds?" It is gratifying to find that the conclusions here arrived at are supported by Dr. Jenner, whose opinion will command attention, in the view he takes of the subject in his Essay on the Migration of Birds.*

Another supposed instance of a Cuckoo having incubated its eggs and nourished its young, which had escaped my former researches, is given

* Transactions of the Royal Society for 1824.

in the octavo edition of *Zoonomia*,* in an extract from a letter written by the Rev. Mr. Wilmot of Morley, near Derby; and as it is deserving of attention, I shall transcribe the entire passage. “ In the beginning of “ July, 1792,” Mr. Wilmot writes, “ I was attending some labourers “ on my farm, when one of them said to me, ‘ there is a bird’s nest “ upon one of the coal-slack hills; the bird is now sitting, and is ex- “ actly like a Cuckoo. They say that Cuckoos never hatch their own “ eggs, otherwise I should have sworn it was one.’ He took me to the “ spot; it was in an open fallow ground; the bird was upon the nest; “ I stood and observed her some time, and was perfectly satisfied it was “ a Cuckoo: I then put my hand towards her, and she almost let me “ touch her before she rose from the nest, which she appeared to quit “ with uneasiness, skimming over the ground in the manner that a hen “ Partridge does when disturbed from a new-hatched brood, and went “ only to a thicket about forty or fifty yards from the nest; and conti- “ nued there as long as I stood to observe her, which was not many mi- “ nutes. In the nest, which was barely a hole scratched out of the coal “ slack in the manner of a Plover’s nest, I observed three eggs, but did “ not touch them. As I had labourers constantly at work in that field, “ I went thither every day, and always looked to see if the bird was “ there, but did not disturb her for seven or eight days, when I was “ tempted to drive her from the nest, and found two young ones, that “ appeared to have been hatched some days, but there was no appear- “ ance of the third egg. I then mentioned this extraordinary circum- “ stance (for such I thought it) to Mr. and Mrs. Holyoak, of Bidford “ Grange, Warwickshire, and to Miss M. Willes, who were on a visit at “ my house, and who all went to see it. Very lately I reminded Mr. “ Holyoak of it, who told me he had a perfect recollection of the whole, “ and that considering it a curiosity, he walked to look at it several times, “ was perfectly satisfied as to its being a Cuckoo, and thought her more “ attentive to her young than any other bird he ever observed, having “ always found her brooding her young. In about a week after I first “ saw the young ones, one of them was missing, and I rather suspected “ my plough-boys having taken it, though it might possibly have been

* See the section on Instinct, p. 246, et seq.

“ taken by a hawk some time when the old one was seeking food. I never found her off her nest but once, and that was the last time I saw the remaining young one, when it was almost full feathered. I then went from home for two or three days, and when I returned the young one was gone, which I take for granted had flown. Though during this time I frequently saw Cuckoos in the thicket I mention, I never observed any one that I supposed to be the cock bird paired with this hen.”

This case, so circumstantially detailed, and attested by witnesses of such high respectability, certainly has an imposing appearance; but a glance at the particulars intended to establish its accuracy is sufficient to convince every ornithologist who is familiar with the economy of the Cuckoo, that the nest discovered by Mr. Wilmot's labourer did not belong to a bird of that species; indeed, from its situation and contents there can scarcely be a doubt that it was a Goatsucker's. We are informed by Mr. Wilmot, that in the beginning of July this nest contained three eggs, two of which were hatched several days after his attention was first directed to them; and that the parental duties of the mother towards her offspring were duly exercised till her last remaining nestling, one having been removed by some unknown cause, was nearly full feathered, which could not have been less than eighteen or twenty days from its extrication from the egg. These, it will appear, are important facts, for, as old Cuckoos quit this kingdom early in July,* they plainly shew that Mr. Wilmot's observations, and those of his friends, must have been made under the delusive influence of false impressions; and this opinion is confirmed by the peaceable manner in which the young birds occupied the nest while they continued together. Perhaps it may be imagined by those to whom the arguments already advanced do not appear conclusive, that the maternal affection of the parent bird induced her to remain so much beyond the time at which adult Cuckoos usually retire: but this hypothesis will not remove a single difficulty, for Mr. Wilmot expressly states that during this period he frequently saw Cuckoos in an adjoining thicket, though he never observed any one which he supposed to be the

* Old Cuckoos depart from the neighbourhood of Manchester on the 27th of June, at a mean of fifteen years' observations.

mate of this female. Had Mr. Wilmot been a skilful Ornithologist, he would not have failed to examine the structure of the feet of these nestlings, as he must have been well aware that by so doing he might have completely established the truth or fallacy of his supposition. It is almost unnecessary to insist upon the caution with which statements should be received from persons whose information does not qualify them to discuss the subjects upon which they write. The error into which Mr. Wilmot has fallen, being evidently occasioned by his imperfect acquaintance with the feathered tribes, for it is pretty clear that he did not distinguish Goatsuckers from Cuckoos, now that the economy of the latter species is better understood, will probably mislead none, except those who are ignorant of natural history, or greatly deficient in reflection; but that so distinguished a Zoologist as Dr. Fleming should have contributed to extend and perpetuate the mistaken notion here controverted, by lending it the sanction of his authority, is to be regretted.

Crumpsall Hall, near Manchester,

Oct. 11th, 1828.

ART. XXXVII. *Description of a new species of Paradoxure, now exhibiting in this Country. By WILLIAM OGILBY, Esq., B.A., of Lincoln's Inn.*

THOUGH the animal which forms the subject of the following observations has been exhibited, in different parts of England, for the last two years, no account of it, as far as I am aware, has hitherto been given to the public. In undertaking to supply this deficiency, through the medium of the Zoological Journal, I beg leave at the same time to assure its readers, that I do so only after the most minute and careful examination and comparison of the animal in question with the published descriptions of its congeners. The length of time during which I have known it, the frequent opportunities which I have enjoyed of examining it, and the care and attention which I have bestowed upon the details of its description, warrant me in hoping that the following memoir will

be found as full, clear and satisfactory as the nature of the subject admits of.

My first acquaintance with it was at Cambridge, about the middle of March 1827. It was then, and still continues, in the possession of Mr. Wombwell; who, during the fortnight he remained in that neighbourhood, afforded me every facility of examining it, and studying its manners. Suspecting it to be an undescribed species, as no mention was made of it in the zoological works to which I had access, I examined it with the greatest attention, and noted down my observations while the animal was under my eye. From this time I lost sight of it till last August, when I had again frequent opportunities of observing it in London, and of verifying the observations which I had formerly made: and, as I had then more ready access to the works of the Continental Naturalists than I before enjoyed, I became confirmed in my former surmise of its being an undescribed species. As such I pointed it out to my friend Mr. Woods, who perfectly coincided with me in opinion; and who has since informed me that it is unknown to the French Museums, which he has lately visited.

In external size, and bodily form and appearance, this animal, to which I propose assigning the name of *Paradoxurus leucopus*, from a circumstance which will be mentioned afterwards, seems to hold an intermediate place between the *Par. Typus*, or *Black Genet* of Buffon, and the common Cat. It has the small attenuated fox-like head of the other *Paradoxures*, which it also resembles in the form of the legs and feet: but the body is rounder and more compact; the fur shorter, thicker and finer; and the tail perfectly cylindrical, thick at the base, and tapering towards the point. The ears are naked and semicircular, of a dark colour, and very ragged, as if torn by the thick and prickly underwood, among which the animals of this genus in all probability reside in their natural state. The nose terminates in a small black muzzle, in the under part of which the nostrils are placed, as in the dog, civet and other carnivorous animals. The extremities are semiplantigrade; the soles of the feet white, and naked to within about half an inch of the heel, which is covered with hair and slightly elevated in walking; and the toes, which are five on each foot, are all on the same line, and connected, like those of the common cat, nearly to the origin of the claws, which are white and almost perfectly

retractile. Neither the present species, nor the *Par. Typus*, has the feet palmated as stated in the generic description of Desmarest: for the connection of the toes bears a perfect resemblance to that observable in the Feline race, which is widely different from the true palmated form presented in the extremities of the otter and beaver.

I had no opportunity of ascertaining the nature of its dentition: but from the close affinity subsisting between the form of its head and extremities, and that of the corresponding organs of the common Paradoxure, it is but natural to suppose that their dental systems are equally approximate.

The hair is long and furry in its texture on the body; short and coarse on the head and limbs. The whiskers are long, stiff and black. The cheeks, nose, and face in general are black, with a tinge of light ash-colour about and between the eyes. The head, neck, shoulders, rump and tail, are covered by a fine, thick, light-brown fur, mixed with long coarser hairs tipped with black and communicating to these parts a dark ash-colour, through which, however, the fine under fur is distinctly visible. These black hairs are much more thickly scattered upon the shoulders than over the neck and rump; so that the neck almost appears to be surrounded by a light brown ring, from the contrast afforded by the dark colour of the head and shoulders on either side of it. The dark ash-colours on the fore and hind parts are separated by a broad ring, from four to five inches in extent, of uniform white hairs, which completely surrounds the loins. The belly, inside of the thighs and tip of the tail are white; the legs are almost jet black; and the feet, from the heel downwards, both before and behind, are a pure unmixed white. It is from this striking feature that I have proposed distinguishing this animal by the specific name of *leucopus*.

In the power of curling the tail, from which circumstance M. F. Cuvier derived the generic name of this tribe of animals, the whitefooted Paradoxure resembles the common black Genet, or *Par. Typus*; as well as in the avidity with which it devours bread, fruit and other vegetable substances. There is, however, one circumstance with respect to this power of folding the tail, which I have repeatedly observed in both these species, and which differs materially from the account given by the French Naturalists. In the instances which have fallen under my notice, the curling

has always taken place in a *horizontal* plane, and assumed something the shape of a roman S; nor have I ever observed the curvature to assume the form of a *vertical spiral*, which the expressions of Desmarest would lead us to suppose it does.

The individual from which the above description was taken, was a very fierce animal, and would not give me an opportunity of taking its dimensions: but, from the size of the cage in which it was confined, which was 31 inches in length, I should suppose it to be very nearly 16 inches from the nose to the origin of the tail; and the tail itself, perhaps, an inch or an inch and a half shorter. It stood low upon its legs; and, in its movements, displayed all the ease and agility of the cat. It had also the nocturnal eye of that animal; generally slept during the day, with the tail folded round the body; but became exceedingly restless and vigilant on the approach of night, and then kept almost constantly on a small perch with which its cage was provided. When teased or otherwise irritated, it emitted a low cry like the half suppressed growl of an angry cat. Immediately beneath the tail, I was informed that there is a slight folding of the skin, which exudes, though in small quantities, a matter of a musky smell; but the fierceness of the animal would not permit me to ascertain the fact from personal observation. Of its native country, I could obtain no account; but it is, most probably, some part of the East Indies, as it was thought to have been brought to England in the Thames.

The accompanying engraving, [TAB. SUPP. XXXV.] for which the public are indebted to the pencil of that able and zealous Naturalist, H. Woods, Esq., is a striking likeness of the individual from which this description was taken. For the ready courtesy with which that gentleman consented to its publication, in illustration of the present memoir, the author begs leave to return his most grateful acknowledgments.

The subjoined phrases will express the specific differences of the species of *Paradoxures* with which I am acquainted. Never having seen a specimen of the *Paradoxurus aureus* of M. F. Cuvier, I do not venture to characterize it; neither should I feel justified in adding to the genus the *Viverra Musangua*, Raffles, without a more accurate examination than I have yet been able to give to specimens of that interesting animal.

PARADOXURUS TYPUS, F. Cuv.

Par. flavescenti-brunneus; vittis dorsalibus, sub-interruptis, sub-obso-

letis, nigrescentibus, utrinque tribus; maculisque flavescenti-albidis infra et supra oculos.

PARADOXURUS LEUCOPUS.

Par. nigro-brunneus; pedibus, cingulo lumborum lato, ventre, membris internè, caudæque apice, albis; cruribus, facieque nigris; hâc circa interque oculos cinereâ.

ART. XXXVIII. *Remarks on the form of the Skull of the North American Indians.* By JOHN SCOULER, M.D.

WHILE the zeal of Naturalists has been so successfully occupied in exploring the most remote regions of the earth, that scarcely a moss or a zoophyte can escape the notice of the traveller, or remain long undescribed, we may be justly surprized that so few contributions have been made to the natural history of our own species. This branch of natural history has been more frequently the amusement of wild theory than the subject of careful and scientific investigation. Buffon has the merit of being among the first who directed the attention of Naturalists to the study of anthropology, by cloathing it with the charms of his eloquence, and since his time it has begun to occupy the curiosity of the Zoologist in the manner it deserves. In the truly classic work of Blumenbach on the varieties of the human race, we have a simple and elegant compendium of the present state of our knowledge in this department of science, and a model for similar investigations. He has judiciously refuted the fictions which less philosophical writers had credited as favourable to some theoretical opinions they wished to defend, and has directed our attention to subjects more deserving of observation. In the history of the American race especially, we shall find many stories of a fabulous nature to reject, while circumstances sufficiently interesting will be brought under our notice.

In no race of mankind do we find more anxiety displayed to impose some artificial deformity on their bodies, than among the Aborigines of the American continent and islands. We have seen, within the circuit of a few hundred miles, almost every variety of artificial deformity that a

wild imagination could suggest. The custom of tattooing is not uncommon; the septum of the nose is so perforated as to admit of shells and feathers; at Queen Charlotte's Island the women make a large incision into the lower lip, so as to contain an oval piece of wood, two inches in length, and from six to eight lines in breadth; but the most interesting process in respect to Natural History is the compression of the childrens' heads, which it is the object of this paper to describe. The existence of this practice has long been known, and the effects produced by it on the form of the cranium have been noticed by various anatomists; yet I trust that the following observations will not prove entirely unacceptable, furnished as they are by one whose repeated and personal enquiries, during a residence among the Indians, have rendered the subject practically familiar to him.

This custom, although far from being universal, is still pretty widely disseminated over the American continent. Adair, in his History of the American Indians, relates that the tribes about Carolina and New Mexico, flatten the heads of their children by placing small bags of sand over the forehead. In some parts of Brazil and in Peru this custom appears to have been so frequent as to require the interference of the Spanish ecclesiastics to prevent it. Among the Caribs of the West Indies its prevalence is sufficiently well known, and the inhabitants of an extensive district on the north-west coast of America are a nation of flat-heads. This strange custom appears to be altogether unknown to the savage tribes of the Old World, and to be the exclusive privilege of the Aborigines of the New.*

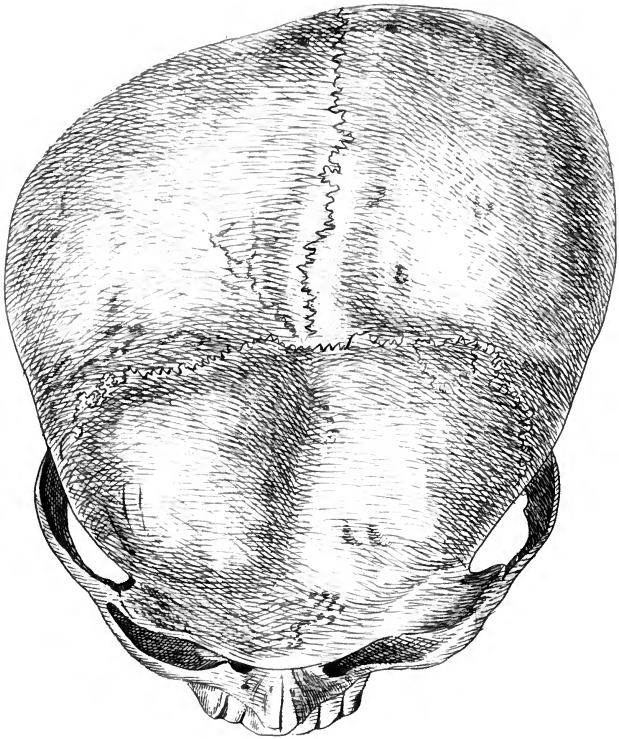
It is difficult to account for the origin of this strange taste among the Americans; but there is probably much truth in the remark of Cuvier concerning this subject. He says, "the skull of the American is naturally compressed, and receding, hence a desire to improve what they considered the *beau ideal* of their structure, led them to an artificial means to depress their foreheads still further. The Mexicans, who

* It would appear, however, that some traces of this deformity formerly were observable among the tribes bordering on the Crimea Genuensis, "cum a Mauris progenitoribus accepissent olim morem, ut infantibus recens natis tempora comprimuntur, nunc absque ullo compresso Thersitio capite omnino nascuntur." Scaliger in Commentar. sup. Theophrast. de causis plant., Lib. V, p. 287.

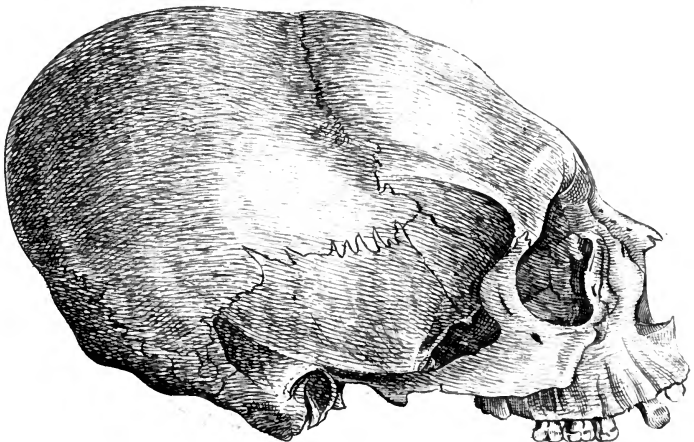
“ appear to have entertained such ideas, wisely allowed their own heads
 “ to grow as nature directed, and flattened only those of their idols.”

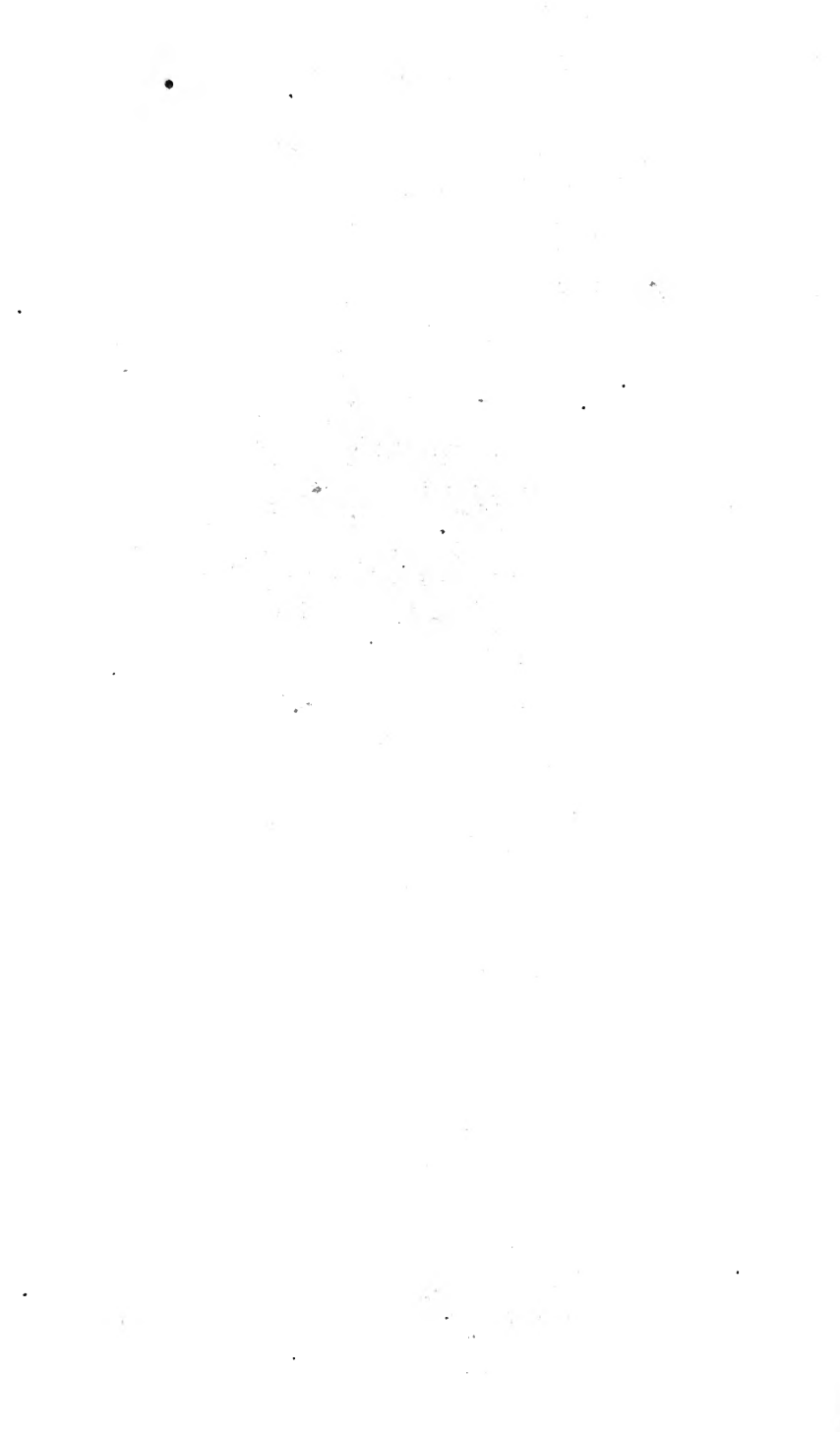
All the tribes on the North West Coast, whether insular or continental, from the banks of the Columbia river to the northern extremity of Quadra and Vancouver's Island, flatten the heads of their children. These tribes have a great similarity in their habits, language, and appearance ; and their method of flattening the head is extremely simple, and does not appear to be attended with any disagreeable circumstances to the health of the child. As soon as the infant is born, the head is frequently and gently compressed with the hand, and this is continued for three or four days. The child is then placed in a box or cradle, which is rendered comfortable by spreading moss or a kind of tow, made from the bark of the cypress, over it. The occiput of the child rests on a board at the upper part of the box and supported by tow or moss ; another board is then brought over the forehead, and tied firmly down on the head of the infant. The child is seldom taken from the cradle, and the compression is continued till it is able to walk. A child about three years old presents a most hideous appearance : the compression operating chiefly on the forehead and occiput reverses the natural proportion of the head, and causes it to assume the form of a wedge. The eye-balls project very much, and the individual ever after has the eyes directed upwards. The head of a child about four years old in my possession measures four inches from the os frontis to the middle of the occiput, while it measures six inches from the centre of the two parietal bones at the greatest transverse measurement of the head. This head is represented TAB. IX, Fig. 1, and gives a very good idea of the form of the head in Indian children when they begin to walk. Nature however, alarmed at such an attempt to deface her works, attempts to repair the injury ; hence the skulls of adults are less flat than when they were infants, although still sufficiently deformed. The two accompanying figures, TAB. X, give an accurate representation of an adult head. In an adult skull, the measurement from the os frontis above the nose to the occiput at the superior transverse ridge, is six inches and eight lines, while the distance between the parietal bones is six inches and three lines. The same measurements in a European skull, were $5\frac{1}{2}$ inches to $7\frac{1}{2}$. From the pressure being applied to the forehead and occiput, the two parietal bones bilge out very much, and from the inequality of the pressure, the

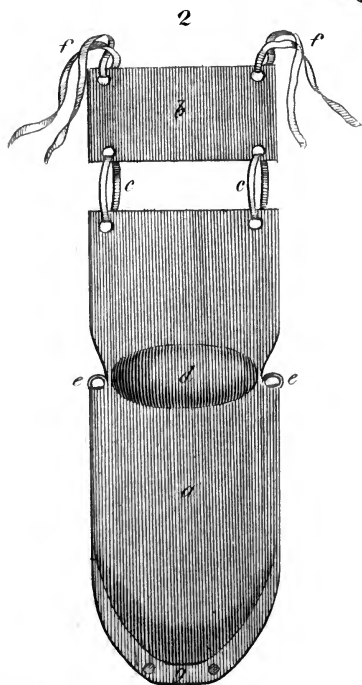
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symmetricality of the head is destroyed. In one head, the right side of the os frontis projects more than the left side, and, to compensate for this, the left parietal bone bilges out more than its fellow. From these circumstances I think the capacity of the skull is nearly the same as in the undeformed heads of the Indians; at all events it has no effect on their intellectual powers.

The uncompressed skulls have the forehead a little depressed, elegantly rounded, high cheek bones, eyes turned a little outwards, olfactory apparatus much developed: on the other hand the compressed heads are receding, and often not symmetrical, eyes directed upwards in all cases, the parietal bones distended very much laterally, the occiput greatly flattened, while the marks of the insertion of the muscles are peculiarly strong. Another peculiarity among the Indians of the Columbia, is the flatness of their teeth, which I think may be attributed to the constant attrition caused by eating their salmon without cleaning it from sand and other hard substances. Their teeth are all of nearly an equal length, and the crowns are completely worn away.

Before finishing this paper, it may be of use to mention a few of the other peculiarities of the Indians besides those derived from the skulls. Their height is moderate, seldom exceeding five feet; their colour that of copper, and rather deeper in the men than in the women; from their indolence and the abundance of provision they are very fat; hair black, coarse, and straight, flowing over their shoulders; hands and feet small; beard when unmolested strong, and hair on other parts of the body sufficiently copious, but always carefully extirpated: hence the origin of the absurd opinion that the Indians are destitute of hair and beard. They vary as much in their features as the people of other countries, and the national difference of features between the people of Nootka and those of Queen Charlotte's Island is well marked. A remarkable circumstance with regard to the tribes which compress their heads, is the frequency of apoplexy. I have known two of them to die in the same day from this disease, but whether the predisposition to it depends on the form of their heads or not is difficult to determine.

Two of the accompanying figures shew the form of the skull, and the effects of compression on people arrived at manhood. The other represents the head of a child of about three years old, with the skin dried and ad-

hering to the bones. This was taken from a little natural mummy brought from one of the canoes in which the Indians deposit their dead, and where, by being protected from the rain and exposed to the air, they often become desiccated.

The compression of the infant's head is effected in the following manner. A piece of wood is selected $2\frac{1}{2}$ or 3 feet long and about 12 or 14 inches broad, and is cushioned with *Sphagnum* and fur, having a board of equal breadth at the top attached by leather thongs, and furnished with thongs at the opposite corners. The child's head being previously swaddled is laid on the board, which serves all the purposes of a cradle, the neck resting on the high pillow so that the head hangs back; the board at the top is then brought forwards on the brow and laced down, gradually tightening it as the operation advances.

Explanation of the Figure.*

TAB. IX. Fig. 2.

- A. The body of the cradle.
- B. The board which is placed on the brow.
- C. The thongs by which it is attached.
- D. The high pillow for the neck.
- E. The loop holes
- F. Thongs for lacing down the board on the brow to the loop holes.
- G. A hoop for the support of the child's feet, when the cradle is standing erect.

* I am indebted for the accompanying figure, to my friend, Mr. David Douglas, who had equally with myself noticed this singular custom among the North-west American Indians.

ART. XXXIX. *Observations on the Goramy of India.* By
Major Gen. HARDWICKE, F.R.S., &c., in a Letter to N. A.
VIGORS, Esq.

My dear Sir,

IN the 14th number of your Zoological Journal is a paper from Dr. Hancock of Demerara, on the Fishes, &c. of that settlement, in which he remarks on habits evinced by some fishes for the preservation of their young: on this subject I feel an interest, having myself, during a residence of some months at the Isle of France, witnessed a similar propensity in fishes found there, quite in accordance with the fact related by that gentleman. In the tanks and fresh water preserves the proprietors breed a fine fish, long since imported by French navigators from China and Batavia; it is known under the name of *Goramy*, and is the *Osphronemus Olfax* of Commerson, and *Trichopus Goramy* of Shaw's Gen. Zool. v. iv, p. 388. It is completely naturalized in the island, and having multiplied to a vast extent, is considered by the inhabitants an important acquisition, and is very deservedly esteemed by every one who has eaten of it as one of the best fishes of the country. The singular habits of this fish must, in the breeding season, have been often observed, for at this time they frequent the sides of the tanks, which afford shelter from the quantity of grass growing about them, the culms of which trail and stretch several feet into the water, and give cover to the operations going on, while the *Goramy* is busied in completing the deposition of its spawn. They are for some days seen very active, passing in and out of the grassy cover, and in some places thickening it, by entangling the trailing shoots, and forming what is commonly considered the spot under which the deposit is made. I was not able to satisfy myself as to the manner in which the spawn of these fishes was disposed of, but they continued to watch with the most active vigilance the margins of the spot which they had selected and prepared; driving away with violence every other fish which approached their cover. From the time I first noticed these operations about one month had elapsed, when one day I saw numerous minute fishes close to the margins of the grass,

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on the outer side of which the parent fishes continued to pass to and fro. I saw them often for many days after, though I had not the opportunity to notice their total dispersion from the spot.

The largest of the *Goramies* I met with was in length 19 inches, and in transverse diameter, $7\frac{1}{2}$. I was told that few were taken of a larger size, and none exceeding it more than a few inches. Having the opportunity of examining this specimen while alive, I made a short description of it, which I will annex to these remarks, together with a drawing of a specimen of smaller size which I wish you would publish, if you see no good reason to the contrary. The figure [TAB. SUPP. XXXVI.] is made from a specimen in the collection of the Zoological Society, sent direct from China, its native country.

The late lamented Marquis of Hastings, when Governor General of India, caused some pairs to be imported, and placed in the fine fresh water preserves in the park at Barrackpore, near Calcutta: but the issue was unsuccessful; the voracious fish which infest most of the tanks in Bengal, it is supposed, destroyed them, and I believe the experiment was not repeated. We may hope, however, that the attempt to give to our Indian settlements so desirable an acquisition will be repeated, and that not only the naturalization of these fishes may be effected in India, but the transmission of them be secured in favour of our native island, Great Britain.

We have sufficient evidence of the practicability of such a measure, in the existence of the Gold and Silver Fish of China, which have been naturalized both in England and in many parts of the Continent of Europe. The efforts now making in this country to promote the natural sciences, will, it is to be hoped, stimulate some naturalist to new exertions, to procure the addition of so fine a fish as the *Goramy* to the edible fishes of our own country; no individuals have better opportunities of effecting it than the Commanders of the Honourable the East India Company's Ships trading to China; the sanction of the Court would no doubt be easily obtained; and the individual who may be actuated to make such a contribution to the useful products of his country, would be amply compensated for his trouble, by the advantage he would confer, and the grateful acknowledgments he would merit from his countrymen. But where, let me ask, have we a greater right to look for this boon, than

to the Zoological Society? One of the professed objects of its illustrious Founder, the late Sir Stamford Raffles, was to benefit his country in this way through the medium of the Society's exertions, by every practicable opportunity. Here then one is offered to their notice and attention, and we may, I trust, look with confidence to those members who possess a voice in its councils, for the adoption of early means for the discharge of so legitimate a duty of the Institution.

In the country in which I had an opportunity of observing the habits of the *Goramies* it will be remembered that they had actually been naturalized in the manner in which it is hoped they will ere long be among ourselves. Originally inhabitants of the fresh waters of China, they are also plentiful in those of Java, where, as Dr. Horsfield informs me, they constitute an important article of provision which is sold in the markets. They were first imported into the Isle of France by the commandant of the troops of that colony, M. de Séré; and the first individuals are stated to have exhibited little shyness, and to have appeared almost domesticated, if such a term may be applied to a fish. So early as 1770, when Commerson visited the Island, they had already become abundant, having spread from the tanks, in which they were at first kept, into the rivers, where they multiplied with great facility and preserved all their good qualities. La Cépède, who first described and figured them from the materials collected by Commerson, was struck with the advantages to be derived from the naturalization in Europe of so valuable a fish, and he expressed a fervent hope that pains might be taken to secure for France "une nourriture peu chère, exquise, salubre, et très abondante."

I am not aware whether any attempts were made in consequence of this suggestion, but at a more recent period the transmission of living *Goramies* has been effected to the French West India Islands, and the experiment affords the most flattering hopes of permanent success. Several statements respecting it have already appeared before the public, of which I prefer adding to this paper that contained in the fourth volume of the "Annales Maritimes et Coloniales, 1827," as it embraces also some very interesting details respecting the natural history of the *Goramy*. As that book may not be generally in the hands of English Naturalists, I will take from it the substance of the memoir.

It is recorded, that one hundred specimens of this fish, in a young

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state, were embarked on board a French vessel at the Isle of France, in April, 1819, out of which number twenty-three only died during a long voyage, and the remainder were distributed between Cayenne and the Islands of Guadaloupe and Martinique. In these colonies, they not only multiplied beyond expectation, but they gave early evidence of their fitness to fulfil the purpose of creation, to the astonishment of those Naturalists who witnessed the experiments made on the spot. Monsieur Le Grand, Director of the Botanical Garden of the colony, Monsieur Chauceir, a Merchant, and M. Guidon, Surgeon to the Hospital, were present and bore testimony to a fact, not perhaps known in the history and physiology of osseous fishes, i. e., that the *Goramy* is viviparous, the young being formed in the egg, previous to its exclusion from the abdomen.

Three female *Goramies* were operated upon, the largest of which did not exceed 20 lines (equal to $1\frac{3}{4}$ inch). From this specimen the sac containing the spawn was removed, and, with the aid of a lens, the young fishes were perfectly perceptible through the transparent membrane which contained them. With the help of a lancet ten distinct and well formed little ones were extracted, and survived the operation, swimming about in the plate which contained them, for half an hour.

The second female produced but few eggs: they were of a yellow colour, round, and the size of a millet seed. The third female possessed a greater number, and though these were in a less advanced state than in the first, with a magnifying glass the eyes of the little ones, and the whiteness of their scales, were, nevertheless, quite distinct.

The whole of these specimens, with their parts, have been preserved in spirits, and are held ready at the call of those whom curiosity may excite to inspect them. From all that the French Naturalists saw in the foregoing experiments and facts, they record the following conclusions:—

First, that the *Goramies* have been fit for generating at the end of six months, although six years have passed away in the instance of those which came from the Isle of France, before they manifested the same faculty.

Secondly, that they are viviparous, since it is evident that their spawn receives in the womb of the mother a process sufficient to vivify the ova, and to cause the exclusion of a living offspring.

Thirdly, that their astonishing fecundity provides for the colony a resource of which it will quickly recognize the importance, by the facility which it offers of soon stocking its ponds and rivers.

I have the honor to be,

My dear Sir,

Your faithful and obedient Servant,

THOMAS HARDWICKE.

Thurlow House, Clapham,

24th Nov. 1828.

Description of the Goramy, a fresh water fish of China, naturalized in the Isle of France.

Osphronemus Olfax, *Commerson* : *Trichopus Goramy*, *Shaw*, *Gen. Zool.* v. iv, p. 388.

In figure ovate, compressed, and almost carinated behind the anus, both above and beneath.

In colour a tarnished silvery white, with a little mixture of brown.

The scales rather large, with rounded and finely serrated external margins, firmly attached and extended over the bases of the dorsal, anal and caudal fins.

The head rather small, the rostrum somewhat produced, jaws extensile, teeth very small, numerous, and without order, inside the mouth; but on each jaw is a marginal row, longer, sharper, and regular.

The tongue is muscular, rather large, and firmly fixed in the mouth, with small file-like teeth about the posterior surface and on the tip. The eyes are just above the angles of the mouth, the pupils round, black, and encircled with a fine golden yellow iris.

The nostrils are double, small, and circular; their anterior aperture is surrounded by a thin tubular membrane.

The branchial membrane is not exposed, and the opening of the gills not very free; the operculum scaly.

The lateral line extends from the upper angle of the gill-opening, in nearly a straight line, above the middle of the sides, to the base of the caudal fin.

Branchial R. 6. D. $\frac{13}{2}$. P. 15. V. $\frac{1}{6}$. A. $\frac{1}{2}$. C. 20.

The length of the fish was 19 inches, and breadth $7\frac{1}{2}$.

The dorsal fin commences nearly parallel to the vent; the first thirteen rays are bony, round, and spinous; the first is the shortest, the rest gradually longer, all united in the common membrane. The soft rays increase in length from the first to the sixth, which is the longest, the rest decrease gradually to the last, which is shortest; this fin ends about an inch before the origin of the tail.

The pectoral fins are nearly on a line with the middle of the gill-aperture, acuminate above, the longest ray $3\frac{3}{4}$ inches long; the base of these fins a dull black.

The ventral fins commence on a line with the posterior ray of the pectorals. The first ray short, bony, and spinous. The second ray is very long, reaching to the end of the tail, rounded, and tapering to a hair-like point; their proportions are as follow:—

The length of the first ray	1 inch
Second ditto	12
Third ditto	$1\frac{1}{2}$
Fourth and Fifth	1
Sixth	$0\frac{3}{4}$

The anal fin commences immediately behind the vent; it resembles the dorsal, but terminates closer to the caudal base, to which it is somewhat united by a naked continuation of the common membrane.

The caudal fin is rounded, very scaly at the base, broad and strong.

THOMAS HARDWICKE.

ART. XL. *Notes on the internal appearance of several Animals examined after death, in the collection of the Zoological Society.* By WILLIAM YARRELL, Esq., F.L.S., &c.

[THE various deaths which necessarily take place in so large a collection of animals as that belonging to the Zoological Society, as well as the

numerous specimens of recently deceased animals which are daily presented to the Society, afford opportunities, such as seldom occur, for the study and description of the animal economy. In most cases these opportunities have not been neglected. The greater number of the animals brought to Bruton Street have been opened in the first instance with the view of ascertaining the cause of their death; and this examination generally led to a further inquiry into their structure. These investigations were for the most part carried on under the superintendance of Mr. Yarrell and myself; that gentleman having kindly undertaken to point out to me some of the general laws relating to the internal conformation of animals;—a subject, in which his extensive studies and his accuracy in dissecting enabled him to give the most valuable instruction. In the course of these inquiries we took many notes of the various appearances of the animals before us; not, however, in any systematick form, but in a desultory manner, as the many interruptions, and various avocations attendant on an establishment like ours, allowed us leisure to note down our observations.

On looking into the papers which contain these notes, we find a mass of information, crudely, it is true, and confusedly brought together, and infinitely less extensive in details than would have been the case, had we not been debarred by want of leisure from committing to paper all that we were enabled to observe; but still information of value to ourselves, and on which we can place every reliance, as having been the result of our own observation. We think that some selections from these notes, relating to a few of the animals which more rarely occur,* may prove interesting to many of our readers. We shall therefore make occasional extracts from the note book of the Society, and particularly where we meet any subject of importance. Little, we are aware, of what may thus appear will be more than a repetition of what has often been repeated. But still the repetition of previous intelligence from authentick sources is always of service, as tending to corroborate it. At the same time it not unfrequently occurs that differences are observable

* A more detailed account of some of the more important subjects belonging to the Society has already been given in this Journal: such as the economy of the *Tapir*, *Fennec*, *Chlamyphorus*, &c.

in the internal appearance of individuals of the same species. Where these occur, the accurate observations of different persons, or of the same person on different subjects, will afford a series of *data* on which the philosophick naturalist may found his more comprehensive inferences; an advantage, similar to that which the investigator of species derives from the comparison of various individuals of the same reputed species. By the publication of such intelligence it will also appear that the Zoological Society is not neglectful of the many advantages placed in its hands, nor backward in diffusing the knowledge of them to the publick.

I cannot conclude this short preface to the following notes, without acknowledging how much the Society is indebted to the liberality of Mr. Yarrell, in devoting so much of his valuable time to their service; and at the same time I must express my own thanks for the friendliness with which he has on all occasions afforded me his instruction and assistance.

The notes are arranged in order; the series commencing with the *Mammalia*. This plan will also in future be observed as far as regards the extracts in each number of the Journal.—N. A. V.]

COMMON OTTER. [*Lutra vulgaris*, Erxl.]

Length from the nose to the root of the tail 2 feet 6 inches. *Stomach* consisting of a single cavity. *Intestines* furnished with a strong muscular coat; of uniform size throughout their whole length; measuring 11 feet 1 inch. No *cæcum*. *Kidnies* lobulated. *Ureters* emptying their contents into the bladder by one common trunk about an inch in length.

GENET PARADOXURE. [*Paradoxurus Typus*, Fred. Cuv.]

Length from the mouth to the root of the tail 20 inches. *Stomach* of one cavity. Length of the small *intestines*, 6 feet; of the *cæcum*, 1½ inch; of the *colon* and *rectum*, 6 inches; the length of the *intestinal canal* is to the animal as 4 to 1; the small *intestines* are to the large as 9 to 1.

OCELOT. [*Felis Pardalis*, Linn.]

Length from the nose to the setting on of the tail 2 feet 6 inches. *Stomach* simple. *Intestinal canal* uniform in size and 7 feet in length;

the *cæcum* $\frac{5}{8}$ of an inch ; a large gland appears on each side of the *ilium* at its insertion into the *cæcum*.

CHINCHILLA.* [*Mus laniger*, Molina. ? *Cricetus laniger*, Geoff.]

The head and skin only of this animal was submitted to examination. The lateral and posterior bones of the head appeared to have been peculiar in their form, but had suffered considerable injury, the upper surface of the *cranium* was flattened, the *zygoma* broad in front descending and affording attachment to a strong flat tendon (independent of portions of the *masseter* muscle) which appeared to have formed the anterior boundary of a cheek pouch ; but these parts had also suffered mutilation. The *coronoid process* small. *Incisors* $\frac{2}{3}$ as usual in most rodent animals. *Molars* $\frac{4}{4}$; the three anterior molars of the upper jaw formed of two flattened parallel bony portions with three alternating lines of enamel : the fourth molar possessed an additional portion of bone and enamel, but smaller than the two principal ones ; the direction of the parallel *laminæ* of these teeth not at right angles with the line of the maxillary bone, but inclining obliquely from without backwards ; the molars of the lower jaw placed still more obliquely than those of the upper.

The dentition of this animal does not agree with that of any genus of *Rodentia* figured in the "*Dents des Mammifères*" of M. F. Cuvier. The molar teeth of *Lagomys* are similar in structure, but are placed directly across the line of each jaw bone. The recently described specimen of the new genus *Lagostomus* of Mr. Brookes, possesses the same form and number of molar teeth, and their parallel *laminæ* are placed in

* A beautiful specimen of this species is now alive in the collection of the Zoological Society, brought from Chili, and presented to the Society by Captain Beechey, R. N. We had intended to have given a figure of the animal, and also plates of the system of dentition, in this number of the Journal, but we are informed by one of our coadjutors, that we have been anticipated in this object, and a plate of the *Chinchilla* has already been engraved in another quarter. We know not the materials from which this latter plate has been taken, as we have not heard of another living specimen besides our own having ever been brought to Europe ; but presuming on their being more perfect than those we possess, (ours being very deficient as to internal structure,) we have laid aside our intention, at least, for the present.—ED.

the same oblique direction in both jaws as in the *Chinchilla*, but the enamel in *Lagostomus* is flatter on the crowns, being perhaps only the effect of age and consequent greater attrition. The nearest described genus to this animal appears to be *Lagostomus*.

AGOUTI. [*Dasyprocta Acuti*, Ill.]

Length from the nose to the root of the tail $17\frac{1}{2}$ inches. *Stomach* capacious but having a single cavity. Small *intestines* 18 feet in length; the *cæcum* 8 inches; the large *intestines* 2 feet 9 inches. The length of the *intestinal canal* is to the body of the animal as $14\frac{1}{2}$ to 1; the small *intestines* are to the large as 5 to 1; the form and volume of the *cæcum* resembles that of our common species of the genus *Cobaya*.

PORPOISE OR PORPUS. [*Delphinus Phocæna*, Briss.]

The whole length from the snout to the centre of the tail 4 feet 6 inches. The upper half of the body of a lead coloured black, the under part silvery white. Skin possessing all the tough and flexible feel of well-dressed leather. On separating the lower surface of the mouth from the plates of the under jaw by cutting in the direction of their inner edges, the apparatus which closes the *trachea*, formed by an extension of the *arytenoid cartilages* and *epiglottis*, was immediately brought into view; the most anterior portion when pressed upwards completely closed the *æsofagus*, and the orifice of this elongated *larynx* could be readily brought into contact with the aperture in the palate leading to the blow-hole, the valves and air cavities of which were examined *in situ*, and afterwards dissected out for preservation; the *larynx*, *trachea* and *bronchial tubes* were also removed entire to be preserved. *Lungs* large, consisting of one single lobe of uniform size on each side, dense in structure, pierced with numerous air tubes arising from the *bronchiæ*, which penetrate deep into the substance of the lobes; these air tubes at their extremities contained numerous worms about 4 inches long, slender and white. The *heart* presented nothing remarkable. *Æsofagus* capable of considerable distension, opening into a *stomach* of four cavities; the first of them lined with a villous coat, the second having a honey-comb surface, the third and fourth plicated; the whole being very similar to the well-known divisions and appearance of the compound stomach of rumi-

nating quadrupeds. *Intestinal canal* nearly of uniform calibre throughout, without *cæcum*, measuring 51 feet in length. *Liver* small in proportion to the other *viscera*, consisting of a single lobe on each side, that on the left being but half as large as the lobe on the right. *Kidnies* of a beautiful appearance externally, from the regularity of the hexagonal figures by which their surfaces were divided. The subject a male; the sexual organ with its appendages of large size, the *penis* having attached to its inferior surface a strong (retractor) muscle, by which it was drawn back and folded upon itself within the cavity of the *abdomen*.

The posterior half of the *sclerotic coat* of the eye cartilaginous and of considerable substance; from its firmness reminding the observer of the bony ring in birds: the *crystalline lens* nearly spherical.

TOURACO. [*Corythaix Persa*, Ill.]

General appearance of the inside of the body of this bird inclining rather to that of the *Perchers* than of the *Gallinæ*. The *trachea* dilated at both extremities and slightly also at its centre; the single pair of muscles of voice very large. *Os furcatorium* closely united by a membrane to the *sternum*. *Œsophagus* wide, without any crop. *Stomach* membranous. *Duodenum* large. *Intestines* short, without *cæcal* appendages.

JAVANESE PEACOCK. [*Pavo Javanicus*, Horsf.]

Stomach a true gizzard; *intestinal canal* 4 feet 9 inches in length, having two *cæca*, one of 10 inches, the second of 12 inches.

SILVER PHEASANT. ♀ [*Phasianus nycthemerus*, Linn.]

A female *silver Pheasant*, which had begun to assume the plumage of the male, exhibited on examination the peculiar disease of the sexual organs which is ascertained to be the cause of the appearance of this neutral colour in the feathers.

Two instances of the female of the *Golden Pheasant* (*Phasianus pictus*, Linn.,) undergoing the same change, have lately occurred.

HYBRID PHEASANT.

A female bred between the *golden* and *common Pheasant*.—*Ovarium* not more than one-fourth of the natural size; containing no appearance

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of true *ova*; in colour exactly similar to that of female Pheasants when they have assumed the male plumage. *Oviduct* not deficient in size; but its canal obliterated at the part immediately in contact with the *ovarium*.

WHITE STORK. [*Ciconia alba*, Briss.]

Œsophagus plicated, and enlarged just above the zone of gastric glands, forming a crop. *Stomach* intermediate as to the thickness of its *parietes*, being in substance more muscular than that of the *Birds of prey*. *Intestines* 5 feet in length, with minute rudiments only of two small *cæca*.

COMMON BITTERN. [*Ardea stellaris*, Linn.]

Trachea descending on the side of the neck, not in front as in most other birds. *Œsophagus* plicated. *Stomach* membranous. *Intestines* very narrow and long, measuring 4 feet 7 inches, with a rudiment of one *cæcum* only.

CRESTED GREBE. [*Podiceps cristatus*, Lath.]

A young male. *Œsophagus* narrow and plicated. *Stomach* membranous, containing a ball of feathers. *Intestines* narrow, 5 feet 6 inches in length, having *cæcal* appendages of * $\frac{2}{10}$ of an inch only.

RED-THROATED DIVER. [*Colymbus septentrionalis*, Linn.]

A young male. *Œsophagus* plicated longitudinally, capable of great distension. *Stomach* elongated, the lower portion most muscular. *Intestines* 4 feet 4 inches in length.

TAME SWAN. [*Cygnus olor*, Briss.]

Male. *Stomach* a true gizzard and large. *Intestines* 18 feet in length, with two *cæcal* appendages of 15 inches each.

WILD SWAN. [*Cygnus ferus*, Briss.]

Trachea exhibiting the well known peculiarities. *Stomach* a mus-

* In an old male I have observed the *cæca* to have attained the length of two inches. W. Y.

cular gizzard, but only half as large as that of the *tame Swan*. *Intestines* 8 feet 8 inches long, with two *cæcal* appendages, 10 inches each.

BLACK SWAN. [*Cygnus atratus*.]

Male. *Trachea* descending sufficiently low to be attached to the angle of the *os furcatorium* by a strong dense membrane. *Stomach* a true gizzard. *Intestinal* canal 10 feet in length; *cæcal* appendages 13 inches each.

CANADA GOOSE. [*Anser Canadensis*, Briss.]

Stomach a true gizzard. *Intestines* 8 feet 4 inches in length, with two *cæcal* appendages of 9 inches each.

WHITE-FRONTED GOOSE. [*Anser albifrons*, Briss.]

Stomach a true muscular gizzard. *Intestinal* canal 8 feet long, having two *cæcal* appendages of 13 inches each.

INDIAN TORTOISE. [*Testudo Indica*, Linn.]

Circumference of the shell 6 feet 6 inches; length of the upper shell from anterior to posterior edge, measuring over the curve, 4 feet 2 inches, greatest thickness of the shell 3 inches. Whole length of the animal, from the nose to the end of the tail, 5 feet. *Trachea* 18 inches; *bronchia* 10 inches; the lungs appeared to cover nearly the whole inner surface of the upper plate, the cells very large; two pairs of powerful muscles extended from the sides of the spine, to be attached to the neck and head, one pair of which drew back the head, the other pair drew in and folded the neck, the *vertebræ* possessing great extent of motion upon each other; *heart* small in proportion to the animal and its other *viscera*; *auricles* far exceeding the *ventricles* in capacity. *Stomach* a single elongated crescent-shaped bag, the upper half lying on the left side, the lower portion turning across the abdominal cavity, the *parietes* thick and muscular. *Intestines* of large calibre, 22 feet in length, with strong muscular coats. *Liver* of great size, composed principally of one large lobe on each side; *kidneys* 6 inches in length and placed very far back near the *pelvis*; *urinary bladder* of extraordinary size, the coats very thin and nearly transparent; when moderately distended with air it

formed a cavity three times as large as the stomach, and parallel contractions on the surface gave it the appearance of being divided into three equal lobes; the animal was a female and weighed about 460 pounds.

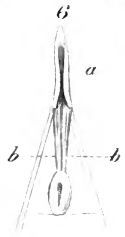
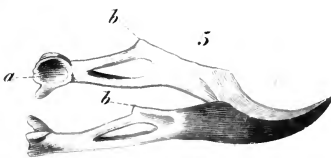
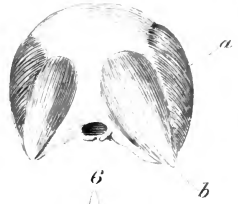
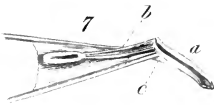
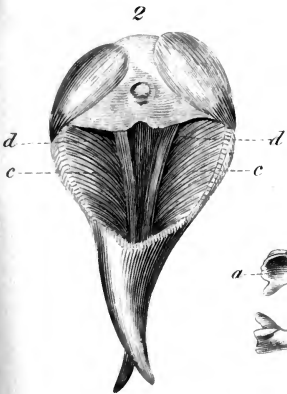
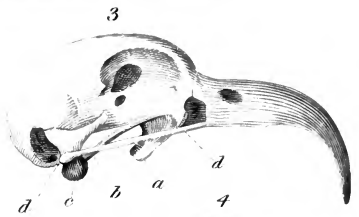
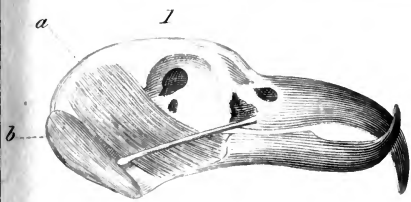
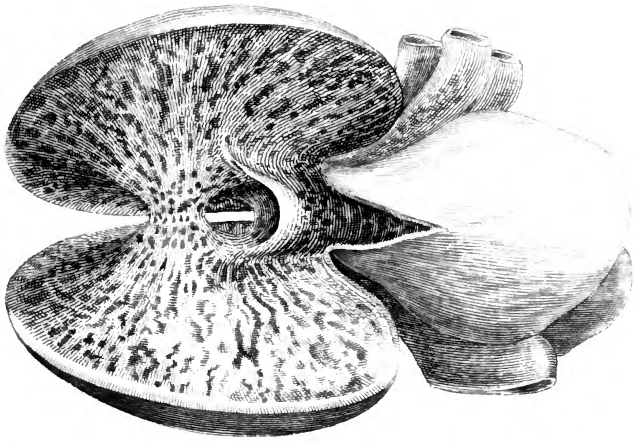
(To be continued.)

ART. XLI. *Observations on the structure of the Heart of the Testudo Indica, founded on the examination of a Specimen in the Collection of the Zoological Society. By G. J. GUTHRIE, Esq, F.R.S., Professor of Anatomy and Surgery, Royal College of Surgeons, &c.*

THE heart is composed of two auricles and two ventricles, the latter communicating with each other. The right auricle, which is by much the largest, receives the blood returning from every part of the body, by a large vein or *sinus*, which enters at the upper and back part, and has two valves, the inner the largest, which, when the auricle is full, prevent the further ingress of blood, the edges of the valves meeting so as to form a mere slit between them. This *sinus* is so continued into the walls of the auricle, as to appear, when distended, an addition to it, and is evidently intended as another receptacle, in which the venous blood may be detained without inconvenience.

The blood from the lungs is returned into the left auricle by one pulmonary vein, which enters at the upper and inner part of the auricle, having received a second pulmonary vein nearly at the point of entrance, and is furnished with a valve formed by a fold of the *septum*. This auricle is of a more regular, and of a rounder form than the other, and was in this instance full of coagulated blood. The auricles are divided by a thin and membranous, but complete *septum*. The walls are strong and muscular, those of the right being about as thick again as those of the left. Neither of them have an *appendix*, but the round point or termination

A



is thicker than any other part, and is furnished with larger muscular fibres or bands passing across in different directions; those in the auricle generally running from the opening into the ventricle, upwards. These fleshy columns are often more than an inch long, and can be easily raised from the side of the auricle. The coronary vein opens into the *sinus venosus* above the valves. The auricles open into the ventricles by separate passages on each side of the *septum*, this part of the heart being very much contracted, so as to form an isthmus between the auricles and ventricles, each when distended passing outwards far beyond it, the auricles extending, however, farther than the ventricles.

The heart is flat, and the walls of the ventricles are so very thick as to leave but little cavity between them: the ventricles measuring five inches from edge to edge, the cavity not more than an inch and an half. The *parietes* of the left side being much thicker than those of the right, the proportion of cavity is so much the less. On the outside or surface the muscular substance is firm and smooth, but on the inside it very much resembles a sponge in appearance, particularly in the left ventricle; the right, although equally partaking of this structure, having within it a more marked muscular or fleshy substance, acting apparently as a valve to the pulmonary artery, and partly as an imperfect *septum*, which runs from below upwards, and rather from left to right. The cavities of the ventricles are very small, not containing one twentieth part as much as the auricles; the spongy walls taking up the whole space, except at the upper part, under the termination of the *septum* of the auricles; which, if continued downwards, would have also formed a *septum* for the ventricles. At this spot there is a distinct and clear passage, through which the finger can be passed from one side or ventricle to the other. This is covered above by a valve on each side, extending from the edge of the *septum* of the auricles. These two valves falling down when the ventricles dilate, and the blood comes in from the auricles, nearly touch each other and close up this opening between the ventricles; and when the ventricles contract and push up these valves, they close the opening between the auricles and ventricles. The right side of the heart is furnished with a very distinct semi-circular muscle towards the outside of the immediate passage between the auricle and ventricle, and above the valve, which contracts this passage, and with the valve, completely closes the opening. On

the left side, this muscle seems wanting, or is not so well marked, and the *ostium* through which the blood passes is not so directly downwards, as it is outwards ; so that the blood seems forced against or into the external edge or spongy wall of the left ventricle, from which no vessel is given off. Three arteries arise from the right ventricle at its upper and anterior part, the veins all entering the auricles from behind (the animal being examined on its back.) The pulmonary artery is the lowest, the two *Aortæ* in succession one immediately above the other. Each of the three vessels is furnished with two semilunar valves, like the semilunar valves of these vessels in the human subject. The pulmonary artery is as large as the two *Aortæ*, and divides into two about an inch and a half from its origin. The superior of the two *Aortæ* is on a level with the under edge of the valve of the auricle. The cavity of each ventricle is lined by a fine membrane, which marks its extent ; at the inferior part, several tendinous cords pass across from behind forwards diagonally, diminishing the size of the passage from one ventricle to the other. When the right ventricle is opened from behind (considering the belly of the animal as the front), a strong muscular band covered by this smooth membrane, and to which some of these tendinous cords are attached, (the pulmonary valve before alluded to), is seen passing from the point of the lower edge of the heart across to the right anterior part of it, just above the orifice of the pulmonary artery, and to the commencement of the aortic openings. This appears to divide, in some measure, the ventricle into two parts, as well as to form with the tendinous cords a sort of imperfect *septum* between the two sides of the heart. On attentive consideration, its use seems to be, to force the venous blood on the contraction of the ventricle, in the first instance, into the pulmonary artery ; for when the ventricle and it contract together, it closes up that part in which the pulmonary artery is situated, and cuts off the communication between it and the upper part of the ventricle, into which the scarlet or arterial blood is now passing through the opening in the *septum*. At the same time that the contraction of this fleshy column closes up the passage into the pulmonary artery, it draws the aortic openings more directly opposite to the passage through the *septum* from the left ventricle, which is also diminished by the tendinous cords already alluded to ; so that no admixture of arterial or scarlet, and black or venous blood takes place in regard to the pulmonary artery, although it must occur in regard

to the *Aortæ*. In the natural state of the animal, whilst breathing freely, it is easy to conceive that the blood of the left side will pass across to the aortic openings, with little admixture in its transit across the right ventricle.

The sponge-like structure of the walls of the ventricles may admit of a ready passage for the blood, from one side to the other through its substance, but no direct opening could be perceived, and none is believed to exist, although in a preparation in the Hunterian collection such a passage is attempted to be shewn.

Mr. Clift, jun. has taken a drawing of these appearances, which will be deposited in the Museum of the Society.

ART. XLII. *Notes taken during the examination of a Specimen of Testudo tabulata, which lately died in the Collection of the Zoological Society.* By THOMAS HENRY HOLBERTON, Esq., M.R.C.S., &c.

THE shell was sawn through in a line drawn from the *axilla* to the groin, and on raising the abdominal part, a strong tendinous membrane was found adhering firmly to its centre; attached also to the muscles which arise from its anterior and posterior thirds and pass to the respective extremities. This membrane then closely covered the lungs on either side, extended across the upper part of the *abdomen*, forming a tendinous diaphragm, and was continued over the *abdominal viscera* as *peritoneum*, being here more delicate in its structure.

The *liver* was composed principally of a right and left lobe, the latter receiving in a hollow a portion of the cardiac end of the stomach. With the former the *duodenum* lay in contact. On the inferior surface of the liver were several smaller lobes or appendages, the most remarkable of which was one, an inch and half in length, and a quarter of an inch in breadth, connected to the rest of the liver only by its base at the *fundus* of the *gall-bladder*, with which it exactly corresponded in size.

The *stomach* was a simple bag: the muscular coat very strong in proportion to the other two, and its fibres circular. Although they appeared

sometimes, when examined through the peritoneal coat, to take a longitudinal course, yet on removing this coat, circular fibres were instantly exposed. The same observation held good with the *œsophagus* and *intestines*. I will not say that no longitudinal fibres existed; but I was unable to demonstrate them. The *œsophagus* was lined with a strong mucous membrane, studded with small mucous follicles, but not furnished with processes as in the turtle. The tongue, as Blumenbach has described, was "thickly covered with long fibrous *papillæ* on its anterior surface." The *ilio-colic valve* was not a projecting fold of the inner membrane, as Carus describes it to be, but a mere thickening of the muscular coat, the calibre of the intestine being diminished at this point, and resembling the valve at the *pylorus*. There was no trace of *appendix cæci*. The *intestines* were five times the length of the shell.

The neck was seen projecting into the *abdomen* on the removal of the liver. There were seven cervical *vertebræ*; the two last placed at right angles to the dorsal, thus forming a strong point of attachment for the tendinous diaphragm. In the neck greater extent of flexion and extension was allowed between the sixth and seventh cervical *vertebræ*, and to the latter on the first of the dorsal class. The last cervical was the smallest of this set. The muscles peculiar to the neck were two pair and a single one, and are as follow. A pair of strong muscles, arising from either side of the bodies of the two or three last dorsal *vertebræ*, and from the lumbar, passed upwards to be inserted into the sides of all the cervical *vertebræ*. A large extensor arising from the first dorsal *vertebra* was inserted into the upper part of the bodies of all the cervical. This is described by Blumenbach. Two smaller and more superficial muscles, arising from the anterior edge of the dorsal shell, ran underneath the skin to the sides and upper part of the anterior cervical *vertebræ*.

The *lungs* extended from the dorsal and lumbar *vertebræ* to the part common to the abdominal and dorsal shell; anteriorly filling the space between the third and fourth lower cervical *vertebræ* and the muscles of the anterior extremities, and posteriorly reaching to the *pelvis*. They were in contact along the spine when distended, but did not communicate with each other. The singular vesicular appearance of the air cells needs no description. The *trachea* took a tortuous course; resting first on the fore part of the neck, it passed obliquely to the right side, then to the left as

far as about the fifth *vertebra* where it divided into the *bronchi*, the right crossing the neck transversely, the left entering the lung of its own side.

The *heart* surrounded by the *pericardium*, and inclined to the right side of the projecting part of the neck, consisted as described by Blumenbach of two *auricles* separated from each other by a *septum*, and of a right and left *ventricle* communicating with each other.

The inferior *cava* receiving the blood from the liver and other abdominal *viscera* terminated in the right *auricle*. There was no superior *cava*; but two veins, (analogous to the right and left *subclavian* in the human subject), situated between the tendinous diaphragm and *pericardium*, terminated at the base of the right *auricle*, in the opening common to them and the inferior *cava*. By a common opening, the left *auricle* received the blood from a right and left pulmonary vein. From the right *ventricle* three trunks arose, which were so united at their roots as to give an appearance of an *appendix*, but a careful dissection displayed each trunk arising separately from the substance of the *ventricle*. Each of these arteries, at its origin, was supplied with two semilunar valves,—folds of the inner membrane.

The first of the three arteries was the pulmonary dividing into two branches.

The second crossed to and ran down the left side of the neck to the second dorsal *vertebra*, where it was joined by a branch from the primitive artery next to be mentioned. By this union the abdominal *aorta* was completed. It passed down to the lumbar *vertebræ*, inclined slightly to the left of the spine, and here divided into two iliac arteries.

The third, a large short trunk soon divided into two branches, one running down the right side of the neck to complete the formation of the abdominal *aorta*, the other passing upwards a short distance subdivided into two, each of which sent a branch to the head and the anterior extremity of its side.

The dorsal *vertebræ*, seven, and lumbar or sacral, four in number, were ankylosed with each other and to the dorsal shell. The caudal were eleven, and moveable. There was free motion between the first caudal and last lumbar or sacral *vertebræ*, on which the *pelvis* moved freely, the *ilium* receiving the two posterior articulating processes.

The *clavicle* and *scapula* constituted one bone, and the former was

attached by a moveable cartilage to the shell, at the side of the first dorsal *vertebra*. There was a strong ligamentous band uniting the two *scapulae* inferiorly where they approximate on the fore part. Thus they formed part of the *parietes* of the cavity containing the heart.

The *penis* was contained in the *cloaca*, and divided longitudinally as in Blumenbach's account. It was furnished with two retractor and two elongator muscles. The retractors arising from either side of the bodies of two or three of the middle dorsal *vertebrae* passed downwards behind the *rectum* to be inserted into the under part of the *penis*, and their action was to draw the *penis* upwards. Their antagonists arose from the *pubes*, and passed completely around the lower end of the former muscles to be attached again to the same bone near their origins. Their action was to draw down the *penis*; but as they were not attached to it, this purpose was effected through the medium of the last mentioned muscles, the lower end of which they draw towards the *pelvis*.

ART. XLIII. *Observations on the Vultur Californianus of Shaw.* By DAVID DOUGLAS, F.L.S., &c.

Vultur Californianus, *Shaw, Nat. Misc.* Vol. ix, pl. 301. *Lath. Hist.* Vol iv, p. 3. *Cathartes Californianus*, *Illiger*. *Sarcoramphus Californianus*, *Auct. rec.*

THE length of this bird is 56 inches; the measure round the body 40 inches. Weight 25 to 35 pounds. *Beak* $3\frac{1}{2}$ inches long, bright glossy yellow. *Head* 9 inches round, deep orange, with a few short scattered feathers on the fore part, at the root of the beak. *Iris* pale red. *Pupil* light green. *Neck* 11 inches long, 9 round, of a changeable color, brownish yellow with blue tints. *Body* 24 inches long, black or slightly brown. *Collar* and breast feathers lanceolate, decomposed, white on the outside near the points. *Quills* thirty-four, the third the longest. Extent between the tips of the wings 9 feet 8 inches.

Under coverts white; upper coverts white at the points. *Tarsi* $4\frac{3}{4}$ of an inch long, bluish black. *Claws* black, blunt, having little curvature. *Tail* 14 feathers, square at the ends, 15 inches long. In plumage both sexes are alike: in size the female is somewhat larger.

These gigantic birds, which represent the *Condor* in the northern hemisphere, are common along the coast of California, but are never seen beyond the woody parts of the country. I have met with them as far to the north as 49° N. Lat. in the summer and autumn months, but no where so abundantly as in the Columbian valley between the Grand Rapids and the sea. They build their nests in the most secret and impenetrable parts of the pine forests, invariably selecting the loftiest trees that overhang precipices on the deepest and least accessible parts of the mountain vallies. The nest is large, composed of strong thorny twigs and grass, in every way similar to that of the eagle tribe, but more slovenly constructed. The same pair resort for several years to the same nest, bestowing little trouble or attention in repairing it. *Eggs* two, nearly spherical, about the size of those of a goose, jet black. Period of incubation 29 or 31 days. They hatch generally about the first of June. The young are covered with thick whitish down, and are incapable of leaving the nest until the fifth or sixth week. Food carrion, dead fish, or other dead animal substance. In no instance will they attack any living animal unless it be wounded and unable to walk. Their senses of smelling and seeing are remarkably keen. In searching for prey they soar to a very great altitude, and when they discover a wounded deer or other animal, they follow its track, and, when it sinks, precipitately descend on their object. Although only one is at first seen occupying the carcase, few minutes elapse before the prey is surrounded by great numbers, and it is then devoured to a skeleton within an hour, even though it be one of the larger animals, *Cervus Elaphus*, for instance, or a horse.

Their voracity is almost insatiable and they are extremely ungenerous, suffering no other animal to approach them while feeding. After eating they become so sluggish and indolent as to remain in the same place until urged by hunger to go in quest of another repast. At such times they perch on decayed trees with their heads so much retracted as to be with difficulty observed through the long, loose, lanceolate feathers of the

collar. The wings at the same time hang down over the feet. This position they invariably preserve in dewy mornings or after rains.

Except after eating, or while protecting the nest, they are so excessively wary, that the hunter can scarcely ever approach sufficiently near, even for buck-shot to take effect on them, the fullness of the plumage affording them a double chance of escaping uninjured. Their flight is slow, steady, and particularly graceful; gliding along with scarcely any apparent motion of the wings, the tips of which are curved upwards in flying. Preceding hurricanes or thunder-storms they are seen most numerous and soar the highest. The quills are used by the hunters as tubes for tobacco pipes.

Specimens, male and female, of this truly interesting bird, which I shot in lat. 45. 30. 15., long. 122. 3. 12., were lately presented by the Council of the Horticultural Society to the Zoological Society, in whose Museum they are now carefully deposited.

ART. XLIV. *Observations on two undescribed species of North American Mammalia.* By DAVID DOUGLAS, F.L.S., &c.

CERVUS LEUCURUS.

Long or white-tailed Deer, Chevreuil of the Canadian Voyagers.

Horns ramose, slender, smooth, round, much turned forwards. Length of the body from the nose to the root of the tail 4 feet 3 inches. Height of the fore shoulder 3 feet 5 inches; that of the hind quarter the same; *girth* behind the fore legs 3 feet 5 inches; distance between the eyes 5 inches. *Ears* 8 inches. *Tail* 12 to 15 inches. *Head, neck, body,* and *legs* light grey, changing to a reddish brown in summer. *Belly,* inside of the legs and thighs, and under the tail, white; *ancles* yellowish brown. *Lips* and *tips* of the *ears* black. From a full grown animal, four years old, the following dimensions will shew correctly the curvature of the horns. Distance between the roots $1\frac{3}{4}$

of an inch; between the root or first antlers 5 inches; between the second 17 inches; between the third 15 inches; and between the tips $9\frac{1}{2}$ inches. Those of the first year $3\frac{1}{2}$ inches long, with one antler $\frac{1}{2}$ an inch long. They herd from November to April and May, at which time the female secretes herself to bring forth. The young are spotted with white until the middle of the first winter, when they change to the same colour as the most aged. Its vernacular name is *Mowitch*.

This species is the most common of any in the districts adjoining the river Columbia, more especially in the fertile Prairies of the *Cowalidske* and *Multnomah* River, within one hundred miles of the Western Ocean. They are also occasionally met with near the base of the Rocky Mountains, on the west side of that ridge. Their favorite haunts are the coppices composed of *Corylus*, *Rubus*, *Rosa* and *Amelanchier*, on the declivities of the low hills or dry undulating grounds. Their gait is two ambling steps and a bound, the bound exceeding double the distance of the steps, which mode they do not depart from even when closely pursued. In running the tail is erect wagging from side to side, and from its unusual length is the most remarkable feature about the animal. The voice of the male calling the female is like the sound produced by blowing in the muzzle of a gun, or in a hollow cane. The voice of the female calling the young is *mæ mæ*, pronounced shortly. This is well imitated by the native tribes with a stem of *Heracleum lanatum* cut at a joint leaving 6 inches of a tube. With this, aided by a head and horns of a full grown buck, which the hunter carries with him as a decoy, and which he moves backwards and forwards among the long grass, alternately feigning the voice with the tube, the unsuspecting animal is attracted within a few yards in the hope of finding its partner, when instantly up springs the hunter and plants an arrow in his object. They are tenacious of life, and often escape although both shoulders be broken. The flesh is excellent when in good order, remarkably tender and well flavoured.

This is the Chevreuil, the jumping, or long-tailed Deer of the Canadian voyagers, and the one alluded to by Mr. Sabine in the Zoological Appendix to Captain Franklin's First Narrative. To *C. Virginianus* and *C. Mexicanus* the present is more nearly related than to any other: from both, however, it is abundantly distinct, not only in natural habit but in manner and disposition.

A female is in the collection of the Zoological Society, which was presented by the Hudson's Bay Company. A pair of horns also of the male, which I brought from the confluence of the river Columbia with the Pacific, was added to the same collection by the Council of the Horticultural Society.

OVIS CALIFORNIANUS.

Length from the nose to the root of the tail 5 feet 10 inches; *height* of the fore shoulder 2 feet 8 inches; that of the hind quarter the same; girth behind the shoulders 6 feet; length of the tail 1 foot 6 inches. Head 16 inches long; 7 inches between the eyes; 9 inches between the horns. *Horns* of the male lunate, partly compressed, comparatively smooth, 24 to 30 inches long, yellowish; of the female, 7 inches long, curved back and pointed outwards. *Wool* short, fine, yellowish white, intermixed with longer brownish coarser hairs about the neck, rump, legs and tail. Hair on the head short, fuscous brown; ears erect, $1\frac{1}{2}$ inch long, obtuse.

Of the manners of this majestic animal I can say nothing, never having had an opportunity of seeing it alive.

From the testimony of the Indian tribes about the Great Falls of the Columbia River, it appears to inhabit the subalpine regions of *Mounts Wood, St. Helens, and Vancouver*, but is more numerous in the mountainous districts in the interior of California. The only good skin that ever came under my observation* was that of a male, apparently recently killed, which I saw on Sunday, 27th August, 1826. This the Indians would not part with, unless I would give in return my shirt, which could ill be dispensed with, my stock being reduced to one at that time. The horns I purchased for a few trinkets and a little tobacco; they are now in the Museum of the Zoological Society.

The horns are generally converted by the Snake Indians into bows, spoons and cooking utensils.

I have been induced to give the above notice, in the hope of directing the attention of persons who may hereafter travel in that country to this animal.

* In Lat. 46. 14. 55., Long. 121. 17. 0.

ART. XLV. *On Aplodontia, a new genus of the order Rodentia, constituted for the reception of the Sewellel, a burrowing animal which inhabits the North Western Coast of America. By JOHN RICHARDSON, M.D., F.R.S., F.L.S., &c.,*

IN the narrative of the memorable journey of Captains Lewis and Clark across the American continent to the mouth of the Columbia, the following passage occurs, “ Sewellel is a small animal found in the timbered country on this coast. It is more abundant in the neighbourhood of the great falls and rapids of the Columbia, than on the coast which we inhabit [mouth of the Columbia]. The natives make great use of the skins of this animal in forming their robes, which they dress with the fur on, and attach them together with sinews of the elk or deer; the skin, when dressed, is from fourteen to eighteen inches long, and from seven to nine in width; the tail is always separated from the skin by the natives when making their robes. This animal mounts a tree and burrows in the ground precisely like a squirrel; the ears are short, thin and pointed, and covered with a fine short hair, of a uniform reddish brown; the bottom or base of the long hairs, which exceed the fur but little in length, as well as the fur itself, are of a dark colour next to the skin for two thirds of the length of this animal: the fur and hair are very fine, short, thickly set, and silky; the ends of the fur and tips of the hair, are of a reddish brown, and that colour predominates in the usual appearance of the animal. Captain Lewis offered considerable rewards to the Indians, but was never able to procure one of these animals alive.”*

It does not appear that the enterprising travellers brought any of the skins of the Sewellel to the United States, and the above notice is the only real information respecting the animal that has reached the public up to this period. M. Rafinesque-Smaltz referred the Sewellel provisionally to his genus *Anisonyx*† under the name of *Anisonyx? rufa*; and

* LEWIS and CLARK, *Journey*, &c. III. p. 40.

† DESMAREST, *Mammalogie*, p. 330 in notis.

Dr. Harlan has placed it in the genus *Arctomys*. It differs, however, essentially from an *Arctomys*, not only in general habit and appearance, but also in dentition, as it does, indeed, from all the *Rodentia* with which I am acquainted. M. Rafinesque has given few details of the genus *Anisonyx*, and says of the teeth, merely, that they resemble those of the Squirrels. This character does not apply at all to the Sewellel, which was known to Rafinesque only from Lewis and Clark's description. I have, therefore, been induced to constitute a new genus for the reception of this animal, and as the specific name of *rufa* is quite inapplicable, I have given it one derived from the general resemblance it bears to animals of the hare kind.

Lewis and Clark deriving their information solely from the natives, and, perhaps, through an imperfect translation, appear to have confounded the Sewellels with a species of *Myoxus*, a very distinct animal, and are mistaken in ascribing to it the habit of climbing trees; neither is it found in the neighbourhood of the Grand Rapids of the Columbia, as they were told. It is a very local animal, confining itself to particular spots, generally on the banks of rivulets flowing through small prairie lands. In these places it forms large villages, whose areas are completely hollow with their burrows. It is common on the Cowlidiske, one of the northern branches of the Columbia, also in the district between Mount St. Helens and Puget Sound, and on the sea coast between the Columbia and Whitby's Harbour.

Its food consists of vegetable substances, such as grass, the bulbs of the *Scilla esculenta*, and the bark of fallen trees, &c. The female has two litters of young in a season, and brings forth from three to five at a time. Several tribes of Indians, particularly those inhabiting the coast from the mouth of the Columbia northwards, form dresses of the skins of the Sewellel.

APLODONTIA.*

CHAR. *Dental formula*, incisors $\frac{2}{2}$, canines $\frac{0}{0}$, grinders $\frac{4}{4}$; 22.

Incisors, very strong, flatly convex anteriorly without grooves, narrower behind. *Grinders* simple, remarkably even on the crowns. The first in the upper jaw, small, cylindrical, and pointed, is placed within

* Th. *απλοος* simplex, *οδους* dens.

the anterior corner of the second one, and exists in the adult animal. The rest of the grinders are perfectly simple in their structure, without roots, have slightly concave crowns, and are simply cased in enamel, without any transverse ridges or eminences. There is an acute vertical ridge on the exterior side of the upper grinders, and inner side of the lower ones, with a wide furrow or groove on each side of it, and the opposite side of the tooth is rounded or semicircular. The second grinder in the upper jaw, and the first in the lower, are a little larger than the others, and the former has a projection of enamel at its anterior corner, producing a second, though smaller, perpendicular ridge, within which the small first grinder is situated. There is a slight furrow on the exterior sides of the lower grinders, most conspicuous in the first one.

Palate narrow; the right and left rows of grinders being near each other, and disposed in parallel straight lines.

Head flat and broad; *nose* a little arched, thick and obtuse.

Lower jaw thick and strong, much developed posteriorly, and having condyles more transverse than longitudinal.

Cheek-pouches none.

Eyes very small. *Ears* short and rounded, approaching in form to the human ear.

Body thick and short.

Limbs short and thick; *feet* moderately strong, with naked soles. Five toes on all the feet, rather short, but well separated. The thumb of the fore-feet is considerably shorter than the other toes. *Claws*, particularly the fore ones, very long, strong, much compressed, and but little curved.

Tail very short, concealed by the fur of the hips.

Mammae six, the anterior pair between the fore-legs.

HABIT. The Sewellel is a plantigrade, burrowing animal, living in villages, and feeding on vegetable substances.

APLODONTIA LEPORINA. *The Sewellel.*

Sewellel. LEWIS and CLARK'S *Journey*, &c. iii, p. 39, (Engl. ed.)

Anisonyx? rufa. RAFINESQUE, *Desm.*, *Mamm.* p. 330, in notis.

Arctomys rufa. HARLAN, *Americ. Fauna*, p. 308. GRIFFITH'S *Animal Kingd.* v. p. 245, spec. 636.

Marmot, No. 17. HUDSON'S BAY MUSEUM.

DESCRIPTION. The *Sewellel* stands very low on its legs, and has a short, thick body, like that of a hare, with a rather large head. The nose is thick and obtuse, the nostrils small and round, and the whiskers very strong, and longer than the head. The eye is very small, the opening in the skin not exceeding two lines. The ear strongly resembles the human ear in its form. The flap or auricle is rounded, and is about half an inch high above, and posterior to the auditory opening. It is prolonged beneath the opening in form of a narrow thick margin, and its anterior part forms a distinct *helix*. It is clothed with very short, soft fur, intermixed with a few larger hairs.

The stump of the tail is scarcely half an inch long, and has a slender cylindrical form. It is covered with fur of the same colour and length with that on the neighbouring parts, and is not visible when the animal is alive.

Fore-feet. The thumb is of sufficient length to be of use in grasping, and its upper *phalanx* is closely covered by a smooth rounded nail. The second fore-toe is the longest, the third is a little shorter, the first is about two lines shorter than the second, and the fourth or last is scarcely shorter than the first. The claws are large, and very much compressed, so that their edges are in contact beneath, for nearly their whole length. The *hind-feet* are a little more slender than the fore ones, and their claws are about one-half smaller, rather more arched, and less compressed.

The fur resembles that of a musk-rat, or a rabbit when out of season, and consists of a close short down, four or five lines long, mixed with longer scattered hairs. The general *colour* of the back is intermediate between umber and chestnut browns, without any tendency towards a rufous hue, and it is rendered darker by most of the long scattered hairs on that part being black. The belly is greyish or clove brown, and many of the long hairs there, and on the sides, are tipped with white. The nose is clothed with short hairs, nearly of the colour of the back; the lips are whitish, and there is a pretty large spot of pure white on the throat. In the female the *mammæ* are indicated by brown circular marks on the fur. The fur has no lustre on its surface, and little beauty.

That on the back has a shining greyish black colour from the roots to the brownish tips.

Dimensions of a full-grown male specimen.

Length of head and body	14 inches.
tail (<i>vertebræ</i>)	$\frac{1}{2}$
fore-claws	$\frac{1}{2}$

The female is nearly of the same size.

I had originally drawn up the characters of this interesting little animal, from a specimen contained in the collection of the Hudson's Bay Company. I have since been indebted to the kindness of Joseph Sabine, Esq., Secretary to the Horticultural Society, for the opportunity of more accurately examining the species, and completing the generic characters, from specimens in the collection of that Society, brought home by Mr. David Douglas. To this gentleman also I have to acknowledge my obligations for the whole of the information which has been given of the habits and manners of the animal. And here I cannot avoid adding my tribute of praise to Mr. Douglas, for the zeal and intelligence with which he has pursued his scientific researches in North America, and the unusual liberality with which he has communicated his knowledge to the friends of science.

I have to add that on examining the specimens brought home by Mr. Douglas, I find one smaller than the others, and with a less brown and more hoary fur, which exhibits a considerable difference in the form of its skull, particularly in the distance between the orbits. It is probable, therefore, that a second species may exist nearly resembling the one described above; but the specimen is unfortunately too much injured to enable me to draw up its characters.

ART. XLVI. *Description of the Animal to which belongs the Shell called, by the Baron de Férussac, Helicolimax Lamarckii. By the Rev. R. T. LOWE.*

THE general appearance of the animal is that of the common naked Slug (*Limax*) with a very tumid cuirass; its form being more or less elongated, thickest in the middle, with the posterior extremity or tail pointed. The neck is of moderate length, and when the animal is crawling, does not extend beyond the anterior edge of the cuirass more than in *Limax*. When at rest, the head and neck are not withdrawn under the cuirass, and the *tentacula* are only partially retracted.

The Cuirass or Shield is properly an appendage to the collar, or that portion of the mantle which, as in *Helix*, encircling the body, closes up the pulmonary cavity within the aperture of the shell. But all this is concealed by the cuirass itself and its lobes; and the attachment beneath of the cuirass to the collar in the centre of the former, and its origin from it, are only ascertainable by particular examination; not entering with strict propriety into a mere description of external form.

The fore part of the cuirass, between the anterior edge of the shell and the neck, is perfectly free and loose, and is placed like a saddle or pad upon the neck, which plays freely beneath it; so that when the animal is forced to withdraw its head under this to avoid some obstacle presented directly before it, the head is often put forth again immediately on one side or the other almost at right angles with the rest of the body. When thus forced to draw its head under the cuirass, the fore part of the latter is sometimes brought down, and its edge closely applied to the surface on which the animal is crawling.

The posterior portion of the cuirass is extended or reflected over the shell, so as to conceal it more or less according to circumstances. In its natural condition, the shell is perfectly concealed by it; in which state the animal has exactly the aspect of a *Limax* with a very tumid, uneven, large, raised cuirass, as before stated: and thus it is always found in its places of retreat under stones, when moist and in a healthy condition. Removed from its natural abode, or after exposure to a free circulation of air, there soon appears, first a *sinus*, then a deep wide slit up the

posterior half of what appeared before to constitute a uniform tumid cuirass. Through this opening appears the shell, the back part of whose last volution, as the animal becomes more and more dry, is gradually more exposed by the enlargement of the *sinus* which dilates more particularly on the left side; till finally the whole shell is exposed, with the exception of about a line's breadth of the outer lip covered by a narrow portion of the cuirass like a border, which becoming broader towards the right side, extends backwards towards and partly over the spire in a kind of broad lateral lobe. The animal is even sometimes completely retracted within the shell, like a *Helix*; and had I not observed in the same individuals the whole process of transition, from the aspect of a *Limax* without the slightest appearance of external shell to that of a *Helix* completely contained within one, the identity of the individuals in the two states would have seemed most questionable.

The shell is placed with its spire posterior and directed towards the right side. Its posterior spiral part is sunk into a kind of hollow bed whose margins rise around and closely embrace it. When partially exposed, it may even be raised up out of this sort of sunken bed, formed for its reception, by something applied behind to its spire. The margins which embrace it originate on each side of the body just below the edge of the cuirass, as far back as the respiratory orifice, becoming higher or broader posteriorly. They are elevated, sharp-edged, with oblique grooves or *striae* dividing them into tumid compartments, and are highest or broadest close beneath, *i. e.* behind, the spire, where they leave a small triangular hollow or cavity, and then approaching close together, form by their opposition a keel which runs some way down the middle of the posterior extremity.

The respiratory orifice is on the right side, within a large distinct *sinus* on the edge of the cuirass near its posterior end, *i. e.* just beneath the spire of the shell, but a little before it; so that on looking into the orifice, the shell is seen distinctly forming a roof to the pulmonary cavity. It is lined with a tissue of ramifying vessels, whose main branch, proceeding from a whitish internal organ situated backwards towards the spire and on the left side (the slime-organ, or "Sac de la viscosité," Cuv.?), runs forwards in an oblique direction across the shell towards the head of the animal. These vessels are best seen externally through the substance of

the shell itself, where it is exposed on the left side of the animal. Through this part also, when the animal is at rest, may be seen, on the left side, beneath the whitish organ just mentioned, a strong and regular pulsation and motion of *systole* and *diastole*, or of alternate contraction and dilatation. The part in which this takes place is the *pericardium*: and that in which the vessels above described are perceptible is the pulmonary cavity. This last occupies, when the animal is crawling, the larger portion of the last volution of the shell, extending about half way backwards from the outer lip. The *pericardium* is at the back of the pulmonary cavity and on the left side; the remainder of the first volution backwards, and the spire of the shell, are occupied by the liver which is of a dark brown colour, with a few fine milky veins interspersed through its substance.

The posterior extremity is acuminate, pointed, triangular when the animal is at rest, elongated when in motion, convex and carinated down the middle. The keel is formed by the opposition of the two lips of skin which form the edges of the bed in which the posterior part of the shell is sunk; and which thus, while giving the appearance of a keel, form in reality a close channel or groove. This is continued a part of the way down, but not to the extremity. The oblique grooves before mentioned on these lips of skin are continued on each side to the extremity of the tail, dividing it into compartments on each side. There is no appearance of a terminal mucous pore.

Head, cheeks, and mouth externally as in *Helix*.

The *tentacula* are four, cylindric, retractile, with black points at the tips only of the upper and longest pair.

The orifice of the organs of generation is close beneath and a little behind the base of the right *tentaculum*, on a line with the shorter pair of *tentacula*.

Foot as in *Limax* or *Helix*; narrow, elongate.

The shell is spiral, of three or four volutions, extremely thin and fragile, pellucid, very glossy and shining, of a bright amber yellow with generally a greenish tinge, much depressed or flattened, ear-shaped, the last volution vastly large; the breadth, in the usual acceptation, (or here more properly *length* in respect to the position of the shell on the animal) exceeding considerably another diameter at right angles to it, and equal-

ling about one fourth of the length of the entire animal. Spire very short, depressed, flattened or scarcely at all raised, and then very obtuse; its volutions are convex, with the suture distinct. Aperture very large, broader than long, elliptic with the exception of a segment taken out by the projection into it of the spire. True *axis* or *columella* none, but the inner lip is a mere continuation of the outer one in a simple, spiral, acute line. The whole internal cavity of the shell is in some specimens visible to the very *apex* as in *Bullæa aperta*. Peristome simple, acute, with generally a thin membranaceous border or rim slightly turned inwards, which is broadest along the upper part of the outer lip and towards the inner part of the aperture. This is the state of the shell represented by Férussac t. ix. f. 9. The border or rim is merely the latest portion of increment to the shell, varying in breadth and sometimes entirely wanting. The surface of the volutions is rendered slightly uneven and wrinkled by the irregular transverse *striæ* of growth.

The head, neck, and *tentacula* of the animal are granulated; with two very distinct grooves close together down the middle of the neck, beginning between the upper pair of *tentacula*, and an intermediate raised black granulated line. The cuirass is strongly wrinkled concentrically like the lines at the end of the fingers. The sides of the posterior extremity are, as before described, divided into regular compartments by equidistant lines running obliquely from the closed groove or keel down its centre to the edge.

The general ground-colour of the animal is either cinereous or a very pale reddish brown; the *tentacula* and fore part of the head and neck rendered dusky by the dark granulations. The cuirass is more or less mottled by large confluent, often distinct, black or dark brown spots or patches. The posterior extremity is of a uniform dusky brown, sometimes olivaceous. The sides are pale cinereous brown. The cuirass and posterior extremity are sometimes also sprinkled with minute, opaque, milky dots.

The animal is very slightly viscous; the *mucus* is hyaline.

Length of the largest specimen seen $1\frac{1}{2}$ inch; of this the tail was $\frac{1}{2}$ an inch. It is found of all sizes from this to $\frac{1}{4}$ of an inch in length; the usual size is that of the specimen figured. When the animal is at rest, the cuirass occupies two-thirds of the whole length; when it is crawling,

about three-fifths of it; the neck and tail then extending each about one-fifth beyond it.

When in motion, it crawls with great activity. Contrary to any other of its tribe that I am acquainted with, if disturbed or irritated it only crawls the faster; and if at rest and contracted, it directly puts itself in motion on being touched or disturbed.

It is found under stones in moist, shady, or grassy situations in the Island of Madeira. It is tolerably plentiful in all the wooded ravines of the interior. I have never met with it below the height of 2000 feet; and the highest point where I have noticed dead shells was at the height of about 4,500 feet on the ascent of Pico Ruivo. In rainy weather it is occasionally found crawling actively about on plants; and I once found it completely retracted within its shell and attached to a leaf of the *Clethra arborea*. I observed it also in Porto Santo, in May, 1828, but very small and rarely alive.

From certain observations in February last, I was led to suspect this animal to be carnivorous. Having shut up together several large and small specimens in a box with damp moss, leaves of succulent plants (*Sedum*, not an acrid sort) and *Fungi* (*Tremella*), I was surprised at finding in the morning nothing left of the smaller ones but the shells, completely cleaned out. I then put two larger ones, of nearly equal size, together into a box. The next day, one was dead, and had the appearance of having been gnawed in certain parts. The same evening, I found the living one (which was quite fresh and lively) actually feeding upon the body of the dead one; gnawing at the place where it had, I suspect, previously been at work. The skin and integuments of the dead animal were quite eaten through, and the living one continued a considerable time eating and making great progress at the place where it had first began. The next day, more appeared to have been eaten in the night; the survivor in the day time remaining quiet, and concealed in the usual contracted (but perfectly natural) state under the moss, leaves, *Fungi*, &c. in the box; none of which, I should observe, on this or any other subsequent occasion, seemed to have been appropriated by the animal to the purposes of food. On the following day, the body of the dead animal was so putrid, that I could scarcely ascertain whether more had been eaten; and after this I neglected to observe them.

In addition to the above, I find the following observation in my papers. "April 26, 1828, A day or two since, I put a live specimen of a young *Helix rubicunda* (n. s. MSS.) into the same box with a *Vitrina Lamarckii*; and the next morning found nothing of the *Helix* but the shell, perfectly cleaned out."

It is well known that many of the genus *Helix* and *Limax* will occasionally prey on dead animal substances; but I know not whether it has been ever ascertained that they will destroy and feed on living ones, and particularly on those of their own species, as did the *Vitrina* in the first of the above instances. Neither I think can it be justly said that the animals were unnaturally forced into these habits: as in both the instances above stated, there was no want of other substances on which the land *Mollusca* usually feed; and the smaller animals were killed and eaten the very night after capture, before hunger could have become sufficiently powerful to effect so remarkable a change as to induce a naturally phytophagous animal to destroy and devour its own species. In other cases, I have kept a solitary animal confined for nearly a fortnight in a box with leaves without its suffering apparently from hunger, though I am certain the leaves themselves were untouched. I am therefore greatly inclined to see in this something more than the accidental change of taste, which induces a *Helix* or *Limax* to feed occasionally on animal substances; and to regard the present animal as a second instance of a truly carnivorous species of *Pulmonifera*, preying like *Testacella* on living animals.

These remarkable habits, together with some peculiarities of external form and structure in the present animal, may, if confirmed by further observation and the anatomical characters, lead hereafter to its establishment as a new genus of Férussac's *Pulmonifera Geophila*, belonging to his second family, the *Cochleæ* or "*Limaçons*." Its nearest affinity is unquestionably to *Vitrina (Helicolimax, Féruss.)*; to which indeed it is so closely allied, that it would be very rash at present to separate it. It appears to me the analogous type among the *Cochleæ* to *Parmacella* in the preceding family, the *Limaces*.

The animal is represented in TAB. SUP. XXXVIII, f. 1, 2, 3, in the intermediate state of exposure of the shell, when the greater part of the back of the last volution is more or less visible. This is the appearance it assumes after crawling for a very short time in the open air. In the uncoloured

344 Rev. Mr. Lowe's *Description of the Animal, &c.*

sketches, f. 4 and 5, drawn considerably larger than life from another and larger specimen, to render more intelligible the structure as above described, the spire has become partly visible; and nothing remains of the enveloping portion of the cuirass but a narrow border round the edge of the outer lip, and a lobe stretching up on the right side, towards the spire. *a.* in f. 5 is the supposed slime-secreting organ (*Sac de la viscosité*, Cuv.,) seen through the shell; beneath which, more on the left, is the *pericardium*, but not seen in this figure. The shaded part *b.* is the liver.

Testæ Icones et Synonyma.

Helicolimax Lamarckii, *Féruss.*, *Tabl. Syst. p.* 25, *n.* 3, and *Hist. Nat.* t. 9, f. 9, opt.

Vitrina Cuvieri, Sowerb., *Gen. f.* 2, opt.; *omisso syn.* "*Helicarion Cuvieri*, *Féruss?*"

I am much inclined to suspect that the shell above referred to, figured by my friend Mr. Sowerby in his admirable "*Genera*" for the *Helicarion Cuvieri* of *Férussac* (probably found in New Holland), may have been rather derived from an animal identical with the present species. The figure is so good a representation of the shell belonging to my animal, that I have not thought it necessary to give here a fresh representation, conceiving it to be already perfectly well illustrated by this figure and the one of *Férussac* above quoted. At any rate, should the shell figured by Sowerby prove an authentic *Helicarion Cuvieri*, derived from an undoubted source, it may serve to teach how little reliance can be placed on the shells alone of this tribe for specific, or even generic distinctions.

R. T. L.

Funchal, Madeira,
Nov. 13, 1828.

ART. XLVII. *Sketches in Ornithology, &c.* By N. A. VIGORS, Esq, M.A., F.R.S., &c.

(Continued from Vol. III. page 448.)

Ordo. RASORES. *Ill.*

Fam. TETRAONIDÆ.

Genus. CRYPTONYX, *Temm.*

A more conclusive answer cannot be given to the arguments of those who are in the habit of declaiming against the minuteness of research adopted by modern Zoologists, than an exposition of the facts which attended the distribution of the birds that form the genus *Cryptonyx* of M. Temminck. The male of the *Rouloul* of Malacca, the first species known of that singular genus, was referred by Dr. Latham,* who described the species in his "Synopsis," (Vol. IV, p. 622.), to the family of *Pigeons*. To this arrangement we must suppose our venerable Ornithologist to have been led by the analogy which the crested head of the bird bore to that of his *Columba coronata*, (*Lophorus coronatus* of the present day,) a relationship which seems to have been considered by him so far indicative of affinity as to have induced him to place the two species next to each other as the *great* and the *lesser crowned Pigeons*. The female again of the *Rouloul*, differing essentially in colour from the male, and wanting this apparent mark of affinity, was at the same time, and in the same work, ranked among the *Partridges*, a station much more accordant with its natural affinities than that assigned to its crested mate. This mode of arrangement consequently placed not only in two different, and not very nearly approaching genera, but even, according to the views of Dr. Latham, in two distinct orders, the male and female of the same species. The subsequent discovery of the fact that these birds differed merely in sex afforded Dr. Latham an opportunity of correcting his opinion; and in the Supplement to the "Synopsis," he has united the two birds together under the title of *Perdix coronata*.†

* Sonnerat first discovered this bird, which was afterwards described and figured by Sparmann, in his "Museum Carlsonianum," under the name of *Phasianus cristatus*.

† Dr. Latham, when he removed this species into the genus *Perdix*, appears to have changed Sparmann's original specifick name of *cristata* into that of

Had sufficient attention been paid to a minute character observable in these birds—the deficiency of the nail of the hind toe; or rather, had that character been deemed of sufficient importance to serve as a guide to the affinities of the birds, for the deficiency itself did not pass unnoticed,* the original error would have been avoided. The identity of this singular character in these two apparently distinct species, observable in them only, and in one more species, among the whole series of birds known at the time, would have led to the comparison of other characters; and thus the similarity of structure in their bill, wings, and tail, as well indeed as their general appearance would have brought the original describers to the conclusion, that the birds, if not sexes of the same species, were at least species next to each other in affinity.

But attention to this character, which probably may at once be pronounced minute and unimportant by the adherents of the older schools of Zoology, would have brought the earlier describer of these birds to results of a still higher nature. It would have led him beyond the discovery of the immediate connexion of the birds themselves to the knowledge of their general station in nature. The typical station of the *Rasorial Birds*, as I have elsewhere observed,† is the ground. Here superior powers of flight are needless; but powers of limb are essential—essential for the purposes of running, the mode of locomotion appropriate to the birds of that peculiar station, and of scratching up the grains, seeds, and roots, which form the chief article of their food. It appears expedient, however, that these powers of limb should be centered chiefly in the *tarsus* and the front toes: the hind toe, the general use of which is that of grasping, needs no strong development in the birds of this group, who want it not, like the *Raptorial Birds*, for the purpose of seizure, nor like the *Insessorial Birds*, for that of perching. The more, in fact, the strength of the hind toe is transferred to those in front, the

coronata, in consequence of there having already been a species named *cristata* among the true *Perdices*. The prior name of *cristata* may now be restored to the bird, as belonging to a different group from *Perdix*.

* In the original descriptions of both sexes of this bird, Dr. Latham points out the "*digitus posticus muticus*." See his description of *Columba cristata*, (*Ind. Orn.* p. 596, No. 10; and of *Perdix viridis*, (*Ib.* p. 650, No. 22.)

† Linn. Trans., Vol. XIV. p. 479.

greater will be the general strength of the limb, in reference to those functions which are adapted to the peculiar station and habits of life of the *Rasorial Birds*. Hence we may observe among the typical birds of that order, that the hind toe is either enfeebled by being articulated highly on the *tarsus*, or is altogether deficient. The first gradual approach to the total absence of this member is thus beautifully indicated by the partial absence of one of its component parts; and the close affinity of the *Cryptonyx* to the typical *Rasores* is at once pointed out by the deficiency. An analogous character is observable in a group of birds, remote from the present order, but exhibiting similar results arising from apparently similar causes. In the group of *Petrels*, (*Procellaria*, Linn.), the strength of the bird is centred in the wing, and, according to the general law, which balances an excess in one leading character by a deficiency in another, the feet are proportionably weak. The hind toe in particular is feebly developed, as the power of grasping or perching is useless to a *Water*, as well as to a *Rasorial* bird. The place of this member is in fact simply indicated by a nail. And thus as the *Cryptonyx* possesses the joint of the hind toe without the nail, so, for analogous reasons, the *Petrel* has the nail without the joint. Trivial as these, and similar characters may be pronounced, they lead to no trivial conclusions. They possess a peculiar expressiveness, similar in its effect to that brought out by some of the master spirits in the Sister Arts, where, by a single stroke of the pen, the pencil, or the chisel, they afford an exhibition of genuine character, more powerful than could be produced by their repeated and most elaborate efforts.

The peculiarity of this character first suggested to M. Temminck the propriety of forming the birds in which it is found into a separate genus from that of *Perdix*, under the appropriate title of *Cryptonyx*. The type of his new genus was of course the *Perdix coronatus*, Lath.; to which species he added the *Perdix Cambaiensis* of the same authour, changing, however, the specifick name, I know not for what reason, into that of *rufus*. This latter species was originally described by Dr. Latham from an unique specimen in the British Museum. M. Temminck also, at a subsequent period saw, and made a description of, this bird for his "*Histoire des Gallinacés*;" and, as would appear, from his observations in that work, took a drawing of it. The specimen, however, it is to be

feared, is lost to science ; Mr. Children, who was so kind as to forward my inquiries upon the subject with his usual readiness, having assured me that he has been unable to discover any trace of it since he undertook the superintendance of the ornithological department in the British Museum. This species has since been rejected by M. Temminck, certainly, as I think, on insufficient grounds. But on this point I shall say more hereafter. A third species has been added to the two already mentioned by the scientific acumen of Sir Stamford Raffles, who, in his description of the *Tetrao ocellatus* among the* Birds of Sumatra, clearly pointed out the affinity of that species to the well-known *Rouloul*. Two additional species may now be given from the collection of the same distinguished individual ; species which he would himself have introduced to our knowledge, had not his untimely end left to weaker hands the accomplishment of these, and of many still higher objects of science.

Of these five species, four of which are now before me, I shall proceed to give the specific descriptions, as well as the characters of the genus.

CRYPTONYX, *Temm.*

Rostrum subbreve, subcrassum, subcompressum, mandibulâ superiore ad apicem deflexâ : naribus nudis, basalibus, longitudinalibus, membranâ semiclausis.

Alæ breves, rotundatæ ; remigibus primâ brevi, secundâ et tertiâ gradatim longioribus, quartâ quintâ et sextâ longissimis æqualibus.

Pedes subfortes ; tarsis in fronte reticulatis, acrotarsiis scutellatis ; digito postico mutico, aut tuberculo corneo, unguis vicem gerente, armato.

Cauda brevis, rotundata.

1. CRYPTONYX CRISTATUS, *Temm.*

(*Phasianus cristatus*, *Sparm.* *Perdix coronatus*, *Lath.*)

Crypt. niger, dorso uropygioque viridibus, cristâ occipitali alisque castaneis, vertice albo, fronte setis longissimis ornato. Mas.

Crypt. viridis, alis castaneis, capite colloque fuscis, fronte setis longissimis ornato. Fæm.

In Mus. Societatis Zoologicæ, aliisque.

* Linn. Trans., Vol. XIII, p. 322.

2. CRYPTONYX OCELLATUS.

(*Tetrao ocellatus*, *Raffles.*)

Crypt. capite corporeque infra rufis, hoc nigro-fasciato; supra niger, nuchâ fasciis gracilibus albis, dorso rufo notato; alis caudâque fuscen-centi-brunneis, illis nigro ocellatis.

In Mus. Societatis Zoologicæ.

3. CRYPTONYX NIGER.

Crypt. corpore toto nigro, remigibus fusciscentibus, regione circumo-culari nudâ.

Rostrum nigrum; pedes pallidi. Tectrices inferiores alarum remiges-que infrâ fuscæ. Longitudo corporis, 10; rostri ad frontem, $\frac{3}{4}$, ad ric-tum, $\frac{7}{8}$; alæ ad apicem remigis 5tæ, 5; caudæ, $2\frac{1}{3}$; tarsi, $1\frac{3}{4}$.

In Mus. Societatis Zoologicæ.

4. CRYPTONYX FERRUGINEUS.

Crypt. saturatè ferrugineus, infra pallidior; dorso alisque transver-sim lineis gracilibus fuscis undulatis; harum plumis nonnullis medium versus flavo-ferrugineis fasciisque latioribus nigris præditis.

*Rostrum brunneum; pedes pallidiores. Gula albescens, plumis in medio pallidioribus. Remiges primariæ fusco-brunneæ; secundariæ scapularesque medium versus ferrugineo pallidior, fasciâque latâ nigrâ notatæ. Dimensiones ferè ut in *Crypt. nigro*, aut paullò majores.*

In Mus. Societatis Zoologicæ.

The plumage and markings of this bird seem generally to accord with those detailed in Dr. Latham's description of his *Perdix Cambaiensis*, with the exception of their being deeper in colour. The dimensions, however, are very different. Of several specimens contained in the collection of the Zoological Society, that from which the above description has been taken is the smallest, and the length of its body rather exceeds 10 inches, while that of the *Perdix Cambaiensis* is represented to be 6 inches. With such a difference in the dimensions of these birds, I do not hesitate, even in the absence of all means of actual comparison, to rank them as different species.

5. CRYPTONYX CAMBAIENSIS.

(*Perdix Cambaiensis*, Lath.* *Cryptonyx rufus*, Temm.)

Crypt. corporis lateribus rufo-flavescentibus; corpore fuscescente-rufo transversim undulato; tegminibus alarum flavescente-rufo terminatis: subtus pallidiore; temporibus et gula plumis tectis. Temm.

Longitudo 6 pollices.

Olim in Mus. Britannico, secundum D.D. Latham et Temminck.

This fifth and last species of *Cryptonyx* must certainly be considered doubtful; inasmuch as the original specimen on which the description of it was founded, can no longer be referred to. All such birds, as well as those which are merely described in books, without any reference to a collection where the type of the species may be consulted, or to an authentick plate of it, which by a superiour artist is nearly equal in point of authority to the typical specimen itself, should ever be considered as unsubstantial materials for the Ornithologist to work upon. In the summing up of the species of a group they must be referred to, but as of no value. I cannot, however, agree with a late opinion of M. Temminck, who, in the description of the 447th plate of his "*Planches Coloriées*," has not only decided on erasing the *Perdix Cambaiensis* of Dr. Latham from the genus *Cryptonyx*, but on identifying that species with a rather abundant inhabitant of the Eastern Continent of India. He asserts that Dr. Latham's specimen, the same which he himself examined and re-described, was mutilated, and at the same time was the young male of the bird in his plate, which is a true Partridge. Now against this assertion, which after such an interval, and under such circumstances, can be pronounced at best but a conjecture, we have the positive testimony of Dr. Latham that his *Perd. Cambaiensis* had the character of the *digitus posticus muticus*, i. e. was in fact a *Cryptonyx*; we have again the subsequent

* The following is the description given by Dr. Latham of this bird; the description in the text is that which M. Temminck has given of it in his "*Histoire des Gallinacès*."

P. rufo flavescens nebulis saturatioribus, digito postico mutico.

HABITAT in India, regno Guzurát.—6 pollices longa.

Rostrum validum, breve, pallidum: corpus totum rufo-flavescens subtus pallidius, pennis omnibus coloribus saturatioribus nebulosis: pedes flavi, digito postico mutico.—Mus. Brit.

and corroborating testimony of M. Temminck himself that the bird was a *Cryptonyx*. We have still further the original description given by Dr. Latham of his *Perdix Cambaiensis*, as well as the re-description given of the same bird at a subsequent period by M. Temminck, (both of which descriptions have been literally copied above,) directly militating against the supposition that the species so described is the same as that figured in the "*Planches Coloriées*." If we allow Dr. Latham and M. Temminck to have been correct in the characters they have given, no two birds can be more dissimilar. The characters alone of the deep red throat, so striking as to give the later bird the name of *Perdrix rousse-gorge*, and of the equally deep red *stria* which, with two parallel white ones, runs conspicuously along the sides of the head, are of themselves sufficient to distinguish the birds. The specimen in the British Museum could not have been so mutilated nor so immature—facts, which by the way were never hinted at when the bird was originally described, and which now can be considered in no other light than as gratuitous assumptions,—as to have shown no indication of these striking characters. On the whole, we must conclude that, from the loss of the original specimen of *Crypt. Cambaiensis* we have, unfortunately, no satisfactory proof of the existence of the species; but on the other hand, we are equally without proof of its being a fictitious species. Neither have we any proof of Dr. Latham's bird being the same as that figured by M. Temminck in the "*Planches Coloriées*;" but rather, as far as we have materials for judging on such subjects, presumptive proof to the contrary. Under such circumstances I consider it advisable to leave the *Cryptonyx Cambaiensis* as a doubtful species among its congeners, in like manner as we must leave in their alleged stations hundreds of species equally unauthenticated; and at the same time to suggest to M. Temminck to give to the beautiful, abundant, and truly authentick species which he has so well described and figured, something better than a doubtful name.

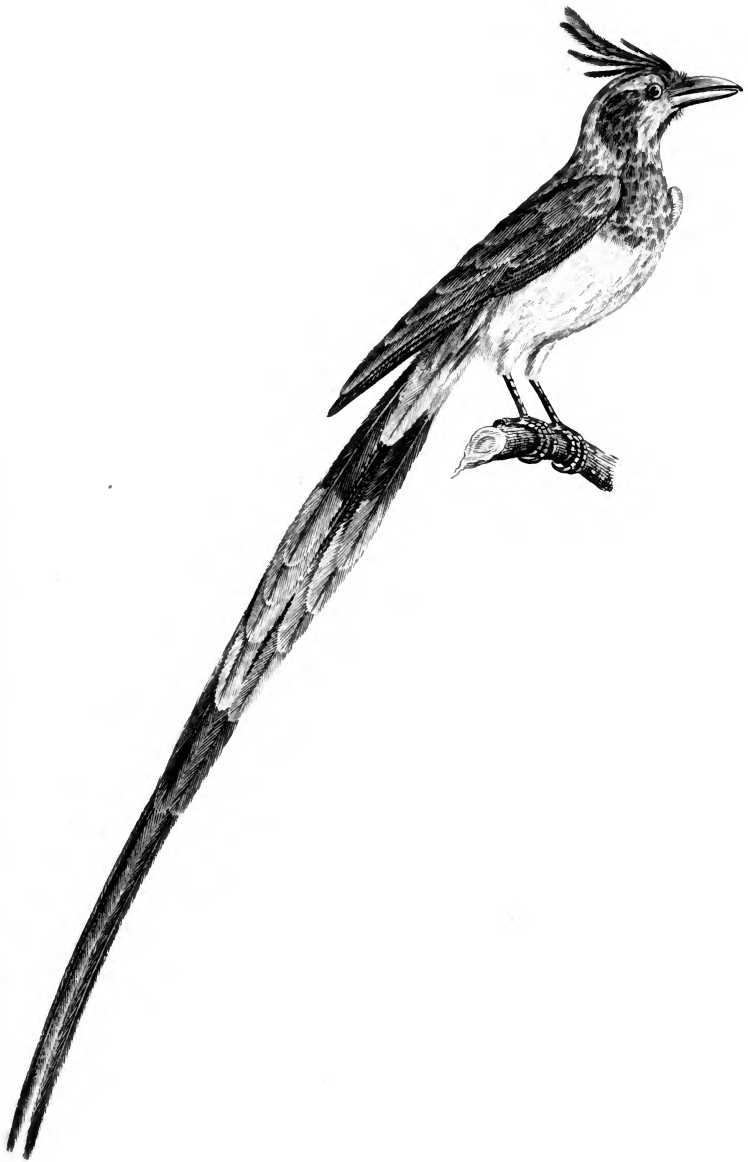
The second, third and fourth species described of this group, deviate from the typical species in having on the joint of the hind toe a small horny tubercle, which may be considered as the rudiment of a nail. This modification of the chief character of the group is not of sufficient importance to cause any change in the arrangement of these birds. Such partial aberrations from the strict typical character, particularly in groups

where the species are not numerous, serve not, as I have often endeavoured to indicate in the course of my observations on arrangement, to detach the species in which they are found from any group, but merely to indicate the passage from it to neighbouring groups. Our grand object in systematick arrangement is to select our types; and then point out the gradual interchange of character by which species more or less accord with these types. In Ornithology, perhaps, more than in any other department of Zoology, this object may be attained with the greatest success. Our materials are, comparatively speaking, more perfect; and fewer intervals in the larger groups remain to be filled up.

Since the above was written, a bird has been brought to me, which probably may come into the present group. The nail is very small, almost a rudiment, but still is more developed than in the other species. The size of the bird, and general appearance, accord more with the true *Partridges* than with *Cryptonyx*. It appears to form a still nearer connection than any species which has hitherto come under my observation, between these two groups. I have not leisure at present to examine the species, but hope shortly to say more on the subject.

ON SOME SPECIES OF BIRDS FROM THE NORTH-WEST COAST OF AMERICA.

Captain Beechey, on his return from the late expedition to the Western shores of North America, having kindly transmitted to me the publick collection of birds formed during that expedition, for the purpose of making a catalogue of them for the Appendix to the forthcoming account of his voyage, and several other species also from the same locality, but not existing in the publick collection, having been presented to the Zoological Society from various quarters, I have had the pleasing opportunity of observing among them many species which are rarely found in our home collections, as well as a few which appear altogether new to science. Being aware of the advantages arising from the speedy publication of such recent acquisitions, and presuming that some time must elapse before the Account of the Voyage will appear, I have requested and obtained Captain Beechey's permission to give a brief account of a few of



the more interesting species in our Journal, previously to their appearing more at large in the Appendix to his work. In this undertaking I shall confine myself merely to the technical description of the birds. The more valuable part of the account of them will be reserved for the more detailed work; in which I may here venture to promise much interesting information, extracted from the journal of Mr. Collie, Surgeon, and Mr. Tradescant Lay, Naturalist, to the expedition. The notes of these gentlemen not only furnish us with the habits and localities of the birds which have been brought home, but also with what is rarely attended to by collectors abroad, an account of their internal structure.

PICA BEECHEII.

Pica capite collo corporeque infra intense nigris, dorso alis rectricibusque supra dilute cæruleis; rostro pedibusque rubro-flavis.

Remiges inferiores, pogonia superiora interiora, rectricesque infra fuscaë. Tectrices alarum inferiores cæruleæ. Cauda subcuneata. Longitudo corporis, 14 $\frac{1}{4}$; rostri, 1 $\frac{1}{2}$; alæ a carpo ad remigem 5tam, 6 $\frac{3}{4}$; caudæ ad apicem rectricis mediæ, 7 $\frac{5}{8}$, ad apicem rectricis externæ, 6; tarsi, 1 $\frac{7}{8}$.

This beautiful and strongly marked species was obtained at Montereale. I have named it after the enterprising Commander of the Expedition, which has added so much to our information in every department of science.

PICA COLLIEI.

Pica maculâ subrectali, corporeque supra cæruleis; fronte, cristâ, genis, colloque inferiore nigris; corpore subtus, rectricumque externarum apicibus albis, caudâ elongatissimâ.

Crista erecta, elongata, antrorsum spectans, facies pectusque intense nigraë. Supercilia, colli latera, pectusque medium albo notata. Tectrices inferiores albæ. Rectrices quatuor mediæ supra cæruleæ, subtus nigraë. Longitudo corporis ab apice rostri ad apicem caudæ, 2 Ped., 4 Unc.; rostri, 1 $\frac{7}{10}$; alæ a carpo ad remigem 5tam, 8; caudæ ad apicem rectricis mediæ, 19 $\frac{1}{2}$; externæ, 6; tarsi, 2.

This beautiful species, which was met with at San Blas, was not in the publick collection sent to me by Captain Beechey. The specimen from which the above description was taken, was presented to the

Zoological Society by A. Collie, Esq., Surgeon to the Blossom, to whose exertions, during the expedition, natural science owes many important obligations. To him I beg leave to dedicate the species.

COCOTHRAUSTES FERREO-ROSTRIS.

Cocc. fusco-brunneus; capite pectore abdomineque superiore coccineis.

Rostrum fortissimum pedesque plumbei. *Longitudo corporis*, $8\frac{1}{2}$; *rostri* ad frontem, $\frac{7}{8}$, ad rictum, $1\frac{3}{16}$, *altitudo* $\frac{7}{8}$; *alæ* a carpo ad remigem 3tiam, $4\frac{1}{2}$; *caudæ*, 3; *tarsi*, $\frac{7}{8}$.

PICUS SCAPULARIS.

Pic. niger; strigâ utrinque longitudinali a rictu ad scapulares descendente abdomineque fulvo-albis; capite cristato, strigâque sub rictu coccineis; rostro eburneo.

Remiges retricesque infra fuscæ. *Tectrices alarum* inferiores albæ. *Longitudo corporis*, 11; *rostri* ad frontem, $1\frac{1}{8}$, ad rictum, $1\frac{3}{8}$; *alæ* a carpo ad remigem 3tiam, $6\frac{3}{8}$; *caudæ*, 5; *tarsi*, 1.

For the male and female of this species, the Society is indebted to the liberality of Mr. Collie, who obtained it, together with the *Pica Colliei* at San Blas.

COLAPTES COLLARIS.

Col. vinaceo-griseus, subtus uropygioque albis; fasciis corporis superni, guttis abdominis, collari semilunari pectorali, remigibus retribusque atris, rhachibus rubro-aurantiacis; strigâ utrinque sub rictu coccineâ.

Caput supernè brunnescens, *collumque* vinaceo-griseum sine fasciis. *Remiges* apice albæ, subtus ad basin rubro-aurantiacæ. *Tectrices* inferiores alarum albæ, internè leviter rubro-aurantiaco diffusæ, externè nigro notatæ. *Rostrum* pedesque brunnei. *Longitudo corporis*, 11; *rostri* ad frontem, $1\frac{3}{8}$, ad rictum, $1\frac{5}{8}$; *alæ* a carpo ad remigem 3tiam, $6\frac{1}{8}$; *caudæ*, 5; *tarsi*, 1.

ORTYX DOUGLASII.

Ort. plumbeo-brunnea, cristâ erectâ alisque superioribus saturatè

brunneis, his flavo-ferrugineo striatis; capite, genis nuchâque brunneo et flavo-ferrugineo lineatis; gula albâ, brunneo notatâ; abdomine albo guttato.

Capitis plumæ in medio brunneæ, ad latera flavo-ferrugineæ; gulæ albæ in medio brunneæ. Dorsum rectricesque superiores plumbeo-brunneæ, fusco gracillimè undulatæ, plumis ad apicem pallido-ferrugineo terminatis. Tectrices alarum remigesque secundariæ interiores saturatè brunneæ, plumis ad latera flavo-ferrugineo ad morem Scolopacum notatis. Remiges primariæ fusco-brunneæ, subtus fuscæ. Tectrices inferiores pallidè fuscæ, albo guttatæ. Crissum flavo-ferrugineum, plumis in medio brunneis. Rostrum pedesque nigri. Longitudo corporis, $10\frac{1}{4}$; rostri, $\frac{1}{2}$; alæ a carpo ad remigem 5tam, $4\frac{1}{2}$; caudæ, 3; tarsi, 1.

One specimen only of this species was contained in the collection formed by the present Expedition. It was found at Monterey. Long before the specimen appeared in this country, the species had been accurately described to me by Mr. Douglas, together with a second new species nearly allied to it, as well as to *Ortyx Californica*; a beautiful group being thus formed by these three Western *Tetraonidæ*, closely united in character, by the elevated crest and the general similarity of colour and markings. The descriptions of these two new species of *Ortyx*, together with an account of five new species of *Grouse* from the same quarter, have been given by Mr. Douglas to the Linnean Society, and will speedily be published in the Transactions of that body. As I had received the bird now before me for description from Captain Beechey, Mr. Douglas kindly conceded to me the right of naming it, which in course should have devolved upon himself. I seize with pleasure the opportunity thus afforded me of giving it the name of the first discoverer. And in performing this customary act of justice, I offer some slight discharge of the obligations I owe for much valuable information respecting the Zoology of North Western America. Few individuals perhaps have done more to elucidate the Natural History of any distant country, than Mr. Douglas has effected in regard to that very interesting part of the World. I believe myself correct when I state that more than six hundred new species of plants have been discovered and brought home by him, and, from the congeniality of our climate to the vegetable produc-

tions of their country, are now among the most brilliant ornaments of our gardens: while his acquisitions in Zoology were of proportionally equal extent, although he was not equally fortunate in bringing them to their destination. I am happy to add that we may now anticipate some valuable information respecting his zoological researches; information, which will raise him as highly in reputation as a scientific naturalist, as he at present stands as an enterprising traveller.

STREPSILAS MELANOCEPHALUS.

Streps. ater; dorso medio, uropygio, fasciis duabus alarum, abdomine, caudâ infra, rectricumque apicibus albis.

Caput brunnescenti-atrum. Tectrices superiores interiores, remigesque secundariæ albo notatæ, fascias duas exhibentes. Remigum rhaches tectrices inferiores, rectricesque omnes basi, duabus mediis exceptis, albæ. Rostrum pedesque atri. Longitudo corporis $6\frac{1}{2}$; rostri, $\frac{1}{6}$; alæ a carpo ad remigem 1m, $5\frac{2}{3}$; caudæ, $2\frac{1}{2}$; tarsi, 1.

The Society are indebted to Lieutenant Belcher of the Blossom for their specimens of this new species of *Turnstone*.

NUMENIUS RUFIVENTRIS.

Num. sub-pallidè rufus, suprâ brunneo notatus; vertice brunneo strigâ medianâ rufâ; uropygio brunnescente; rostro subelongato, sub-curvato.

*Gula albida. Collum infrâ graciliter, suprâ fortiùs, brunneo striatum. Dorsi, scapularium, alarumque plumæ brunneo in medio latius notatæ; uropygium pallidè brunneum, sine notis. Remiges supra brunneæ, exteriores pogoniis internis, interiores pogoniis utrinque rufo notatis; subtus pallidè fuscae, similiter notatæ. Tectrices inferiores brunneo et rufo marmoratæ. Plumæ axillares brunneæ, rufo fasciatæ. Rectrices rufæ, fasciis septem brunneis notatæ. Rostrum rectius quam in *Numeniis* adhuc descriptis, basi infrâ rufum, suprâ apiceque brunneum. Pedes rufi. Longitudo corporis ab apice rostri ad apicem caudæ, $14\frac{1}{2}$; rostri, 3: alæ a carpo ad remigem 1m, $8\frac{2}{3}$; caudæ, $3\frac{1}{2}$; tarsi, 2.*

RECURVIROSTRA OCCIDENTALIS.

Recurv. dorso, corpore infrâ, remigumque secundariarum apicibus

albis; capite, collo supra, caudâque pallidissimè griseis; remigibus nigris.

Rostrum pedesque nigri. Longitudo corporis, 18; rostri, 4; alæ a carpo ad remigem 1m, 7½; caudæ, 3½; tarsi, 4.

This bird was found in abundance at San Francisco.

ANAS UROPHASIANUS.

Anas capite corpore caudâque pallidè rufis, illis brunneo ocellatis; genis, gulâ, colloque infrâ albis; alis fuscis, speculo fasciis quatuor, primâ gracili rufâ, secundâ latâ dilutè cæruleâ, tertiâ gracillimâ atrâ, quartâ latâ rufâ, efformato.

Capitis maculæ parvæ, nuchæ pectorisque, paullò grandiores, abdominis subgrandes. Scapulares fuscæ, rufo-marginatæ. Dorsum imum fuscescens. Tectrices alarum inferiores, primæ brunneæ, secundariæ albæ. Plumæ axillares albæ. Longitudo corporis, 21½; rostri, 2, alæ a carpo ad remigem 2dam, 9½; caudæ, 5⅞; tarsi, 1¼.

A species closely allied in form to our *An. acuta*, or *Sea Pheasant*.

URIA BREVIROSTRIS.

Uria supra griseo-fusca, capite dorsoque albo notatis; subtus alba, fusco undulatim maculata; reatricibus albis, duabus mediis-fusco notatis; rostro brevi gracili.

Alæ supra et infrâ, tectricesque inferiores fuscæ. Rostrum nigrum. Pedes flavi membranis unguibusque brunneis. Longitudo corporis, 9; rostri ad frontem, ½, ad rictum, 1⅞; alæ a carpo ad remigem 1m, 5¼; caudæ, 1; tarsi, ½.

This bird, shot at San Blas, presents a new form among the *Alcadæ*. The bill is short and slender, the mandibles not being above half an inch in length, although the extent of the mouth, when measured from the *rictus* is equal to that of a *Guillemot* of equal size. The form is most near to that of *Uria*, where I shall place the species provisionally. The specimen is apparently that of an immature bird. The adult I originally suspected to have been the *Uria marmorata* of Dr. Latham. We have, however, no specimen of that species in this country to which I can refer: and neither the plate of it in the "Synopsis" nor the accom-

panying descriptive characters convey any idea of the form of the bill of the bird before me.

FRATERCULA CIRRHATA, jun.?

Frat. fronte genisque albis, cirrho postoculari flavescente brevi, capitis vertice dorso pectoreque nigris, abdomine grisescente, rostro compresso carinato.

This bird, although not belonging to the public collection sent to me by Captain Beechey, came from the same locality as many specimens of *Fratercula cirrhata*, and differing from them in no material points except the bill, is most probably the young of that species. The keel of the bill is more elevated and compressed than that of *Frat. cirrhata*, which is flattened on the *culmen*, and much rounded on the sides. There are some differences also in the colours, as may be seen by comparing the descriptions; but not such as may be considered incompatible with the different stages of the same species. Like the *Hornbills*, to which the birds of this group shew some analogy, they may exhibit a material difference in the shape of the bill according to age. This is a matter of fact to be determined only by time and observation. Should the bird before us prove distinct, it may receive the specifick name of *carinata*.

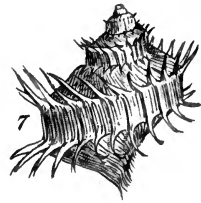
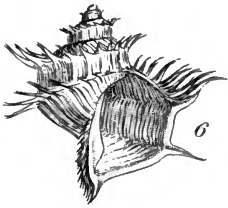
LARUS BELCHERI.

Lar. fuscescenti-plumbeus, subtùs pallidior; remigibus primariis reatricibusque nigris; uropygio, remigum reatricumque apicibus albis; rostro rubro apice nigro.

Longitudo corporis, 21; rostri, 2; alæ a carpo ad remigem 1mam, 11; caudæ, 6; tarsi, 2.

The specimen from which the above description was taken, was presented to the Society by Edward Belcher, Esq., first Lieutenant of the Blossom. That gentleman will, I hope, accept the dedication of this species to him, as an offering of friendship.

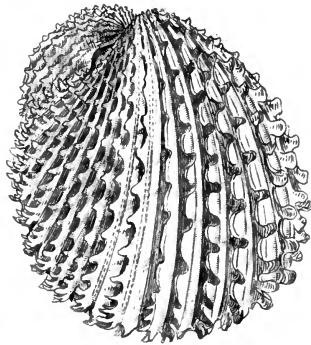
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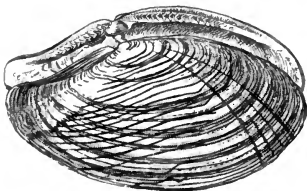
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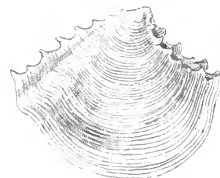
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ART. XLVIII. *Observations on new or interesting Mollusca contained, for the most part, in the Museum of the Zoological Society.* By W. J. BRODERIP, Esq., F.R.S., Sec. G.S., &c., and G. B. SOWERBY, F.L.S., &c.

HAVING been requested by the Council to draw up an account of the Mollusca worthy of note, contained in the Museum of the Zoological Society, our attention has been at once arrested by the multitude of new objects, which the zeal of Lieut. Belcher induced him to collect while attached to the expedition under the command of Captain Beechey, and which the Lieutenant liberally presented on his return to the above-named institution. The value and importance of this addition to the museum may be in some degree estimated by the reader when he finds sixty new species recorded in this paper, of which forty-six are in the Society's collection.

A short description of one of the species, taken from the only specimen then known, has been given in the supplement to the Catalogue of the Tankerville collection, where it is, not without hesitation, named *Turbo bicarinatus*. The number collected by Lieut. Belcher, and their fine condition, not only enable us to assign to the animal a place more congenial to its natural characters, but have induced us to establish for it, together with a new cognate species brought home by Captain Parry, the generic appellation of *Trichotropis*.* With this exception, the whole of the testacea mentioned in this memoir, are, it is believed, characterized for the first time. Those distinguished by an asterisk were brought home by Lieut. Belcher, but do not belong to the museum of the Zoological Society.

NUCULA ARCTICA.

TAB. IX, Fig. 1.

N. testâ oblongâ, posticè subrostratâ, anticè subrotundatâ; epidermide

* See p. 373.

*crassá, olivacéa; valvis striatis, striis obliquis lineas incrementi decussantibus; long. $1\frac{5}{8}$, alt. $\frac{6}{8}$, lat. $\frac{7}{16}$, poll.**

Hab. in Oceano Arctico.

One of the largest of the Nuculæ, in some respects resembling a fossil species found in the Crag of Suffolk. It is of an oblong shape, the anterior being longer than the posterior side: it is covered with a strong, shining olivaceous epidermis: the anterior side is somewhat rounded, and the posterior produced into a slightly recurved beak. The surface of each valve is covered with delicate concentric lines of growth, which are crossed on the central part, and towards the posterior side of the valves by stronger oblique striæ. When the valves are closed, the upper posterior edge forms a sharp elevated ridge. The oblique striæ are distinct on the epidermis as well as on the shell. Two or three specimens were obtained in Vatcha Bay, Kamtschatka.

MACTRA PALLIDA.

M. testá ovato-trigoná, convexá, anticè rotundatá, posticè sub-carinatá, albidá, sub-pellucidá, umbonibus distantibus; epidermide tenui, corneá; long. $2\frac{2}{10}$, lat. $1\frac{2}{10}$, alt. $1\frac{6}{10}$, poll.

Hab. ad littora Oceani Pacifici.

Approaching in form to *M. Stultorum*, but differing from that shell especially in the carination of the posterior part of each valve, and in the distance of the umbones. From St. Blas.

*MACTRA SUBGLOBOSA.

M. testá subglobosá, anticè rotundatá, posticè rotundato-angulatá, albi-

* To prevent an inaccurate conclusion as to the proportions, the reader is requested to observe this explanation of the terms used in describing the bivalves. *Length*—the distance from the anterior to the posterior extremity. *Breadth*—the space between the external surfaces of the valves when closed. *Depth* or *height*—the distance from the basal margin to the highest point of the umbones. The bivalve, thus measured, is supposed to rest on the basal margins of the valves, with the umbones uppermost. The anterior part which may be, generally, known from its comparative shortness, and the turn of the umbones towards it, is the place where the mouth of the animal is situated.

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dd, lævi, lateribus et margine inferiore striatis; long. $1\frac{8}{10}$, lat. $1\frac{2}{10}$, alt. $1\frac{6}{10}$, poll.

Hab.

There is nothing peculiarly remarkable in the aspect of this shell, except the depth of the valves, which gives it a more globular appearance than is usual in the species of this genus. In Mr. Bland's Collection.

*CORBULA ROSTRATA.

C. testá oblongá, striatá, anticè rotundatá, posticè subacuminato-rostratá; long. $\frac{9}{10}$, lat. $\frac{4}{10}$, alt. $\frac{5}{10}$, poll.

Hab.

The two valves are nearly equal: a thin horny epidermis covers the shell, except near the umbones, where two diverging dark red rays are observed to commence. In Mr. Bland's collection.

*CORBULA GIBBOSA.

C. testá obovatá, æquivalvi, valvis gibbosis, lævibus, posticè bicarinatis; epidermide corneá; long. $\frac{9}{10}$, lat. $\frac{1}{2}$, alt. $\frac{7}{10}$, poll.

Hab. in Oceano Arctico.

The two valves of this singular Corbula are very nearly equal, and both are remarkably gibbous. The only specimen we have seen is of a chalky whiteness; the thin, horny epidermis only remaining near the margin. We apprehend it is a dead shell. From Icy Cape. In Mr. Sowerby's collection.

SOLEN ACUTIDENS.

S. testá lineari-ovali, medio coarctatá, albidá, umbonibus erosis, dentibus in utrâque valvâ duobus, acutissimis; epidermide corneá; long. $1\frac{3}{10}$, lat. $\frac{3}{10}$, alt. $\frac{4}{10}$, poll.

Hab. in Mari Sinensi.

Approaches *S. Dombeyi* in form and general appearance; but it is more linear, and is remarkable for the length and sharpness of the curved teeth.

*SOLEN TENUIS.

S. testá albidá, tenui, ovato-oblongá, anticè angustiore; long. $1\frac{7}{10}$, lat. $\frac{3}{10}$, alt. $\frac{5}{10}$, poll.

Hab. in Oceano Boreali.

The epidermis of this species is very thin. In Mr. Sowerby's collection.

SOLENIUM.

S. testâ albedo-carned, subovatâ, altâ, anticè rotundatâ, posticè elongatâ, epidermide fuscâ, extra marginem extensâ; long. $4\frac{2}{10}$, lat. $\frac{2}{10}$, alt. $2\frac{2}{10}$, poll.

Hab. in Oceano arctico.

Towards the middle of each valve there are some slight radiations, which are visible through the strong epidermis. There are also corrugations of the epidermis which appear to be the effect of drying.

TELLINA BURNETI.

TAB. IX, Fig. 2.

T. testâ trigonâ, margine inferiore rotundatâ, inæquivalvi, lateribus serratis, antico falcato; umbonibus acutis; valvis concentricè striatis, alterâ planiusculâ, alterâ subconvexâ; long. $1\frac{1}{8}$, alt. $\frac{1}{8}$, lat. $\frac{3}{16}$, poll.

Hab. ad Mazatlan, in æstuario.

Shell triangular, with the lower margin rounded, and slightly flexuous towards the posterior margin; the valves are unequal, one being a little depressed, especially towards the umbo, but so little as to be nearly flat, and the other slightly convex, and they are rough with close-set, raised, concentric lines. The margins of both sides are serrated, and, between them, when the valves are shut, there is a deep sinus, the bottom of which is formed by the well-closed edges. The posterior margins are nearly straight; the anterior margins are sickle-shaped. The colour of the lower half of the shell is of a dead or opaline white, and the upper part is slightly tinged with yellow. The texture is delicate, and the shell is translucent.

Found in the Estuary of Mazatlan, among the shoals of large Pinnæ which are left dry at low water. The Pinnæ lie so thick as to form a stratum above the sand, and are very injurious to boats that ground upon them, cutting like a sharp instrument.

Young specimens of *Fusus Morio* were found within dead Pinnæ at the same place.

TELLINA EDENTULA.

T. testá obovatá, anticè longiore, posticè subangulatá; valvis concentricè striatis, albicantibus; ligamento magno; dentibus cardinalibus obsoletis, lateralibus nullis; long. $2\frac{5}{10}$, lat. $\frac{1}{2}\frac{9}{10}$, alt. 2, poll.
Hab. in Oceano Boreali.

Shell rather inequivalve, with a dull whitish, concentrically striated surface. From Behring's Straits.

TELLINA ALTERNIDENTATA.

T. testá oblongá, compressá, anticè rotundatá, posticè subacuminatá dentibus in utráque valvá duobus, altero simplici, altero bicuspidato, alternatim inter se insertis; long. $2\frac{3}{10}$, lat. $\frac{5}{10}$, alt. $1\frac{5}{10}$, poll.
Hab. in Oceano Arctico.

From Icy Cape. A thin, greenish, very fugacious epidermis coats this shell when in its young state; when full grown, however, only some small remains of this are to be observed near the edges. There are no lateral teeth.

TELLINA INCONSPICUA.

T. testá obovatá, sublenticulari, anticè breviorè; ligamento magno, dentibus cardinalibus parvis, lateralibus nullis; long. $\frac{1}{2}\frac{9}{10}$, lat. $\frac{1}{10}$, alt. $\frac{1}{2}\frac{5}{10}$, poll.
Hab. in Oceano Arctico.

From Icy Cape. It bears a general resemblance to *Tellina solidula*, but it has not the acuminate posterior extremity of that species. A thin corneous epidermis is observable on the lower edges, but the umbones are eroded, and a great part of the surface has a chalky appearance. The remains of the dried animal were still within the shells from which this description was made. We have only seen two specimens, one of which is colourless, the other has a flesh-coloured surface with darker umbones.

*TELLINIDES PURPUREUS.

T. testá oblongá, compressá, subæquilaterali, concinnè decussatá, latere postico subacuminato, leviter emarginato; long. $2\frac{3}{10}$, lat. $\frac{1}{10}$, alt. $1\frac{5}{10}$, poll.
Hab. ad littora Oceani Pacifici.

The right valve is rather deeper than the left; both are beautifully, though very minutely decussated. The notch in the posterior edge is placed just above the rather acuminate point. In Mr. Sowerby's collection.

CYTHEREA ROSEA.

C. testá obliquè cordatá, subcompressá, roseo-purpurascete, concentricè sulcatá, anticè lamellatá, lamellis remotis, posticè spinis brevissimis, latiusculis, muricatá; long. $1\frac{7}{10}$, lat. $\frac{7}{10}$, alt. $1\frac{3}{10}$, poll.

Hab. ad littora Oceani Pacifici.

A species with which we have been long acquainted, but which has been commonly regarded merely as a variety of *C. Dione*. It differs, however, in so many characters that we do not hesitate to describe it as a distinct species. From St. Blas.

VENUS GNIDIA.

V. testá æquivalvi, sub-ventricosá, liris concentricis, muricatis, distantibus, strias radiantes decussantibus, anticè spinosioribus; long. $2\frac{4}{10}$, lat. $1\frac{4}{10}$, alt. $1\frac{9}{10}$, poll.*

Hab. ad littora Oceani Pacifici.

Lieut. Belcher dredged some fine specimens of this most elegant shell near St. Blas. It has been known in this country for some time. It is of moderate thickness, and the muricated concentric distant ridges (the spines of which become more broad and developed towards the anterior end) beautifully cross the radiating striæ which occur in pairs, with a more narrow one intervening. The colour in fine specimens is a reddish fawn; white inside, with a finely crenated margin.

*CYRENA MEXICANA.

C. testá ellipticá, ventricosá, utrinque rotundatá, anticè breviorè; dentibus parvis, obtusis; long. $1\frac{4}{10}$, lat. $\frac{1}{2}\frac{9}{10}$, alt. $1\frac{3}{10}$, poll.

Hab. in Mexico.

From Mazatlan. Outside white, with an olivaceous epidermis; inside whitish, varied with reddish violet. In Mr. Sowerby's collection.

* Lira, a ridge between two furrows.

*ASTARTE CRASSIDENS.

A. testá suborbiculari, crassá, obsoletè radiatim sulcatá; anticè brevissimá; umbonibus anticè productis; marginibus internis crenatis; cardine lato, dente centrali in valvâ alterâ maximo; long. $1\frac{6}{10}$, lat. $\frac{17}{10}$, alt. $1\frac{1}{2}\frac{3}{8}$, poll.

Hab. in Oceano Arctico.

A single specimen of this fine species of Astarte was obtained off Icy Cape by Lieut. Belcher. Its epidermis is thick and dark coloured, but it is much eroded around the umbones. The shell is of a dirty white colour, except the center within, where it is tinged with dull reddish purple. The edges of the very broad tooth in the hinge of the right valve are irregularly sculptured. The internal marginal crenations are very wide, and have almost the appearance of low embrasures. In Mr. Bland's collection.

ASTARTE LACTEA.

A. testá obovatá, compressá, anticè breviorè; margine dorsali postico depresso; intus lacteá, marginibus integerrimis; long. $1\frac{8}{10}$, lat. $\frac{8}{10}$, alt. $1\frac{8}{10}$, poll.

Hab. in Oceano Arctico.

The outer surface is rather dull, it has a thick, dark coloured epidermis, and is distinctly marked with the concentric lines of growth. From Icy Cape.

ARCA GRANDIS.

A. testá obliquè subquadratá, crassá, albá, radiatim costatá, lævi, costis rotundatis, anticis crenulatis, reliquis muticis, epidermide coriaceá; long. $4\frac{3}{10}$, lat. $3\frac{3}{10}$, alt. $3\frac{8}{10}$, poll.

Hab.

The largest species of Arca we remember to have seen, growing even to a larger size than *A. senilis*, which it also resembles very much; it is, however, longer, and the number of ribs greater.

ARCA GRADATA.

A. testá oblongá, posticè angulatá; costis concentricis, radiatim imbric-

catis, ad marginem inferiorem gradatim descendentes; long. 1, lat. $\frac{1}{10}$, alt. $\frac{9}{20}$, poll.

Hab. ad littora Oceani Pacifici.

This elaborately ornamented shell looks at first sight like a piece of Chinese carving. From Mazatlan.

CARDIUM BELCHERI.

TAB. IX, Fig. 3.

C. testá obovatá, subobliquá, costis radiantibus 24, posticis muricatis, mediis serratis, anticis (quatuor vel quinque) tuberculiferis; marginibus anticis acutè serratis; long. $1\frac{9}{20}$, $1\frac{7}{20}$, alt. $1\frac{7}{20}$, poll.

Hab. in Oceano Pacifico.

A very handsome species, of which only three specimens were dredged by Lieut. Belcher at sea, to the northward of Isabella Island, at the entrance of the Gulf of California, in 15 fathoms. It is of an obovate form, rather oblique, with 23 or 24 radiating ribs; those of the posterior side being furnished with compressed teeth, all turned one way; the middle being serrated, and the three or four anterior ribs, instead of these compressed teeth, having rather distant prominent tubercles: the teeth are all placed along the posterior edge of the ribs, and are remarkable for being smooth and shining on the anterior, while they have a dull surface on the posterior side: of the ribs themselves, the upper anterior surface alone is polished. The general colour of this shell is orange yellow, which is darker in front, and more inclined to red at the posterior part.

*CARDIUM RADULA.

C. testá rotundatá, costis numerosis, dorso angulatis et ad latera muricatis, tuberculis obliquis; long. $1\frac{7}{20}$, lat. $1\frac{2}{10}$, alt. $1\frac{7}{20}$, poll.

Hab.

In general appearance this resembles *C. muricatum*; it differs from it, however, in form, and in the ribs being angular at both edges. In Mr. Bland's collection.

*CARDIUM PUNCTULATUM.

C. testá suborbiculari, costis 22 elevatis, rotundatis, et interstitiis angulatis, punctulatis; long. $1\frac{2}{10}$, lat. $\frac{1}{2}$, alt. $1\frac{1}{10}$, poll.

Hab.

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We have seen only one specimen. The surfaces of the anterior ribs as well as the interstices are covered with minute raised dots, and a slender horny fringe of epidermis is observable on the posterior edges of the hinder ridges. The marginal teeth are large, and deeply cut. In Mr. Bland's collection.

CARDIUM DIONÆUM.

C. testâ cordatâ, valvis convexis, carinatis, carinâ dentatâ, costis radiantibus sublævibus, anticis subgranosis, duabus posticis subser-ratis; long. 1, lat. $1\frac{3}{10}$, alt. $1\frac{4}{10}$, poll.

Hab. in Oceano Pacifico.

Several specimens of this elegant Cardium, in different stages of growth, were collected by Lieut. Belcher. In the young specimens the anterior side is more prominent than the posterior; the teeth on the keel also are more distinct and pointed than in the full grown specimens, until they become entirely obsolete in the aged specimens. The largest individual we have seen is in the Cabinet of Mr. Bland; it is white, inclining to orange colour towards the edges, which are much more obtuse than in the younger specimens. From an Island in the Southern Pacific Ocean.

CARDIUM GRANIFERUM.

C. testâ suborbiculari, posticè angulatâ, costis radiantibus 16 graniferis, posticis confertis; interstitiis longitudinaliter concinnè striatis; long. $\frac{5}{10}$, lat. $\frac{4}{10}$, alt. $\frac{11}{10}$, poll.

Hab. ad littora Oceani Pacifici.

A beautiful small white Cardium, with distant and very prominent ridges, and numerous grains set on their edges; these grains are larger on the anterior than on the posterior ridges. Dug from a depth of about 6 inches in the mud of the Estero de Mazatlan.

CARDIUM BIANGULATUM.

C. testâ turgidâ, obliquè subcordatâ, anticè rotundatâ, posticè biangulatâ; costis radiantibus longitudinaliter striatis, anticis subcrenatis, posticis rugulosis; interstitiis punctatis; long. $\frac{9}{10}$, lat. $\frac{6}{10}$, alt. $\frac{8}{10}$, poll.

Hab.

Shell marbled with whitish, greyish purple and chesnut. In general form it resembles *Cardium medium*: the longitudinal striæ are worn down on the upper parts of the shell.

CARDIUM BOREALE.

C. testâ obovatâ, posticè subangulatâ, costis radiantibus numerosis, rotundatis; epidermide fuscâ; long. $1\frac{6}{10}$, lat. $\frac{9}{10}$, alt. $1\frac{3}{10}$, poll.

Hab. in Oceano Arctico.

Shell white, with a dirty brown epidermis and numerous close-set rounded ribs: the two ends nearly equal in length, the posterior being slightly angulated. From Icy Cape.

CHITON ALBOLINEATUS.

Ch. valvis lævibus, atro-fuscis, areis lateralibus elevatiusculis, radiatim albo-lineatis, margine granulato; long. $1\frac{3}{10}$, lat. $\frac{1}{2}\frac{3}{8}$, poll.

Hab. ad littora Mexicana.

The valves are of a dark colour, sometimes wholly so, but mostly with two or three white dotted lines passing from the central points towards the edges: the two terminal valves have numerous white lines diverging from their centers. From Mazatlan.

CHITON LOO-CHOOANUS.

Ch. valvis subscabrosis, areis marginalibus radiatim granosis, margine coriaceo supernè granoso, granis elevatis; long. $\frac{1}{2}\frac{5}{8}$, lat. $\frac{1}{10}$, poll.

Hab. in mari Sinensi, ad littora Insulæ Loo-Choo.

A very pretty little Chiton, whose margin is covered with small grains, resembling very short, blunt spines.

CHITON VESTITUS.

Ch. valvis reniformibus, membrânâ coriaceâ vestitis, apicibus nudis; long. $1\frac{6}{10}$, lat. $\frac{9}{10}$, poll.

Hab. in Oceano Arctico.

The rather elevated points of the valves are alone visible in the living animal: but when the coriaceous membrane which covers them is dry, their edges are easily traced. Little bunches of brownish hairs are scattered over the surface. This cannot be the *Ch. amiculatus* of Pallas,

because in that species the valves are entirely covered. The branchiæ in *Ch. vestitus* do not reach above half way from the posterior to the anterior extremity.

It may be as well to mention here, that a specimen of *Chiton tunicatus* of Wood, from the Arctic Ocean, is preserved in the Society's Collection : in that species the branchiæ are continued from one extremity to the other.

VERMETUS PELLUCIDUS.

V. testâ pellucidâ, longitudinaliter striatâ, apicem versus carinatâ.

Hab.

The striæ, which become carinated towards the apex are best seen in the young shell. This species, in texture, has somewhat the appearance of *Magilus*.

PATELLA MEXICANA.

P. testâ ovali, radiatim striatâ, vertice subcentrali, margine crenulato ;
long. $7\frac{3}{10}$, lat. $5\frac{3}{10}$, alt. $2\frac{4}{10}$, poll.

Hab. ad littora Oceani Pacifici.

From Mazatlan. This is the largest *Patella* we have ever seen, some individuals measuring nine inches in length. The young specimens are distinctly, but very closely striated, and their edge is very neatly crenulated, but when of large size they are much less neat and regular, and scarcely show any remaining vestiges of the radiating striæ.

DENTALIUM SEMIPOLITUM.

D. testâ albidâ, politâ, extremitate posticâ subrecurvâ, subtilissimè
striatâ, fissurâ posticâ nullâ ; long. $1\frac{4}{10}$, lat. $\frac{1}{10}$, poll.

Hab.

The very fine striæ continue about half the length of the shell, which is rather narrower in proportion than *D. nebulosum*.

BULLA CALYCVLATA.

B. testâ obovatâ, viridi aut castaneâ, aperturâ supernè subcanaliculatâ ;
labio interno appendiculâ calyciformi instructo, intus spirali ;
long. $\frac{7}{10}$, lat. $\frac{5}{10}$, poll.

Hab. ad Insulam Pitcairni.

From Pitcairn's Island, between the chasms formed by the coral rocks in a cavern, in about one foot water. Many specimens were brought from some of the Sandwich Islands by Captain Cook in the Endeavour: they were all of a dark green colour, and pierced, having been strung by the natives.

CREPIDULA INCURVATA.

C. testá ovatá, vertice incurvo, marginali; laminá interná arcuatá, incurvá; long. $1\frac{1}{10}$, lat. $\frac{8}{10}$, poll.

Hab. in Oceano Boreali, ad littora Kamtchatkæ.

A thick, rough epidermis coats the outside of this singular Crepidula.

FISSURELLA HIANIS.

F. testá ovali, convexá, cinereá, sub-radiatá, intus albidá, margine sub-purpurascete, pellucido; foramine magno, ovali, hiante; long. $4\frac{5}{10}$, lat. 3, alt. $1\frac{5}{10}$, poll.

Hab. ad littora Oceani Pacifici.

This fine species of Fissurella came from the neighbourhood of Valparaiso.

*EMARGINULA CRENULATA.

E. testá ovatá, posticè longiore, margine crenulato, siphone laterali; long. $\frac{6}{10}$, lat. $\frac{4}{10}$, poll.

Hab.

We have seen only one specimen, which is remarkable for the groove formed to conduct the siphon, being placed on one side of the head.

LITTORINA SQUALIDA.

L. testá obovali, apice acuminato; anfractibus supernè depressiusculis; aperturá rotundá, labio supernè coarctato; long. 1, lat. $\frac{8}{10}$, poll.

Hab. in Oceano Boreali.

Shell very much like the common Periwinkle; but not so thick and heavy: it is further distinguished by the contraction of the upper part of the lip.

MARGARITA UMBILICALIS.

M. testá obtusè conicá, obliquá, anfractibus sensim majoribus, longitudinaliter striatis; umbilico maximo; long. $\frac{6}{10}$, lat. $\frac{8}{10}$, poll.

Hab. in Oceano Boreali.

Only one specimen of this interesting species has occurred. The outer lip is much broken.

MARGARITA STRIATA.

M. testá conoidéa, anfractibus rotundatis, longitudinaliter striatis; umbilico parvo; long. $\frac{4}{10}$, lat. $\frac{8}{10}$, poll.

Hab. in Oceano Boreali.

The whole shell has a dull surface, its raised longitudinal striæ are decussated by very fine and close-set lines of growth: and those beneath are much closer than those on the upper sides.

*SIGARETUS CORIACEUS.

S. testá ovali, tenuissimá, spirá depressá, epidermide coriaced; long. $\frac{3}{4}$, lat. 1, poll.

Hab. in Oceano Arctico.

We have placed this with *Sigaretus* on account of its similarity in form, without any knowledge of the animal. It is remarkable for the strength of the epidermis; and such is the extreme tenuity of the shell, that scarcely any vestiges of it remain when the specimen is dry, the contraction of the epidermis causing it to scale off from the inside. From Cape Lisbon Bay. In Mr. Bland's collection.

NERITINA ALATA.

N. testá ventricosá, alatá, longitudinaliter striatá, spiram versus obsolete transversim tri-sulcatá, nigrá, fulvo-varid; aperturá albá; margine nigro; columellá obsolete crenulatá; long. $\frac{7}{10}$, lat. $\frac{8}{10}$, poll.

Hab. in insulá Taheite.

The lip spreads out into a wing, projecting so far beyond the spire, as to give that part of the shell an umbilicated appearance in old specimens. From Taheite.

NATICA PALLIDA.

N. testá subglobosá, albidá, tenui, apice breviter acuminato, eroso ; anfractibus rotundatis, marginè elevatiusculo, suturá distinctá ; umbilico parvo ; long. $1\frac{3}{8}$, lat. 1, poll.

Hab. in Oceano Arctico.

From Icy Cape. A very thin horny epidermis covers the outside of this shell, which is eroded at the apex, like many others from the same locality as well as several from Melville Island, the coast of Newfoundland, and other arctic regions.

NATICA OTIS.

N. testá obovatá, spirá brevissimá, acuminatá, pallidá, umbilico magno calloque umbilicali purpurascenti-nigrificantibus ; long. $1\frac{3}{8}$, lat. 1, poll.

Hab. ad littora Oceani Pacifici.

In general form this species nearly resembles *N. melanostoma*, but is at once distinguished by its solidity. The inside of the aperture is purple brown. From Mazatlan.

*NATICA CLAUSA.

N. testá subglobosá, anfractibus ventricosis, supernè subdepressis, margine elevatiusculo ; umbilico clauso ; long. $\frac{1}{2}$, lat. $\frac{1}{2}$, poll.

Hab.

The umbilical callus completely covers the umbilicus. Operculum testaceous, rather thin and somewhat concave. In Mr. Sowerby's collection.

MITRA CRASSIDENS.

M. testá fuscá, ovato-fusiforimi, spirá mediocri ; suturá simplici ; anfractu ultimo subventricoso, medio subdepresso, ad basim sub recurvo ; columellá 4-plicatá, plicis tribus superioribus crassis, inferiore sub-obsoletá ; epidermide crassá, fuscá ; long. $2\frac{3}{8}$, lat. $\frac{1}{8}$, poll.

The sub-recurved base is coarsely striated. In the young shells the epidermis is comparatively thin, and the base of the body-whorl is not recurved.

*HARPA GRACILIS.

H. testá oblongá, gracili, costis distantibus, muticis, lævigatis; long.

$1\frac{1}{10}$, lat. $\frac{5}{10}$, poll.

Hab.

An unique specimen of this remarkably slender Harp is in Mr. Bland's collection. It is white, varied with pale rose colour, and on the ribs are a few small transverse brown lines.

TRICHOTROPIS.*

Testa univalvis, turbinata, carinata, tenuis, aperturá longitudinem spiræ superante, basi integrá, columellá ad basim obliquè truncatá, labio externo tenuissimo, acuto. Epidermis cornea, super carinas testæ erinacea. Operculum corneum, parvum, lamellis ellipticis confertum, nucleo laterali.

The shell may be characterized as being turbinated, and carinated externally; its aperture is wide, but still longitudinal, and it is rather longer than the spire; its base is entire, without any notch, although immediately below the obliquely truncated base of the columella there is an indistinct canal. The whole shell is thin and delicate, its outer lip particularly so. Epidermis horny, forming numerous sharp-pointed bristle-like processes on the edges of the carinæ outside the shell; very strong and by its contraction in drying frequently breaking the edge of the lip. Operculum horny, much smaller than the aperture, composed of elliptical laminae, its apex or nucleus lateral.

The animal in most particulars resembles a Buccinum as to its external form and characters, differing from it principally in having only a very small fold of the mantle to line the nearly obsolete canal of the shell.

This and some other inequalities of the edge of the mantle corresponding in position to the keels on the outside of the shell, constitute the whole of the differences observable between the soft parts of the animals.

It may not be improper to add a short explanation of the characters by which the present genus may be distinguished from others with which it has either been confounded or to which it may be related. These are

* $\Theta\pi\lambda\iota$ seta, $\tau\rho\omicron\pi\iota\varsigma$ carina.

Turbo, Buccinum and Cancellaria. From Turbo it may easily be known by its thin shell, its elliptical and not spiral operculum, and by the absence of the ciliated lateral membranes which belong to the Turbines. From Buccinum, it is distinguished not only by the discrepancies observable in the soft parts, but also by the general habit of the shell, and more particularly by the want of a notch at the base of the aperture, and by the very indistinct canal. From Cancellaria it may be at once known by its being destitute of the oblique folds near the base of the columella:—it appears, however, to be the type connecting the true Buccina (*Buccinum undatum* and its congeners) with the Cancellariæ.

We have trespassed thus far on the patience of our readers, that they might have before them our reasons for constituting a new genus. They appear to us to be peremptory, otherwise we should have abstained from adding to the list of genera.

The specimens are not sufficiently well preserved to enable us to examine or describe the internal structure.

TRICHOTROPIS BICARINATA.

TAB. IX. fig. 4—8.

T. testâ anfractibus, quinque, ultimo ventricoso, carinis duabus validis; long. $1\frac{1}{2}$, poll., lat. $1\frac{1}{10}$, poll.

Syn. Turbo bicarinatus, Sowerby in Tank. Catal. App. p. xii.

Hab. in Oceano Arctico.

Shell with four or five volutions, the last of which is much larger than the others, and ventricose,—smooth on the outside, with two prominent keels, which are ornamented with the numerous strong, sharp-pointed, bristle-like processes formed by the epidermis. The aperture is large, and rather triangular; being, however, rounded externally, with two obtuse angles, and pointed at the base. The shell has a very narrow, linear umbilicus, which is carinated on the outer edge, and its carina is bristly like those on the back; its inner edge is formed by the elevation of the edge of the inner lip. The columella is rather flattened. Shell white, translucent, epidermis pale horn colour.

Near the apex of the shell which was in the Tankerville collection, and which is now in the museum of Dr. Goodall, two Terebratulæ

were attached; on the body-whorl of one of the specimens brought home by Lieut. Belcher, some small Balani have fixed their abode, and two of them are near the lip. Dr. Goodall's specimen was said to have been brought from Newfoundland; those from which our description was taken were dredged up, in from ten to fifteen fathoms water, in the bay between Icy Cape and Cape Lisbon.

**TRICHOTROPIS BOREALIS.*

T. testá suboblongá, anfractibus quatuor rotundatis, subcancellatis, ultimo carinis tribus vel quatuor setosis; long. $\frac{8}{10}$, lat. $\frac{1}{8}$, poll.

Hab. in Oceano boreali, prope Insulam Melville dictam.

Shell of a rather oblong form, with from three to four volutions, which are somewhat rounded, but furnished with three or four not very prominent, obtuse, keels, with smaller intervening striæ, which are decussated by the lines of growth. The columella and the canal immediately below it are rather more lengthened than in the last species; the umbilicus is also rather more expanded, and consequently not so linear as in the last species; on its edge as well as on the keels of the outside of the shell, the epidermis is produced into numerous bristle-like appendages.

Several specimens were brought to England by Captain Parry and Lieut. Griffiths; and a single individual has occurred at Oban, in Argyleshire: it was found there by the Rev. R. T. Lowe, who has obligingly enriched Mr. G. B. Sowerby's collection with it. Lieut. Belcher procured a single specimen at Icy Cape.

Whether the *Fusus 4-costatus* of Say,* might not, with propriety, constitute a third species of this genus, must, in our opinion, still remain undecided; it is a fossil which attains a considerable size, and it differs materially from both our species in having an enormous umbilicus.

BUCCINUM BOREALE.

B. testá tenui, ovato-fusiforimi, anfractibus ventricosis striatis; ultimo suturá simplici; cæteris suturam versus plicatis; aperturá patulá, labio supernè sub-lobato; epidermide fuscá, crassá; long. $2\frac{6}{10}$, lat. $1\frac{6}{10}$, poll.

Habitat in Oceano Boreali.

* Journal of the Academy of Natural Sciences of Philadelphia, Vol. IV. p. 127, t. vii. f. 5.

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The habit of this shell is not unlike that of *B. undatum*: but it differs from it in many points, especially in the form of the aperture and thinness of the shell. In young specimens the epidermis is so strong, that, in drying, it breaks the delicate edge of the lip. From Kamtschatka.

COLUMBELLA COSTELLATA.

C. testá oblongá, acuminatá, anfractibus subventricosis, costellatis; epidermide fuscá, striatá, nitente; long. $\frac{1}{10}$, lat. $\frac{3}{10}$, poll.

Hab.

Two varieties of this *Columbella* have occurred, differing, however, only in the more or less acuminated form of the spire and in the closeness of the ribs. They are of a light colour, with dark brown specks and bands.

NASSA LUTEOSTOMA.

N. testá oblongo-acuminatá, anfractibus tuberculato-costatis, aperturá crocá; long. $\frac{1}{2}$, lat. $\frac{5}{10}$, poll.

Hab.

Shell of a dark colour, almost black. The aperture in full-grown specimens is of a bright saffron colour; the young shells, however, have their lips much paler.

RICINULA ELEGANS.

R. testá obovatá, albidá, spinis subulatis muricatá, prope marginem longioribus; aperturá ringente, albá, lineá castaneá concinnè circumdatá; long. $\frac{7}{10}$, lat. $\frac{1}{10}$, poll.

Hab.

This species very closely resembles *R. arachnoidea*, but is beautifully distinguished by a bright chesnut coloured line surrounding the aperture just within the margin. Very few specimens occurred; and we have since found a single individual among the stores of the late G. Humphrey.

RANELLA NANA.

R. testá ovato-acutá, sub-compressá, muricatá, anfractu basali albofasciatá; brunneá, lineis castaneis transversis variá; labio subfo-

liato, supernè canaliculato; columellâ crenulatâ; long. $1\frac{4}{10}$, lat. $\frac{1}{2}$, poll.

Hab.

In this species, besides the murications, there are on each whorl two rows of granulations near the suture.

MUREX DUCALIS.

M. testâ ventricosâ, tuberculato-muricatâ, spirâ brevi; anfractu ultimo admodum ventricoso, varicibus 6-7, elevatis, dentatis et juxta basin fornicato-muricatis, infra rubris; umbilico mediocri; aperturâ et labio dentato rubris; long. 6, lat. 4, poll.

Hab. in Oceano Pacifico.

This fine shell was dredged up by Lieut. Belcher, near Mazatlan. The ground colour of the old shell is fawn, banded closely and unequally with obscure chesnut. In the young shell the ground colour is lighter, the bands are broader, more distant and darker, and the muricated tubercles are sharper, while the umbilicus is scarcely apparent, and the aperture, excepting its rosy margin, is white.

PYRULA PATULA.

P. testâ pyriformi, ventricosâ, spirâ brevissimâ, anfractibus superioribus tuberculato-muricatis, ultimo supernè angulato; aperturâ magnâ, patulâ, labio supernè angulato, spiram versus in sinum profundè excavato; columellâ arcuatâ, ad basin flexuosâ; labio columellari tenui; epidermide crassâ, striatâ.

Hab. ad littora Oceani Pacifici.

This fine shell was first noticed in the Tankerville Catalogue, with doubts whether it might not be a species distinct from *P. Melongena*. Specimens of all ages, in the finest condition, brought from Mazatlan by Lieut. Belcher, have, in our opinion, dispelled these doubts. The very short but muricated spire with the high angle of the body whorl—the angular upper lip terminating near the spire in a deep and rounded sinus—the arched columella, sinuous towards the base—the thin and curtailed columellar lip—the wide reddish-yellow aperture bordered round the exterior lip with black, and the absence of the deep and wide canal at the sutures, are

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strongly distinguished from the comparatively elongated and ribbed spire—the rounded body whorl and upper lip terminating near the spire in an angular sinus—the almost straight columella—the thick and far-extended columellar lip shewing that the mantle must have extended over a comparatively large portion of the shell—the white aperture, and the deep and wide canal of the sutures of the spire, which mark *P. Melongena*. In all the full-grown spined specimens of *P. patula* which we have seen there is but one row of tubercular spines, and those are on the angle of the body whorl. Other young and intermediate specimens have either a single row of spines on the same angle or are entirely unarmed. The epidermis is striated and very thick.

FUSUS LAPILLUS.

F. testá bulbiformi, spirá acuminatá, tuberculiferá; anfractu ultimo ventricosó, lævi; caudá subrecurvá; labio internè striato; long. $1\frac{3}{10}$, lat. $\frac{1}{2}$ poll.

Hab. ad littora Oceani Pacifici.

Shell of a pale brown colour, with a thin horny epidermis. The inside of the lip is deeply striated.

FUSUS PALLIDUS.

F. testá subfusiformi, sulcatá, anfractibus medio carinato-tuberculatis; caudá reflexá; labio internè striato, margine crenulato; epidermide tenui; long. $1\frac{4}{10}$, lat. $\frac{2}{10}$, poll.

Hab. ad littora Oceani Pacifici.

A very pretty species, of a pale brownish colour, and with a white, internally striated aperture. A thin fuscous epidermis coats the outer surface; and the tubercles are sharp-edged. From Mazatlan. It may not be uninteresting to add, that a *Fusus* from the Calcaire grossier in the neighbourhood of Paris presents no observable marks by which it may be distinguished from this recent species.

*PLEUROTOMA TUBERCULIFERA.

P testá fusiformi, striatá, tuberculiferá, apice acuto, anfractibus fusco fasciatis; long. $1\frac{2}{10}$, lat. $\frac{6}{10}$, poll.

Hab. in Oceano Pacifico prope Sinum Californiensem.

The body whorl has a dark chesnut band next to the suture and a lighter divided one below the row of tubercles; two other faint and almost obsolete bands are seen between the divided band and the base in the young shell.

Dredged at Sea to the northward of Isabella Island, at the entrance of the Gulf of California. In Mr. Sowerby's collection.

CONUS ARCUATUS.

C. testá fusiformi, albidá, castaneo-marmoratá, striis et labio spiram versus marginato arcuatis; spirá mediocri, carinatá; epidermide tenui; long. 2, lat. $\frac{9}{16}$, poll.

Habitat in Oceano Pacifico.

This Cone, of which we have seen but one other specimen, is remarkable for its curved striæ and lip, which last is deeply notched at the termination next to the spire, so as almost to resemble the ala of some of the strombi. There are a few not very deep striæ at the base of the shell. Found in the Pacific Ocean, near Mazatlan.

CONUS INTERRUPTUS.

C. testá subgracili, albidá, spadiceo-nubilá, tæniis frequentibus spadiceis albo interruptis cinctá, ad basin striatá; spirá mediocri, simplici; labio recto, crenulato; epidermide tenui; long. $1\frac{9}{16}$, lat. $\frac{9}{16}$, poll.

Habitat in Oceano Pacifico.

The younger shells of this pretty Cone are not so slender as those of larger growth. Dredged in the Pacific, near Mazatlan.

*OLIVA GRACILIS.

O. testá fusiformi, obsoletè longitudinaliter striatá, albá, castaneo-marmoratá; long. 1, lat. $\frac{3}{16}$, poll.

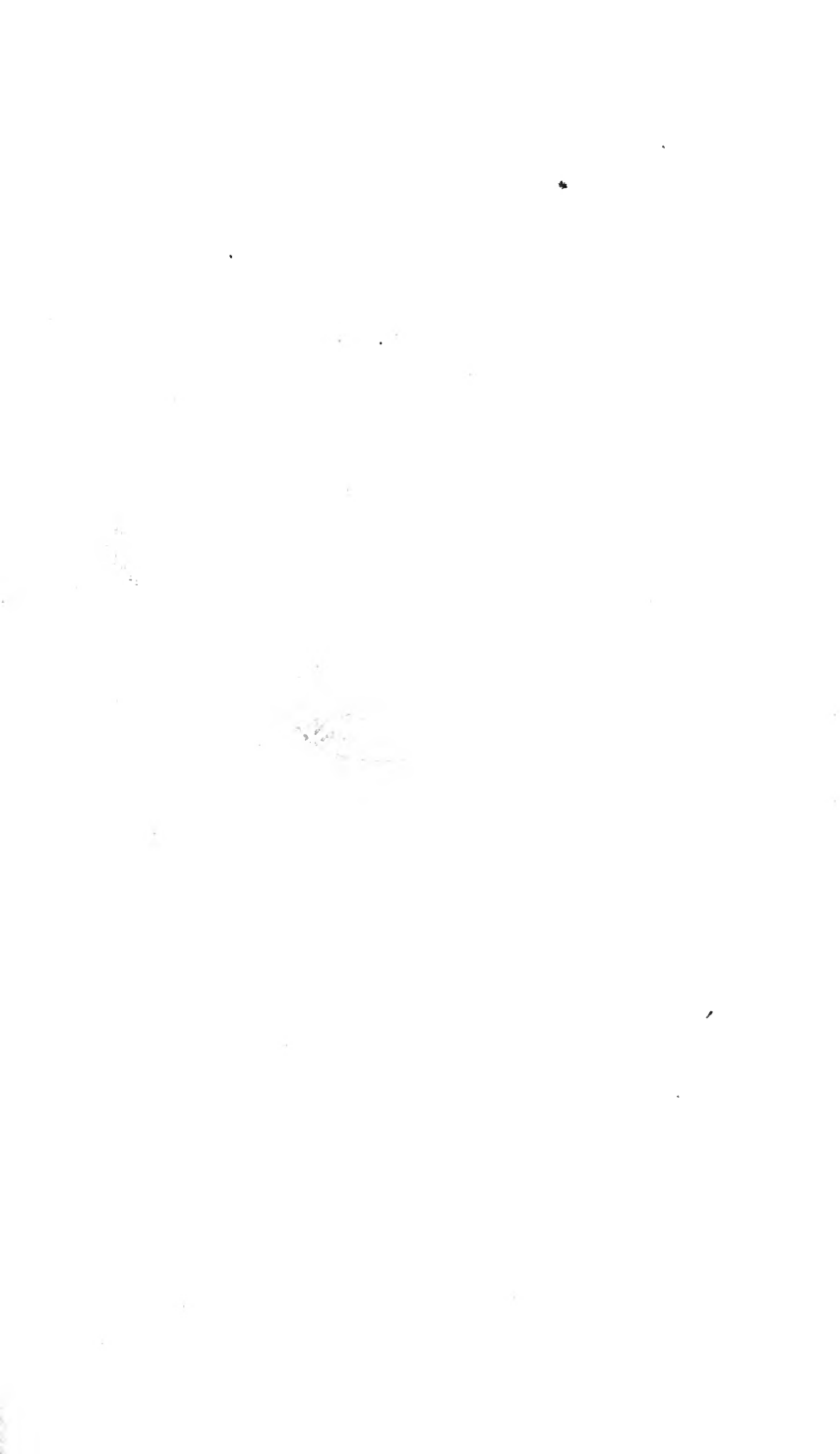
This beautiful and interesting shell in general appearance comes so near to a Terebellum, that a casual observer might, at first sight, mistake it for a species of that genus. In Mr. Bland's Collection.

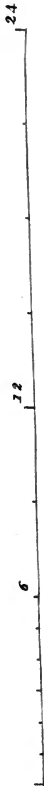
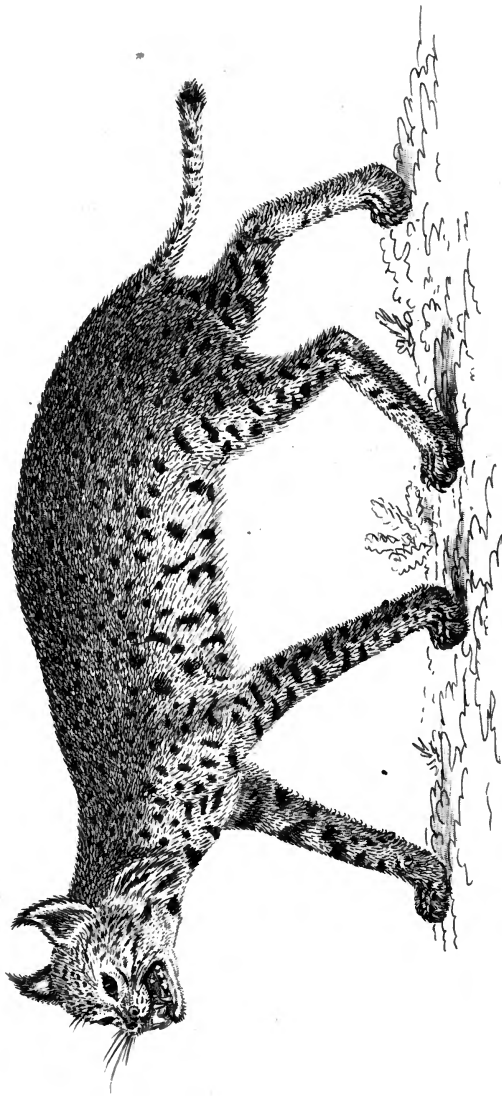
(To be continued.)

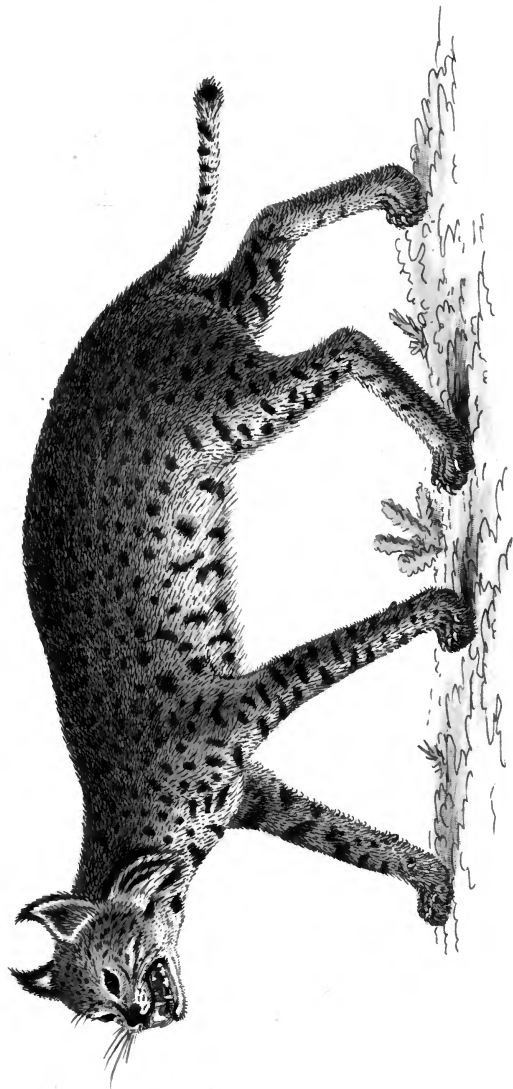
ART. XLIX. *Observations on some of the Mammalia contained in the Collection of the Zoological Society. By THOMAS HORSFIELD, M.D., F.R.S., &c., and N. A. VIGORS, Esq., M. A., F. R. S., &c.*

A *Lynx* from Mexico, lately presented to the Society by one of its most zealous corresponding members, Capt. Lyon, R. N., affords us the opportunity of figuring an animal, which, if not an undescribed species, has not as yet, as far as we are aware, been figured under its present appearance. That it is a new species we can not venture to assert, where so much difference exists in the furs of the animals of this group at different ages and seasons, and where the group itself is so numerous, that M. Rafinesque has already announced more than twenty species, according to M. Fred. Cuvier, as existing in the country from whence our animal comes. We are not of M. Temminck's opinion that the determination of species in such groups as these rests upon any examination, however acute, of preserved specimens in cabinets, or in any research, however extensive, into the stores of furriers. Such examination leads to conjecture; probable and plausible conjecture it may be true,—but still conjecture and not facts. We are in this way as likely to fall into the error of confounding true species, as into that of creating nominal ones. The truth can be satisfactorily attained only by diligent researches in the native country of these animals; or by accurate observations on their changes and differences as to sex, age and season, when in a living state in confinement.

But although we may not possess the best materials for our purpose, it is incumbent on us to turn to advantage those which we have. In figuring an animal which appears new, we make some addition to science. “We make certain a fact,” as M. Fred. Cuvier states, when speaking of his doubtful species, the *Chat à ventre tacheté*, “that in a certain country, and in a certain stage of life, an animal is found bearing the appearance of that which we figure.” A name perhaps ought to be added to such figures or descriptions; ought, we repeat, because if the real describer neglects to perform this office, some subsequent compiler will







Felis maculata. p. 381.

usurp it. This name may stand, or sink into a synonym, according as the truth when ascertained determines the point. But the stability or precariousness of a name is a matter of the utmost insignificance, and should not weigh with us for a moment when we have weightier matters at stake. We must not suffer the real dignity of our science to be frittered away by imposing a fictitious value upon trifles such as these.

FELIS MACULATA.

Fel. rufo-grisea, dorso saturatiore; corporis lateribus membrisque externè brunneo maculatis; gulá, corpore infrá, membrisque internè albis, brunneo latius maculatis; auribus penicillatis.

TAB. XIII.

The hairs of this animal are moderate in length and softness; they are pale rufous at the base, annulated with brown towards the ends, and white at the tip. On the back the tips are partially brown, so as to give a brownish grey appearance to the whole surface. On the head and shoulders the white tips prevail so as to give more of a grey cast to these parts. Along the back are faint indications of brown lines. The flanks and sides of the legs are marked with moderately small brown spots. The cheeks also are similarly spotted; and the elongated hairs at the sides of the cheeks exhibit lines, rather indistinct, of brown. When erected and viewed behind, these hairs exhibit a brown patch. The ears are white in front; behind, black with a large white spot in the middle; the hairs which form the brush at the extremity are rather copious in number, and all are black. Around the eyes is a little white. The upper lip is white with black lines. The under lip is white, as well as the whole throat, breast, *abdomen* and inside of the legs; all these parts, except the under lip and throat, are marked by blotches of black, much larger than the spots on the flanks. The tail is slender, the beneath part white; above, it is marked with small blotches of brown and a large black spot on the tip.

DIMENSIONS.

	ft.	in.
Length of the body and head from the extremity		
of the nose to the root of the tail	2	6

Length of the tail	0	6
Length of the head	0	6
Breadth of the head across the ears	0	$6\frac{1}{4}$
Distance between the eyes	0	$1\frac{3}{5}$
Height of the shoulder	0	$14\frac{1}{2}$
Height of the rump	0	$15\frac{1}{2}$
Length of the anterior <i>tarsus</i> and toes	0	$2\frac{1}{4}$
Length of the posterior ditto	0	$2\frac{1}{2}$

This animal is probably one of the numerous alleged varieties of *Felis rufa*, Guld., the *Bay Cat*, as it is considered, of Pennant. It differs materially however from the original description of that species, although it may approach some of the varieties, lately assigned to it by the continental naturalists. One point of distinction may be observed upon,—the length of the tail; not that I consider it in this instance important, but I wish to draw the attention of naturalists to some facts relating to these varieties, as they are called, of this animal, which involves a character generally considered of some value among the *Lynces*. In M. Cuvier's *Felis rufa*, the tail is four inches long; in M. Temminck's, it is five; in our animal it is decidedly six. It were much to be wished that the American naturalists would pay more attention to the *Mammalia* of their country, and determine those points, about which Europeans are contending. They exclusively have the materials for working upon: they are sufficiently powerful in numbers and ability to perform the office; and to them it legitimately falls as a national duty. But they pay too much deference to our continental writers; and consequently meet in return with no adequate respect. Let them remember that they have had a Wilson among their birds. Why should they not assert an equal authority in the elucidation of their numerous *Mammalia*?

FELIS NEPÁLENSIS.

Fel. caudá mediocri tenui apice griseá, corpore ex fulvescente griseo, maculis lateralibus oblongis vel angularibus saturato-fusco et fulvescente variis, singulis plagá saturatiore posticá notatis, situ obliquo sparsis; jugulo subtùs immaculato; collo utrinque fasciis duabus undulatis maculáque posticá oblongá transversá; gulá fasciá an-

gustá ; malis lineis duabus maculáque lunari ad rictum extensá atris.

TAB. SUPP. XXXIX.

The size of this animal is that of the *Felis Javanensis*; its habit more slender, the tail and neck proportionally elongate. The ground colour is grey, with a very slight admixture of tawny; the bands and spots of the head, back, neck, throat, *abdomen*, and thighs, are of a deep black colour; the superior longitudinal bands resembling those of the *Felis Javanensis*. The ground colour of the throat and *abdomen* is nearly white; the lower flanks being marked with a faint tawny longitudinal streak. The cheeks are streaked with two parallel longitudinal lines, at the termination of which follows a transverse lunar mark which passes with a bold curve to the angle of the mouth, near which a very narrow band crosses the throat.

The sides of the neck appear marked with two broad waving bands, at the termination of which stands an oblong regularly transverse band. The neck underneath is nearly immaculate. The shoulder and flanks exhibit irregular, diversified marks, the anterior oblong, the posterior angular; these are of a mixed tawny and black colour, and individually bear above or posteriorly a broad dash of a saturated black colour: they are scattered over the sides without any regular longitudinal disposition; but they have generally an oblique direction,

The *abdomen* is marked throughout with uniform oval spots; the anterior thighs within exhibiting one, the posterior thighs two broad black bands. The rump and thighs are marked externally with roundish or oblong spots. The tail above, to within about an inch of the tip, has uniform roundish spots which posteriorly are arranged in regular transverse bands. The head above and ears agree generally with those members in the *Felis Javanensis*.

DIMENSIONS.

	ft.	in.
Length of the body, from the extremity of the nose to the root of the tail	1	10½
Length of the head	0	4½
Length of the tail	0	10½

Length of the anterior extremities (about) . . 0 10

Length of the posterior extremity (about) . . 0 12

N. B. The latter are proportionally longer than in the *Javanese Cat*.

The distinguishing characters of this species are its comparatively lengthened habit; the slenderness and proportional length of the tail; the disposition of the marks on the flanks, and the character of these marks as far as regards their diversified form; and the saturated black patch, with which they are individually marked at their upper or posterior edge.

In the *Bengal Cat* these marks have a different form and disposition; they are oblong, and arranged on the flanks in regular succession longitudinally. The materials contained in the Museum, at the India House, have enabled us to make this statement, which is founded on the examination of a specimen, brought by General Hardwicke, and on a careful drawing, prepared under the eyes of Dr. Hamilton. We have thus two distinct species of small *Cats* from India, and the elucidation of this point is of some importance, as it appears, from the following remark in M. Temminck's Monographs, "*l'existence de cette espece dans l'Inde n'est pas constatée,*" that he entertained some doubts on the existence of the *Bengal Cat*. It is not our intention, at present, to give a comparative analysis of all the species which resemble our animal. The discrimination of many species of *Felis* is at all times a difficult subject; and on many of them Naturalists still disagree. Our immediate object is to indicate a new form of *Felis*, from the upper provinces of India, differing essentially from that which is found in the plains of Bengal; and so direct the attention of Naturalists in that country, to a more careful investigation of the various oriental species of this interesting genus.

The specimen in the Society's Collection was presented by Captain Farrer, of the East India Company's Service. It came immediately from Calcutta, where it was said to have been sent from Nepâl. It lived some time in the Society's Gardens, but was extremely wild and savage. It generally remained in a sitting posture, like that of the common *Domestic Cat*, and never paced its den in the manner of most other animals of this group.

ART. L. *Analytical Notices of Books.*

Atlas zu der Reise im nördlichen Afrika, von EDUARD RÜPPELL.—
Erste Abtheilung, Zoologie. Hefte I—VIII, Folio.—Frankfurt
am Main, 1826—1828.

IN the north-eastern regions of Africa, and in some part of what may be regarded almost as the central portion of that extraordinary continent, M. Rüppell has recently been a sojourner during six successive years. Upper Egypt, Nubia, Dongola, and Sennaar have been visited by him carefully and repeatedly, and he has penetrated into the Oasis of Kordofan, while his assistant has ascended some distance up the Bahr-el-Abiad. For nearly three years his head quarters were at Kurgos, and from hence he made excursions in various directions towards the south and west extending as far as the 14th degree of north latitude. His object has been to explore, so far as they could be rendered accessible to him, the countries of the interior of north-eastern Africa, and his researches have been directed to the acquisition of information in nearly every branch of science. Throughout the whole of his stay in these comparatively little known regions he devoted himself especially to the investigation of their natural productions, and succeeded in transmitting to his native city, Frankfort, many subjects of considerable interest, which have been deposited from time to time in the museum of the Senkenbergian Society of Natural History. At once to point out the important results of the labours of M. Rüppell, by which their collection had been so extensively increased, and to enable Naturalists generally to participate in the benefits conferred on Zoology by that enterprising traveller, the Directors of the Society determined not to defer until his return to Europe the publication of the materials transmitted by him. They accordingly commenced, in 1826, the Zoological Atlas which we have now to notice, and entrusted the editing of the work to three of their members; Dr. Sömmering superintending the execution of the plates; the articles on the *Vertebrata* being written

by Dr. Cretzschmar; and those on the *Invertebrata* by M. Heyden. The latter appears subsequently to have undertaken the descriptions of the *Reptilia*, the articles relating to such of them as have yet been given having affixed to them a signature corresponding with his initials.

Eight numbers of this Atlas have already appeared, each of which contains six coloured lithographic plates with corresponding letter-press. The execution of the whole is highly creditable to the scientific gentlemen by whom it is superintended, and to the artists whom they have employed. As, however, it will probably pass into the hands of but few individuals in this country, we shall endeavour to make known to our readers its contents, so far as it has hitherto proceeded, as completely as can be effected by the specific characters of the new and interesting animals described in it, aided only by a few occasional observations.

Commencing with the *Mammalia*, we have first to notice two species of *Vespertilionidæ*, the *Rhinolophus clivosus*, “ Rhin. apparatu olfactorio externo clivis gradatim elatis non dissimili: fossæ nasali ferro equino membranaceo circumdatæ interpositus scyphus parvulus; sequitur membrana transversalis concavata, antrorsum eminens, culmine obtuso, tunc membrana recta conjungens posteriorem transversariè positam, hastatam: corporis colore ex fusco cinerascente:” and the *Vespertilio Temminckii*, “ Vesp. corpore suprâ ex cinereo fuscato, infrâ albo.” Seven specimens of the latter were collected in the neighbourhood of Dongola. It is entirely distinct from the *Vesp. Temminckii* of Dr. Horsfield, which belongs to Rafinesque’s genus *Nycticeius*, and will, it is stated, be described in M. Temminck’s Monographs under the name of *Nyct. Temminckii*.

Of the genus *Felis* two species are figured and described; the *Fel. maniculata*, and the *Fel. Chaus*, Gûld. For the discovery of the former of these we are indebted to M. Rüppell, who regards it as the original stock from which the domestic Cat of the Egyptians was derived, and whence probably also sprung the house Cat of Europe. In this opinion he has been followed by M. Temminck, whose character of the species we have given at page 531 of our second volume. That of Dr. Cretzschmar is as follows: “ Felis colore griseo-ochraceo; genis colloque antico albis, hoc lineis ochraceis duabus cincto; plantâ pedum, metacarpi et metatarsi parte posteriore nigris; caudâ gracili, æquali,

“ ad apicem annulis nigris duobus.” It was obtained in Nubia, on the western side of the Nile, at Ambukol. The latter, the *Felis Chaus*, appears to have been hitherto imperfectly known, having been frequently confounded with another inhabitant of the same countries, the *Felis caligata*, or Booted Lynx of Bruce. The *Felis Chaus* is thus characterized: “ Felis corpore griseo, subflavo, passim nigro undulato; caudâ “ mediocri, ad apicem nigrâ, apicemque versus nigro annulatâ; auriculis “ extus nigricantibus, apice nigro barbatis.” The length of the tail, it should be remarked, does not exceed one-third of that of the body.

No less than seven species of *Canis* have been collected by M. Rüppell, the whole of which are here figured and described. 1. The Fennec, *Canis Zerda*, Zimm., “ Can. corpore suprâ stramineo sive isabellino, “ infrâ albescente; auriculis maximis, marginibus internis pilis longi- “ oribus albis vestitis; caudæ apice, et basi suprâ, nigricantibus.” Of this rare animal, the true nature of which was so little understood previously to the travels of Colonel Denham into the interior of Africa, three specimens have been transmitted to Frankfort. They are all perfectly alike in markings, and differ little from each other in size. They were found in the neighbourhood of Ambukol, and in the Desert of Korti, where they live in holes dug by themselves, and not on trees, as was pertinaciously asserted by Bruce.—2. *Canis famelicus*, “ Can. “ capite ochraceo; fasciâ dorsali castaneâ; corpore suprâ ex griseo “ flavescente, infrâ ex subflavo albescente; auriculis permagnis erectis.” This character is derived from the examination of seven specimens, collected partly in the Deserts of Nubia, and partly in Kordofan. The species is nearly related to the Fennec, which it resembles also in its habits. It is probably the fox-like animal represented on the monuments of ancient Egypt; as the Jackall, *Canis aureus*, Linn., does not appear to exist either there or in the immediately adjoining countries.—3. *Canis variegatus*, “ Can. corpore ochraceo pilis villosis perlongis ad apicem “ nigerrimis variegato; auriculis erectis, unicoloribus, ochraceis; caudâ “ breviori; unguibus crassis, obtusis.” This species was found in Nubia and Upper Egypt, where it lives in the Deserts, but does not burrow like the two preceding.—4. *Canis pallidus*, “ Can. capite, “ nuchâ, torque, toto notæo et caudâ ex colore stramineo pallidé rufes- “ centibus; regione paroticâ, gutture, pectore, gastræo albescentibus;

“ dorso ex albo, nigro, et rufescente vario; caudâ ad apicem nigrâ.” Very little exceeding the Fennec in size, it hides in burrows during the day, and hunts the smaller quadrupeds and birds by night; is extremely cunning, and is very rarely captured. Three specimens were obtained in Kordofan, where, and in Darfur, it is well known; but to the north of which it is not found.—5. *Canis pictus*, F. Cuv., “ Can. capite suprâ, “ nuchâ et regione temporali, pallidè ochraceis; striâ nigrâ intermediâ “ a fronte ad nucham porrectâ; facie nigrâ; corpore ex nigro, albo, et “ ochraceo maculato; caudâ ad apicem albâ; pedibus anterioribus tetra- “ dactylis.” This animal, the *Hyæna venatica* of Mr. Burchell, was obtained in the Desert of Korti and the Steppes of Kordofan, and appears therefore to be spread over a great part of Africa, extending northwards from the Cape of Good Hope. It is by no means rare, and, in addition to the habits ascribed to it by Mr. Burchell, M. Rüppell states that it attacks men. It is much feared by the Arabs, who hold its flesh in detestation.—6. *Canis Niloticus*, Geoff., “ Can. corpore pedibus- “ que fulvis; labiis albis; collo inferiore et abdomine ex cinereo griseis; “ caudâ ad apicem albâ.” This animal inhabits Egypt very extensively, and resembles closely in habits and appearance the European Fox, from which, however, it is readily distinguishable by its longer legs and more slender body.—7. *Canis Anthus*, F. Cuv., “ Can. capite crassiore; “ auriculis erectis, curtis; gutture et collo infrâ sordidè albidis; corpore “ suprâ ex fulvo, albido, nigro, et ochraceo vario, infrâ albido; caudâ “ nigrâ, basi tantummodo infernè albido; pedibus ex fulvo ochraceis.” This differs in some respects from the figure given by M. F. Cuvier; but M. Temminck, who has seen both specimens, considers them as belonging to the same species. It may be regarded as the Wolf of Egypt and Nubia, where it is very rare; and resembles in the colour of its fur the European Wolf. Dr. Cretzschmar appears disposed to believe that from it sprung the now widely diffused House Dog.

No other carnivorous quadruped has yet been given. Of the *Rodentia* three are figured: the common Domestic Mouse of Egypt, the *Mus Cahirinus*, Geoff., “ Mus corpore ex griseo fusciscente, pilis tergi “ aculeatis”: a Field Mouse of Mount Sinai and Nubia, *Mus dimidiatus*, “ Mus corpore suprâ colore ex stramineo pallidè rufescente; infrâ albo; “ pilis tergi aculeatis:” and the *Lepus isabellinus*, “ Lepus corpore

“suprà isabellino, infrà albescente; auriculis nudis capite longioribus.” This latter differs both in colour and size from the *Lep. Ægyptius*, Geoff., which was also obtained in abundance, and specimens of which from Abyssinia agreed in every respect with those taken in the Fayoum.

To our knowledge of the *Camelopardalis Giraffa*, Linn., M. Rüppell has added considerably. He obtained in Nubia and Kordofan five specimens, two of which were males and three females; and states that it lives in small herds in all the desert steppes south of Simrie, is plentiful in Darfur, and is even found to the east of the Bahr-el-Azrek. He regards the horns as constituting the principal generic character; they being formed by distinct bones, united to the frontal and parietal bones by a very obvious suture, and having throughout the same structure with the other bones. In both sexes one of these abnormal bones is situated on each branch of the coronal suture, and the male possesses an additional one placed more anteriorly, and occupying the middle of the frontal suture. The anomalous position of this appendage furnishes a complete refutation of the theory of Camper with regard to the Unicorn, that such an occurrence was contrary to nature, and proves at least the possibility of the existence of such an animal. Some information on this much debated subject was obtained by M. Rüppell in Kordofan, where the Unicorn was said to be known, and to bear the name of Nillekma. Persons of various conditions in life agreed in the statement that the Nillekma was of a reddish colour, of the size of a small horse, of the slender make of a Gazelle, and furnished with a long, straight, slender horn in the male, which was wanting in the female. Some added that it had divided hoofs, while others declared it to be single-hoofed. According to these statements it inhabits the deserts to the South of Kordofan, is uncommonly fleet, and comes only occasionally to the Koldagi Slave Mountain on the borders of Kordofan. Three several Arabs asserted to M. Rüppell that they had themselves seen the animal in question; and one of his slaves from Koldagi, on seeing the Antelopes brought from the desert of Korti, gave, of his own free motion, a description of the Nillekma, exactly coinciding with the notices afterwards obtained by the traveller. He had eaten of it in his own country, and described it as a very beautiful animal. Of the veracity of this slave M. Rüppell had frequent proofs, especially in the descriptions of

animals, all of which were found to correspond with the respective species which were subsequently procured.

With the Antelopes, four species only of which are figured, the list of *Mammalia* concludes. The *Antilope montana*, “Ant. corpore “suprà badio, infrà albo; cornubus lævibus erectis; regione paroticâ “maculâ nudâ rotundâ; caudâ brevi,” has been compared by M. Temminck with the *Ant. scoparia*, Schreb., to which it approaches most nearly, but from which he has determined it to be distinct. It is from the neighbourhood of Fazoql on the White Nile. Another species for which we are indebted to the researches of M. Rüppell is the *Ant. Addax*, which we have already had occasion to mention under that name while noticing the *Histoire Naturelle des Mammifères*, and, in a different state of clothing, under the name of the *Ant. suturosa*, Otto. It is thus characterized in the present work, “Ant. corpore lacteo; capite colore “cacaotico, quo collum superinductum; capronâ frontali spadiceâ; “cornubus, rugarum ambitu contortis, in læve fastigium exacutis, “lyratis; jugulo jubato.” It is worthy of remark that the character here given of the horns is in the very words of Pliny. It was found only in certain parts of the desert to the south of Ambukol, where it lives in small herds; and M. Rüppell states it to be so exceedingly fleet, that even the best Arabian horses have much difficulty to keep pace with it. Four other species nearly resembling the preceding are mentioned in a note which very briefly describes them, but of these our traveller was unable to procure specimens. A third new species is the *Ant. Soemmeringii*, “Ant. corpore suprà colore isabellino, pilis quasi sericatis, “suturis undique implicatis nitescente; infrà splendidè albo; facie, “fronteque fuliginoso-nigris, tæniâ albâ superciliari; basi cornu ad “rhinarium usque descendente; cornubus annulatis reclinatis, apicibus “lævibus introrsum flexis, lyratis.” This is intermediate in size between *Ant. Dama*, and *Ant. Euchore*, and is found in pairs, or rarely in small troops, in the eastern dependencies of Abyssinia. The remaining species is the *Ant. Dama*, Pall., to the male, the female, and the young of which two plates are devoted.

The illustrations of the Birds exceed in number those of the *Mammalia*, and embrace specimens of all the orders. Of the *Raptores* one only is given, and this had been previously noticed by Mr. Burchell as

the *Vultur occipitalis*, “ Vult. auchenio, dorso, caudâ, pectore, tectricibus, fusco-nigricantibus; pileo cristato, jugulo, abdomine, et remigibus secundariis albis; rostro sanguineo; ceromate nigro; pedibus rubris.” It lives solitary or in pairs in the eastern dependencies of Abyssinia, and appears to extend far into the interior of Africa.

The Insectorial Birds are numerous. Of these the first is the *Caprimulgus infuscatus*, “ Capr. corporis colore ex fusco rufescente; plumis omnibus striis subtilibus nigris undulatis; gulâ, fasciâ mentali remigumque, rectricibusque duabus externis albis.” Of *Ixos*, Temm., (*Turdoides*, Ejuds.) four species were obtained, two of which are described as new, the *Ixos leucocephalus*, “ Ix. rostro nigro, capite albo; alarum caudæque color umbraceus, plumarum laxarum nuchæ, auchenii, et interscapulii dilutior; gastræo e fusco candicante; gulâ maculis albescentibus variâ:” and the *Ixos plebeius*, “ Ix. rostro nigro, corpore suprâ umbrino, gulâ albâ, jugulo et pectore fusciscentibus, plumis maculis albis terminatis, abdomine ex fusco candicante.” The former of these is found plentifully in Sennaar, and the latter, which is probably migratory, occurs in troops in Kordofan during the winter. The next species, the *Sylvia Ruppellii*, Temm., from the Red Sea, has been previously figured in the Planches Coloriées. Of the genus *Malurus* four are given: the *Mal. Acaciæ*, “ Mal. corpore coloris ex ochraceo isabellini; capite cinerascete, obsolete fuscâ striolato; gulâ albâ; rostro pedibusque flavis,” which has been included in Lichtenstein's Catalogue as a species of *Sphenura*: the *Mal. squamiceps*, “ Mal. corporis colore fabarum coffeæ naturali; plumis capitis rigidioribus, maculæ oblongæ nigræ, illis dorsi et gastræi fuliginosis; gulâ albâ:” the *Mal. clamans*, “ Mal. fronte et vertice ex albo nigroque variegatis: corpore suprâ helvolo; infrâ subflavo; tectricibus nigris, albo limbatis:” and the *Mal. gracilis*, “ Mal. corpore suprâ ex cinereo olivascente, subtus albescente: in pileo, cervice et dorso maculæ oblongæ, obsolete fuliginosæ.” The latter is the *Sylvia gracilis* of Lichtenstein's Catalogue, and an uncoloured figure of it has been given in the Description de l'Égypte. The *Emberizæ* are three: the *Emb. cæsia*, “ Emb. capite, nuchâ, pectore cæruleo-cinerascentibus; gutture, gastræo cinnamomeis; remigibus et rectricibus nigris, rufo limbatis; rectricum extimarum duarum pogonio interno maculâ albâ:” found near Kurgos only in the winter months: *Emb. striolata*, (*Fringilla striolata*,

Licht.,) “*Emb. capite, dorsoque rufescentibus, nigro striolatis; tæniâ superciliari, infraorbitali, et mentali albis; alis caudâque nigris; pennis rufo limbatis; abdomine helvolo;*” also apparently migratory, occurring through the winter in the neighbourhood of Ambukol: and the *Emb. flavigaster*, “*Emb. capite nigro, fasciâ a medio verticis ad nucham albescente, lineâ superciliari et infraorbitali albis; tergo castaneo, tectricibus minoribus et majoribus apice albis; corpore infrâ citrino; crisso albo:*” a winter inhabitant of Kordofan. The *Alauda bifasciata*, Licht., has been figured in the Planches Coloriées, and appears to extend its visits as far as to the coast of Barbary and even to the South of France. The *Ploceus superciliosus*, “*Ploc. capitis colore lætè castaneo, tæniâ superciliari, mentali, gulâ, et maculâ infraorbitali, albis; striâ nigrâ descendente ad latera colli; alis umbrinis, margine pennarum flavicanti; corpore inferiore ex fuscescente albo,*” was met with plentifully in Kordofan: and in the same country was obtained a new species of *Psittacus*, *Psitt. Meyeri*, “*Psitt. capite, collo, et pectore, ex fusco cinerascens; alis caudâque brevi ex olivaceo fuscescentibus; plicâ sulphuræâ; toto gastræo, crisso, et uropygio viridi splendentibus.*” The *Bucco margaritatus* “*Bucco fronte et vertice nigris, facie, gutture, abdomine, tergo, colore sulphureo; fasciâ pectorali nigrâ; maculis infra eam, rostro, crisso, et uropygio coccineis; auchenio, interscapulio, et alis umbrinis, maculis albis uti margaritis aspersis,*” is a native of Senaar: and over the whole of the north-eastern part of Africa lives the *Nectarinia metallica*, Licht., “*Nect. viridi-ænea, uropygio et fasciâ pectorali violaceis; pectore, abdomine, et crisso, ranunculaceis; mas: fœmina cinerea infrâ flava.*”

The Rasorial Birds figured are the *Perdix Clappertoni*, the *Francolinus Clappertoni* of Messrs. Children and Vigors in the Appendix to Denham and Clapperton’s Travels, which is here erroneously ascribed to Mr. Barrow; of this the characters have been already given in the Zoological Journal: and two species of *Otis*, the *Otis Nuba*, “*Otis fasciâ superciliari gulâque nigris; collo cinereo-cærulescenti, collari extante rufo; corpore suprâ badio, striis nigris irregularibus multangulis consperso, infrâ albo; pedibus flavis;*” a bird of the deserts of tropical Africa: and the *Otis Arabs*, Linn., a full grown pair of which were obtained in Kordofan.

The *Grallatores* are in number two: the *Ciconia ephippiorhyncha*,

figured by M. Temminck in the Planches Coloriées, and perhaps synonymous with the *Mycteria Senegalensis*, Vieill.: and the *Ciconia Abdimii*, Licht., “Cic. viridi-purpurea; ventre et uropygio albis; facie gulâque nudis; clypeo frontali depresso; rostro pedibusque virescentibus; pedum articulis rubris.” In the name of this species the Prussian travellers Ehrenberg and Hemprich, have commemorated their gratitude for the hospitality of the Nubian chief Abdim-Bey, to whose kindness was owing much also of Rüppell's success.

The *Natatores* comprise the *Pelecanus rufescens*, Lath.: the *Sterna velox*, “Sterna rostro flavo ad basin virescente; capite suprâ nigro; regione frontali, malari, temporali, collo, et toto corpore inferiore candidissimè albis; dorso, uropygio, caudâ, et alis, obscurè cinereis; pedibus nigris:” the *Sterna affinis*, “Sterna rostro flavo; fronte capiteque nigris; regione malari, toto collo, et corpore inferiore, candidissimè albis; dorso, remigibus, et rectricibus, argenteo-cinereis; pedibus nigris:” both the latter being from the Red Sea: the *Rhynchops orientalis*, “Rhynch. fronte, parauchenio, totoque corpore inferiore albis; superiore fusco-atro; rectricibus fuscescentibus, albo marginatis; rostro sanguineo, apice flavescente,” synonymous with the *Rhynch. albirostris*, Licht., the description and name of which must have been taken from a bad specimen with the bill bleached: and the *Larus ichthyatus*, Pall., the range of which appears to be extremely wide, it being found not only on the Red Sea, but also on the Caspian, and on the Ganges and other large rivers of Hindoostan.

Only three *Reptilia* have yet been figured: the *Stellio vulgaris*, Daud.: the *Agama Sinaita*, “Ag. corpore ex fuscescente griseo, maculis dilutioribus; squamæ dorsales æquales, subcarinatae, marginatae; limbus auriculæ unispinosus; scutella analia sex:” and the *Uromastix ornatus*, “Urom. obscurè viridis; corpore fasciis citrinis irregularibus; segmenta subcaudalia squamis inermibus, serie simplici dispositis.” The latter differs by its larger, fewer, and flatter scales, which are not spined round the ears, on the sides of the neck and back, and on the anterior legs, from the two other species found by M. Rüppell, the *Urom. spinipes*, Merr., (of which the following character is given in a note, “Urom. suprâ obscurè viridi-fuscus (mas et fæm.); segmenta subcaudalia squamis dentatis, in series plures dispositis:”) and the *Urom.*

dispar, n. s. “Urom. suprà nigro-fuscus (mas) aut cinereo-flavus (fæm.); “segmenta subcaudalia squamis dentatis, in series plures dispositis.” These two species, the differences between which were first noticed by Ehrenberg and Hemprich, are more nearly related to each other than to the *Urom. ornatus*, which, however, in outward form closely resembles the *Urom. spinipes*.

From the preceding analysis it will have been seen how much of important matter is already contained in this valuable work. From its continuation we are therefore justified in anticipating still further additions to our knowledge, of which we propose occasionally to avail ourselves in this department. No portion of the Fishes or Insects, the collections of which are noticed in the prospectus, have yet appeared.

Elements of Natural History, adapted to the present state of the Science, containing the Generic Characters of nearly the whole Animal Kingdom, and Descriptions of the principal Species. By JOHN STARK, F. R. S. E., M. W. S., &c. With illustrative Engravings. 2 vols. 8vo. Edinburgh, 1828.

As an elementary work on Natural History at large, this production, although not ill adapted to convey much general information, is deficient in several important respects, and particularly in not supplying that essential requisite to the beginner, an explanation of the terms employed in the science which he is about to study. But the Elements, if as such we are to regard the general remarks on natural objects, whether organic or inorganic, and on animals and vegetables, occupy a comparatively small proportion of these volumes, and can by no means be considered as their most prominent feature. It is as a Manual of Zoology that they will be purchased and read, and it is as such that they deserve to be recommended to general use more strongly than any compilation of the kind, either in our own or in any other language, with which we are acquainted. Of compilations in general they have indeed most of the defects, and, as in the mass of such works, many errors are retained in them which might readily have been corrected by referring, if not to specimens, at least to original authours. But there is a redeeming merit

in the candour of Mr. Stark, who openly admits, in the advertisement prefixed, the absence of originality in the pages he has given to the world, and states, though not without some little reserve, the sources to which he is indebted for the information collected by him. To quote from this advertisement, and to take in connexion with it a rapid glance at the exposition here given of the animal kingdom, will best explain the contents of the work, and most effectually point out the authorities on which it is based.

“ In the class *Mammalia*,” we are informed that “ the Mammalogie of M. Desmarest has been followed, with the addition of the species described since that work was published :” but the absence of certain errors which are to be found in that still useful compilation, induces us to suspect that the authour has, in many instances at least, had recourse to the Synopsis of the species of *Mammalia* contained in Mr. Griffiths’s edition of the Règne Animal of Baron Cuvier. From this latter compilation, (which, although erroneous in many particulars, and especially confused as regards its typographical execution, is yet the best, so far as it extends, that has hitherto appeared,) the greater number, if not the whole, of the additional species of the present publication have been adopted ; but, by some over-sight, several which might have been taken from it have been omitted ; instances of which will be seen by comparing the genera *Canis* and *Ursus* in the two works. The productions in which these species of modern introduction were first described, have evidently not been personally referred to by Mr. Stark ; and as it is said by him, that “ in the collection and arrangement of the materials, every accessible source has been consulted,” we can only regret that his opportunities have been so limited, not only in this, but in every other department ; scarcely a single original work of any modern Zoologist being quoted, except at second-hand.

“ In the class of Birds Temminck has been taken for the guide ; and in addition to the European species described by that celebrated Ornithologist, the characters, and at least one typical species, of all the extra-European genera have been given :” the latter being apparently derived from the compilation of Mr. Stephens, which forms part of Shaw’s General Zoology. Mr. Selby’s Illustrations of British Ornithology seems to be the only recent original work which has been consulted in this de-

partment. As the subject is probably not uninteresting to our readers, we may notice a curious remark which occurs in the preliminary observations on this class, where it is stated that the "chain of affinities, Mr. Vigors conceives, takes always a quincunx form:" a quite erroneous expression, quincunx, as applied to a circle, implying five-twelfths, and not one-fifth, of the circumference. The authour yet more extraordinarily adds, "As a further confirmation of Mr. Vigors's theory, it may be remarked, that Professor Blumenbach long since noticed the same principle as applicable to the arrangement of the feathers of birds on the skin, which he observed always to follow a quincunx order:" quincunx, we need not observe, having here an entirely different signification, and expressing an arrangement in parallel rows where every two objects of the upper row represent with one in the lower the extreme points of V, the Roman five. Quinary, we may inform Mr. Stark, is the term generally employed to express the distribution contemplated in the *Horæ Entomologicæ*.

"The arrangement of Baron Cuvier has been followed in the classes of Reptiles and Fishes:" and here also the authour has relied for the species he has noticed principally on the General Zoology of Dr. Shaw. An error which has struck us as we were turning over the pages, induces the remark that the authour should have carefully avoided any departure from his model; for, had he closely copied M. Cuvier, he would not have included among the Sea Tortoises the genera *Chelys* and *Trionyx*, which are in reality inhabitants of fresh water.

"The classes *Mollusca* and *Conchifera*, including the fossil genera, and the class *Tunicata*, have been adopted from M. Lamarck:" and to the characters of each of the genera in these departments are appended those of species extracted from the works of that eminent Naturalist. For the Annulose animals the authour is chiefly indebted to Latreille, Desmarest, and Dr. Leach: and in the *Radiata* and *Acrita* he has been guided by Cuvier, Rudolphi, and Lamarck. Here also, except in the *Insecta*, characters are given of the whole of the genera as they appear in the works of the authour who has been consulted for each department, and one or more species are characterized in illustration of them. In the selection of the species no principle, however, appears to have been uniformly followed.

In the illustration of the *Insecta* a different plan has been pursued. Their immense number probably presented an insuperable obstacle to the introduction of every genus, of its characters, and of typical species, although only the older works of Latreille are here employed, in which the genera are less numerous than in those recently published by that distinguished Entomologist. For this reason analytical tables have been given of each family, under the sections of which every genus is named; but some only of the genera are characterized, and these are illustrated by very few examples. Here also Dr. Shaw's very meagre work on this subject has been put in requisition for the species, which are generally selected from such as are natives of Europe.

From the names of the authours whose works have been mentioned in the course of this notice as having supplied to Mr. Stark the information which he has included in these volumes, it will have been seen that he has usually consulted those who rank highest in public estimation among the general writers on the departments to which they have chiefly devoted themselves. By compressing the most important parts of their many valuable volumes into two, he has furnished a work of much real utility, and the more practically useful because its moderate size admits of its being made a travelling companion, and being thus rendered available in many situations where the incumbrance of more bulky productions would prevent their being employed. Such indeed appears to be the principal value of works like the present. To the voyager, or to the traveller, they may be made in themselves a library adequate to most of his zoological wants; and to the retired student, whose means are limited, they are almost equally useful. But both the one and the other, and every person who aims at attaining the best information on such subjects, will not fail to have recourse to very different sources, whenever they possess opportunities of consulting libraries.

It has been already said that we believe that these *Elements* may safely be placed at the head of the *Manuals of Species of Animals*; but although it is, at the present moment, the best book of its class, a much more useful one might readily be concocted by the mere labour of compiling from those numerous original productions which have been neglected by its authour. Even a person, like that gentleman, by no means intimately versed in the subject, might readily supersede the present work,

and give to the public a far better compilation. To prepare a Species Animalium, if indeed such a work be at all practicable in the present state of our knowledge and collections, would require abilities and industry of a very superior order.

Of the plates it will be sufficient to remark, that they also are taken from other works, and these, in some instances, by no means the best that might have been employed for such a purpose. The one which illustrates the insects, for example, contains copies of French figures in the very worst style of art in which such objects have ever been represented even in France.

Manuel d'Ornithologie, ou Description des Genres et des principales Espèces d'Oiseaux: par A. P. LESSON. Paris, 1828. 18mo., 2 tomes, pp. 421 and 448.

UNLIKE the convenient little Manuel de Mammalogie of the same authour, which has recently been noticed in this Journal, the present work does not attempt to characterize the whole of the species of the class to which it is devoted. It is rather designed as a Genera of Birds; the characters or descriptions of each group being accompanied, in addition, by incidental remarks on its value, its position in the general system, or its geographical distribution, and also by references to, or characters of, some of the species contained in it. Beyond this no fixed plan is pursued; and hence great inequality exists in the various parts of the volumes. In some instances the genera are characterized with precision and conciseness; in others, the characters are given with such diffuseness as to merit the appellation of generic descriptions. In some of the groups again, the species are merely referred to, and even these references are few in number, an example of which may be found in the *Psittacida*, those quoted in M. Lesson's pages being scarcely one-tenth of the whole number, and few among them having attached to their names any notice of the peculiarities by which they are distinguished. In other cases, as in *Tanagra*, nearly every species known to ornithologists is characterized; and in others again, as in *Charadrius*, not only is the enumeration of the species equally complete, but each of them is also fully described.

Notwithstanding these inequalities the *Manuel d'Ornithologie* is a useful compilation; for as such it must be regarded, although its authour asserts that it is throughout the result of original research; an observation which can only be understood as implying that M. Lesson has, on this occasion, abstained from collecting from other compilers, and directed his attention principally to the works of original enquirers; a mode of proceeding by which the probability of error is considerably diminished. The number of genera inserted in the body of the work amounts to about three hundred and fifty, without including many groups noticed as sub-genera, to which, however, characters are assigned. Under each of these, references to the writings of the older authours are usually avoided as far as possible; but the productions of the more recent ornithologists have been sedulously searched, and the whole of the species described by M. Temminck, Dr. Horsfield, Mr. Vigors, MM. Quoy and Gaimard, &c., are characterized, and characters and full descriptions are also given of all the novel species collected by MM. Lesson and Garnot, and even of those which have not yet appeared in the Zoological part of the voyage of the *Coquille*. The *Manuel*, consequently, not only exhibits a view of the genera at present in use, but also furnishes a supplement to every species of Birds compiled upwards of ten years since, the whole of which it is adapted to complete up to the present time.

The first volume is preceded by tabular views of the principal systems of Ornithology which have yet been proposed; and the second concludes with additions and corrections which have occurred to the authour during the printing of his work. Among the latter are given the characters of thirty-seven genera proposed by Mr. Swainson in the third volume of this Journal; while treating of one of which, *Tigrisoma*, M. Lesson had previously taken occasion to inveigh against the multiplication of genera, especially by the "naturalistes insulaires." That the authour is himself by no means averse to enjoying that liberty which he would deny to others is shown by his having already in the *Voyage de la Coquille*, proposed various genera, which may even be regarded as numerous in comparison with his materials; by his continuing the practice, though on a more limited scale, in the present volumes, as in *Phonygama*, founded on the *Barita Keraudreni* of his voyage, and scarcely differing from that group except by the convolutions of its *trachea*; and by his concluding and

almost regretful remark, that certainly he could readily have created a good number of them by giving better and more detailed descriptions of the forms; but that he had felt himself bound to conform to the views of the Editor [of the whole series of *Manuels*] who had required a book of reference, free from innovations.

An *Atlas pour les Oiseaux, composé de 129 planches représentant un grand nombre de sujets*, may be had separate from the text of the *Manuel*.

THE
ZOOLOGICAL JOURNAL.

January—May, 1829.

ART. LI. *A Letter to J. E. Bicheno, Esq., F.R.S., in examination of his Paper "On Systems and Methods," in the Linnean Transactions. By W. S. MACLEAY, Esq., A.M., F.L.S., &c.*

MY DEAR SIR,

I HAVE read your Paper "On Systems and Methods," in the Linnean Transactions, with some degree of interest, as it derives no small importance from being, as every word shews, clearly written "*ex Cathedrâ.*" With a few exceptions, which I should hope have proceeded from inadvertency, it is, moreover, upon the whole, a liberal exposition of the opinions prevalent among the Naturalists of the old Linnean School. True it is, you think it necessary to shew your impartiality, and to bestow some censure *en passant* on this School, but it requires no great penetration to see that your Paper was intended for their peculiar circle, and I therefore earnestly trust that your labours may not go unrewarded, and that you may obtain all the honour and glory which you promised yourself from the staunch Linneans, by this publication.

I know enough of you to be convinced, that although, from the style of your paper, you seem to wish to lay down your "principles of arrangement" oracularly, still, rather than that your laws should be wholly slighted, you would be most willing, nay, desirous to have them well sifted and examined. I am convinced, I repeat, that you have too firm an opinion of their soundness to believe for a moment, that they will not come like pure gold from any crucible in which they may be assayed.

Perhaps other friends who have the pleasure of being nearer to you, have long ere this shewn you your mistake ; but in case they have not, I am sure that you will not be surprized that I should have determined to state how far I feel myself called upon to agree with you in opinion.

My review of your paper must be premised with the remark, that I do not pretend to combat the general conclusion to which it is your object to arrive, for I confess, that after having twice carefully read over your argument, I am not sure that I understand its drift, and much less am I certain, that if I did understand it, your sentiments would differ considerably from my own. If, however, the purport of your Paper be, as there is some reason to suspect, comprehended in the assertion, that "the danger to be now apprehended is, that those who adopt other "arrangements" than the Linnean, "will forget the advantages to be derived from what is old in their love of that which is new," then I would once for all observe, that there never was a time when Naturalists paid more attention to the labours of their predecessors, whether ancient or modern, than at present : and therein indeed consists a part of their diagnosis, as you would perhaps express it, from the school which you advocate, and which in its love and veneration for what is not old, but only Linnean, remains in a total and complete ignorance of whatever has not proceeded from the pens of the Swede and his most servile admirers.

Still, nevertheless, since I remain in doubt as to this being the object you had in view in writing on Systems and Methods, I shall confine myself strictly to those of your propositions which I think most difficult to assent to, leaving the general conclusion at which you would arrive, unless it be as above, untouched, until you shall have, at some future period, more clearly expressed it:

You say that you are not yourself opposed to any particular system, but only intend in your Paper to lay down some "*first principles of arrangement,*" to serve as a test by which Naturalists may try all systems. Let us, however, examine calmly these "first principles" themselves, before we apply them ; for the test of a system ought surely to be proved good and true before we can allow it to regulate either our assent or dissent.

In the first place, you propose to treat the subject metaphysically, as

a Locke, not as a Linnæus ; now to this proposal no Naturalist ought to object, provided you found your metaphysical arguments, and "abstract reasoning," on some little observation of nature, and provided you illustrate your various positions by facts drawn from Natural History. How far your Paper is strictly logical or metaphysical, I will not now discuss, but I will venture to say that your abstract reasoning would have carried much more weight with it, had you seasoned it a little more with illustrations drawn from observed facts.

You are pleased upon the authority of Mr. Roscoe and Sir J. Smith, which you very naturally esteem quite conclusive, to state to those who break up the old genera into many new ones, "that the artificial and "natural systems aim at two very distinct objects." Although in these degenerate days it is not very usual to talk of the natural system as *aiming at an object*, I imagine that I understand what you would say, in which case the information you would impart is not very original either from your botanical authorities or yourself ; nor am I aware exactly for whom you are charitable enough to intend it, as I know of no naturalist who does *break up*, at least in your sense of the words, the old orders and genera when he deems them good. I say *in your sense of the words*, for I must suppose you mean your advice for those who destroy or take no notice of the ancient groupes. You cannot surely, with your talents for abstract reasoning, mean to attack those who not merely preserve them, but by subdivision make us by the consequent analysis better acquainted with their internal construction. A person who retains the groupes of the older Naturalists, and moreover shews us how these may be resolved again into others, evidently possesses a greater portion of that acquaintance with individual forms upon which our knowledge of the natural system must, as even you yourself allow, eventually be grounded. I cannot believe that you who profess to understand the exact portion of merit that belongs respectively to the various schools of Naturalists, now require to be informed that those of the present day make it a rule to preserve the ancient groupes where they deem them good, and only differ from their predecessors in shewing how these groupes may be subdivided. This, in fact, is the real progress of Natural History ; for on looking back at the mode, for instance, in which Zoology has advanced, we find that Aristotle's genera were the orders of Linnæus, and that the genera

of Linnæus are the families of the present day. And not only the word *genus*, but even the word *species*, as you yourself say, has become more confined in its signification. To say that the word *genus* had originally any confined or determinate sense given to it by Linnæus, or that any particular limits were assigned to it by him, beyond that perhaps of its being his smallest known groupe of species, is sufficiently disproved, not only by the impossibility of his making it to signify any thing else than a groupe, but also by the fact, that the learned Swede was constantly, as his knowledge of individuals increased, subdividing his early genera into new ones. But however this may be, I beg you may rest assured that every person who goes on increasing his acquaintance with the smaller natural groupes, whether they be called *genera* or *subgenera*, or any thing else, must know but too well that artificial systems aim at a different object from the natural system. I should have fancied, indeed, that so much was implied by the bare use of such terms as *natural* and *artificial*.

An artificial system aims at facilitating the distinction and nomenclature of species, and not at the knowledge of how these species are connected together in the one great plan of creation, which in fact is *the natural* system. An artificial system, therefore, really aims at an object, but the natural system is itself the object aimed at by those, who truly know the difference between the two, and how trivial and contemptible the most perfect acquaintance with the one is in comparison with the smallest glimpse of the other. But you state that the natural system has an object, namely, "to abridge the labour of reasoning!" If I know what is meant by the natural system, it is as I have already stated, the original plan of the creation, and to say, therefore, that the object of the natural system, or rather of the Deity who devised it, was to abridge the labour of reasoning, is beyond my comprehension, and still less can I understand how it answers to the purpose thus assigned to it. I suspect, indeed, the longer you study it, the less you will find your labour abridged. At least such is the recorded experience of men who have dealt as much in the observation of facts as in abstract reasoning.

You favor us with the Linnean definition of a *species*, and then think proper to throw doubt on its accuracy, because, as I conceive, you happened not at the moment to turn over a page or two more of the *Philosophia Botanica*. I am not sufficient Botanist, perhaps, to understand

the difficulties which appear to have beset you in the particular department of Natural History which you have studied, but I may state that when similar difficulties occur in Zoology, and species are ascertained "to run into one another," we are accustomed to doubt the fact of their being distinct species; we call them *varieties*, and search for some general characteristic which will include and insulate the whole of these varieties, and then call that the specific character. If I may trust the evidence of my eyes, the White and Negro races of the human species "run into one another by imperceptible shades unappreciable by human sense, so as to render it impossible to circumscribe them." Nay, there are "empirical characters" which distinguish even a Frenchman from an Englishman, and "which can only be perceived by long and familiar experience, and cannot be described by words;" yet no one hitherto has been bold enough to declare them distinct species. It seems, nevertheless, that there are certain persons "who think it advisable to break up" the old species into many new ones, but you evidently consider such persons as angels in comparison to the wretches who would dare to subdivide a Linnean genus, a crime which you have ever held in the utmost abhorrence. Yet, as I understand the matter, if there be any groupe in Natural History more truly insulated than another, it is a species, and the division of this natural groupe of individuals ought scarcely, therefore, to be less blamed than that of a genus which may have only rested on the good pleasure or ignorance of Linnæus, or on that of some blind worshipper of his infallibility. Not indeed that I would have those poor species-makers attacked; for I care very little one way or the other about them, although for all that I know, even they may be doing good in their generation, by pointing out differences.

By the bye, on the subject of species you settle the question, by deciding that "in cases of difficulty the assumed law ought to be brought to the test of experiment, or the species should be rejected." Now I find it to be a case of some difficulty to understand this advice, since on looking back, the only "assumed law" I can perceive mentioned is as follows: "A species shall be that distinct form originally so created, and producing, by certain laws of generation, others like itself," and unfortunately you have forgotten to inform us how we are to ascertain by experiment, "a distinct form originally so created." This, however, is

clearly the essential characteristic laid down in the law, since a Negro "produces by certain laws of generation others like himself," and yet is not very generally accounted to be a distinct species. But I ought to recollect, that in spite of Mr. Wilberforce, you have your doubts on this particular point; that in fact it still remains with you "the most difficult problem of all."

You lay down as a "first principle of arrangement," that "in Botany the characters of a genus should be taken from the parts of fructification, and in Zoology from such parts as are indicative of structure and habits." Having myself, as you know, dabbled a little in Zoology, and being pleased with the sight of a really new definition, I am anxious to learn what other zoological parts remain, in order that I may avoid them.

To clear up the fog in which our poor brains are enveloped when we attempt to distinguish a species from a genus, you next inform us that "there is the same difference between a genus and a species as instruments of reasoning, as between a definition and a proposition in Geometry. Now the difference between the latter is, that the proposition requires demonstration, and the definition not. I must therefore suppose that this mode of illustration is "*ut lucus a non lucendo*," for you have just before declared that species must "be brought to the test of experiment," in other words, must be demonstrated.

It appears you do not regard genera as merely conventional, but as actually founded in nature as well as species. I likewise consider genera *when properly defined*, to be founded in nature, as I have elsewhere said,* but I have not found even these natural genera, upon the whole, to be so distinctly insulated from each other as species. I will now, however, go further than you, by stating that the groupes you object to, such as class, order, tribe, cohort, and family, are, when properly defined, just as natural as genera; and also that the higher we ascend in the scale, and the more comprehensive our groupes are, we may, in general, be assured, that in the same proportion they are perhaps even more natural. Thus, who will assert that *Animals* form a less natural groupe than *Vertebrata*, *Vertebrata* than *Mammalia*, *Mammalia* than *Cetacea*, or

* See Horæ Ent. p. 490.

these last than the genus *Balæna*? Even Linnæus, the infallible Linnæus, speaks of natural classes and natural orders as distinct from artificial ones. No one, till now, has ventured to call the classes of Mammalia, Birds and Fishes, or the orders Lepidoptera, Coleoptera and Diptera, “*gratuitous assumptions.*” Your doctrine, therefore, is really original; but at the same time it is rather surprizing that the recognized organ of the Linnean Society should publickly, in the Transactions of that learned body, state that the above “different gradations are gratuitous assumptions with which nature has nothing to do,” and that pursuing this doctrine, he should object, not merely to those who would “attempt to express with more accuracy larger generalizations than they would do by employing a generic term,” but also bestow censure on those “who think it advisable to break up the old genera into new ones.” In short, we must remain stationary, according to you, with neither greater nor less groupes of species than the genera of Linnæus and Sir James Smith. All other assemblages of approximations, and approximations of assemblages, “are rather predicated than proved,” and in future we are only to be permitted by you “to point them out by mere signs, such as are used in printing,” by asterisks, forsooth, and obelisks, or a casual dagger. Such is the perfect vehicle which in future is to convey with precision the just relations of things! I trust that you will favour us yourself with a specimen of it, and shew that you know how, by example, to enforce your precepts.

You do not seem to think those persons who regard genera subject to be broken down to suit their convenience, as entitled to make use of the word genus. It is a downright robbery on their part. “They would do well to employ some other term, else one great object will be lost at which we are aiming;—the keeping together under one common head those small assemblages of species which in some instances are so obvious and so important.” On this head I experience great pleasure in being able to allay your fears, and to assure you that they do keep together under a common head, all those small assemblages of species which they conceive to be obvious, and that they even go farther (too far you will say), and keep together the large assemblages also.

I now come to one of those illustrations with which you have so sparingly sprinkled your Paper, no doubt from reluctance to increase its

bulk ; and I find that " it would be the height of folly to give up the " term of genus for such insulated groups as *Erica*, *Rosa*, and *Eriocaulon* among plants, and *Vespertilio*, *Strix*, and *Scarabæus* among animals." If there be pleasure in being able to meet you on a known arena, I may also be expected to experience fear in having to defend myself against one who enters the lists so cavalierly. There is nothing like presenting an imposing front on the first attack where boldness is often of more avail than strength of weapons. No doubt it was from contempt for a strong example, that you chose your present zoological weapons, and therefore it would be presumption in me to tell you that upon a little deeper acquaintance with Zoology, you will see that neither *Vespertilio*, *Strix*, nor *Scarabæus*, as defined by Linnæus, are insulated groupes. As to *Scarabæus*, indeed, I should be glad to know by what characters you would insulate it. I happen to have seen more than 2000 species of the Linnean genus *Scarabæus*, when Linnæus himself saw little more than 80. I suspect, therefore, that I have given quite as much time and attention to the consideration of this Linnean genus as you, although you, by a species of intuition, have got the start of me. This must be my apology for daring still to brave your polite imputation of having arrived at the acme of folly, and for still imagining that I have done some service to Entomology in helping to subdivide so immense a groupe. You are truly the first of Naturalists, and I dare say will also have the honour of being the last, who has written on *Scarabæus*, and pronounced it to be an insulated groupe. Perhaps it was from their being so little abstract, and their descending so low as to study the subject in nature that those plodding Entomologists, Fabricius and Latreille, have had such difficulty in finding a place for *Sinodendron*, *Lethrus*, &c., &c. As you profess, two or three pages after, to look at Entomology with the eye of a master, and to point out the difficulties and defects of the science, you could not surely be ignorant that Fabricius, whom Linnæus called his master in Entomology, that Latreille, Olivier, and Kirby, that in short every modern Entomologist who does not belong to what may be termed the defunct or dying Linnean school of England, has found it necessary to subdivide the Linnean genus *Scarabæus*. The chair, therefore, of the Secretary of the Linnean Society, must be placed on some peculiarly high eminence, when it entitles a gentleman on

the strength of having described three species of Orchis, and perhaps twice as many Rushes, to dismiss all Entomologists subsequent to Linnæus with the compliment of being a pack of fools.

It is to be regretted, that so oracular an authority on Systems and Methods should not have shewn wherein they differ from each other. It only remains for me, therefore, in the investigation of your "first principles of arrangement," to ascertain what distinction you, who are so apt to charge dissenters from your maxims with the height of folly, make between artificial systems and the natural one. It would be curious, if he who blames others "for not fully appreciating the difficulty of this subject," should happen to have promulgated his principles before he had made himself acquainted with the above distinction.

You say "division and separation is the end of the artificial system," and as I know not what particular artificial system you allude to, far be it from me to say that you may not possibly be in the right. But then you proceed as follows:—"To establish agreements is the end of the natural system." Now that you who kindly offer to "prevent young Naturalists from being prematurely embarrassed in this difficult subject," should thus express yourself, surprizes me not a little; for I had always understood that so far from the natural system having for its object to establish agreements, its agreements have remained established from the time of the creation. I will not suppose that a writer "on systems and methods" could have forgotten to make himself master of the very keystone of his subject, and that he can still remain ignorant of the natural system itself being the end or object at which we aim, and not an instrument like any artificial system to arrive at an end. It is no doubt for the purpose of displaying your powers of abstract reasoning that you advance such positions as the above, or that you state that the artificial system is a descending series, and the natural system an ascending one. Nay, what is more extraordinary than all, you seem in another place to imagine that there are more natural systems than one, and that a variety of them have been already attained by the Linnean Society; for you advise us to "*take any* natural system and see if this," &c. Pray let me know where I shall find one of them, and I shall be content. It excites your surprize that "many modern Naturalists have not adopted your truths;" but you ought to have recollected that the many are not

so far advanced as yourself. They have been looking for one natural system, *only one*, and confined as their aim is, they have not as yet been able to attain it.

“ It is the prevalent error of modern Naturalists to attempt to generalize where they ought to analyze, while their arrangements called “ natural, are almost all framed with a view to distinguish.” Metaphysically, perhaps, this passage is very clear, but what, in the name of plain sense, is the meaning of it? Modern Naturalists err in refraining to analyze, and also err, inasmuch as they are all busy distinguishing! Perhaps, however, after all, there is consistency in this paradox, for we have seen that you censure as well those who subdivide the Linnean genera as those who combine them into larger groups. It was possible, nevertheless, for you to have expressed yourself with greater clearness, if this be really the meaning of so contradictory and curious a sentence.

You next draw “ a diagnosis” between M. M. Brown and Decandolle, which, because perhaps I am no Botanist, I cannot pretend altogether to understand; for the latter is blamed for “ attempting fresh *combinations* “ at every stage,” and the former praised “ as his object is chiefly *synthesis*.” I am the more sorry for my ignorance of the botanical difference between *combination* and *synthesis*, not merely because I have myself the highest opinion of Mr. Brown's science, but because I of course must feel interest in any eulogy of our friend by those who, as Botanists, must be best able to judge of his merits.

I have already hinted, that your distinction between the natural and an artificial system, making the latter a descending series, and the former an ascending one, could have only been maintained by you from love of paradox; but as you return to this distinction, and may therefore possibly believe it correct, I shall explain myself more fully. Both kinds of system afford ascending and descending series. It is clear, for instance, that the Linnean sexual system in Botany was in the first case founded as much on the examination of individuals as if it had been the natural system. In studying, therefore, any system, whether natural or artificial, we must always begin with individuals, and look upwards, discovering first the species, next the genus, and so on. It is true, indeed, that *the genus* may have been a more comprehensive group with early Naturalists than with modern; but however this may be, the above

is the general process of investigation. Nay, it so happens, that this system of combining has hitherto been pursued principally in various artificial systems, although the searchers after the natural system have no reluctance to apply the knowledge of natural groupes, that happens sometimes to be thus acquired, to their own more particular object. In the same way the natural system is not essentially an ascending series, for it is equally true, whether it ascends or descends; being equally the plan of the Deity, however we may please to study it whether by analysis or synthesis.

Next you say, "If we find a large genus agreeing in some well-marked characters of structure, form, station, and properties, it appears contrary to the end proposed by the natural system to divide and subdivide the species into small groups, and to give each of these the same value as is now possessed by the whole. This is frittering away characters which are essential to the use of a genus, and destroying our power over it when we wish to generalize." On this passage I would first remark, for the third time, that the natural system proposes no end, but is itself the end proposed; next I would say, that no one, except yourself, ever indulged the idea of giving the same value to a part as to the whole; that neither you nor I can possibly know *a priori* what characters are essential to the use of genera, so as to deny the propriety of their being subdivided; and lastly, that so far from your power being thus destroyed when you wish to generalize, the genus remains, although possibly under another name, a groupe as much connected as before, and as much in your power for further combination, or even in a greater degree, inasmuch as by the more accurate examination of it in the process of subdivision, you must have become more definitely acquainted with its external limits, and its interior typical qualities.

Allow me here to ask two questions, First, Have you in your voluminous investigation of genera never broken up a Linnean genus? Secondly, How is it that you, who object to the combination of genera, should now complain of your power over them being destroyed when you wish to generalize?

Entomologists have to regret, that you who, in so kind and polite a manner have pointed out their defects, should not have attempted to remedy them. The only specimen which as yet you have given of the

depth of your researches in this branch of Natural History, is your declaration, that Entomology is "a kingdom of nature," and that the Linnean genus *Scarabæus* is an insulated group, which it would be the height of folly to subdivide ! There is some merit in making your *debut* in a science with only two observations, and taking care that they should be both original and new. Certainly the having proposed such two solitary improvements, not only denotes your acquaintance with the subject, but well entitles you to decide that "Entomology requires the most skilful arrangement to enable the student to determine the multitude of "species," and that "it is, nevertheless, unquestionably the worst furnished with assistance in this way." This may, no doubt, be *abstractedly* quite correct ; but there is no one who lays down "first principles "of arrangement" in Entomology, excepting yourself, who will consider it to be the height of folly to subdivide a group like *Scarabæus*, of more than 2000 known species, and, in leaving the mass in chaotic confusion, thereby think that he is giving the most skilful arrangement for enabling the student to determine them. Were you indeed to take *another* glance at two common English insects, viz. *Cetonia aurata* and *Trox sabulosus*, I should not be surprized if you changed your opinion as to the best mode of enabling the student to determine the species.

I had long thought that there was but one natural system in the world, and that every created being formed a part of it ; but you say, "Take "any natural system, and see if there is not always a remainder of unknown things." But if the natural system be that of God, what is meant by a remainder of unknown things ? Not surely that He did not understand the relations subsisting between the things He created. And as to the Naturalists not understanding them, this only proves that we have not yet attained the knowledge of *the* natural system, and much less that of *many* of them. "We are constantly approximating to the truth, "but never reaching it." At the same time it must be allowed, we are sometimes too apt to forget that the real object of the Naturalist ought to be to come as near the truth as possible, and that this is not to be done by "abstract reasoning," so much as by observing and arranging facts.

We next have rather a novel proposition started, to wit, that "the "mammiferous animals are arranged with more ease, according to a "natural system, (again as if there were more than one) in consequence

“ of their number being comparatively small, and their forms strongly “ marked.” That is, in other words, the more widely the species are asunder, and the more distant they are in form, the more easily are they combined : just, perhaps, as a chain is more connected in proportion to the number of links that are wanting !

In order to prove that you have not confined your studies to the vegetable kingdom, you afterwards infer that the series of M. Cuvier in the *Regne Animal* is the natural system. This author indeed says as much in his title-page, and you only think it necessary to criticize his groups of *Pachydermata* and *Passeres*, and to prefer Jussieu's method of having for such *unknown things* a miscellaneous group at the end of the work. As neither *Passeres* nor *Pachydermata* are much more “ unknown” than other beings, it would perhaps save trouble, and give more satisfaction to make one miscellaneous group of the whole of organized matter.

You decide that “ those persons, who imagine it to be necessary or advantageous to find a place for every thing, appear to lose sight of the “ chief object of the natural system, and to destroy its utility as an instrument of general reasoning. So then, the natural system, or plan by which the Deity regulated the creation, is nothing more, in your opinion, than an instrument of general reasoning towards attaining a particular object. You are constantly alluding to this object, but what it is you do not deign to state, nor do you explain how they who endeavour to find a place for every thing destroy the utility of your instrument of general reasoning. But the defect, without doubt, is on my side, and results from my being one of those practical Naturalists who would attempt to make accumulations to science without the aid of such abstract reasoning.

Your reflections on the French school are, no doubt, intended, by their severity, to give us all due warning. I much question, however, whether the present perverse generation will not continue with the French to observe and arrange facts, dividing and subdividing them, rather than take with you a free and lofty range by issuing forth “ first principles of arrangement” founded on abstract reasoning.

Although I am, as you are aware, no Botanist, I am glad to acquire any information on plants, and I confess your assertion, that *Parnassia* and *Linnaea* are as distinct as any of the *classes* of vegetables, is quite new to me. Still more am I interested by your observations, that “ in

“ many instances a class is equivalent to an order or genus,” and that “ the great division of Cotyledonous plants may only be equivalent to “ the order of grasses.” I do not now wonder that in another part of your paper you should place Natural History in diametrical opposition to mathematics, for I recollect that Euclid begins with the fundamental axiom, that “ the whole must be greater than its part.”

You are obliging enough to consent to the adoption of the terms *species* and *genus* in Natural History, but to these alone. All other terms for groupes are *επεα πτεροεντα*, “ fleeting instruments of thought.” But how the term *genus*, or even *species*, is not equally objectionable, how it is not equally a fleeting instrument of thought, as well as the terms class, order, family, &c., I cannot well discover. In the place of these last terms you would, in the natural method, employ the words *groupe*, section, and division, but I have yet to learn the ground of preference. *Groupe* is a general word for all masses of individuals, of whatever degree, and as to the words section and division, it surely requires explanation how they can express “ assemblages of approximations” better than the terms tribes and families.

I have now gone through your Paper, of which, as I said at the beginning of my review, the object aimed at may, for all that I know, coincide with my own opinions. It is indeed the peculiar advantage of the style of argument you have chosen to adopt, that the purport and aim of your remarks remain enveloped in secure mystery, while the only visible points of your line of attack are detached and insulated propositions. Many of these detached propositions I am far from fighting with; many indeed are truisms; while many, such as those discussed above, will require some time, I suspect, before they can possibly triumph. But whether assented to or denied, I confess I do not perceive the use of any of them, and the novelty of but very few. Believe me, I do not say this in any spirit but that of good will. I do not feel, indeed, except that I happen to have followed in the wake of such idiots as Fabricius and Latreille, and have subdivided *Scarabæus*, that any one of your observations personally affects me; and I can never forget that you have always, in the most honourable way, been a friend to the free expression of opinion, and have of late most warmly patronized Zoology. Yet as every law-giver must, in these days, expect to have the goodness of his

laws examined before they are adopted, and as it is the duty of every lover of truth to sift them well before he allows them to pass current, I have judged that you would not be displeased if I, although from a very remote quarter, should return them to you for a little amendment. You know that the days of demigods and despotism in science have for ever gone by, and that by publishing your "*principles*," you stipulated for criticism.

Your object may possibly be to clear the way for the reception of a system of your own, for I observe that you find fault both with the Linnean and Jussieuan schools of Botany, although you appear to prefer the former. I observe, also, that no system of Zoology hitherto propounded, meets with your approbation. You have, therefore, with just confidence, taken a wide range for your "first principles of arrangement," and I assure you I shall be glad to hear that your talents are employed in the application of them to observed facts. You must indeed be aware that such an application of your principles will tend more to give them weight in the eyes of Naturalists than your most abstract reasoning or profound metaphysics; however to slight these last may argue the height of folly. It really, however, appears to me high time now to let every one have his own way in Natural History; and in the spirit of toleration to let the Linnean enjoy his twelve words, colons, and specific differences, while you publish your asterisk system, and the obstinate heretics continue to wallow in the mire of natural groupes and subdivisions. Persecution, I fear, only serves to wed these last unfortunate wretches to their guilt, and, moreover, is perfectly useless trouble, inasmuch as we may be sure that the world will swim in the orthodox channel at last.

I remain, dear Sir, &c.

W. S. MACLEAY.

ART. LII. *Contributions to the British Fauna.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh, &c.

[Continued from p. 57.]

Cl. GASTEROPODA }
Ord. NUDIBRANCHIA } Cuvier.
Gen. DORIS }

DORIS TUBERCULATA.

Doris corpore ovato-oblongo, suprà tuberculis rotundis granulato, fuscumarmorato; tentaculis superioribus conicis, e foveis nudis exsertentibus.

Doris tuberculata? Lamarck, Anim. sans Verteb., vi. i. 311.

Hab. Mare Britannicum. Near Berwick.

DESC. *Body* ovate-oblong, rather depressed, 3 inches long, nearly 2 broad. *Cloak* grey, marbled with cinereous and pink spots, and closely covered with round prominent unequal tubercles of a blueish colour; the margin broad, entire, somewhat undulate. Space between the cloak and foot white. *Foot* pale yellow. *Superior Tentacula* conical, round, the upper half yellow and imbricate, the base white and smooth; the apertures with smooth even edges. *Branchiæ* 11, large, pinnate, the branches beautifully pectinate, so that each resembles a fine plume of a light blue colour, spotted with white about the base. They form a circle round the *anus*, which is streaked with lines of a sulphur colour.

Obs. The figure of *Doris Argo* in Pennant, Brit. Zool. iv. tab. 24. Edit. 1812, is a tolerably good representation of our animal, but from that species it differs in colour, and in the character of its cloak, which is very distinctly tuberculated to the naked eye, while in the *D. Argo* it is said to be smooth. The *Tentacula* are represented as conical by Pennant, but they are described as club-shaped and verrucose by Lamarck. I suspect that the figure of the former naturalist has been taken from a

specimen of the animal before me, which *may* be the *Dor. Argo* of British authors (though our descriptions differ very considerably), but that this is quite distinct from the *Dor. Argus* of Lamarck, and probably also from Cuvier's *Dor. tuberculata*. The want of an opportunity to consult the figures and references of authors, compels me to leave the subject in this uncertainty.

Of the genus *Gammarus*, as defined by Lamarck, I have had occasion to describe five species, new to our coasts; and of late another has occurred to me, different from any I had previously seen, and apparently also a non-descript.

GAMMARUS SPINIPES.

Gamm. corpore albo, lævi, lineis rubris transversis picto; palmâ pedis secundi dilatatâ, apice triangulari, monodactylâ, spinâ validâ infernè terminatâ.

Hab. Littora maris Britannici.

DESC. *Body* $\frac{1}{4}$ of an inch long, smooth, white, with transverse red lines, which run between the segments. *Antennæ* 4-jointed: *superior* longest, the basal joint very short, second and third equal, the terminal one longer than both; no *seta*: *inferior* with all the joints nearly of equal lengths. *Eyes* scarlet, round. *First pair of hands* short, small, scarcely dilated, monodactyle. *Second pair* with the palm much dilated, armed with a single claw, and beneath with a conical spine, much like a claw. Between these there is a triangular process. *Legs* of four elongated joints, the femoral rather dilated, and the tarsal terminated by a single, rather long, curved claw. The first (not counting the two pair of anterior ones, considered as arms) are slender, and slightly spinous, but as we proceed backwards, they become stronger, more spinous, and have the second or tibial joint remarkably dilated and pointed. *Tail* terminated by three pairs of stalked and forked processes, the stalk longer than the straight conical smooth branches.

Obs. I found this species among *Sertulariæ* taken from a fishing boat, so that it probably inhabits deep water. I cannot refer it to any described species. It surely cannot be the *Jassa pulchella* of Dr. Leach. The brevity of the descriptions of that eminent naturalist often leaves a

doubt concerning what he may intend, but in *Jassa pulchella* the inferior antennæ are the longest, and are said to be leg-shaped, a form which those of *Gamm. spinipes* have not, if I have a correct idea of what is meant by that term. His character, "thumb of the second pair of legs with " its internal edge notched at the base," is unintelligible, for it seems to imply that the hand is didactyle, while in the definition of the genus it is stated to be monodactyle.

ALCYONIUM HIRSUTUM.

(Fleming, Brit. Anim. p. 517.)

DESC. Polypidom variously branched, often proliferous, sometimes subcylindrical, commonly flattened and palmate, of a dirty straw-yellow colour, often partially stained with red, and (always ?) spotted, the spots yellowish, numerous, circular, and irregularly disposed. It is thickish, and somewhat cartilaginous, and to the naked eye resembles a compact sponge. When viewed through a common magnifier, the surface is seen to be covered with close-set conical transparent papillæ, each of which is a cell containing a Polype with 16 equal long filiform tentacula, arranged in a circle.

I have at present (February 3rd.) at least 50 specimens before me of various sizes, and all of them are marked with the yellow spots mentioned in the description, and which are about $\frac{1}{10}$ of an inch in diameter. They are placed in the thickness (not on the surface) of the Polypidom, and on breaking it we can readily separate them with a needle. Each then appears to be made up of ten or more small globules of a milk-white colour, and opaque. When magnified, I was surprised to find them moving in the glass of water with great rapidity, and in all directions. This progressive motion is very obviously effected by the ceaseless play of a fine thick fringe of ciliæ, which surrounds two-thirds of their circumference. They have also a rotatory motion; and a globule may be seen moving forward and whirling on its own axis at the same time.

On the nature of these bodies I will not decide. They are too large to be considered as ova, and they resemble very closely the *Entomostraca*

of the genus *Cypris*, but every *Cypris* I have seen moves by articulated limbs, and not by the assistance of a ciliated fringe. In these particles no members of the kind could be detected, but as the magnifier I use is one of no great power, some other observer, with a better glass, might easily unfold their whole structure.

Dr. Fleming describes the Polypes as having from 18 to 20 tentacula, but I could discover 16 only, and the number appeared constant. The animals are easily procured for examination by breaking down a portion of the Polypidom in a little salt water. It is a very common species on the coasts of North Durham and of Berwickshire, and is always found attached to marine plants. It is frequent on the stem of the *Laminaria digitata*, but more common on *Ptilota plumosa* and *Delesseria coccinea*. When on the former it grows free, but it first encrusts the fronds of the latter, and then throws out its leaf-like processes and expansions.

Cl. ANNELIDES	}	Lamarck.
Ord. ANTENNÉES		
Fam. NÉRÉIDÉES		
Gen. LYCORIS		

LYC. VIRIDIS.

Lyc. viridis; segmento antico lineis pallidis longitudinaliter striato.

Hab. Ad littora maris Britannici inter Algas marinas.

DESC. *Body* of a uniform grass-green colour, marked with darker lines, slender, depressed, tapered towards the tail, which is terminated by two filaments. Segments numerous, the first (exclusive of the head) convex, smooth, and striated with longitudinal white lines. The feet appear to be divided into four conical processes, from one of which is exerted a brush of long black bristles. Length 4 inches.

Obs. A green species of *Nereis* has been admitted into the British Fauna on the authority of Mr. Adams, of Pembroke. He has given no description but that which is embraced in the very short specific character of Linnæus; for the extended description, in some British works, is taken

from foreign authors. The Linnean species, however, appears, so far as I am able to form an opinion from the account of Fabricius, to be a *Phyllodoce*, and at all events is certainly distinct from that described above. Of it I have seen only two individuals, and I believe it to be rare.

The only other species of *Lycoris* which I have seen is the *Lyc. margaritacea* of Dr. Leach, which is common. The structure of the head, and the number of its parts, are precisely the same in both, and are well and most correctly represented in the figure of the *Lyc. margaritacea* in the Supplement to the Encyclopædia Britannica. Savigny says that the proboscis is divided into two joints; a structure which I have not observed. It is short and thick, with two rows of short ferruginous prickles at its base, and two similar prickles on mammillary processes are situated just under the middle lobe of the head. The point is armed with two falcate, brown, serrated mandibles, and around these are four distinct patches of prickles, similar to those of the base. The antennæ are, moreover, described as external and internal, the former larger and thicker than the others. Two papillary processes, consisting apparently of three joints, the last of which is small, and arising beneath the head, are obviously thus characterised; while the internal are two small setaceous filaments, which have their origin from the centre of the anterior margin of the head, and are directed forwards. No organs can apparently be more distinct:—the papillary are retractile, with a small nipple-like point, and do not arise from the head, but beneath it. During life the animal is constantly pushing them forwards, and again retracting them. Not so with those to which alone I think the name antennæ ought to be applied. They are non-retractile, are regularly tapered, and arise from the vertex, and the animal neither does nor can use them like the others. As for that part of the generic character which says “mamillarum pediformium par primum secundumque in cirros tentaculares mutata,” such a phraseology can only be allowed by those who adopt his theory of the mutation of organs. That doctrine, I am aware, has been received in this country as if it were not an hypothesis, but an incontrovertible law of nature. It appears to me in a different light, and, after all, if the organs are thus changed, so that they assume different and various forms, and with these changes take up different, perhaps

opposite, functions, what do we gain by the use of a theoretical language? In the present genus there are four tentacular filaments on each side, two short, and two about twice as long, and the simple enunciation of the fact appears to me vastly preferable to the language of Savigny and Lamarck.

In my "Contribution," printed in the 11th number of the Zoological Journal, there are some errors, which I take this opportunity to correct. Vol. III. p. 322, line 10, for 'springs' read 'spines or prickles.'

In the description of *Camponotia eruciformis* (Vol. III. p. 325.) the term *proleg* is misapplied; they are true feet, similar to the prolegs of caterpillars in shape and structure. It would have been more correct also, had I compared the animal itself to the larva of some dipterous flies, for since the paper was written, I have observed two of these in ditches, which I think it would be difficult to separate generically from the *Camponotia*, so close is the resemblance, and yet it is obvious that there can be no true affinity between them.

The *Lumbricus pellucidus*, Vol. III. p. 327, I am now inclined to believe, is the larva of an insect; and for having thus obtruded on the science a false species, my apology must be, that at the time I believed it to be a true one. The *Lumb. vermicularis* of Müller I have lately ascertained to be common in this neighbourhood.

In the specific character of *Polynoe imbricata*, Vol. III. p. 332, after "brevisimis," insert "velatis." I have met with a pretty variety, in which the scales were of a pale uniform colour, surrounded with a narrow black border.

(To be continued.)

ART. LIII. *Observations on the Reproduction of the Members in Spiders and Insects.* By CHARLES HEINEKEN, M.D.

(Continued from page 294.)

As a favorable opportunity offers, I avail myself of it for continuing the subject of my former communication, although I am yet ignorant whether it has been published or not.

After many experiments, which it would be a mere waste of time to enumerate, I am unable to establish the fact that young spiders part with their limbs more readily than adults; generally speaking they do, but not so universally as to make it a law of their economy. Hunters, under all circumstances, but especially when the limbs have been crushed, throw them off with greater alacrity than web-makers. The following experiments will, I think, satisfactorily prove that they, (spiders generally), exercise the privilege of choice, as to retaining or detaching an injured member, and that in the instances of crushing it is influenced (as before suggested) by the extent of the injury and the process of reparation which would be required.

1.

- July 31. *Epeira fasciata*.—Tibia crushed with a pair of forceps.
 Aug. 1. Swollen and stiff, and the limb useless.
 — 2. Thrown off at the suture.

2.

- July 30. *Ep. fasciata*. Tibia crushed.
 — 31. Looks plump and uninjured.—Crushed again.
 Aug. 1. Swollen and corrugated.
 — 3. Ditto.
 — 4. Has disappeared.

3.

- July 30. *Ep. fasciata*.—Tibia crushed.
 — 31. The injured limb cannot be distinguished from the other.—
 The tarsus and tibia (different legs) crushed.
 Aug. 3. The limb of which the tibia was crushed on the 31st, has

been cast, the other retained—the tarsus was split in crushing, and the extremity has either been pulled or sloughed off.

- 10. Retained portion of tarsus sound, and just as after a clean amputation. Another tibia crushed—the skin broken and fluid oozing, &c.
- 11. Cast at the suture.
- 16. The tibia crushed on the 30th of July, and tarsus on the 31st. are as sound and healthy as before.
- 18. Disappeared.

N. B. The above were in a garden, and at liberty. The following, as well as all those referred to in my former paper, were in confinement either in cages, jars, or bottles.

4.

- Aug. 3. *Epeira* — ? Femur crushed—skin broken, &c.
- 4. Cast.

5.

- Aug. 6. *Aranea domestica*.—Tibia crushed—skin broken, &c.
- 7. Cast.—Another crushed—skin *not* broken.
- 8. Ditto.
- 14. Another tibia crushed slightly, and in one place only.
- 17. Cannot be distinguished from the rest.—Another crushed—skin broken, &c.
- 18. Cast. That injured on the 14th quite recovered.

I could multiply examples, but the object is not of sufficient consequence to require it; in all the instances with hunters (none are given in consequence of their uniformity) a crushed limb was thrown off at the suture, and generally either immediately after, or within an hour or two; with the web-makers some delay (hesitation?) took place. A crushed limb is never thrown off while that operation is going on, because the necessary confinement of both the body and limb of the animal prevents this action from taking place. In amputation, by the mode in which I effected it, it is different: if it be not very quickly performed, it affords a sufficient fulcrum for the muscles to act upon, the body and remaining

portion of limb being at liberty: but when a crushed limb is to be cast, as it is incapable, from its powerless condition, of serving as a point d'appui, if placed upon a solid substance, one of the sound limbs is pressed against it; or when, from previous mutilation, but few such remain, it (the crushed limb) is entangled in the web; and the act of casting then takes place after simple amputation, as the leg is only abbreviated, and not enfeebled, the cut extremity is pressed against the ground or web, and serves for its own fulcrum.

In a postscript to my former observations I briefly and very hastily noticed the reproduction of the antennæ by a larva of a cock-roach, and some wood-lice also, I think, (for I have no copy of the paper, and shall therefore be excused any repetition which may occur). The latter, from their habits, cannot be so frequently and easily observed as would be convenient, but as far as I can ascertain, the reproduction with them is gradual, and independent of moulting. On the 2d of December I cut off an antenna from each of two Armadillos: on the 8th both antennæ were removed from two others, and one, from each of several more: on the 11th they were all examined, were found to be unchanged, and placed all in the same box. On the 12th of January two had reproduced perfect but colourless antennæ, and rudiments were very evident in several others. Within two months from the removal a dozen, including the two which had been deprived of both, were found with fully-formed, but pallid antennæ. These observations are, I am aware, too few, and were too imperfectly conducted, to establish the fact of reproduction differing so materially in these animals. I will not say positively that what appeared to me to be rudiments might not, under a more powerful lens, and a more patiently scrutinizing eye, have proved minute, but perfect antennæ; neither can I assert that moulting did not take place, for the exuvix might have been concealed in the rubbish in which the animals lived, and have eluded my search; or, as they are, in the strictest sense of the word, omnivorous, have been eaten as soon as cast. Should this have been the case, they will belong to that class where the reproductive power is connected with, and confined to, the periods of moulting: but on the contrary, should my conclusions be correct, to that class where

the reproduction is gradual, and unconnected with moulting. Bonnet mentions distinctly that newts, both young and full grown, cast several successive skins; and adds, that reproducing limbs throw off the epidermis as well as the original: but he never even hints that there is the slightest connexion between the two processes, and both by description and drawings proves that with them the reproduction is a gradual growth, not a new operation. In one of the scientific journals some time back there was a very elaborate and interesting paper on the "Aquatic Salamander," by a gentleman whose name has at the moment escaped me. I do not remember whether he agreed with Bonnet upon the subject, but my impression is, that there was at least nothing contradictory in his conclusions. I shall be glad to be set right upon this subject, for if it be clearly established, that with a certain class of animals reproduction takes place solely in connexion with moulting, and as long only as they are in an immature state, and that it consists in a new formation, not a growing or shooting out of the original parts—and that in another class it is independent of the periods and changes of the immature state, and strictly and truly a gradual, observable reproduction, not a sudden new creation—two very well-defined and interesting divisions will be established; and instead of the reproductive power being confined to a comparatively small number, viz. those in which it is independent of age, and gradual, it will perhaps prove to be the property, under certain modifications, of a great many more of the animal kingdom than has hitherto been suspected, for that it is not confined to those which have the prerogative of throwing off a member is evident in the example of the cock-roach. Another in passing from the pupa to the perfect state has since reproduced both antennæ: and a pupa of *Reduvius* has done the same. The following are the particulars:—

1.

- July 25. A larva of *Blatta Maderæ*.—Both antennæ amputated, with a little of their base.
- Aug. 8. Has moulted and become a perfect insect, and reproduced two short, unequal antennæ, more rigid and less taper than the original ones, and curled at their extremities. They have not an equal number of joints: in one I can

count thirty, the number of the other is indistinct.—Killed for a preparation.

2.

- July 25. Two pupæ of *Blatta Madera*.—Both antennæ removed near the base.
- Aug. 27. Have moulted and reproduced similar antennæ to those of 1. —One kept alive, the other killed for a preparation.
- Sept. 27. Antennæ as before. I can count 28 joints in the one, and 17 in the other : the basal and third joints of the two do not correspond in length.
- Oct. 25. Antennæ nearly in the same state. It has not again moulted.

3.

- Aug. 8. A pupa of *Reduvius* ———? Both antennæ divided through the basal joint.
- Sept. 4. Reproduced, at the same time moulting into a perfect insect. They are of unequal lengths, thicker and shorter than the original ones, and, as far as I can ascertain, having only three instead of four joints.
- 27. The same.
- Oct. 10. Died from want of proper food, the antennæ still unequal and imperfect. It had not moulted again.

In the above instances sufficient care was not taken to leave the stumps of both antennæ of equal lengths, or to note accurately the joint at which the amputation took place, and the number of joints which each antenna possessed previously, to explain why the reproductions were unequal and imperfect—some future experiments, conducted with more precision, may perhaps elucidate it. I had previously and long ago removed the antennæ, one or both, from many perfect *Blattæ*, *Forficulæ*, *Grylli*, *Locustæ*, *Acrydia*, &c., but although they survived for different periods, from a fortnight to even two months or more, reproduction never took place ; it is, therefore, I think, clear that they are amenable to the same conditions as spiders. I intend to pursue the inquiry as extensively as my feeble means will allow, upon the larvæ and pupæ of insects gene-

rally, and have very little doubt that when they can be kept alive and healthy, a large proportion of them will be found to possess the reproductive power. Perfect *Grylli*, *Locustæ*, and *Acrydia* cast their jumping legs with even greater alacrity than spiders, but although I have kept them alive for months, I never knew one to be reproduced. They have not the power of parting with their walking legs, another proof that it is bestowed as a means of escape from present peril, and not as a mode of recovery from past injury. Besides, it will universally (I think) be found that a hunting spider parts with his first pair of legs (those used in seizing his prey), and a crab with his hands, with much greater exertion and reluctance than with any of the others; they are less liable to seizure, and better fitted for extricating themselves without compromising the life of the animal.

In Vol. IV. p. 198, of the Introduction to Entomology, by Messrs. Kirby and Spence, is the following note :

“ Dr. Leach, from a communication of Sir Joseph Banks, has given a very interesting history of a spider which, having lost five of its legs, from a web-weaver had become a hunter : these legs, it afterwards reproduced, though shorter than the others. *Linn. Trans.* xi. 393.”

Upon reading the above, it occurred to me as very singular, that an animal which in its perfect state was obliged to have recourse to an elaborate contrivance for obtaining its prey, should when so crippled and mutilated that its locomotive powers were reduced to the lowest order, assume the habits, and successfully imitate the actions, of the most alert and active of its congeners. I endeavoured to procure from England (for here I might as well have looked for one of the lost books of the classics) the volume of Transactions containing the communication, but as I did not succeed, and as I concluded that Messrs. Kirby and Spence might be implicitly relied upon for the faithfulness of the quotation, I thought I would put the fact, although backed by such authority, to the test of experiment. I accordingly removed five legs at once from several spiders, but they all died from the operation. I then got rid of them by instalments, but as there can be no object in giving these details I shall omit them.

1.

Epeira fasciata. The first limb was removed on the 23d of July, and the last on the 3d of August. The remaining legs were, then, the second and last on the left side, and the last but one on the right side.

Aug. 4. Full two-thirds of the web torn away.

— 5. Web thoroughly mended.* The spider maintains the same position and attitude as before mutilation, and has in every respect the manners of a weaver.

— 9. Disappeared.

2.

Ep. fasciata. First limb removed July 24, last August 1.

Aug. 3. Web torn.

— 4. The spider has disappeared. The web is not mended. It had frequently during the progressive mutilation mended the web, and always maintained the character of a weaver.

3.

The same in every respect as 2.

N. B. The above were in a garden and at liberty. The following were in the house and confined.

4.

July 10. A tube-making spider caught with two middle legs off. On the 24th the number of legs was reduced to three, and it was put into a large clean goblet with a flat bottom and a cover. On the afternoon of the same day a sufficient number of filaments were drawn across the bottom of the glass to hamper, but not to catch, a lively unamputated fly: the spider remaining quiet and crouched like other web-makers, and instead of facing, or attempting to spring upon the prey like a hunter, running from it when they accidentally came in contact.

— 25. Fly entangled and killed.

— 26. Another fly introduced: still no attempt at hunting. Is unable to climb up the glass—A twig put in.

* The *Ep. fasciata* makes a very large, firm, geometrical web, of laborious construction.

July 27. Has spun filaments from many of the branches.

— 29. More filaments. Another fly. No hunting propensities.

— 30. A very considerable quantity of web below the end of the twig, enough to form a tube sufficient to receive the spider, and ramifying in several directions, with many long connecting filaments to different branches. On the 12th of August another limb was removed, reducing the number to two, and the web cleaned out: even then enough web was spun to cover the spider imperfectly, and occasionally to entangle an exhausted fly. On the 20th of September it died.

5.

Epeira ——— ? First leg taken off on the 3d of August, and last on the 7th: the first on the right side, and the second and last on the left, remaining. Web cleared out.

On the following day filaments appeared in several directions. These were constantly added to, and by the 20th a geometrical web was formed equally perfect, but more sparing in quantity than one made by a spider of the same species, and precisely under the same mode of confinement, but healthy and unmutated: the entanglement and taking of flies, and the conduct of the two spiders was in every respect similar: they were confined in large glass jars, and a branch put into each.

I tried the experiment upon four other individuals, and the results were equally satisfactory and conclusive. It was my intention not only to have detailed these also, but to have pursued the inquiry still further, feeling that nothing but weight of evidence on my part would be entitled to prevail against such authorities as a Banks, a Leach, and a Kirby; but I am fortunately saved further trouble, at least for the present, by the following extract from Mr. Samouelle's "Entomologist's Compendium," p. 120, (which I happened to meet with since I commenced writing the present paper, and which I conclude to be a verbatim extract from the original communication in the Linnean Transactions, although he does not say so) for it may, I think, be readily made to convict itself, and to disprove, by its details, the assertion with which it starts, that "from a web-spinning it became a hunting spider."

"They (spiders) have likewise the power of reproducing their legs:

“ the mode in which this takes place was first made known by that ac-
 “ curate observer of nature, Sir J. Banks. As he was writing one
 “ evening in his study, one of the web-spinning spiders, of more than
 “ the middle size, passed over some papers on the table, holding a *fly*
 “ *in its mouth*. Much surprised to see a spider of this description
 “ *walking about with its prey,*” “ he caught it, and placed it within a
 “ *glass* for examination, when, instead of eight, he perceived it had
 “ but three legs, which accounted for the *inability* of the creature to
 “ *spin its web* ; but the curious circumstance of its having *changed* its
 “ *usual economy*, and having *become a hunting instead of a spinning*
 “ *spider,*” “ induced him to keep the animal in *the glass.*” “ On
 “ the following morning it ate two flies *given to it,*” &c. “ *Soon after*
 “ its confinement, it attempted to *form a web* on the side of the vessel,
 “ but performed the business very slowly and clumsily.” “ In about a
 “ fortnight it had *completed a small web*, upon which it generally sat.
 “ A month after being caught it *shed its skin.*” “ *After this change*
 “ five new legs appeared.” “ *The web was now increased*, and the
 “ animal continued *immoveably sitting on it* in the day-time, unless
 “ drawn from it, or attracted by a *fly thrown to it* as its usual provision.
 “ Twenty-nine days afterwards it *again lost its skin*, leaving the slough
 “ hanging in the web, opposite to a *hollow cell it had woven.*” “ The legs
 “ were now *larger than before the change of skin.*” “ The animal now
 “ *increased its web*, and being put into a *small bowl*, as a more commo-
 “ dious residence, soon renewed a *better web than the first,*” &c. &c.

I have marked by italics those parts of the above abridged quotation to which I wish particularly to call attention. It was not what I believe is generally understood by the term a weaving spider, but only a tube-maker (“ *it had woven a hollow cell,*”) and the latter always make a scanty and imperfect web, compared with that of the geometrical weavers. Its having “ a *fly in its mouth*” was no proof that it had captured that fly after the *manner of a hunter* : it is more probable, either that it was induced by hunger to put up with a dead fly which had fallen in its way, or that in seizing a live one entangled in its imperfect web, that structure had given way with them both, and being unable, from its crippled state, to

remount to its original haunt, it was crossing the table in search of some place of security, retaining, and carrying with it, its prey, as a matter of course. The "*inability of the creature to spin its web*" is a mere assumption: it was first seen crossing the table, but it might have been inhabiting a web of its own construction for weeks previously; and "the curious circumstance of its having changed its usual economy, and having become a hunting, instead of a spinning spider," certainly ceased as soon as it was confined, even if it had ever previously existed, for "SOON AFTER *its confinement it attempted to FORM A WEB*"—"in a fortnight it had COMPLETED a SMALL WEB"—in a month "*the web was increased,*" and when "put into a bowl," a *better web still was made*. It is true, that nothing is said about flies being entangled in the web, and that, on the contrary, it would appear they were at once taken as soon as put in; but the "ate two flies GIVEN TO IT," and "a fly THROWN TO IT, as its usual provision," induce me to infer that they were either maimed or dead, and it would have been a work of supererogation indeed to have enveloped such in a web before eating them. It is stated that although confined in "a glass," (a most inconvenient vessel for the purpose, as my experiment, 4, proves) and with "*flies GIVEN and THROWN*" to it, still its web-making propensities prevailed, and a web was "*soon*" made: that its habits remained those of a web-maker—"it generally sat on its web"—"*continued immoveably sitting on it in the day-time.*" Hence I think I have made good the assertion, that it contradicts itself, and that its own inference, and of course that of Messrs. Kirby and Spence also, is an erroneous one.

But although weavers have not, under any circumstances in which I have placed them, become hunters, and although it is my firm persuasion that it is quite impossible they ever should, yet the inverse takes place, and hunters do actually, to a certain extent, become web-makers. All spiders secrete, and have the power of emitting, to a greater or less extent, those filaments which, under certain arrangements, constitute webs; but all have not the powers and endowments of hunters. The latter therefore becoming web-makers, implies merely an increased exercise of an original power; for web-makers to become hunters, a totally new set of endowments must have been acquired. A hunter, when at liberty, has generally a filament hanging from his spinners, and attached to something at

its other extremity, so that if he fall he can recover himself. More than this I have never observed in one at liberty, but confine either a sound or a mutilated hunter in a small jar or a bottle, and a small, imperfect, confused web is the consequence: generally but little, if any, is deposited until a fly is put in, and he finds that, from the shape and nature of his prison he cannot avail himself of his hunting abilities to full advantage; but many commence a slender inefficient web, before they can have had this proof of its necessity. Mutilation makes no difference in this respect, and it appears to be attributable to the change of situation and circumstances solely: but the *manners* and *habits* of the animal still remain the same; there is the same restlessness, the same quick turning of the head, the same inclination and attempt to spring upon the prey, as when at liberty, and the web seems to be had recourse to as a dernier ressort, and as an assistance only, for the instant a fly becomes ever so slightly embarrassed, it is seized and borne off. I have not thought it worth while to detail any experiments in proof of these deductions, because they are so uniform and uninteresting, and may so readily be tried at any time. I feel also that I have already intruded too much; the subject, however, is still far from being exhausted, and if my readers will not be alarmed, I may perhaps again recur to it.

C. HEINEKEN, M.D.

Funchal, Madeira,
October 25, 1828.

P. S. I had almost forgotten to notice the mention of moulting having occurred previously to reproduction in Sir J. Banks's spider, but it will be evident to every one, that he mentions it merely as a coincidence, and does not attempt to connect the facts.

ART. LIV. *Contributions to the Natural History of South Africa, &c.* By ANDREW SMITH, M.D., M.W.S., Corresponding Member of the Zoological Society; Honorary Member of the Mineralogical Society of Jena; Superintendent of the South African Museum; and Assistant Surgeon to the Forces.

MAMMALIA.

Pteropus Leachii, mihi.

P. supra fusco-cinereus, infra sordido-cinereus, caudâ liberâ.

Colour above a sort of brownish gray, beneath a dirty pale smoke gray; incisors short, strong, regular, and rounded at tips; head long; ears of moderate length and rounded at the apices; membranes blackish, interfemoral one only edging the inner side of each hinder extremity; tail free. Length from forehead to root of tail, four inches; length of tail, three-quarters of an inch; expanse of wings, thirteen inches. Found abundantly in the gardens about Cape Town during the fruit season, and often proves very destructive to vineyards in the night. A larger species of the same genus inhabits the interior, but I have not yet been able to obtain a perfect specimen. Named after the celebrated naturalist Dr. Leach, F. R. S.

Rhinolophus Geoffroyii, mihi.

R. supra ligneo-fuscus; subtus sublignicolor, membranis nigris, interfemorali transversè venosâ; caudâ vix præter apicem porrectâ; superiore membranæ nasalis lobô supra acuminato.

Colour above wood brown, beneath lighter; membranes black, interfemoral one veined longitudinally, and the tip of the tail just extending beyond its posterior margin; upper lobe of nasal membrane pointed above; eyes small and nearly in front of the inner edges of auricles; ears large and patulous, nearly as long as the head, pointed, and each with an inferior lobe towards the base of the outer margin, which is separated from the principal by a deep intervening notch: interfemoral membrane semicircular behind. Length from the tip of nose to com-

mencement of interfemoral membrane, three inches; length of latter, one inch; expanse of wings, thirteen inches. Inhabits the whole of South Africa.

This species decidedly differs from both the *Rhinolophus affinis*, and *Rhinolophus minor*, of Horsfield, not only in size and colour, but also in the depth of the notch in the outer edge of the auricle, as well as in the form of the nasal appendages, &c.

Nycteris Capensis, mihi.

N. cervice et dorso nigro-fuscis, colli lateribus sordido-albis; partibus inferioribus subcinereis: membranis rubro-fuscis; apice tragi semicirculari cum cristâ villi albescentis.

Neck above and back blackish brown, sides of neck dirty white, below cinereous white with shades of blackish; membranes reddish brown; height of ears without from fur to tip, $\frac{7}{8}$ of an inch, width better than $\frac{6}{8}$; tragus short, apex semicircular and its upper edge clothed with a tuft of long, white, woolly fur; termination of tail but slightly forked, last vertebra but one if any thing the shortest. Length from nose to root of tail, better than two inches; expanse of wings, ten inches. Found in the interior parts of South Africa as well as upon the Eastern coast.

Nycteris affinis, mihi.

N. cervice et dorso rubro-fulvis; colli lateribus rubro-albis; a tergo aurium subrufa; partibus inferioribus fulvo-albis; membranis nigro-fuscis; dentibus primoribus maxilla in paria dispositis.

Neck above and back reddish brown or tawny, sides of neck before wings reddish white; behind ears somewhat rufous; beneath tawny white, membranes blackish brown. Incisors of upper jaw in pairs which are separated from each other by a distinct open space immediately in the front of the jaw. Length from nose to root of tail, two inches; ears rather longer and broader than in the last species; tragus short, and its apex semicircular; termination of tail deeply forked, with the last vertebra but one the longest.

The arrangement of the incisors of the upper jaw, the marked difference in respect to the last joint but one of the tail, added to the

depth of the fork, and the greater proportion of transverse veins, in the portion of the interfemoral membrane connected with the joint named, tend, with other characters, to establish this as a distinct species from the last.

Vespertilio Capensis, mihi.

V. supra flavo-fuscus, subtus flavo-albus; membranis nigro-fuscis, interfemorali longè ultra pedes extensâ et posticè acuminatâ, ubi caudæ est terminatio; auriculis indentatis externè, et apicibus sub-acutis, trago lineari, subfalciformi.

43. b. 12

Above yellowish brown, beneath yellowish white; membranes blackish brown, the interfemoral one extending considerably beyond the feet and pointed behind, where the tail terminates; auricles indented on their outer edges and with their tips sub-acute; tragus linear and falciform; head short, its sides and the muzzle bare and black, lips margined towards the angles of the mouth with strong brownish hair. Length of body, an inch and three-quarters; length of tail, three-quarters of an inch; expanse of wings, nine inches.

This species has a strong affinity to the *Vespertilio Temminckii* of Dr. Horsfield, and perhaps when the two are accurately compared together will be found to be the same, and the trifling apparent differences to be dependent upon changes which take place during the preparation of specimens. In the Cape example the posterior part of the interfemoral membrane is inclined to a semicircular form, whilst in that of Java it will be found to be more acuminated. Other slight differences are also observable, independent of those of colour and size.

GENUS MACROSCELIDES. *mihi.*

Dentes primores $\frac{2}{2}$, *discreti seu dimoti; superiores verticales compressi et acuminati; inferiores procumbentes aciebus incisoriiis. Laniarii* $\frac{4-4}{4-4}$, *suprà primoribus breviores, discreti, lateribus compressi et coronis plus minusve bicuspidatis; infrâ approximati, et partim ita imbricati ut posteriorum margo anterior antecedentium lateribus paullum obducatur; anterior tricuspidatus; secundus, tertius et quartus bicuspidati. Molares* $\frac{2-2}{2-2}$, *suprà anterior quinquecuspidatus, tertius et quartus quadricuspidati, quintus subtriangularis et*

tricuspidatus; infrà, duo anteriores lateribus compressi, tricuspidati; tertius, quartus et quintus quadricuspidati; summâ dentium in maxillâ viginti, et totidem in mandibulâ. Rostrum angustum et anticè in proboscidem longam et subcylindraceam desinens, nares in apice habens. Oculi mediocres. Auriculæ magnæ et rotundatæ. Corpus villosum. Cauda elongata, squamata, annulata, raropilosa. Pedes distincti, plantigradi, pentadactyli. Ungues falculares. Scelides antepedibus multo longiores. Genus post Soricem Linnæi locum tenet.

Macrosclidès typus, mihi.

M. suprâ fuscus nitore fulvo, infrâ subalbus.

Above brown brightened by an intermixture of tawny; beneath whitish; extremities covered with a very short whitish hair; ears within scantily furnished with some of a similar colour, without nearly bare; tail thinly clothed with a stiff short black hair; whiskers near the base of the proboscis, each hair variegated black and white; claws short, black, compressed and pointed. Length from nostrils to root of tail, four inches and three quarters; length of tail, three inches and a quarter.

Inhabits the open flat country in the interior of South Africa, and is occasionally seen during the day, about the roots of bushes or amongst small brushwood, from whence, upon being discovered, it instantly retreats to its natural and subterranean habitation.

Chrysochloris Hottentotus, mihi.

C. rostro elongato, nudo et rufo; fronte plus minusve albo variegatâ; corpore rufo-fusco ad ferrugineum transiente.

Muzzle slightly elongated, its tip bare and flesh coloured; forehead more or less variegated with white; body reddish brown passing into ferruginous or chesnut. In young specimens the colour is more or less of a dark blackish green; and even in old ones, portions of the head and back have often tinges of that hue. Length about four inches. Inhabits the interior parts of South Africa, but has not, as far as I know, been yet found in the vicinity of Cape Town, where the *Chrysochloris Capensis* is so abundant.

Mangusta Urinatrix, mihi.

M. subnigra aut nigro-fusca; crinibus dorsi et caudæ ferè ad apicem, etiamque totius capitis, circulis coloris subrubri aut subalbidi variegatis; caudâ attenuatâ apice simplici acuto.

Colour of upper parts inclined to black or blackish brown, with most of the hairs having one or more broad circles of reddish white; under parts of the same general colour, but with few of the variegations just mentioned. On the sides of the head the dark and light colours are nearly in equal proportions; on the centre the latter is rather less abundant, as is also the case on the chin and beginning of the throat. Head rather broad behind, muzzle narrow, nose blackish brown, irides cinnamon coloured, pupils transverse: toes very long, slender, and almost without fur; claws dark, inclined to black; ears rounded and projecting but little beyond the hair. Length from nose to root of tail, one foot five inches; from root to tip of tail, thirteen inches; the latter tapers to a slender point, but is thick and bushy towards its origin. Inhabits marshy spots, as well as the banks of the smaller rivers, throughout the whole of South Africa; and in search of its food, which is frogs, crabs, &c., it is very often observed to dive under water and remain there for several minutes together. Appears to have considerable affinity to the *Mangusta Javanica* of Horsfield* but differs therefrom in its resorts, &c.

Mangusta Le Vaillantii, mihi.

M. suprâ rubro-fulva, pilis fuscis et nigricantibus intermixtis variegata; infrâ subfulva; apice caudæ albo.

Colour throughout reddish yellow inclining to chesnut, with the upper parts in particular slightly variegated by an intermixture of brown and blackish hairs; tail of the same colour, with the exception of the tip which is pure white. Eyes reddish brown; pupils transverse. Length from tip of nose to root of tail, one foot five inches; length of the tail, about ten inches. This species is common throughout the whole of

* Zoological Researches in Java and the neighbouring Islands, by T. Horsfield, M. D., F. L. S., M. G. S., 4to., London, 1824.

South Africa, inhabiting a dry flat country, and distinguished by the white tip of the tail just adverted to. Named after the celebrated South African traveller Le Vaillant.

Myoxus erythrobronchus, mihi.

M. supra fusco-griseus; latera rufo-alba; infra cinereus; in gluvie, gutture, parte anteriore pectoris, latere interiore antepedum, et margine labii superioris ferrugineis.

Colour above brownish gray; sides reddish white; under part cinereous; space under lower jaw, throat, anterior part of breast, insides of fore legs, and edges of upper lip ferruginous; ears roundish and projecting considerably beyond the fur, bare and flesh coloured both without and within; whiskers long, bushy, and black; muzzle moderately long and inclined to pointed; tail bushy, more particularly towards the tip, and throughout of a dirty reddish hue; fur soft and silky. Found inhabiting trees in many of the forests of South Africa.

GENUS DENDROMUS. *mihi.*

Dentes primores, utrinque duo, supra paginâ anticâ sulco longitudinali exarata; infra longi, graciles, scalpro cuneato. Pro lanariis diastema. Molares utrinque terni: supra, primus tuberculis sex in duplici serie, duobus præterea indistinctis quorum unum ad anteriorem partem coronæ dentis, alterum juxta alterum seriei internæ tuberculum, ponè lamina transversa incisoria; secundus duabus aut tribus longitudinalibus laminis incisorii secus marginem externum coronæ suæ, cujus in medio tria aut quatuor obtusa tubercula transversa seriatim jacent; tertius duabus laminis incisorii transversis sulco interjacente: infra, primus tuberculis sex ferè in duplici serie; secundus quatuor obtusis eodem ordine dispositis; tertius perparvus, undatis aliquot laminis transversis et sulcis interjectis. Rostrum acutum. Labrum fissum. Auriculæ oblongæ nudiusculæ, et intùs juxta cranium duabus valvulis transversis, membranaceis, quarum inferior meatui auditorio externo superjacet. Cauda elongata, annulata, raropilosa. Pedes distincti ambulatorii, antici digitis tribus et verrucâ hallucari, postici pen-

tactyli. Ungues falculares. Positio adhuc in familiâ Murum non bene determinata est; sed fortasse post Murem locum habet.

Dendromus typus, mihi.

D. suprâ fuscus aut ferrugineus; infrâ rubro-albus; caudâ elongatâ; linedâ nigrâ indistinctâ et longitudinally in medio dorso.

Colour above brown passing to ferrugineous, beneath reddish white; whiskers long, partly black and partly white; upper lip white; ears without and within slightly covered with a fine short white reddish fur; extremities the same; tail pointed, considerably longer than the body, and of a faint grayish brown colour; along the centre of the back, particularly towards the tail, an indistinct black line. Length from point of nose to root of tail, three inches and a half; length of tail, four inches and a half. This little animal is usually found upon the branches of trees, &c.; and in such situations it constructs its nest and brings forth its young.

Sciurus ocellaris.

S. suprâ cæruleo-canus, subtùs albescens; rostro maculâque supra, et unâ post singulas aures albis; ingluvie ferrugineâ, latere capitis cum linedâ nigrâ transversâ.

Above bluish gray; beneath whitish, muzzle together with a spot above and another behind each ear white, space behind chin rufous; head crossed on each side by a narrow black line which includes the eye, tail bushy and penniform, above grayish, below blackish. Length from nose to root of tail, 4 inches; length of tail, $3\frac{1}{2}$ inches.

The only example of this species which I have seen was found in a hollow tree near Plettenberg's Bay.

Bathyergus Ludwigii, mihi.

B. suprâ rufo-griseus in cæruleo-griseum transiens, subtùs eodem colore, sed minùs austero; incisores omnes anticè plani.

Above reddish gray passing into bluish gray; beneath the same but lighter, incisors all plain in front, legs and feet reddish, the latter edged with stiff white hairs. Length from nose to root of tail, six inches; length of tail itself about half an inch. The colour in young specimens is

throughout a deep slate hue. This species is not of quite so robust a form as the *Bathjergus Capensis*, which it resembles otherwise in point of size; nor has it the variegations about the head which the latter at all stages of its growth more or less exhibits. Inhabits various parts of South Africa, but is much less frequent than the other species just mentioned. Like it, the present frequents gardens, and proves very destructive to bulbous roots, which it searches for, both by burrowing under ground, and digging from the surface.

Lepus rufinucha. *Kleine Klip Haas* of the Colonists.

L. suprà griseo-fuscescens nigro inspersus, subtùs albus, nuchá rufá; caudá suprà nigrá, subtùs albá.

Above grayish brown, thinly mottled with black, beneath white; anterior extremities reddish brown, posterior of the same colour as the back without, but on the inner and anterior aspects pure white; tip of nose and a narrow space round the eyes white, also a line of the same colour, but less bright, descends on each side of the neck from the hinder part of the ear to the chin, which is most distinct when the head is closely retracted to the shoulders. Centre of face with a considerable tinge of reddish brown, ears long, erect, and with rounded tips, without thinly covered with hair of the same colour as that of the back, within with a fine white down, through which is distinctly seen the natural colour of the skin; nape of neck a light rufous or chesnut hue, with the hair parted in the middle, and directed towards the sides, thereby exhibiting an appearance like that displayed by the feathers on the breasts of many water-fowls. Length from nose to root of tail, fourteen inches; length of tail, nearly two inches; height about six inches. Inhabits rocky and mountainous situations in South Africa.

Perhaps this may be the *Lepus saxatilis* of F. Cuvier, which is too concisely described in the translation of "The Animal Kingdom," to permit its being recognised.

Phocæna Homeii, mihi.

P. suprà nigra pura, capitis corporisque lateribus nigricante et albo variegatis; dentibus suprà utrinque quadraginta, infrà sex et triginta; posteriori pinnae dorsalis margine falcato.

Colour above pure black ; sides of the head and body clouded black and white ; belly white. On each side an indistinct dusky band or stripe commences immediately under the dorsal fin, and descends obliquely downwards and backwards till it terminates on the under and posterior part of the body, also a dusky coloured circle round each eye. Below, the anterior part of the lower jaw, and a space of nearly a foot and a half before the tail, dusky. Snout short, pointed, and not readily distinguished from the anterior part of the head, teeth slightly curved, convexities outwards, forty on each side above, below thirty-six. Pectoral fins long and pointed, arched before, and concave behind, with the exception of a small portion towards the root of each, which consists of a rounded projection. Dorsal fin rather nearer tail than head, large, high, and pointed, with its hinder edge falciform ; caudal semilunar, and with a narrow slit or fissure at the termination of the back ; usual length six feet. Inhabits the seas about the Cape of Good Hope, and is often caught in Table Bay. Named after Sir Everard Home, Bart., V. P. R. S.

SERPENTIA.

Fam. Dendrophidæ. GENUS BUCEPHALUS. *mihi*.

Caput cubiforme multò latius collo ; maxilla quatuor dentium ordinibus omnium solidorum præter paucos posteriores ordinis externi qui a radicibus usque ad apices canaliculati sunt ; corpus subgracile ad medium crassiusculum ; in singulis scutorum lateribus præsertim prope caput distincta cutis laxæ plica ; cauda gracilis teres circa quartam totius longitudinis partem duplici subtùs squamarum serie ; squamæ corporis carinatae, cingulis transversis curvatis ordinatæ.

Bucephalus typus, mihi.

Suprà fuscus, subtùs argenteo-griscus fusco tinctus.

Head thick and clumsy ; colour above an uniform lightish brown ; beneath silvery gray speckled with brown ; irides green ; last scuta of abdomen divided ; length between five and six feet ; thickness rather greater than that of a man's thumb. Found upon branches of trees, as well as on the ground, in the eastern districts of South Africa.

Bucephalus Jardinii, mihi.

Suprà nigro-viridis, subtùs croceus in viridi-croceum transiens.

Scuta 188. Squamæ 108.

Head as in the last ; back and sides blackish green ; under parts yellow, with a black line extending along the posterior margin of each scutum. In the male, the first and more or less of the second row of scales on each side of the scuta are yellow ; length from five to six feet, thickness rather greater than the foregoing. Found on branches of trees about Cape Town and its vicinity. Named in honor of the distinguished ornithologist, Sir William Jardine, Bart.

Bucephalus gutturalis, mihi.

Suprà viridi-fuscus, parvâ maculâ viridi-albâ in plurimis squamis variegatus ; subtùs griseo-fuscus, fusco maculatus ; initium juguli fasciâ transversâ rutilo-flavâ distinctum.

Scuta 192. Squamæ 129.

Colour above and on sides greenish brown, most of the scales with a light greenish white mark ; below light grayish brown, mottled with a dark greenish brown ; a transverse orange-coloured band towards commencement of throat ; length about three feet ; thickness about that of a man's fore-finger. Found upon branches of trees in the forests on the eastern coast.

Bucephalus Bellii, mihi.

Suprà nigro-viridis, maculâ parvâ viridi-albâ in plurimis squamis ; subtùs flavo-viridis ; singula scuta lined obscurâ transversâ in margine posteriori.

Colour above a sort of blackish green, with most of the scales marked by a small greenish white dot ; below yellowish green, with the hinder edge of each scutum margined by a transverse blackish line ; length from five to six feet ; thickness nearly that of the typical species, and is found inhabiting similar situations. Named after the celebrated ophiologist, Thomas Bell, Esq.

Fam. Anodontidæ. GENUS ANODON. *mihi*.

Maxilla et mandibula edentulæ ; hiatus mediocris ; corpus nonnihil supra carinatum, longum, et gracile ; cauda teres.

Anodon typus, *mihi*.

Suprà cinereus seriebus tribus macularum nigrarum ; subtùs argenteus ; squamæ carinatæ.

Colour above cinereous, passing to bluish gray or reddish gray, with three rows of irregular shaped black spots, and carinated scales ; below a shining silvery hue ; length from two to three feet ; thickness about that of a man's little finger. Found in the vicinity of Cape Town, and also on the west coast, as far as the Orange River. Lives principally upon eggs, which it swallows entire.

PISCES.

Fam. Squalidæ. GENUS RHINCODON. *mihi*.

Dentes graciles breves leniter curvati, ordinibus longitudinalibus ita dispositi ut lineæ in anteriore maxillæ, nec non et mandibulæ parte jacentis, speciem habeant ; caput latum, depressum, quadrangulare, os ad apicem capitis cui latitudine ferè par est ; latera liris longitudinalibus et carina perquam distincta in utroque caudæ latere ; spiraculum a tergo utriusque oculi ; pinna analis alteri pinne dorsali pænè opposita.

Rhincodon typus, *mihi*.

Suprà viridi-griseus maculis et lineis albis numerosis ; subtùs rubro-albus ad rubrum transiens ; dorso ante anteriorem suam pinnam carinato, post rotundato, deinde plano.

Colour of back and sides greenish gray, with numerous white spots, varying in size from that of a sixpence to a halfpenny ; also several white lines on the sides of the head, body and about the branchiæ ; below reddish white, passing into vermilion red, anterior part of back carinated, posterior rounded or flat. Length of the specimen from which the descrip-

tion was taken, fifteen feet; greatest circumference nine feet. Was caught by fishermen in Table Bay during the month of April, 1828, and the skin was purchased for £6. sterling, and forwarded to the Paris Museum.

ART. LV. *On the Fish known in Jamaica as the Sea-Devil.*
By E. N. BANCROFT, M.D., Corresponding Member of
the Zoological Society, &c.

ON Thursday, the 8th of May, 1828, a fish of extraordinary dimensions, which occasionally visits the mouth of this harbour (Kingston), and is called Sea-Devil by the fishermen, was caught by Major General Sir John Keane, Lieutenant Governor, assisted by Lieutenant St. John, of the Royal Artillery, Mr. Read, Ordnance store-keeper, and some other adventurous officers. It was struck with the first harpoon at about eight o'clock A.M., and was not overpowered and killed till four P.M., when it was hauled up on the Ordnance Wharf in this city. Its resistance had been considerable, and its strength was sufficient to drag, from time to time, three or four boats fastened one to another, at the rate of four miles per hour. The Lieutenant Governor was pleased to present the fish to the Jamaica Society; and as I then had reason to believe that it had never been described with sufficient accuracy to enable naturalists to ascertain its true characters, I gladly availed myself of the opportunity thus kindly offered, and very rarely met with, to take such notes of its structure, organs, &c. as will, I hope, suffice to remove the existing doubts concerning its classification. From these the statement now submitted to the Society has been prepared. To show how much obscurity has existed (and probably still exists) in regard to certain species, or individuals, of the Ray family that have been met with of an enormous size, and more particularly in regard to those which some ichthyologists have named *Raia Giorna*, *Raia Mobular*, *Raia Fabroniana*, *Raia Banksiana*, and *Raia Manatia*, I may mention that Cuvier (whose authority ought justly to be

* The Jamaica Society for the encouragement of Agriculture and of other arts and sciences, before whom this paper was originally read.

considered as one of the very highest) has expressed his opinion, that the second and the third of these “are probably individuals of the *Giorna* “species that have been mutilated;” and he considers the accounts of the two last “as not resting upon authentic documents,” (*Règne Animal*, Vol. II. p. 138), while the respectable writer of the article *Raia* in Rees’s *Cyclopædia*, from similar impressions, has abstained from noticing any of the five Rays just mentioned, although, with some inconsistency, a figure of *Raia diabolus* (the name assigned by Dr. Shaw in his *General Zoology* to *R. Mobular*) has, without any further particulars, been introduced into the 6th plate of the order *Chondropterygii* of that work; which figure, from whomsoever it may have been copied, is faulty in many material respects, if it was intended to represent the *Sea-Devil* of these waters, as its name seems to imply.* Nor has the account which Dr. Brown has given of this animal at page 457 of his *Natural History of Jamaica*, (obviously without having ever seen it,) done otherwise than increase that obscurity; for, being probably misled by the *Lophius piscatorius* having been called by many persons in England, France and Holland the *Sea Devil*, and also perhaps by the circumstance of two small species of *Lophius* being found in these waters, he has described our *Sea Devil* as another species, of that genus under the name of “*Lophius maximus Monoceros*,” thus placing it not only under a very different genus, but a very different order also, from that to which it really belongs. It is probably under the new genus which has been separated from that of *Raia* by Dumeril, and named *Cephalopterus* (winged head), that the *Sea-Devil* ought to be placed. According to Cuvier (who it is to be presumed had not seen the type of this genus) the two processes, or wings, on the head are merely “productions of the pectoral fins, which,” says he (l. c.) “instead of embracing the head, prolong their anterior extremities each into a salient point, giving to the fish the

* In the figure here alluded to, the head, instead of being very broad, and depressed, is narrow, and subcylindrical, and is made besides to project a great deal too much before the pectoral fins; the anterior processes or flappers are concave, instead of being flat; the eyes which ought to stand prominently on the edge of the head, are sunk into a groove; the body behind ends in an acute angle instead of a semicircle; the dorsal fin is misplaced; and the ventral fins, as well as the spiracula behind the eyes, are wholly wanting.

“ appearance of having two horns *.” But if the specimen before us may serve to direct our judgment, the description just cited will be found to convey a very wrong notion concerning both the origin and the form of the part which has been adopted as characteristic of the genus. So little connected are these processes in reality with the pectoral fins, that a space of not less than fifteen inches intervenes between their respective roots, which space is occupied by the anterior edge of the thorax. The processes arise from, and are articulated with, a thick straight cartilage, nearly answering to the os malæ in the human subject, which extends somewhat obliquely downwards and backwards, from a little before the angle of the mouth, across to the edge of the thorax, four or five inches behind the eye. They measure about twenty-one inches in length, nearly a foot in breadth at their origin, nine inches across the middle, and an inch in thickness, and terminate in a sub-oval flap, nearly flat on the under surface, but strengthened on the upper by a strong ridge of cartilage, ten or twelve inches long, which projects from near the eye, forms the interior edge of the flap, and gradually tapers into it. They consist of a broad layer of longitudinal cartilaginous ribs, or rays, covered on each side with muscular fibres, and inclosed by the common integument. Between their bases a void semicircular space intervenes, whose diameter measures twenty-five inches, while their ends recede a little from each other.

Similar as these appendages appear to be in structure to the pectoral fins of the same animal, there seems reason to think that they are not intended to serve the ordinary purposes of fins. Their exterior edge and their extremity are the only parts of them which are flexible, the firm ridge on their upper surface restricting them from being moved either downwards or backwards, the only movements likely to aid in propelling the body forwards. But this ridge will allow them a considerable extent of horizontal motion; and if the situation, and form, of the flaps be considered in relation to the breadth, make, and bulk of the fish, they seem much more likely to impede, than to assist, his advance, whenever brought

† The Abbé Bonnaterre, in his description of *Raia Mobular* (*Ichthyologie*, page 5,) has called these appendages ears, and likened them to the ears of a Bat, “ *Deux grandes oreilles saillantes comme celles de la Chauve-Souris.*”

into action. It seems more natural to suppose that they might help towards shifting his course to either side; but the extent, the range of action, and the power of his pectoral fins, are such as scarcely to require any aid from the flaps for this purpose. I am accordingly assured by Lieutenant St. John, who has attentively watched the movements of the fish on many occasions, that when he alters his course to one side, he changes his body from its usual horizontal position, to an inclined one, keeping the fin of the opposite side uppermost, and this he curves into a concave form, so as, by holding water, to arrest his progress on that side, and thereby make it serve as a kind of pivot on which to turn; whereas the flaps are only moved when the fish is as it were at rest, seeking his food. He then brings them alternately in a lateral direction, from without inwards, and vice versâ, presenting the flat surface towards the mouth, by which he is enabled to drive a large volume of water into it at each movement; and as the mouth itself is formed of strong rigid cartilages, allowing of no motion whatever beyond simply opening and shutting, and is firmly set besides into the shoulders or thorax, the flappers in question, acting nearly as the mandibles of some tribes of insects, must doubtless be of the utmost utility to the animal in increasing his supplies of both food and water. Their utility ceases, however, the moment he begins to move, when, in order to lessen the obstruction to his advance which they would cause, even if loose, he coils the flexible portion of each against the ridge by a single oblique turn, into a straight roll, which stands perpendicularly from, and out of his line of vision, so as at a certain distance to have been taken for a pair of horns. By these explanations the contradictory accounts that have ascribed ears, horns, lobes, wattles, &c. to the animal, become reconcileable with each other and with truth. The singularity of the organ, its probable importance to the economy of the fish, and the imperfect or mistaken ideas which were entertained as to its structure and uses by those naturalists even who have constituted it an essential character of their new genus, will, I hope, excuse the length of the foregoing details.

The body has some resemblance to a rhomb truncated at the apex, and is depressed and convex on the upper surface, but rather less so on the under. The anterior or truncated portion, or head, is furnished, at each

extremity with a tongue-shaped lobe (the flappers already described) from between which a segment of a circle seems to have been scooped out; while the hinder part of the body ends in a somewhat semicircular form. Its length from the snout to the tip of the ventral fins, as taken over the convexity of the back, measured six feet and a half; its breadth taken in the same way was about five feet, and its thickness in the middle from the dorsal to the sternal aspect eighteen inches. The pectoral fins extended about four feet and a half beyond the body on each side, in the form of an acute angle slightly bowed backwards, measuring about three feet at their base, while the distance between their tips was not less than fourteen feet. The Sea-Devil killed near Fort Augusta in October 1823 by Lieutenants St. John and Lamont, some account of which was given in the eleventh volume of the Edinburgh Philosophical Journal, a female with young, was larger, being fifteen feet in extreme breadth, and more than three feet thick in the body. The ventral fins were by the side of the tail, ten inches long, and five broad; but two-thirds of their breadth on the upper surface were covered by the posterior ends of the pectoral fins. The dorsal fin was about ten inches long, and seven high at its extremity, and stood partly on the back, that is for two-thirds of its length, and the rest on the root of the tail. I was told that the tail must have measured originally about five feet and a half in length; but fifteen inches or more of the end of it, which had been held in the hand, was broken off in one of the fish's struggles. It was very slender, being only eight inches in circumference at its root, four or five inches below which it swelled into a knob nearly as large as the root; and immediately beyond the knob the circumference was but five inches, whence the tail regularly tapered to a point. It was quadrangular and channelled on the right and left side. At the back of the knob a spine issued from a deep groove, that in a full grown fish, as I learn from Lieutenant St. John, is from six to seven inches long, slender, triangular, finely barbed on the edges, and slightly curved upwards towards the end. Our fish wanted the spine, which from the appearance of the groove, it seemed to have recently cast. In the Rays the tail-spine has commonly been described as two edged. Although the animal was a male, there were no traces of those pendulous appendages between the ventral fin and the tail, which naturalists seem to have agreed

in regarding as attributes of the male gender among the Rays proper. * The mouth was not placed as in the true Rays, but at the anterior extremity of the body : each jaw represented a segment of a circle, but in the upper jaw, as already explained, the arch was bent inwards towards the body, whereas the lower jaw bore its arch outwards, from which conformation, it projected about an inch before the upper jaw. In width the mouth measured twenty-seven inches ; but the cavity which it opened into was twice that width and three feet in depth, and from its vaulted form might easily have contained a man. Another and singular deviation from the ordinary structure of the mouth in the Ray family is, that neither along the jaw, nor in any part of this vast cavity, was a single tooth discovered. The tongue also was wanting. Immediately within and along the upper jaw was a membranous fold or valve, twenty-one inches in length and nearly two inches in breadth, which scarcely opened except at its extremities, where the organs of smell are situated ; and beyond this was a second valve, twenty-six inches long, and three to four inches broad, perfectly pliant, serving apparently as a curtain to prevent the egress of any animals that had entered the mouth, and thereby supplying in some measure the want of teeth. This fish differs again from the Rays proper in the position of its eyes, which are not, as in them, near each other on the dorsal surface, but at the extreme edges of the head, and are placed about two inches before the line of the jaws, and three feet and a half asunder. They were inclosed in a strong cartilaginous oval case, admitting in some degree of a rotatory motion, and measuring $3\frac{1}{2}$ inches to $2\frac{4}{10}$ ths of an inch, and placed horizontally. But the iris, which was also oval, black,

* In a letter addressed to the Editor since the above communication was written, Dr. Bancroft states that he has recently had an opportunity of examining a female of this species. " The principal external difference," he remarks, " is, that the ventral fins, instead of consisting of one undivided " lobe, have an appendix arising from it on the side next to the tail, which is " fleshy, thick, firm, subcylindrical, compressed, and extending three or four " inches beyond the ventral fins. This seems to constitute another deviation " from the characters of the proper Rays, in which, according to Col. Montagu, " it is the male alone that is furnished with a process from or near the inner " side of the ventral fins, which he considers as a masculine appendage ; while, " in the Manta, it is the female, and not the male, that has such a process."

and measured $\frac{1}{8}$ ths by $\frac{2}{10}$ ths of an inch, had its long axis placed vertically. The pupil conformed to the iris, and was $\frac{1}{10}$ ths of an inch in length. I did not observe any nictitating membrane, in wanting which it also differs from the Rays. The spiracles stood nine inches in nearly a straight line behind the eyes, and were of an oval form above; the lower portion extended two or three inches towards the edge of the thorax, and was covered with a valve. The openings of the branchiæ, or gills, were, as usual, placed transversely on the under surface of the thorax, five on each side, the anterior pair were thirteen inches distant from the mouth, eighteen inches from each other, and eighteen inches in length, and the posterior pair were thirty-four inches distant from the mouth, only nine inches from each other, and twelve inches long; the intermediate pairs lying from four to five inches behind one another, and varying as to their respective lengths and distances across the thorax in nearly regular gradations between the proportions as above stated of the first and last pairs.

The skin of this fish was smooth, as it is termed, that is without thorns or tubercles, but like that of various species of Shark; it was thickly studded over the under, as well as the upper, surface with hard granules of roundish, square, or polygonal, shapes, flattened and slightly hooked at top, the minute points of which, when examined by a lens, were found to be all bent in the same direction, causing the skin to feel rough, when the finger was passed over them in the contrary direction. The granules on the tail were larger and rougher than upon the rest of the body. The colour was a brownish black over the back; changing into a dark grey over the pectoral fins, which became lighter towards their anterior edges and on the side of the thorax and eyes. On the morning after it was killed the back was covered with a very viscid humour, of the colour of pitch, which had oozed out during the night, as the skin was clear of it the evening before. On the under surface of the body the skin was generally very white, but over the abdomen were several spots of irregular shapes and sizes, of which two or three, very small, were of a light blue colour, and the rest of a bluish grey varying among themselves in depth of shade. The middle and posterior portions of the pectoral fins were also bluish grey, deepest along the middle. The frontal flappers were also white, except at their inner and anterior edge, which was

bordered with a broad black stripe proceeding from the upper jaw. There were unfortunately no means at hand by which the weight of the fish could be ascertained; but several competent judges estimated it at not less than a ton. As the rapidity with which dead animal substances run into decomposition in this climate, rendered any minute anatomical investigation into the structure of this fish impracticable, it was thought best to have all the internal organs carefully removed and sent home preserved in strong brine to the Zoological Society of London, which has accordingly been since done; I cannot doubt however that every requisite information concerning these organs will be fully and ably supplied by the scientific members of the Society, to whose examination they will be submitted.

From the preceding description the fish seems to agree generally with the characters assigned by Dumeril to the genus *Cephalopterus*, which are given as follows in the *Nouveau Dictionnaire d'Histoire Naturelle*, viz.

Body much depressed with five or six branchial apertures on each side beneath; mouth transverse and nostrils situated under and behind the snout, forked in the shape of two fins supported by articulated rays; eyes lateral and two spiracles behind; tail long, conical, much narrower than the trunk. As applicable to our specimen, however, the terms are not the happiest which define the situation of the nostrils, the form of the tail and its size in relation to the trunk; besides which, as being marked distinctions between this genus and that of *Raia*, the mouth should have been described not merely as transverse but also terminal; and the eyes as being placed widely apart on the extreme edges of the head. It should moreover be observed, that teeth of a small size, less even than those of the sting rays, (*dents plus menues encore que celles des Pastenagues*,) are included by Cuvier among the generic characters of the *Cephalopteri*, and when the marked contrast is considered which the want of teeth in our fish presents, as compared with the family of the Rays generally, and the very important difference moreover which the having or not having teeth must create in the physical economy of animals, it may reasonably be doubted whether the fish in question can with propriety be classed in the same genus with fishes that are provided with teeth, or whether a new genus ought not rather to be created for its reception? The solution of this doubt however I shall leave to scientific

naturalists in Europe, and for the present, as new genera ought never to be proposed without the clearest necessity, I shall content myself with assuming that *Cephalopterus* is the proper genus, and proceed accordingly. A new generic title, that of *Dicerobatus*, or two-horned Ray, given by Blainville to another division of the Ray family, seems to be at least as applicable to our fish as *Cephalopterus*, because the two flaps in front look so exactly like horns, when rolled up, as to have been always believed to be such by the fishermen here; but the type of this genus, *Raia fimbriata*, differs so entirely from our fish by its lozenge shape, the position of its eyes near each other on the dorsal surface, the want of a dorsal fin, the fringed edge of the posterior part of its body from the tip of the pectoral fins to that of the tail, and the form and size of the latter, as to forbid its being classed in the same genus with the other. Two species only appear to have been admitted into the genus *Cephalopterus* by naturalists, the first of which, serving as the type of the genus, was formerly called *Raia Giorna* by La Cépède, and the second is the *Raia Massena* of Risso's *Ichthyologie de Nice*. From the former of these, as described by Dr. Shaw, our fish differs in not having its horns or frontal flappers "blackish," longitudinally striated and marked with eight rows of tubercles, in its dorsal and pectoral fins not being shaped like an isosceles triangle, in its tail not being twice the length of the rest of the animal nor smooth for about a quarter of its length and afterwards tuberculated on both sides, neither is its colour brown above with an olivaceous cast on each side. Of the *Raia Massena* the only characters I find in the books to which I have had access are the following, given by Bosc in the *Nouveau Dictionnaire d'Histoire Naturelle*, viz. smooth, the edge of the fins recurved, the horns black at their extremity, the tail with three rows of rough points (*asperités*): but of these characters the two which relate to the recurved edge of the fins and to the triple row of points on the tail, may suffice to show that it is of a different species from our fish. In regard to the *Raia Mobular*, of which I have no description before me but those in the Dictionary just mentioned, in Shaw's *General Zoology*, and in Bonnatere's *Ichthyologie*, I certainly find in these works some particulars wherein it seems to resemble the fish we are treating of; but the following characters in which it differs clearly prove the latter to be of a different species, viz. The head of moderate size, rectilinear in

front. The mouth placed beneath, measuring about 15 inches in width. The back slightly elevated into a somewhat pyramidal form. The dorsal fin of a lengthened shape, and the tail unarmed, besides which it is stated to have obtuse teeth. To these observations I may add, that I compared Shaw's figures of *Raia Giorna*, *Raia Banksiana*, and *Raia Fabroniana*, with our fish while fresh on the wharf, and that every one was struck with the dissimilarity between them. Such differences in the respective characters of the several fishes as those just adduced, tend necessarily to the conclusion, that our fish is of a distinct species, not hitherto described, and it consequently becomes requisite to point out the specific characters by which it is to be distinguished from all others. A sense of duty prompts me accordingly to propose such characters, but aware how scanty the information is which I here possess concerning the family of Rays generally, and more especially concerning the Cephalopterous division of it, it is only with great diffidence that I offer those which follow, prefixing to them the word *Manta* as the specific name of the fish, for reasons which will immediately be submitted.

CEPHALOPTERUS MANTA,* *subrhomboideus*, *lævis*, *piceus*, *pinnis acutè elongatis nigro-griseis*; *subtus albus maculis plumbeis*; *caudâ corpore paullo breviori, basin versus aculeo triangulâri instructâ, sub-quadrangulâri, gracillimâ.*

Cephalopterus Manta, *subrhomboid*, smooth, blackish; fins acutely elongated, dark grey; white beneath, with lead-coloured spots; tail rather shorter than the body, armed with a triangular spine near the root, sub-quadrangular, very slender.

There is one interesting but obscure point in the history of the class of fishes which the examination that has recently been made of the subject of this paper will assist in clearing up; I allude to the destruction which is stated in Anson's Voyage, by Don Antonio De Ulloa (at page 130 of Volume I. of his Voyage to South America), to be caused among

* Although we have not ventured to make any alterations in the above Paper, we apprehend that the name here given must be regarded as synonymous with the *Ceph. Giorna* of Le Sueur (*Journ. Acad. Nat. Sci. Phil. iv. 100.*) with the description and figure of which the present species corresponds in almost every particular. That also is known as the Devil-fish by the Americans, and is described under that name by Catesby. — Ed.

the divers engaged in the Pearl Fisheries between Panama and Guayaquil by a certain prodigiously large fish called Manta, which, says he, “ being broad and long like a quilt, wraps its fins round a man that happens to come within its reach, and immediately squeezes him to death,” to prevent which the officers are always on the watch that they may warn the divers by a signal of their danger: and this statement has been repeated by Mr. Walter in the 8th chapter of the 2d book of his Relation of Lord Anson’s Voyage, as well as by the Abbé Raynal, and since adopted by Alcedo, who, in his excellent Geographical and Historical Dictionary of America, (article Manta) has described the fish as being “ so inimical to man, that it darts at the diver immediately that he submerges, and envelopes, and devours him.” The Manta has, I believe, been generally supposed to belong to the Ray family, but its species has not hitherto been ascertained, so far as I can discover. The only conjecture about it by any naturalist that I have found is that of Colonel Montagu who, in the second volume of the Wernerian Transactions, page 426, hints at the probability of the sharp-nosed Ray, *Raia Oxyrinchus*, being “ the Manta of the South Seas, where undoubtedly its size is vastly increased.” In this, however, the Colonel proves to have erred, for I am assured by several Spanish gentlemen who went to see our Devil-fish, (two of whom are merchants in the habit of navigating between Guayaquil and Panama), that it was the very same fish which they had been accustomed to see, and to call Manta, but they considered our individual as rather small. Its identity therefore with the Manta of Spanish authors being established, I beg leave to suggest, in case, for the reasons already given, or for others, it should be ascertained not to be a *Cephalopterus*, and a new genus be required to be created for its reception, that we ought not to seek either in the Greek or in the Latin language for a generic title which shall designate its frontal flappers or feeders, because the structure and uses of organs such as these were utterly unknown to the ancients, and even till very lately to the moderns; and that instead of a learned, but necessarily inappropriate title, it will be more safe and useful to science to employ one already familiarized to ichthyologists, and no longer obscure, and to call the genus by the name of Manta, and our species by that of *Manta Americana*, from its having been hitherto found, if not solely, at least chiefly, in the American Seas.

When the fish was placed before us, it was natural that we should endeavour to satisfy ourselves as to the degree of credit which the accounts above quoted of the mode in which it destroyed the divers might justly be entitled to. It is here proper to state that every one of the Spanish gentlemen just alluded to, gave a similar account; but each of them confessed that he had never known of such an event, and it was obvious that they all spoke from tradition.

That the pectoral fins of a Manta can enfold a man in the mode that has been supposed, seems, nevertheless, upon examination, quite impossible from their structure and position; they are too thick at their base and along a great part of their anterior margin, and their cartilages are too stiff to bend in that way; neither would the manner of their articulation with the strong and rigid arch of the skeleton on each side of the body admit of any considerable approximation between their tips. There is besides the whole breadth of the body, measuring five feet in our subject, which must be kept immoveably extended by the arch both of the sternum and also of the skeleton as just explained, and which, even if the ends of the fins could be brought to meet, would still afford ample space to secure a man from being compressed in the way pretended: to say nothing of the suspension of the fish's locomotive power so long as his fins are thus kept together.

For these reasons, if the Manta has ever in reality killed any divers, it seems much more likely to have been effected by seizing and ingulphing them within its huge mouth, than by squeezing them between its fins. But, if we advert on the other hand to its total privation of teeth, the number of which has been thought, even by naturalists, to be generally proportioned to the voracious and destructive natures of fishes, to its very narrow œsophagus, and to what has been observed of its habits, which are as opposite as possible to those of the Shark, (for it has never been seen in this harbour to feed on carcases, but only on what the fishermen call small fry,) it appears very improbable that the fish would either seek to devour men, or even to snap at and catch them with its mouth. And under these circumstances it seems more rational to attribute the deaths of divers, that doubtless have happened on the Pearl Fishery Bank, to the notorious voracity of Sharks, which in general abound there, rather than to the hostility of the Manta.

In the East Indian Seas, in which several species of very large Rays have been seen, and the Manta itself is very probably to be found, it does not appear from the most authentic accounts that have been given of the Great Pearl Fisheries near Ceylon, particularly Mr. Le Beck's in the 5th Volume of the Asiatic Researches, and Captain Percival's in his account of Ceylon, that the divers entertain a dread of any fish, except the Shark. But so great is their apprehension of this animal, that even the British government has been compelled to yield to the superstitions of the natives, and to maintain shark-conjurors in their pay to avert danger from this enemy. On this head I shall only add, that the result of the enquiries which I have made on the subject in question from several ancient fishermen in this harbour, is, that not one of them has heard of any injury having been done to men by the Sea Devil, and that they have rather thought it a timid animal, as it always moves quickly out of the way of even the smallest canoe it approaches. Yet they had, it appears, a superstitious dread of it, and believed that whoever should attack and kill it, would himself shortly be visited with death, and were therefore extremely loth to assist in the act. Lieutenant St. John also tells me, that on one occasion, when a Sea Devil accidentally upset a boat at anchor fishing in deep water, by entangling its flappers with the cable, which it had dragged under the bows, it made no attack on the crew; and that he has himself been bathing in the midst of three, when they seemed to avoid his presence, by moving away, as he advanced or swam towards them.

While the Shark has generally been observed to be a solitary animal, the Sea Devil on the contrary appears to be a gregarious one; in this harbour it has almost always been seen in company, to the number in one instance of eleven, the greater part of which were probably females, as may be presumed from this circumstance, that out of six of these fishes which Lieutenant St. John has assisted in killing, the last was the only male one. I am likewise informed by my estimable friend Don Antonio San Hemeterio, that, in one of his voyages from Campeche hither, a shoal of not less than a hundred Mantas crossed his vessel, some of them now and then leaping two or three yards out of the water and coming down flat on their bellies with a loud noise; and Mr. Smith, first mate of the brig Mars, now loading here for London, tells me that when employed

lately in fishing for pearls off the Bank of Cubagua, near Margarita, he once saw a large herd of these fishes passing near him, many of which leaped up in the manner just described. Sharks, I am told, never approach the Sea Devil, unless it be wounded or dead; when they pursue it so greedily, that, in one instance, they devoured a great portion of a fish which had been struck, before it could be drawn to the shore.

EDW. NATH. BANCROFT.

ART. LVI. *Observations on a species of Pteropus from Bonin.* By G. TRADESCANT LAY, Esq

DURING the short stay of the Blossom at the Island of Bonin I had frequent opportunities of observing the habits of a species of *Pteropus*, Briss., which appears to differ from all that have been previously described in its nearly uniform colour, and in the length and proportion of its teeth. I shall denominate it *pselaphon* in allusion to the habit of feeling instead of seeing its way in the day time.

Alar membrane or the expansion of the integuments, broad, extended, rather deeply cut, black in the living animal, but becoming brownish on drying: interfemoral membrane about half an inch in width towards its extremities, narrower and almost rudimentary near the coccyx, where it is entirely concealed by the long hairs of the body, hairy on nearly the whole of its upper, and on about one half of its under surface. Fur smooth and adpressed on the back, loose and apparently frizzled on the shoulders, neck, head, and under surface, extending along the arm and fore-arm, and somewhat on the under surface of the alar membranes, brownish black, with an intermixture of longer gray hairs. These latter appear to be more numerous where the fur is loose, and give to the shoulders, neck, head, and under surface a lighter colour, approaching slightly to ferruginous; the ferruginous tint being most remarkable at the coccyx and near the anus. The claws are all cutting, and the first of them is frequently employed by the animal

in dressing the fur of its head. The incisor teeth of the upper jaw are well-ranged, and those of the lower are somewhat irregular, the two medial projecting beyond the lateral: the canine often supply the place of the incisors and vice-versâ. The nostrils have the form of an incipient Volute. The tongue is large in proportion to the size of the animal, and has a fleshy pavement. The stomach is a loose membranous bag, which is usually found to contain a small portion of acid pulp. The intestinal canal is long, and possesses no cæcal appendage; and its diameter is equal throughout. Length of the body from the tip of the nose to the edge of the interfemoral membrane, 10 inches: extent of the expanded wings, two feet seven inches: length of the antibrachium, five inches: distance between the nostrils and the anterior margin of the eye-lid, eleven lines.

The *Bonin Roussette* appears to subsist chiefly upon the fruit of the *Sapota* and *Pandanus*, the juices of which it sucks, carefully rejecting the fibrous part; but since a certain portion of the latter must necessarily enter the mouth while the animal is feeding, this is rolled up in the hollow of the palate, and when the juices are abstracted it is removed from its lodgement by an oblique application of the tongue to make room for the next juicy morsel of *parenchyma*.

To obviate the inconvenience of direct light falling upon the optic nerve, in the pendent attitude of rest, it enjoys the faculty of shutting the ordinary passage of light through the crystalline lens, and the pupil in consequence disappearing, nothing save the brown iris is seen to pervade the eye-ball. In this blind condition it climbs trees, groping its way up to the topmost branches, where, after extending its claws to learn whether there be another sprig within reach still higher than its present situation, it quietly drops its weight upon the hind claws, and composes itself to rest, apparently with as much inward felicity as a traveller feels when, after descending some perilous height, he has safely reached a smooth level.

It would seem that they make but little use of their eye-sight in the day-time, except when on the wing, trusting in the search of their food to the sense of smell, which they enjoy in perfection. When captured they were often observed to sneeze, which I took to be an indication of the high degree of irritability in the pituitary membrane. A cluster of

the ripe fruit of the *Pandanus odoratissimus*, carried by some boys, drew many of these animals to the spot. One that had been caught and tied by the leg, though blindly striving to get free with unavailing diligence, forgot its fears and embarrassment when a piece of that fruit was held at the distance of a yard or two from it, and eagerly pawed after the odourous morsel; which having obtained, and finding its gyves loosened, it began forthwith to hasten away, holding the booty firmly in its mouth.

One of them being thrown by the sailors into the sea, laboured some time to keep its head above water and reach the shore; but finding all attempts vain, it quietly resumed its wonted position of rest, and resigned itself to a watery death. When cast upon a raft by the same unfeeling hands, it made some attempts to suspend itself from a projection, without dipping its head into the water, but perceiving its efforts to be useless, it abandoned the float, and swam pertinaciously after the boat, deeming that it saw some object at a distance which would afford a comfortable resting-place.

When thirsty, it descends a tree on the margin of the rill, and after sipping a little refreshment, re-ascends the trunk, and takes its departure from the branches.

Those which were taken on board and confined, did not discover any sign of fear, and ate without repining the fruit that was given them; and on their being set at liberty they climbed to the highest parts of the rigging, and there found a convenient place for repose.

ART. LVII. *On the structure of the Beak and its muscles in the Crossbill, (Loxia curvirostra.)* By WILLIAM YARRELL, Esq., F.L.S., &c.

THE peculiar formation and direction of the parts of the beak in the Crossbill, its anomalous appearance, as well as the particular and powerful manner in which it is exercised, had long excited in me a desire to examine the structure of an organ so curious; and the kindness of a friend has lately supplied me with an opportunity.

To those who have not made the habits and economy of birds an object of investigation, it may be necessary to state that our two species of Crossbill are the only British birds that exhibit or seem to require any lateral motion of the mandibles, and it is the object of this paper to describe the bony structure and muscles by which this peculiar and powerful action is obtained.

It may be necessary to premise that Mr. Townson in his "Observations in Natural History and Physiology," has devoted a chapter to the structure of the bill of the Crossbeak, some extracts from which will be introduced in this notice; but to show that I am not occupying the valuable pages of the Journal with a tale twice told, the first sentence I select is as follows. Speaking of the beak, he says, "I ought now to give the anatomy of it, and I wish it were in my power; but on the muscles, by which the motions I have spoken of are performed, I find scarce any memorandums in my portfolio."

The beak of the Crossbill is altogether unique in its form; the mandibles do not lye upon each other with their lateral edges in opposition as in other birds, but curve to the right and left, and always in opposite directions to each other. In some specimens the upper mandible is turned to the right, the lower mandible curved to the left; in others, the position of the mandibles is reversed as to their direction. In the specimen I examined the upper mandible curved downwards and to the left, the under portion turned upwards and to the right, as the figures 1 and 2, plate xiv, will demonstrate. When holding the head of this bird in my fingers, I found I could bring the point of the under mandible in a line underneath and touching the point of the upper, but not beyond it towards the left side, while on its own side the point passed with ease to the distance of $\frac{3}{8}$ of an inch. The upper mandible has a limited degree of motion on the cranium, the superior maxillary and nasal bones being united to the frontal by flexible bony laminae.

The form as well as the magnitude of the processes of some of the bones of the head are also peculiar to this bird.

The pterygoid processes of the palatine bones are considerably elongated downwards, as shewn at figure 3, letter *a*, to afford space for the insertion of large pterygoid muscles. The os omoideum on each side (figure 3, letter *b*,) is strongly articulated to the os quadratum, (figure 3,

letter c.) affording firm support to the moveable portion of the upper mandible. Letters *d. d.* figure 3, refer to the jugal bone, which, united to the superior maxillary bone in front, is firmly attached by its posterior extremity to the outer side of the os quadratum; when, therefore, the os quadratum is pulled upwards and forwards by its own peculiar muscles, to be hereafter mentioned, the jugal bone on each side by its pressure forwards elevates the upper mandible.

The inferior projecting process of the os quadratum, to which the lower jaw is articulated, in most other birds is somewhat linear from before backwards, and compressed at the sides, admitting vertical motion only upwards and downwards; the same processes in the Crossbill are spherical, as shewn at c. figure 3; the cavity in the lower jaw destined to receive this process is a hollow circular cup (figure 5, letter *a*); the union of these two portions therefore forms an articulation possessing the universal motion and flexibility of the mechanical ball and socket joint.

The lower jaw is of great strength, the sides or plates elevated, with prominent coronoid processes, (figure 5, *b. b.*) to which, as well as to the whole outer side of the plates, the temporal muscle is attached, and in a head of this bird which had been divested of all the soft parts, I found on sliding the lower jaw laterally upon the upper as performed by the bird, that before the coronoid process is brought into contact with the pterygoid on its own side, the extreme points of the mandibles were separated laterally to the extent I have already mentioned of $\frac{2}{8}$ of an inch.

The temporal and pyramidal muscles on the right side of the head, that being the side to which the lower jaw inclined, were considerably larger than those on the left, as represented in figures 1, 2 and 4, letters *a.* and *b.*, and indicated by their bulk the great lateral power this bird is capable of exerting to be hereafter noticed. The unusually large size of the pterygoid muscles on each side was very conspicuous, (figure 2, letters *c. c.*.) the space for them being obtained by the great distance to which the articulated extremities of the lower jaw were removed, and the food of the bird being small seeds rendered a narrow pharynx sufficient for the purpose of swallowing.

The muscles depressing the lower mandible are three in number, only one of which, the great pyramidal, is visible, figures 1, 2 and 4, letter *b.*

This strong muscle covers two other small ones, the triangular and square muscles, so called from their particular shape. These three muscles, all of which have their origin on the occipital portion of the cranium, are inserted by strong tendons on the under and back part of each extremity of the lower jaw behind the centre of motion, and consequently by their simultaneous contraction raise the point to which they are attached, and depress the anterior part of the mandible. The lower portions of the *ossa quadrata* are pushed somewhat forwards by this compression, assisted by two small muscles not exhibited, but the situation of which may be explained by a reference to figure 3. One of these, a small flat muscle, arises from the septum of the orbits behind the small aperture observed in the septum, and passes downwards to be inserted upon the projecting styloid process of the *os quadratum*; the second is a small pyramidal shaped muscle arising also from the septum, anterior to the other muscle, and passing downwards and backwards is inserted upon the *omoideum*, both by their contraction pulling the *os quadratum* forwards and thus elevating the other mandible. The depressors of the lower jaw, and the elevators of the upper, therefore act together to separate the mandibles.

To close the mandibles the temporal and pterygoid muscles elevate the lower jaw, assisted by the slender slips marked *d. d.* figure 2, which extending forwards to the superior maxillary bones, act in concert by bringing them down.

When the lateral motion is required, the great pyramidal muscle on the right side pulls the extremity of the lower jaw to which it is attached backwards, the pterygoid muscles of the left side at the same time powerfully assisting by carrying that side of the lower jaw inwards.

Having thus described the muscles of the mandibles in birds generally, and their peculiar mode of action in the Crossbill, I shall quote Mr. Townson's description of the manner in which they are made subservient to the use of the bird in feeding. "The great pine forests, such as the Hartz in Germany, are the natural places of residence of the Crossbeaks, and the seed of the cones of these trees their food, and it is to pull out the seeds from between the *squamæ*, or scales of the cones, that this structure is given them. Their mode of operation is thus: they first fix themselves across the cone, then bring the points of the maxillæ from their crossed or lateral position, to be immediately over each other. In this reduced compass, they insinuate their beaks

“ between the scales, and then opening them, not in the usual manner,
 “ but by drawing the inferior maxilla sideways, force open the scales
 “ or squamæ.

At this stage of the proceeding the aid of the tongue becomes necessary, and this organ is no less admirably adapted for the service required. The os hyoides or bone of the tongue has articulated to its anterior extremity an additional portion formed partly of bone with a horny covering, figures 6 and 7, letter *a*. In shape it is narrow, about $\frac{2}{3}$ of an inch in length, and extends forwards and downwards, the sides curved upwards, the distal extremity shaped like a scoop, somewhat pointed, and thin on both edges, the proximal extremity ending in two small processes elongated upwards and backwards above the articulation with the bone of the tongue, each process having inserted upon it a slender muscle, *b*. figures 6 and 7, extending backwards to the glottis and attached to the os hyoides, which muscles by their contraction extend and raise the scoop-like point. Underneath the articulation of this horny and grooved appendage is another small muscle, *c*. figure 7, which is attached at one extremity to the os hyoides, at the other to the moveable piece, and by its action, as an antagonist to the upper muscles, bends the point downwards and backwards; while, therefore, the points of the beak press the shell from the body of the cone, the tongue brought forward by its own muscle (*genio-hyoideus*) is enabled, by the additional muscles described, to direct and insert its cutting scoop underneath the seed, and the food thus dislodged is transferred to the mouth; and it will be seen by a reference to the first figure, that when the mandibles are separated laterally in this operation the bird has an uninterrupted view of the seed in the cavity, with the eye on that side to which the under mandible is curved.

“ The degree of the lateral power of these birds,” says Mr. Townson,
 “ is surprising, and they are fond of exercising it for mere amusement;
 “ they are therefore not a little mischievous.

“ My pets would often come to my table, whilst I was writing, and
 “ carry off my pencils, little chip boxes in which I occasionally kept
 “ insects, and other similar objects, and tear them to pieces in a minute.
 “ Their mode of operation is by first pecking a little hole, in this they
 “ insert their bill, and then split or tear the object by the lateral force.
 “ When I treated them, as I often did, with almonds in their shells, they

“ got at the kernel in the same manner ; first pecking a hole in the shell, “ and then enlarging it by wrenching off pieces by the lateral power.”

Notwithstanding M. Buffon’s assertion to the contrary, they can pick up and eat the smallest seeds, and they shell or husk hemp and similar seeds like other birds; so well contrived and useful is this singular beak. My friend Mr. Morgan kept a pair of these birds for some time, and had opportunities for observing their curious habits. They were impatient under confinement, and restless, climbing over the wires of their cage by the use of their beak and claws like parrots. One of their principal occupations was twisting out the ends of the wires of their prison, which they accomplished with equal ease and dexterity. A short flat-headed nail that confined some strong net-work was a favorite object upon which they tried their strength; and the male, who was usually pioneer in every new exploit, succeeded, by long continued efforts, in drawing this nail out of the wood, though not without breaking off the point of his beak in the experiment. Their unceasing destruction of cages at length brought upon them sentence of banishment. During the period of their captivity a complete change took place in the colour of their plumage without the shedding of a single feather.

The remarks of Buffon on the beak of this bird, which he characterizes as “ an error and defect of Nature, and a useless deformity,” exhibit, to say the least of them, an erroneous and hasty conclusion, unworthy the spirit of the science he cultivated. During a series of observations on the habits and structure of British birds, I have never met with a more interesting or beautiful example of the adaptation of means to an end, than is to be found in the tongue, the beak and its muscles in the Crossbill.

Explanation of the Plate.

- Fig. 1. Head of the Crossbill; side view. *a.* temporal muscle; *b.* great pyramidal muscle.
2. Head viewed from below. *b.* great pyramidal muscle; *c. c.* pterygoid muscles; *d. d.* graciles muscles.
3. Head viewed from the side; *a.* pterygoid process; *b.* os omoideum; *c.* os quadratum; *d. d.* os jugale.

4. Head viewed from behind; *a.* right temporal muscle; *b.* great pyramidal muscle.
 5. Lower jaw, side view; *a.* cavity for articulation; *b. b.* coronoid processes.
 6. Tongue seen from above; *a.* horny scoop; *b. b.* extensor muscles.
 7. Tongue, side view; *a.* horny scoop; *b.* extensor muscles; *c.* flexor muscle.
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ART. LVIII. *Remarks on some English Fishes, with Notices of three Species, new to the British Fauna.* By WILLIAM YARRELL, Esq., F.L.S., &c.

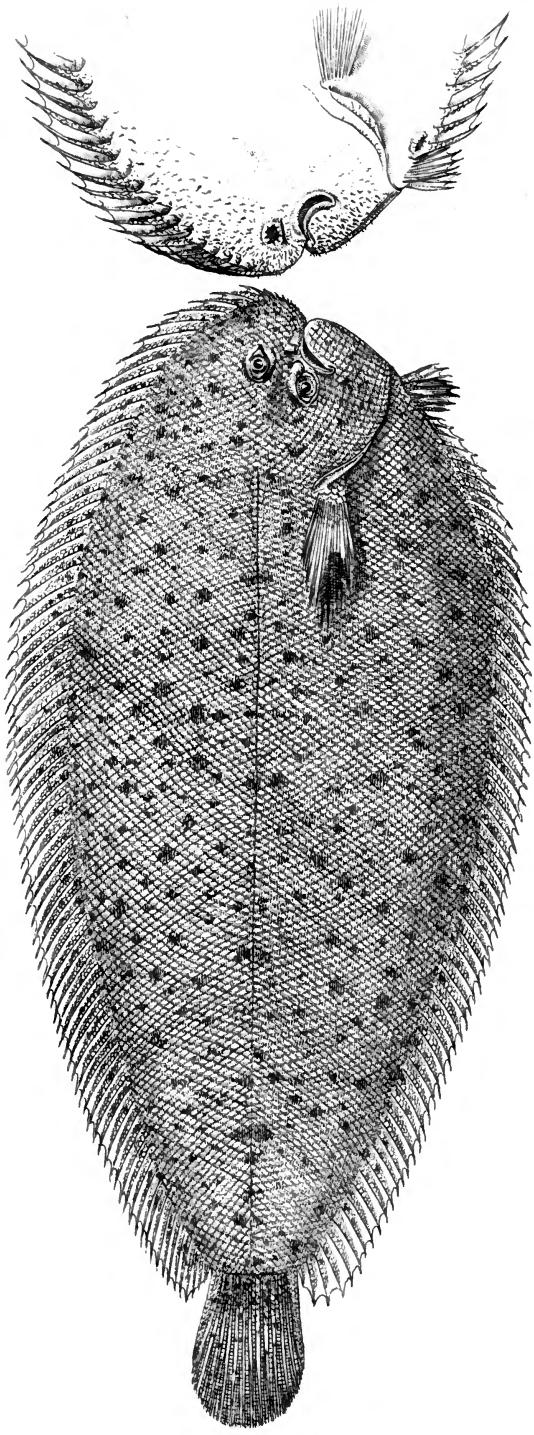
THE season for Whitebait fishing having expired soon after the sending my former remarks on that subject for insertion in the XIVth Number of the Zoological Journal, I waited with some anxiety for the period when nets of small meshes might legally be worked at the mouth of the Thames for Smelts and Sprats, in the hope of obtaining further evidence of the distinction between Whitebait and Shads; and in this expectation I was not disappointed. I obtained, but in small numbers only, both adult Whitebait in roe, and some young ones; but it appeared that the large shoals of this fish, like all those which visit the fresh water for the purpose of depositing their spawn, had, with their fry of the year, quitted the river and returned to the deep. As late as the month of November I obtained several small Shads, only $2\frac{1}{2}$ inches in length, which illustrated another point in the history of that fish. We are told by Baron Cuvier and M. Valenciennes, in the second volume of their work on the Natural History of Fishes (p. 25) that a Perch of 7 inches is in his third year; and I therefore felt convinced that these young Shads, only $2\frac{1}{2}$ inches in length when taken in November, were in reality young fishes of the same year, and that the young Shads of 4 inches in length, obtained in the months of July and August preceding, were the young fishes of the year before, the greater part of them having arrived at the length of 4 inches

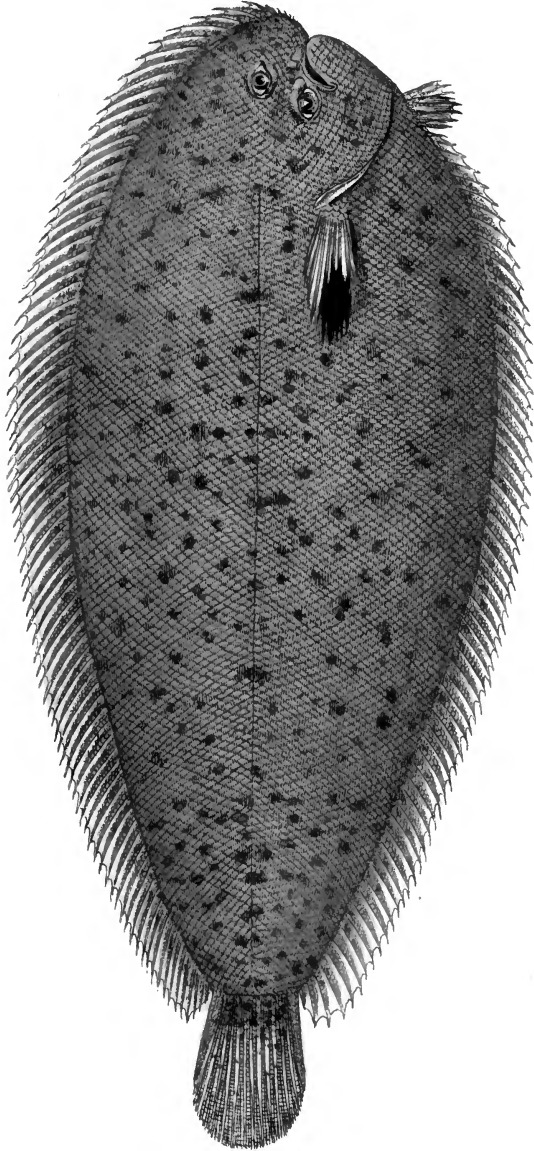
at or very soon after the time the adult fishes had shed their ova. There was also this obvious and invariable distinction between young Shads and Whitebait: the latter never exhibited any trace of the spots on the sides so conspicuous in the Shads. The Shads, on the contrary, were never without some indication of these peculiar spots, though their number and intensity of colour appeared to depend on the strength and condition of the fish. The first spot immediately behind the operculum however is never wanting; some of the young Shads taken in July and August exhibited as many as five spots, of which the specimen figured was an example, but the youngest as well as the weakest invariably possess one spot behind the upper part of the edge of the operculum; even the young Shads of $2\frac{1}{2}$ inches only, taken in November, the smallest I have been able to procure, have this distinction, and in this state most resemble Whitebait; but I may add in conclusion, as an invariable point of distinction between the two fishes, that I have never seen a Whitebait of any age or size with this spot, or a Shad without it.

On shewing a series of specimens of these two fishes to M. Valenciennes during his late visit to London, that gentleman, who has made this branch of Natural History his particular study, stated that he considered them decidedly different.

In proposing the term *alba* as a specific distinction for the Whitebait, in a former paper, I by no means intended to be understood as supposing that this fish had remained as yet undescribed by Continental Naturalists, I only desired to claim for this distinct species an appropriate appellation in our list of British Fishes. It may be "Le Prêtre ou Spret de Calais, le Franc-Blaquet ou Franche Blanche," four names given by Duhamel to one small species of *Clupea*, though his figure is not like our fish; yet as the Whitebait frequents the Thames every summer, it is not unlikely that it should be taken at Calais.

Sir Everard Home, in his recently published additional volumes on Comparative Anatomy (Vol. V. c. 4, sect. 1, page 232 and Vol. VI. plate 28) has inferred, from certain resemblances in the ova and serrated abdominal edges of four fishes of the genus *Clupea*, that the Whitebait is a young Shad, and the Sprat a young Herring. Dr. Fleming, in his History of British animals, published in 1828, does not allow the Sprat a place among his fishes, and at page 183, after giving the specific cha-





Solea Regia. p. 467.

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acters of the Pilchard (*Clupea Pilcardus*.) the follow' sentences occur: " The fry of the Herring and Pilchard are confounded together under the " epithet *Sprat*. The position of the dorsal fin, in reference to gravity, " furnishes, however, an obvious mark of distinction." The differences already detailed as existing in the anatomy and habits of Whitebait and Shads render any further observations on that subject unnecessary, while between the Sprat and Herring the distinctions are still more decided. On comparing a Sprat with a young Herring of the same length, at which age they are called by the fishermen Yawlings, the Sprat will be found to be considerably deeper, and the scales much larger ; in this latter circumstance the Sprat resembles the Pilchard, but the Pilchard on the other hand is not so deep a fish as the Herring. The Sprat and Herring differ also in the number of rays in three of their fins out of the four they possess, and also in the tail, as the following numbers exhibit.

	D.	P.	V.	A.	C.
Sprat	17	15	7	18	19
Herring	17	14	9	14	20

There is also one other most material difference, the vertebræ in the Sprat are 48 in number, in the Herring there are 56, as I have ascertained upon many examples of both species.

The number of vertebræ in the Whitebait and Herring being the same might suggest the idea that the Whitebait were young Herrings, but the economy of the species prevents this conclusion. The Whitebait are unknown on the shores of our various Northern Islands, where the Herrings in myriads deposit their spawn; and on the other hand, the Thames produces Whitebait in abundance during the summer, remaining with us till August, when the Herrings are heavy with roe which they do not deposit till October.

SOLEA PEGUSA.

During a short visit to Brighton the last week of February I obtained a single specimen of a Sole which it occurred to me had not been admitted into any British Fauna, and further search on my

return home has confirmed that opinion. No description in our various ichthyological works appearing to agree with this species, I venture to consider it as new to our coast, and shall therefore describe it. In shape it is wider in proportion to its whole length than the common Sole (*Solea vulgaris*) and it is also somewhat thicker. The specimen measures from the point of the nose to the end of the tail 8 inches, across the widest part of the body, not including the fins, 3 inches, including both fins, 4 inches. In an example of the common Sole obtained for comparison, the whole length of which was 8 inches and $\frac{2}{3}$, the greatest breadth without the fins was only $2\frac{1}{3}$ inches, with the fins included, $3\frac{1}{3}$. The number of rays in the different fins of the two species were

	D.	P.	V.	A.	C.	
Common Sole. . .	84	7	5	67	17	vertebræ 47
New species. . . .	81	8	5	69	17	„ 43

In its general aspect this new Sole, compared with our common species, is much more round and fleshy, the head obtuse, shorter and wider, the mouth arched, the operculum formed externally of a single piece, circular in shape and less deep, tip of the pectoral fin black, lateral line straight but not very strongly marked, tail narrower than in the common sort though composed of the same number of rays, the prevailing colours a mixture of orange and light brown, freckled over with small circular spots of very dark brown, giving a mottled appearance to the whole upper surface. The scales also differ both in character and general arrangement. On the under side the appearance is still more characteristic of its distinction. The surface of the head is almost smooth, without any of the papillary eminences so remarkable in the common sort, and the nostril is pierced in a prominent tubular projection which is wanting in the other; the under surface white, the appearance of the scales more strongly marked than upon the upper. This species is occasionally taken with the common Sole by trawling over a clear bottom of soft sand, about 16 miles from Brighton. It is but partially known there by the name of Lemon Sole, and the same name is by the fishermen also applied to a species of *Pleuronectes*, which however has no resemblance to this new fish beyond that of its prevailing yellow colour.

It appears to be perfectly distinct from the *Pleuronectes Lingula* of Pennant, which may be considered the *Pleuronectes Linguatula* and *Pleuronecte languette* of Linn., Gmel., and La Cépède, and differs also from the *Pleuronectes variegatus* of Donovan. A short description of *Solea Pegusa* will be found in the *Histoire Naturelle des Poissons* of M. La Cépède, Vol. IV. p. 639; it appears to be a fish of the Mediterranean, and according to M. Noel of Rouen has been taken in the environs of Caen, but considered very rare. It is described shortly by Risso, under the names of *Sollo de rocco*, *Pleuronecte Pegouse* and *Pleuronectes Pegusa* in his *Ichthyologie de Nice*, p. 308, and is also the *Monochirus Pegusa*, *Monochire Pegouse* and *Solla d'arga* of the same author's *Histoire Naturelle des principales productions de l'Europe Meridionale*, Tom. III. p. 258.

The different writers on British Fishes agree in admitting but one common species of fresh-water Eel, but from recent examinations I am induced to believe there are two, independent of course of the species our markets are largely supplied with from Holland, which appears to be distinct from either. The difference between our two Eels is immediately apparent when they are brought together for comparison, by the very opposite characters of the head, the one being as remarkable for its slender and attenuated form, as the other is robust and blunt. The sharp-headed Eel, which I call it for distinction, appears to be the *Anguilla vulgaris* of authors. In this species the head is angular, depressed, eyes small, placed immediately over the angles of the mouth, irides yellow, both jaws narrow, acute, the lower jaw longest, nostrils with two openings on each side, one tubular, the other a simple pore near the eye, gill opening before and below the pectoral fin, the fin $1\frac{1}{2}$ inch from the point of the nose, dorsal fin occupying $\frac{3}{4}$ of the whole length of the fish, lateral line straight, tail acute. In the second species the head is rounded superiorly and flattened from the eyes forward, both jaws broad and blunt, the lower one the widest, and longer than the upper, the eyes large, placed rather before the gape, irides golden yellow, the gill openings, pectoral fins, commencement of the dorsal fin and the vent placed farther back than in the sharp-headed Eel, pectoral fins larger, tail broad,

dorsal and anal fin much deeper and thicker in substance than in the first species. The two Eels here described were of the same length. The sharp-headed fish measured two inches in girth, and was a male, the blunt-headed species measured $2\frac{5}{8}$ inches, and proved a female; of five others examined as to the sexual organs, two were males and three females, exhibiting distinctly their milt and ova. The figure in Bloch is that of the sharp-headed eel, that in Meyer, plate 42, is a representation of the blunt-headed Eel; both species appear therefore to be known on the continent. I have said nothing of colour in either, believing that it affords no true specific distinction, and may partly depend on the quality of the water from which they have been taken. This species may be the Grig of Pennant, but this is stated to be of small size and less fat than the sharp-headed species. This has not been the case with numbers that I have examined by comparison, which have universally appeared one-fourth larger in circumference, for equal length, and in good condition. A prejudice exists that all fishes with large heads are in bad condition or out of season, which though true in regard to Trout or Salmon, is certainly not founded in fact with respect to Eels.

COTTUS BUBALIS.

During the summer months of last year, when pursuing the investigation of the distinctions between the Whitebait and Shads, I was supplied with three examples of the genus *Cottus*, taken at the mouth of the Thames, which at that time, more intent on the subject I had in hand, I took no notice of beyond placing them in a preserving liquid, believing them to be specimens of *Cottus Scorpius*. When favoured lately with a visit from M. Valenciennes, and looking over a small collection of British Fishes together, that gentleman pointed out these specimens as examples of the *Cottus Bubalis*, and demonstrated the specific differences between *Bubalis* and *Scorpius*. The *Cottus Bubalis* appears to have been noticed by Euphrasen, *Nouv. Mem. de Stockholm*, Vol. VII, plate 4, fig. 2 and 3; it is also noticed in the *Règne Animal* of Baron Cuvier, Vol. II. page 306, note.

The *Cottus Bubalis* is distinguished by having the head still more powerfully armed than the Father Lasher, and is thus characterised by Schneider, Vol. I. p. 62. "Capite depresso, scabro, spinoso, bicorni, oculis

“ verticalibus, approximatis, linea laterali scabra, tuberculata, radiis 4
 “ pinnarum ventralium.”

This species has not hitherto been admitted in our Fauna, yet I have reason to believe it is very common, and has been constantly confounded with *C. Scorpius*. The fin rays are as follow.

	1st D.	2d D.	P.	V.	A.	C.
<i>Cottus Scorpius</i>	. 10	14	17	3	10	12
<i>Bubalis</i>	. 8	11	15	3 or 4	9	10

Atherina Hepsetus. The Atherine is taken in great abundance during the spring months within a short distance of Brighton. A fishing-boat's crew under favourable circumstances have been known to take as many as would fill a bushel measure during one tide. They are sold under the name of Sea-smelt and Sand-smelt, from the nature of the bottom over which they are taken; but possess none of the odour, and but little of the flavour, peculiar to the true Smelt. The Atherine is plentiful along the extended line of our Southern coast, but only occasionally makes its appearance in the London Market.

The *Sparus lineatus* of Montagu, described and figured in the Wern. Mem. Vol. II. p. 451, tab. 22, a specimen of which I exhibited a short time since to the Zoological Club, and of which I have since seen a second example, both taken on our coast, proves to be a Mediterranean fish, the *Sparus Sargus* of Bloch, but imperfectly figured. Its characters are given by Schneider, Vol. 1. p. 270. The trivial name *lineatus* proposed by Montagu, and recently adopted by Dr. Fleming, will therefore require to be changed.

ART. LIX. *On the Mus Barbarus of Linnæus.* By E. T. BENNETT, Esq., F.L.S., &c.

IN the collection of the Zoological Society there have recently been living three specimens of an animal which appears to have been hitherto observed by Linnæus alone, in the Additions to the 12th Edition of whose *Systema Naturæ* occurs the only original description that has yet been given of it. It is there characterized as the "*Mus barbarus*, caudâ me-
" diocri, corpore fusco striis decem pallidis, palmis tridactylis, plantis
" pentadactylis." Its description is as follows:—"Corpus M. Musculo
" minus supra fuscum. Abdomen pallidum. Dorsum striis decem
" pallidis et sæpe lineolâ vix manifestâ inter strias laterales. Pedes an-
" tici digitis tribus unguiculatis; præterea pollice obsoleto; sub plantâ
" ipsâ rudimentum quinti digiti. Cauda nudiuscula, subverticillata,
" longitudine corporis."

So clear a description of the animal, evidently taken, as the word "sæpe" shows, from more than one individual, would have seemed to render it impossible that confusion could have been subsequently introduced into the history of the *Mus Barbarus*, and that this should have gradually increased to the extent of rendering, not merely its genus, but its very existence, questionable. Such, however, has been the effect produced by the mode in which the works of Linnæus have been edited by Gmelin, whose compilation must be rejected as a work of authority from every Zoological, as it was, immediately after its appearance, from every Botanical library. Gmelin, like all compilers, repeatedly described under two or more names the same animal, and thus introduced into science a considerable number of merely nominal species; an error inseparable from the plan pursued by him of looking to books alone, and not to the objects in nature, to which their descriptions were meant to apply. But such errors, deeply injurious as they are to the cause of science, are trifling when compared with the mischiefs resulting from mis-quotation. Gmelin did not even copy correctly. In the instance before us he took from Linnæus the words of his specific character of *Mus Barbarus*, and translated into his own phraseology the greater part of the description: but he omitted to mention the indistinct slender line noticed as frequently



existing between the *striæ* ; and, which is of far greater importance, he omitted altogether the description of the anterior feet. Linnæus's *Mus Barbarus*, from the modification of the character of these organs, as explained in his description, was evidently truly murine, although deviating somewhat from the typical character of the genus : but Gmelin's, owing to this gross omission, had but three toes on its anterior feet ; no rudiment whatever of any other appeared in his character : he was puzzled by his own blunder, which alone rendered the animal no longer a *Mus* ; and he enquired "An forsam ad Caviam releganda?" a question propounded, be it remarked, in immediate apposition with the words "Cauda—longitudine corporis," the character of *Cavia*, as given by him a few pages before, being "Cauda abbreviata aut nulla."

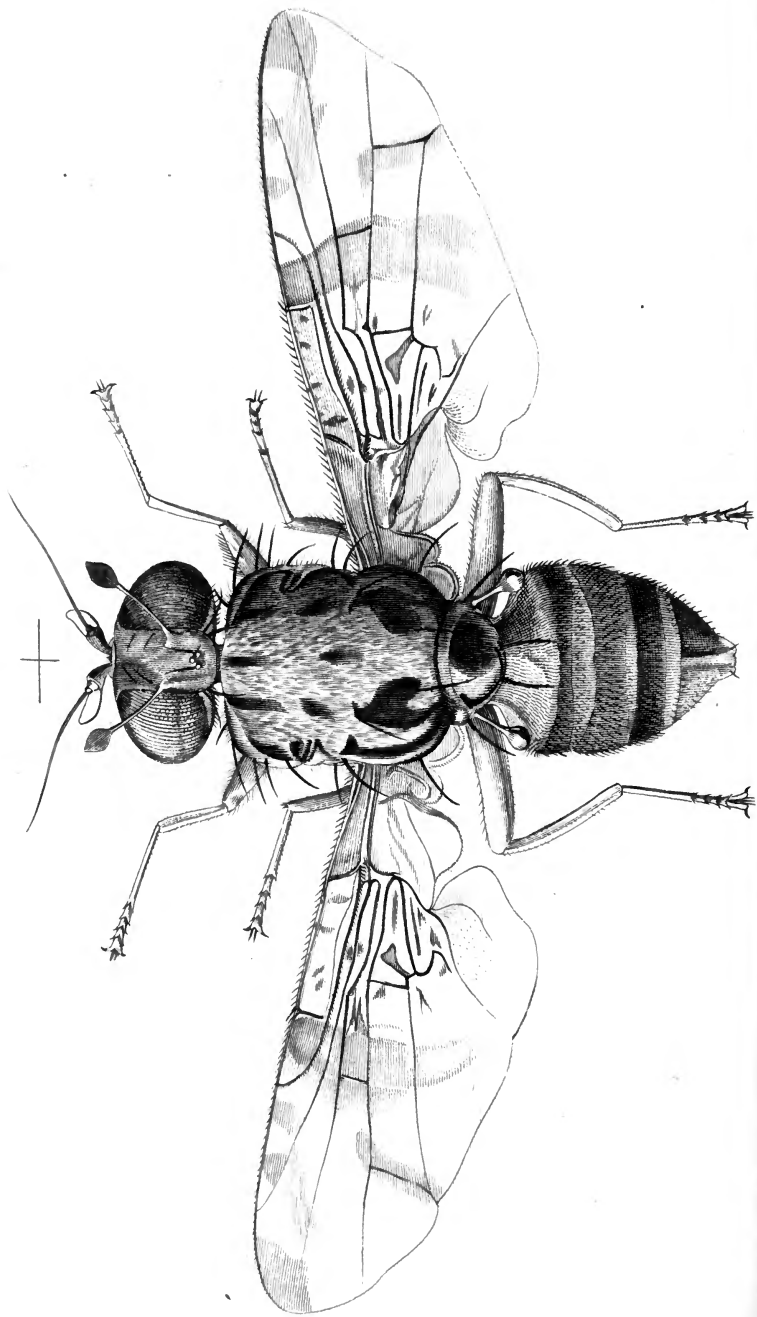
Succeeding naturalists, enjoying no opportunity of referring to specimens, were reduced to the necessity of consulting the works of the writers who had preceded them, and they appear to have had recourse to Gmelin alone, to the utter neglect of the original authority for the species. They have consequently been equally puzzled with the compiler himself at the singular character of the *Mus Barbarus* introduced by his mistake. M. Desmarest, the latest writer of repute on the species of the *Mammalia* generally, translates the character given by Linnæus, and the description furnished by Gmelin ; and evidently regarding the latter as truly representing, or rather as identical with, the great naturalist of the North, he prefaces his version of Gmelin's description by the words, "Linné ajoute," &c. In this description, thus asserted to be quoted from Linnæus, M. Desmarest states, "que les oreilles sont courtes et nues." Whence this observation, incorrect in fact, was derived, it is impossible to guess : not one word relating to the ears is to be found in either edition of the *Systema Naturæ*.

The note of M. Desmarest on this species is as follows :—"Nous pensons que cette espèce ne pourra être définitivement admise que lorsqu'on aura pu l'examiner de nouveau, et surtout lorsqu'on connoitra son système dentaire, qui peut la faire reporter dans un autre genre que celui des Rats." He had previously enquired, in the *Nouveau Dictionnaire d'Histoire Naturelle*, "Est-ce bien un Rat?" and still later his scepticism on the subject has been carried much farther, for he treats it in the *Dictionnaire des Sciences Naturelles* as a species, "dont l'existence mérite d'être confirmée."

Of the existence of such an animal ample confirmation is afforded by the three individuals of the Zoological Society's collection, which differ in no respect, except in size, from the description given by Linnæus of his *Mus Barbarus*. In size they are intermediate between the Domestic Mouse and the Black Rat. Their ground colour is fuscous-brown above, intermingled with a few yellow hairs, and they are marked on each side with five or six continuous longitudinal yellowish lines, narrower than their intervening spaces, and blending gradually with the under surface, which is pale, and between the fore-legs nearly pure white. Their ears are moderately large, rounded, and covered with hairs so short as to cause them to appear nearly naked. The anterior feet are furnished with five toes, the outer and inner of which are merely rudimentary, so that three only are remarkable, and of these the two inner are the longest. The hinder feet are also five-toed, but might almost with equal correctness as the anterior be described as tri-dactyle; the middle three toes being very long, the inner one rudimentary, and the outer so short as not to reach the base of the adjoining one.

An earlier notice of these animals would have been given, had it not appeared desirable that the information respecting them should be rendered more complete than it was possible to make it from the examination of living specimens alone. The opportunity of minutely observing the teeth has lately been afforded by the death of one of the individuals, and from these it is evident that the species has been rightly referred to the genus *Mus*. Its molars are rooted, tubercular, and three on each side in either jaw. In the lower jaw the first molar has its crown elongated, nearly equal to the united length of the succeeding two; increasing somewhat in breadth towards its hinder part; divided transversely into three portions, the anterior of which is smaller than the others; and grooved along its middle from before backwards, so as to form six slightly elevated tubercles, of which the outer and anterior is smaller than the others: the crown of the second molar is square, divided into two equal portions, and grooved along its middle so as to form four tubercles: the crown of the third is triangular with the apex directed backwards, and is composed of two portions, the anterior of which is grooved and divided into two tubercles, while the posterior is undivided. In the upper jaw, the molars correspond in number, proportion, and shape with those of the lower. The crowns are also flattened, and have





slightly elevated tubercles, a row of which, of larger size, occupies the middle line of the series, and is bordered on the outer and inner sides by smaller ones. The crown of the first molar has three middle tubercles; three external, the anterior and posterior of which are small; and two internal: the second molar has two middle, three external, and two internal tubercles: and the third molar exhibits one middle, two internal, and one posterior, tubercles.

A comparison of this description with the teeth of the *Mus Musculus*, Linn., will suffice to show that no essential difference exists between these organs in the two animals; and they consequently both belong to the same genus. The *cranium* of *Mus Barbarus*, it may be added, is comparatively more elongated than that of *Mus Musculus*: its length is one inch and three lines; its greatest breadth, six lines; its breadth between the orbits, two lines and a half; and the width of the zygomatic arches nearly eight lines.

The accompanying figure, TAB. XVII, was taken from one of the specimens at present living in the collection of the Zoological Society.

ART. LX. *Notice of Ceratitis Citriperda, an Insect very destructive to Oranges. By W. S. MacLeay, Esq., A.M., F.L.S., &c., in a Letter to the Editor.*

MY DEAR VIGORS,

IT argues but little acquaintance with the gratification that may be derived from the study of Natural History, to confine our researches within what we may deem to be the sphere of its practical utility. The Naturalist is the Historian of facts; and to him it ought little to matter whether these facts be of apparent utility or not. It is his duty to record them all, because he can never be sure that any are to remain absolutely without importance, or that some one of his successors in the science may not have occasion to make use of them. If even he should be fortunate enough to make a new observation, having an immediate bearing on the common purposes of life, he is not to suppose that he

has therein fulfilled the great object of Natural History, or indeed that scientifically he has more merit than another, whose researches, provided they may be accurate, are not of utility so visible. Were we once to concede any such principle, a great portion of facts, which however uninteresting to the world at large, are at the same time absolutely necessary for the Naturalist to know, would thus be neglected, and when we came to study the noblest and most interesting branch of our science, the progression of natural affinities, we should find ourselves without data to proceed upon.

I even think it may be easily shewn that the study of Zoology has not been so immediately beneficial to the ordinary interests of mankind as it would have been, had persons looked less anxiously to the *cui bono*, and more accurately to apparently useless facts that lay within their observation. To take one most obvious example; it is apparently of little import to our domestic comfort that insects should be subject to metamorphosis, and therefore this metamorphosis remains a fact scarcely known to the generality of those individuals, who, from their professions or mode of life, are often most subject to their ravages, although of all points of insect history, it is a knowledge of their metamorphosis that in most cases offers us the best hope of counteracting the evils these little animals inflict.

It may seem needless to make these common-place remarks to the Editor of a Journal, which has originated in similar views of Natural History, and the very object of which is to record and perpetuate the knowledge of facts, that without some such protecting influence would soon sink into oblivion. If, therefore, I have been led to decry the force of the most vulgar of the various objections that have been brought against Entomologists, it is that none of your readers may imagine, because an insect may be minute (such as the very one, of which, as destructive to oranges, I propose giving the following account) that therefore it is unworthy to occupy attention; and that still less any of them may think, that when an insect is proved to be destructive, all investigation ought to cease with the knowledge of this bare fact. The only reward the Naturalist ought to look for, is the delight which the study affords, and this proceeds from the examination of an *Aphis* as well as from that of a *Limulus*.

The quantity of oranges annually imported into England, amounts to about from 90,000 to 100,000 chests, of which the greatest part comes from the Azores. Of the quantity imported, however, only about two-thirds are of use, as the orange-merchants calculate on a total loss of one-third of their average importations; and indeed it frequently happens that whole cargoes arrive in such a state of decay as not even to sell for the value of their freight, so that the London merchant, if not insured, incurs, in addition to this loss, all that of the first cost and shippers' charges. As, however, he calculates on the sound cargoes making up the loss, and leaving him a profit on the whole of his importations, it is clear that the real burden falls on the public, who are thus obliged to pay nearly a third more for the oranges they consume, than they would do on the supposition of the cargoes remaining sound. When it is considered that this increase of price affects one of the most esteemed and refreshing of fruits, it becomes a matter of some little interest to investigate the causes of their decay, and if possible to remedy it. A great object will indeed be gained, if we can point out any one of these causes, inasmuch as the first great step towards removing an evil is to understand thoroughly its cause. I believe the prevalent idea on the subject to be, that the arrival of a cargo of oranges in an unsound state results from their being, while on the voyage, necessarily stowed away where there can be no free circulation of air; and without doubt where decay has once begun, it cannot fail to be hastened by this circumstance. It is, however, easy to perceive, that were this the sole cause in which the decay of oranges originates, all cargoes on their arrival would be nearly in the same state, whereas orange-merchants experience not only that some arrive totally destroyed, and others wholly sound, but that the soundness of the cargo varies with the season, and even with the year. Thus the decay of oranges was much greater in 1822 than in 1823, and it was again much more considerable in 1824. Making all due allowance, therefore, for the effect of the heated and confined air in the hold of a vessel, I conceive the mischief to originate chiefly in the oranges being unsound when shipped; for a general remark made by the orange-merchants is, that the St. Michael oranges rot much sooner than those from other parts of the world, and that the average proportion of decayed

oranges is much greater from St. Michael's than from Lisbon, differences that can scarcely be supposed to result from their voyage to England. Now the decay of the St. Michael oranges, which form the great bulk of those brought to the London market, is towards the end of their season, namely, during the months of March, April, and May, almost universally accompanied by the presence of the larva of a small fly, which I shall shew by observations made by a friend in the Isle of France, and by myself in London, to be the cause of the evil. Whether the Lisbon oranges suffer from any similar insect, I have not been able accurately to ascertain, but sure it is that the general symptoms of decay are much the same in both cases, so that there is at least great reason to suspect it. As for the St. Michael oranges, towards the end of the season whole chests are destroyed by this fly, specimens of which are easy to be procured, as they may be bred from the larvæ which are to be found in almost every one of those damaged oranges which our barrow-women display for sale in the month of May. Those worthy collectors, however, that confine their attention to British insects, need not place it in their cabinets, as I find they have of late been doing with American forms. At least they must first shew the orange-tree itself to be indigenous.

On a first view of the subject, it would appear, that if oranges are shipped in a damaged state, it must be certainly known to the shipper; but there is no good reason to believe that any such advantage is taken of the London merchant, since oranges as frequently arrive in a damaged state, when on account of the shipper, as when to the order of a merchant. The truth is, that both parties being able to shift the burden from off their own shoulders, it is a matter of comparatively little concern to them what may be the cause of a general evil, and this cause being moreover, in its nature, of that sort which requires a minute investigation, it is not to be wondered at that it should have so long remained unknown. I ought, however, here to state, that Mr. Trevelyan having given my father some specimens of the insect, I was induced by the singularity of its form to consult Mr. Mart of Oxford Street, the respectable orange merchant who had called Mr. Trevelyan's attention to the subject. It would therefore be a great injustice to Mr. Mart, if I did not give him the full credit of having discovered the fly which is the

cause of the decay in oranges, and if I did not thank this gentleman, as well as Mr. Adams of Thames Street, for the valuable information on the subject, which their profession has enabled them to give me.

In the third volume of M. Cuvier's *Règne Animal*, page 647, M. Latreille makes the following remark under the head of *Tephritis*. "Les Colons de l'Isle de France ne peuvent presque pas, d'après des observations que m'a communiquées M. Cattoire, obtenir des Citrons sains et en parfaite maturité à raison de l'extrême multiplicité d'un diptère du même sousgenre qui y depose ses œufs." To the kindness of M. Cattoire who was formerly Paymaster of the French forces in the Mauritius, I hold myself indebted for a female specimen of this insect, which he says attacks the oranges and not the limes; but as the note which he gave me affixed to the insect differs still more materially from the above statement of M. Latreille I cannot do better than to copy it *verbatim*. "Cet Insecte depose sa larve dans l'ovaire de la fleur d'Orange, et en detruit le fruit." I shall shew at some future opportunity, how little difference exists between this insect from the Mauritius, and that which attacks the oranges of St. Michael. In the mean while I shall merely observe, that the above few words of M. Cattoire, the only observer as yet of the insect's economy on the spot, are evidently hastily expressed, and do not coincide with the above information, which M. Latreille professes to have derived from him. And indeed it is almost impossible to believe on examining a decayed orange from St. Michael's that the parent fly deposited its egg in the flower, and not in the fruit, as the original puncture of its ovipositor remains visible in the centre of the soft part of the rind, and is the invariable proof of a maggot being the cause of the decay of the orange. In weighing therefore the degrees of credit for accuracy which ought to be attached to these conflicting statements, namely, that of M. Cattoire to me, and that of M. Latreille, as given on M. Cattoire's authority, I am inclined to agree with the former, that the fruit attacked in the Mauritius is the orange and not the lime, because the insect is scarcely more than a variety of the St. Michael species; and I am induced to place confidence in M. Latreille's statement, that the parent insect deposits its egg in the fruit, because in like manner this is obvious from the appearance of the infected St. Michael oranges

which always exhibit the puncture, by which the fly inserted its destructive offspring.

Whenever this puncture appears in an orange, we may be sure, I repeat, that there is a worm concealed in the interior; and a little attention therefore to this circumstance on the part of the packers at St. Michael's, might prevent so many unsound oranges being shipped. The orange merchants, as I have before said, find that certain cargoes are wholly infected with this insect, while others are almost untouched, that one year the oranges are very subject to it, and another year scarcely at all; the whole of which evidently corresponds with what every Entomologist knows from experience to be probable, namely, that the perfect insect or imago is particularly prevalent at particular times, in particular districts. It is difficult, however, to say what the districts or seasons are in which this fly is most prevalent at St. Michael's; but as the continuation of the evil evidently depends on the oranges consumed in the Island, one can easily imagine that the havoc is not entirely without remedy. The examination for two or three consecutive years of all the fruit as soon as plucked, and the immediate destruction of all such as contained larvæ, would, if it did not entirely eradicate the species, at least diminish its influence to an amount that would render it altogether inconsiderable. When Horticulturists complain of the mischief done to their ripe fruit by the larvæ of insects, they have themselves in a great measure to blame, since the facility of lessening the numbers of such species is great indeed when compared with that of protecting the tree itself, or even the blossom, from the injury which other insects inflict. But if the fruit be either left too long on the tree, or if when plucked it should be left unexamined, so as to allow the perfect insect to emerge in safety, and propagate the evil, while the fruit itself is almost of no value, we must not be surprized at the result. With respect to the St. Michael oranges, did the loss fall on the proprietors of the orange-groves, or even on the shippers, it would be their interest to pay some attention to an insect by which the public at present suffer so much; and strict attention on their part during the spring of two or three consecutive years, to the appearance of the ripe fruit consumed in the Azores, which, according to Dr. Webster, amounts to about 40,000 chests, and the careful destruction in proper

time of the worthless oranges, which are punctured in the above-mentioned manner, would serve at least to diminish the evil, if not entirely to eradicate it.*

I shall now describe more particularly the appearance of an infected orange, which may be at once known by a greater or less portion of its rind being withered, and shewing evident symptoms of decay, in having lost its firm consistency and texture, and in having changed the usual brilliancy of its colour for an opaque and dull olive yellow. The size of this withered and discoloured spot must of course, in a great measure, depend on the havoc committed in the orange by the concealed insect. While, however, the fly is in its larva state, this spot appears to vary from a space that might be covered with a sixpence, to one that might be covered with half-a-crown. In the centre we may perceive a small white orifice, which is the puncture of the parent insect, and which in general may be distinguished with ease from the orifice made by the larva previous to metamorphosis by a certain whiteness of the sides, which appears to result from some mould or other vegetable of that nature.

On opening such a fruit as has just been described, we discover the whole space from the discoloured spot to the core to be in a state of perfect decay, the juice having disappeared, and the fibres being completely decomposed, and covered in a greater or less degree with that blue and white mould which is usual in decayed oranges. The rest of the orange is generally entire, but so desiccated as most imperfectly to represent that pulpy substance, which in a good St. Michaels' fruit is so replete with juice. It is revelling in the decayed part of the orange that we find the larva of our fly, which, when of sufficient maturity to emerge from it, undergoes its coarctate metamorphosis outside the fruit.

I became acquainted with this insect in its various states, in 1822, when I made my drawings and dissections of it. One of these drawings, which is that of the male in its imago state, highly magnified, I herewith send you to accompany the publication of this notice. At that time I found that I could not proceed on any generalizing anatomical principle with the

* I ought, however, to observe, that I have seen the perfect fly on a heap of oranges in the market-place of Funchal, in the Island of Madeira, and also in St. Jago, one of the Capeverds. I am informed, moreover, that a maggot infests oranges in the West Indies, but I have not myself yet seen it.

description of what I had observed, without inventing a number of new terms, which, to me at least, is a most odious office. As I understood that such terms were soon about to be proposed to the scientific world, I was induced to wait for their publication, and to let my drawings and observations of the above fly to lie at rest for a while in my portfolio, together with a paper on the wings of *Diptera*, which had been read to the Zoological Club of the Linnean Society. As, however, I find myself remaining in much the same state of inability to describe what I have observed, and that there is still sufficient room left for my lucubrations, I shall transmit to you, from time to time, a rather extensive series of remarks on the above order of insects. For the present I request you merely to let naturalists be aware of the existence of such an insect as *Ceratitis Citriperda*, the male of which is most remarkable in an entomological point of view, for having two clavate subarticulate horns planted between the eyes, so as to make the insect appear provided with two anomalous antennæ in addition to its regular pair. The female is without these singular appendages. *Ceratitis* is a genus that differs from *Tephritis* in the nervures of the wings, as well as in the above remarkable structure of the male, which, by the bye, does not appear to have been noticed by M. Cattoire. The colour of the eyes, when alive, is brilliantly metallic, as in most of the *Tephritidæ*, but being violet, is exquisitely beautiful, and different from the hue of the eyes in any other dipterous insect I have seen. I shall give you the characters of this genus at length in a future paper, where I shall enter more deeply into the subject of the little understood order of *Diptera*.

Yours ever most truly,

W. S. MACLEAY.

ART. LXI. *Analytical Notices of Books.*

The Transactions of the Linnean Society of London, Vol. XVI, Part I. pp. 149, Plates xv.

In the present purely zoological part of the Transactions of the Linnean Society, the first paper which claims our attention is entitled "Remarks on the Comparative Anatomy of certain Birds of Cuba, with a view to their respective places in the System of Nature, or to their Relations with other Animals." It is from the pen of our valued friend and correspondent Mr. MacLeay, and, like all the productions of that gentleman, aims at far higher objects than the mere placing on record of a few facts, which are left to be turned to account at some future time by an abler and more philosophical naturalist than the observer who first announces them to the world. Of Mr. MacLeay's studies, the primary object has always been to elucidate more fully the natural arrangement of the animal kingdom, and in the present remarks this aim it kept steadily in view, so far as regards the two principal, and consequently the most generally interesting, classes of animated nature, the *Mammalia* and the *Birds*. Of comparative anatomy they contain but little, and appear rather to be designed as prefatory observations introductory to anatomical notices which are intended hereafter to be given. But they are filled with curious research, with deep speculation and with interesting facts, so brought together from various sources as to be made to bear upon the leading object of enquiry, and thereby to exhibit themselves in a point of view altogether novel.

Commencing with some general observations on the primary importance of comparative anatomy in zoological researches, and remarking that no zoologist can be satisfied that he has ascertained the place of any animal in nature, without fully investigating the structure and use of its various organs, since on this structure and on this use depends all his knowledge of its place, Mr. MacLeay proceeds to state his intention to avail himself of the facilities afforded by his residence in an intertropical climate, for examining anatomically particular genera which are not

within the reach of naturalists at home. To this undertaking he has been chiefly induced by a desire of ascertaining the accuracy of the various positions taken by Mr. Vigors in his general view of Ornithology, published in an earlier part of the Linnean Transactions, wherein, on the principle of the variation of structure, he has developed the arrangement of Birds much further than has been done in any other class of animals, pointing out the place of every family with reference to its affinities and analogies, and giving the reasons in detail for this location; and subsequently carrying the same principle to the extent of assigning a determinate place to every genus hitherto discovered. To try the validity of the arrangement deduced from the variation of external structure, by comparing it with the results obtained from a careful examination of the variation of the internal structure, is to apply to it a test which can be withstood by a natural system alone.

On the principle that in those groups where the variation of an organ is at its maximum, there such an organ is of less consequence as a ground of division characterising large groups, it follows that the number of *vertebræ* is of much more importance as connected with natural arrangement in *Birds* than it is in the *Mammalia*, where it is subject to much greater variation, differing occasionally even in closely allied species. From a series of tables exhibiting the maximum and minimum numbers of the *vertebræ* generally, and of the cervical, dorsal, sacral, and coccygian *vertebræ* respectively, in the five orders of *Birds*, it is shewn that the variation is least in the typical orders, the *Raptores* and *Insessores*, and is remarkably greatest in the two most aberrant orders, the *Rasores* and the *Natatores*: evidencing that in the latter nature is, as it were, looking out for the structure of some other class; a deduction from facts precisely according with theory. And as it is clear that the *Natatores* approximate to the *Chelonian Reptiles*, it is consequently among the *Rasores* that the approach to *Mammalia* must be found. To show the point of nearest approach made by *Mammalia* to *Birds*, and that made by *Birds* to *Mammalia*, is a branch of the enquiry into which Mr. MacLeay enters fully: premising to it an exposition of the analogies existing between the orders of *Birds* and those of the *Mammalia*, and an explanation of the connexion of the various orders of *Mammalia*, in their own series of affinity.

The orders of *Mammalia* were clearly indicated by Aristotle and by

Ray; they are the *Primates*, the *Feræ*, the *Glires*, the *Ungulata*, and the *Cete*; and may be typically represented by Man, the Lion, the Mouse, the Horse, and the Whale. The evident analogies borne by the *Insesores* among *Birds* to the *Primates* among the *Mammalia*, by the *Raptores* to the *Feræ*, and by the *Natatores* to the *Cetacea*, have been repeatedly pointed out, and their accuracy has never been questioned; but differences of opinion are entertained as to the relations existing between the *Glires* and the *Ungulata* on the one hand, and the *Rasores* and the *Grallatores*, on the other. Mr. MacLeay considers the *Ungulata* as analogous to the *Grallatores*, agreeing in this with Linnæus, who, however, remarked the relation as regarded the *Bruta* alone, which form a natural subdivision of the *Ungulata*. In support of the accuracy of this position, various particulars are enumerated in which many of the *Ungulata* bear a striking resemblance to certain of the *Grallatores*; such as the length of legs, the elongation of *facies*, &c. Four orders in each class being thus disposed of, it follows that the *Glires* ought to be placed in analogical relation to the *Rasores*. To shew that this is correct, in fact as well as in theory, Mr. MacLeay passes in review the grand characteristics of the *Rasores*, and points out their accordance with those of the *Glires* in numerous respects, such as their gregarious and frugivorous habits, the diminished power of their anterior limbs, and increased strength of the posterior, the burrowing propensities of the one, represented by the scratching of the other, &c.

Having thus laid down the parallel analogies between the classes, the authour proceeds to explain the affinities connecting together the orders of *Mammalia*. The *Primates* are connected with the *Glires*, by means of *Cheiromys*, an animal so truly osculant as to have been described by Gmelin as a *Sciurus*, to have been placed by Illiger next to *Galago*, to have been ranged by M. Cuvier with the *Rongeurs*, and by M. de Blainville with the *Primates*. From the *Glires* to the *Ungulata* a ready passage is obtained through the intervention of *Hyrax*, a *Cavia* and consequently a *Glis* of Pallas and Linnæus, but united by M. Cuvier with the *Rhinoceros* to form a small group among the *Ungulata*. From the latter we proceed through the *Pachydermata* by the *Manati* and *Dugong* to the other *Cetacea*; which are quitted for the *Feræ* by the extremely natural series formed by *Trichechus* and *Phoca*. The affinity of the *Feræ* to the *Pri-*

mates is universally acknowledged, and the transition may be made either through the *Bats*, which by Linnæus were arranged with the latter, and by M. Cuvier with the former; or through *Didelphis*, placed among the *Feræ* by Linnæus, and connected with *Lemur* by Schreber and Illiger. The progression of affinity has in this manner brought us back to the point from which we departed, and the group is therefore a natural one.

The nearest approach of the *Mammalia* to *Birds* exists, according to Mr. MacLeay, among the *Glires*, which make several attempts, as it were, to attain the structure of the feathered class. *Dipus* gives us the legs and feet of a bird; *Sciurus*, the feathers; *Hystrix*, the quills; and *Pteromys*, the wings, of a bird. The only other flying *Mammalia* are the *Petauri*, which are so nearly allied to *Pteromys* as not to require in this enquiry to be separated from it; and the *Bats*, which are entirely unconnected with *Birds* in all their organs excepting those immediately subservient to the purpose of sustaining them in the air. Among the *Birds* the nearest approach to *Mammalia* is made by the *Struthionidæ*, a position which may be considered as having been already repeatedly proved.

In the brief outline which we have attempted of this most curious and valuable paper, we have been compelled to limit our analysis to a bare enumeration of the leading views advanced by its authour, omitting altogether the evidences adduced by him in support of them. We have also been under the necessity of abstaining from noticing many interesting remarks which are incidentally introduced, such as those which relate to the *Marsupiata* and *Edentata*, to the relation existing between them and the *Reptilia*, to the analogies exhibited by the *Edentata* to genera among the *Glires* and the *Insectivora*, &c.; such as those again in which it is shown that as the five groups of *Insessores* represent, as explained by Mr. Vigors, the five orders of *Birds*, so are they, and consequently the orders, represented by the five groups of the *Scansores*. For these we must refer to the paper itself, which we quit with the single additional observation that in it Mr. MacLeay repeatedly insists on a kind of relation hitherto little remarked on by him, that of transultation; which exists where the direct affinity of a group to that immediately succeeding it being preserved, a marked resemblance is yet found between it and that which is next but one in succession to it. Thus the rounded *facies* and the strength of jaws are met with in the *Raptores*

and in the *Rasores*, in the *Feræ* and in the *Glires*; and the diminished power of the fore, and increased strength of the hinder, extremities, exists in the *Rasores* and in the *Natatores*, in the *Glires* and in the *Cetacea*: groups not immediately following each other in the direct series of affinity, but yet having a mutual resemblance in remarkable and important particulars.

A second truly valuable contribution to the natural history of the *Mammalia* is furnished in the "Description of the Mammary Organs of the "Kangaroo," by John Morgan, Esq., F.L.S., in which the fullest light is thrown on that very interesting subject of physiological enquiry, the means by which nature has provided for the nourishment and growth of the young of *Marsupial* animals, while yet remaining in the maternal pouch. By the anatomical examinations of which the results are here described in detail, Mr. Morgan has succeeded in demonstrating in the most satisfactory manner the existence of structures adapted for injecting the milk into the alimentary canal of the young while it is yet too feeble and imperfectly organised itself to extract the nutritious fluid, and has shown to what extent each of the contrivances which he has pointed out is capable of being rendered subservient to the end proposed. He has also explained the very curious differences which exist between the state of these organs in the unimpregnated and in the suckling animal, and has completely elucidated almost every point immediately connected with the subject of his enquiry. Of this excellent paper so full an analysis has already been given at page 127 of our present volume as to render it unnecessary for us again to enter into details respecting its contents, which are admirably illustrated by an extensive series of well executed engravings exhibiting the anatomy of the whole of the organs described.

A Contribution to our native Fauna is furnished by the Rev. Leonard Jenyns, F.L.S., in a paper entitled, "The distinctive Characters of two "British Species of *Plecotus*, supposed to have been confounded under "the name of Long-eared Bat." Its principal object is to describe a Bat to which the authour has applied the name of *Plecotus brevimanus*, and which he regards as specifically distinct from the *Plec. auritus*, Geoff. The chief differential characteristics are thus expressed: "1. *Plec. auritus*; " *Plec. vellere fusco-griseo, subtùs aliquantò pallidiori*; *auriculis oblongis, capite plus duplò longioribus*; *trago ovato-lanceolato*; *caudâ*

“ elongatâ, antibrachium longitudine superante, apice obtusiusculo : 2.
 “ *Plec. brevimanus* ; *Plec. vellere* suprâ rufo-fusco, subtùs albescente ;
 “ auriculis oblongis, capite haud duplò longioribus ; trago ovato-lanceo-
 “ lato ; caudâ antibrachium longitudine æquanti, apice acuto.” In addition to these distinctive characters others are suggested by a comparison of the dimensions of each of the species appended by Mr. Jenyns to his descriptions. They differ also in absolute size, the expansion of the flying membrane in the *Plec. auritus* exceeding that of the *Plec. brevimanus* by one half ; and in colour, the former being brownish-grey mixed with dusky, which is merely of a somewhat paler tint below, while in the *Plec. brevimanus* the upper parts have a reddish tinge, which presents a marked contrast to the yellowish white of the under surface. The only specimen of the latter which has yet been seen was found adhering to the bark of an old tree at a distance from any habitation, which would appear to indicate that its habits differ from those of the *Plec. auritus*, a resident altogether in buildings, and taking shelter more particularly within the roofs of dwelling-houses. Mr. Jenyns concludes his notice by stating his suspicion, founded on a memorandum made by him respecting a specimen not now in his possession, that a third, and much larger, species of long-eared *Plecotus* exists in England.

Mr. Bell has given us, in his “ Description of a new species of *Phalangista*” a detailed account of the *Phal. gliriformis*, the specific character of which will be found at page 502 of our present volume. In form it resembles the common Dormouse, than which it is somewhat larger, broader, and more depressed ; and the habits of the two animals are also extremely similar. The *Phal. gliriformis* is nocturnal, remaining asleep during the whole of the day, and coming forth late in the evening, when its movements are rapid and vivacious. It feeds on nuts and other similar nutriment, sitting up on its hind quarters, and carrying its food to its mouth by means of its fore paws, which it uses as hands. It has not, however, been observed to hibernate like the Dormouse, nor had it, up to a very late period in the year, evinced any disposition to prepare a winter bed, although wool and other soft substances were purposely placed within its reach. Two living specimens in the possession of Mr. Morgan have furnished the materials for Mr. Bell’s detailed description and account of the habits. Both of them are females, and one

of them had brought forth young previously to their arrival in England. The teats in this individual were larger than in the other, apparently unimpregnated, specimen, but subsequently diminished in size. Contrary to the state of these organs in the Kangaroo, the anterior teats alone were enlarged in the *Phalangista gliriformis*. Two beautiful figures of the animal accompany the paper, which is further illustrated by a plate, giving various details of its organisation, so as to exhibit, in a much more complete manner than is usually done, the whole of the generic characters with the exception of those derived from the teeth.

In a paper "On a new Genus of the Order *Rodentia*," Mr. Brookes describes fully the skeleton of an animal hitherto imperfectly known as the *Dipus maximus* of M. Blainville. Contrasting its osteology with that of the *Dipus Sagitta* Mr. Brookes finds in them so many and such important differences, as to induce him to regard the two animals as generically distinct; and as the former is distinguished, by its dentary characters especially, from every known genus of the order, he proposes its reception as a new one under the name of *LAGOSTOMUS*. Its characters are thus given: "*Dentes incisores* in utrâque maxillâ duo elongati, prominentes: maxillæ inferioris canaliculati, paullò longiores: *molures* in utrâque maxillâ utrinque quatuor, obliqui, antrorsùm extrorsùmque spectantes, coronâ simplici laminatâ: maxillæ inferioris obliquiores bilaminati; maxillæ superioris tres anteriores bilaminati, posticus trilaminatus. *Pedes antici* breviores, digitis quatuor: *postici* elongati, validi, digitis tribus: *ossa metatarsi* digitis numero æqualia. *Cauda* mediocris, pilis longioribus pectinatis vestita." To the single species to which this generic character applies Mr. Brookes gives the name of *Lagostomus trichodactylus*. He also adds some particulars to the published descriptions of it, and furnishes detailed measurements of the more important parts of the skeleton. Representations of the skeleton, of the teeth and of the animal, the latter taken from the stuffed skin, accompany the description.

The ornithological papers are from the pens of Mr. Yarrell, Mr. Leadbeater, and Mr. Douglas. To the latter we are indebted for "Observations on some Species of the Genera *Tetrao* and *Ortyx*, natives of North America; with Descriptions of Four new Species of the former and Two of the latter Genus." The new species described are,

“ 1. *Tetrao Urophasianellus*: Mas. Griseo-brunnescens, albo ferrugineo
 “ nigroque undulatus, nuchâ alisque albo maculatis, abdomine albo lateri-
 “ bus brunneo-fasciatis, rectricibus mediis 4 elongatis. Fæm. Mari tertio
 “ minor, subpallidior, nuchâ nigro fasciatâ, rectricibus subelongatis. 2.
 “ *Tetrao Sabini*: rufus, nigro notatus: dorso maculis cordiformibus, nuchâ
 “ alisque lineis ferrugineo-flavis; abdomine albo brunneo fasciato; rectri-
 “ cibus fasciatis, fascia subapicali latâ nigrâ. 3. *Tetrao Franklinii*: Mas.
 “ Saturatè plumbo-griseus nigro fasciatus; gulâ pectore nuchâque nigris,
 “ tectricibus suprâ et infrâ nigris, apice albo. Fæm. Pallidior, gulâ pec-
 “ tore nuchâque plumbeo-griseis. 4. *Tetrao Richardsonii*, Sabine, MSS.:
 “ Mas. Pallidè plumbeo-griseus fusco sparsim undulatus: gulæ plumis in
 “ medio albis: abdomine saturatiore albo parcè maculato: maculâ laterali
 “ sub nuchâ albâ: rectricibus nigris, apice albicante. Fæm. Minor, brun-
 “ nescenti-grisea, dorso brunneo fasciato: subtùs albo frequenter notata,
 “ rectricibus duabus mediis ferrugineo fasciatis. 5. *Ortyx picta*. Mas.
 “ Fusca subtùs ferrugineo flava nigro-fasciata: gulâ rubro-purpureâ albo
 “ graciliter cinctâ; pectore vertice caudâque plumbeis: cristâ nigrâ lon-
 “ gissimâ lineari; lineis superciliaribus albis, caudâ tectricibus inferioribus
 “ ferrugineis. Fæm. Subcristata, gulâ pectoreque fusco-ferrugineis, fusco
 “ fasciatis. 6. *Ortyx Douglasii*, Vigors, MSS. Plumbeo-brunnea: cristâ
 “ erectâ alisque superioribus saturatè brunneis: his flavo-ferrugineo stri-
 “ atis: capite genis nuchâque brunneo et flavo-ferrugineo striatis: gulâ
 “ albâ brunneo notatâ: abdomine albo guttato.” Of each of these ex-
 tremely interesting additions to our ornithological lists ample descriptions
 are given, accompanied with detailed accounts of their habits, as observed
 by the authour during his recent and eminently successful travels in Cali-
 fornia and the western parts of North America. He also adds to our
 stock of information as to American Birds by notices of the habits and
 range of eight other species of *Tetrao* which he met with on his journey,
 including a new species about to be described by Dr. Richardson in his
 forthcoming Fauna of British North America. He further notices a
 Grouse, from the Rocky Mountains, differing in some particulars from the
Tetrao umbellus of Wilson; and gives the following character of a species
 first described in this Journal, Vol. III. p. 212, by the Prince of Musig-
 nano, apparently from a young male in indifferent plumage: “ *Tetrao*
 “ *Urophasianus*. Mas. Brunnescenti-griseus, ferrugineo nigroque un-

“dulatus, collo anteriore abdomineque imo nigris, pectore albo plumis superioribus rhachibus rigidis, inferioribus in medio nigro-lineatis, plumis colli lateralibus elongatis, linearibus: caudâ cuneatâ, rectricibus subrigidis, acutis. Fæm. Brunnescenti-grisea, albo nigroque parcè undulata; abdomine imo nigro, pectore albo nigro-fasciato, caudâ subcuneatâ, rectricibus subacutis.”

In his “Descriptions of some new Species of Birds belonging chiefly to the rare Genera *Phytotoma*, Gmel., *Indicator*, Vieill., and *Cursorius*, Latham,” Mr. Leadbeater has contributed from his valuable collection several important additions to our ornithological list. First of these is the *Phytotoma ferreo-rostre*, Phyt. “brunneum, capite, gulâ, caudâque suprâ rufis; rostro nigro, crassissimo;” the extraordinary dimensions of whose bill considerably exceeding both in breadth and height the greatest breadth of the skull, and the peculiarity of some other characters, have induced Mr. Leadbeater to believe that it will eventually be found to constitute a distinct group from that with which he has at present associated it. The *Myiothera Yarrellii* is thus characterized: Myioth. “suprâ brunnea; strigâ superciliari, thorace, crisso, guttisque alarum pallidè fulvis, abdomine albo; strigâ per oculos tectricibusque nigris.” A third species is a Wren from Chili, the *Tyrannulus Vieilloti*, Tyr. “suprâ viridi-olivaceus, corpore subtùs strigâque superciliari utrinque flavis; capite cristato, alis, caudâ, maculâque utrinque abdominali atris; regione auriculari atrocærulea; capite summo crissoque roseis; mento strigâque alarum albis.” The fourth is an African species of the New Holland genus *Pardalotus*, *Pard. Africanus*, Pard. “suprâ virescenti-olivaceus, subtùs flavescenti-albidus; alis caudâque nigris, illis albo guttatis, hâc albo terminatâ.” A brief indication of the species hitherto noticed as belonging to the genus precedes the description of three species of *Indicator*, Vieill. These are, 1. *Ind. Le Vaillantii*, Ind. “olivaceo-brunneus, subtùs albidus, gulâ pectoreque flavo-variegatis; rectricibus duabus mediis fusco-brunneis, cæteris albis fusco-brunneo notatis.” 2. *Ind. Buphagoides*, Ind. “olivaceo-fuscus, abdomine albido; alis dorsoque infimo flavo variegatis; rectricibus quatuor mediis olivaceo-brunneis; rostro brevi, crasso.” 3. *Ind. Sparmanni?* Ind. “olivaceo-brunneus, gulâ pectoreque albido maculatis; abdomine crissoque albidis, brunneo linea-

“tis, reatricibus externis albis, apice brunneis.” The remaining species are the *Momotus platyrhynchus*, Mom. “flavescenti-viridis, capite collo pectoreque rufo-castaneis; strigâ per oculos, notisque thoracis nigris; rostro latissimo:” and the *Cursorius Grallator*, Curs. “ochraceus, capite dorsoque nigro brunneoquevariegatis; subtus parçè nigro lineatus; fasciis duabus parallelis pectoralibus nigris.”

A second contribution by Mr. Leadbeater is “On an undescribed Species of *Phasianus*,” two males of which, originally from Cochin-China, were brought to England by Lady Amherst, whose name has been recorded for the services rendered by her to ornithology, in the specific appellation of *Phasianus Amherstiae*. Its general character, and the arrangement of its plumage, are similar to those of the Golden Pheasant: its head is green, with the crest-feathers crimson; its tippet white, crossed by dark green bands; the neck, back, shoulders, chest, and wing-coverts, metallic green, with zones of velvet black; the wing primaries dusky, with white outer edges; the greater wing-coverts and secondaries bluish-black; the breast and belly white; the tail is three times as long as the body, and its feathers are white, with numerous broad bars of green, and mottled across from bar to bar. A figure of this exceedingly beautiful bird accompanies the description.

Mr. Yarrell has added to our list of native birds by the “Description of a Species of *Tringa*, killed in Cambridgeshire, new to England and Europe.” It is the *Tringa rufescens* of Vieillot, an American species, apparently of extreme rarity, only one specimen having fallen under the notice of the very industrious ornithologist by whom it was first described. The English specimen described by Mr. Yarrell is in a different state of plumage from that noticed by M. Vieillot, and from this and the extent of ossification of the *tarsi* appeared to be a young bird of the year. How, at so early a period of its existence, so uncommon an American bird should have become an inhabitant of this country, remains open to conjecture; but it is worthy of remark, that a specimen has also reached the continent of Europe, and was killed in Picardy. The bird is figured in illustration of the paper, which concludes with an enumeration of other species of birds which have been added within the last few years to our native Fauna.

A single herpetological paper is contained in the present part. It is a

“ Description of a new Species of *Agama*, brought from the Columbia River by Mr. Douglas;” and is from the pen of Mr. Bell, who has named it, after the enterprising traveller who first discovered it, *Agama Douglasii*, Ag. “poris femoralibus utrinque xx.” This remarkable character deviates entirely from that assigned by authors to the genus with which Mr. Bell has associated it, of which the absence of femoral pores forms a distinguishing mark; but he observes that as in every other respect it may be considered even a typical representative of *Agama*, he would propose rather to alter the generic character so as to admit of its reception, than to form a new genus by which it would be separated from its immediate congeners. In its general form, colours, and marking, it very much resembles *Ag. superciliosa*, *Ag. orbicularis*, and others of the same section. The representation which accompanies the detailed description given by Mr. Bell is most beautifully executed.

To the departments of Zoology which embrace the study of invertebrated animals there are but two contributions. Both of these are entomological, and are from the pen of our correspondent, the Rev. Lansdown Guilding. The first is on “The Generic Characters of *Formica-leo*; with the Description of two new Species;” the distinguishing characteristics of the latter of which will be found at page 599 of our third Volume. The second is “An Account of *Margarodes*, a new Genus of Insects found in the Neighbourhood of Ants’ Nests.” Of this paper also an analysis has been given in the Zoological Journal, Vol. III. p. 600, which contains the essential particulars of Mr. Guilding’s communication; yet so singular is the insect which it introduces to our notice, that we cannot refrain from offering a few additional remarks. As to the station in our systems to which *Margarodes* should be referred, Mr. Guilding professes an uncertainty so absolute as to abstain from offering even a guess at the order with which it should be associated. Were we to venture a suggestion on this point, it would be that the insect possesses considerable affinity with the *Parasita* of Latreille, including the genera *Pediculus* and *Ricinus*, alternately referred by that great entomologist to the *Arachnida* and the *Insecta*. With these it accords in the possession of *antennæ*, and in the absence of true eyes. The number of its feet is the same, and the structure of these organs in *Margarodes*, to judge from the figures given in illustration of the paper,

agrees nearly with that of *Pediculus*, and is evidently more adapted for adhering to other bodies than for progression; the motion of the insect is accordingly described as slow. In *Pediculus* the mouth during inaction is indistinct, and in *Margarodes* this indistinctness, for we cannot for an instant suppose a mouth to be entirely wanting in it, is so great as to have induced Mr. Guilding to describe the insect as possessing none whatever: the most practiced entomological dissector in England has also failed in detecting any trace of such an organ in a specimen transmitted by Mr. Guilding to this country. To the location of this very remarkable insect among the *Parasita*, an important objection certainly suggests itself in its habits, as hitherto observed, being entirely subterraneous, and in its existence being confined apparently to a single stratum: but it is probable that some circumstance may be discovered capable of removing this difficulty, when the history of *Margarodes*, at present very imperfectly known, shall be fully investigated by Mr. Guilding, whose researches, at all times ardent, will doubtless be doubly active in the prosecution of so very interesting an enquiry.

British Entomology, or Illustrations and Descriptions of the Genera of Insects found in Great Britain and Ireland. By JOHN CURTIS, F.L.S., Vol. IV., [Nos. xxxvii—xlviii].

To repeat the praises which we have bestowed on the preceding volumes of this valuable work would now be superfluous. Its interest continues undiminished, and its usefulness increases as it advances in its progress, rendering it indispensable to the scientific entomologist, whether his attention be directed solely to the study of our native insects, or embrace the still wider field of inquiry afforded by those of other and distant countries. Like its predecessors the present volume exhibits figures and descriptions, accompanied with detailed dissections, of forty-eight genera, of which representatives are found in the British Islands. Several of these are now for the first time proposed, and many others have been hitherto unnoticed, or are illustrated by species of which no traces are to be found in the works of previous writers.

The *Coleoptera* figured are twenty-three in number, one genus alone

among these being new. It is founded on a Bostrichidous insect of which only two individuals have yet occurred. Its natural situation appears to be between *Cis* and *Cerylon*, from both which genera it differs in the club of the *antennæ* being formed by a single orbicular and very large joint. Mr. Curtis has applied to it the name of *CICONES*. The single species is the *Cic. Carpini*, which in size and appearance resembles the *Bolitophagus pictus*, Sturm. The species illustrative of the genera *Patrobis*, *Stenus*, *Throscus*, and *Malachius*, are new; and the characters which distinguish the genus *Rugilus* of Dr. Leach are now for the first time published. *Cybister* is added to the list of British genera by the discovery of a single specimen of *Cyb. Raselii*; the generic name being necessarily changed from *Trogus* applied to it by Dr. Leach, which had been previously used to designate a group of *Ichneumonidæ*. Only three *Hymenoptera* are figured; one of which is illustrative of a new Cynipsidous genus, *Colax*. The species is described as new, as are also those which have been selected as specimens of *Perilampus* and of *Cleonymus*. The only Neuropterous insect, the *Perla cephalotes*, is likewise new.

Of the *Haustellata* twenty-one genera are contained in the present volume, thirteen of these being Lepidopterous. Among them two are now for the first time proposed. *ANACAMPSIS*, a Tortricidous group, having for its type the *Tinea populella*, Linn., and illustrated by a new species, *Anac. longicornis*; and *GLYPHIPTERYX*, which is easily distinguished from the other *Tineidæ* by the drooping and outward direction of its *palpi*, organs which in this family are almost universally either porrected, or recurved over the head. The latter derives its name from the embossed appearance given to the wings by the metallic spots which adorn them. Its type is the *Phalæna Linneella*, Clerck, which is figured in illustration of it. The species illustrative of *Cerura*, *Leucania*, *Eudorea*, (*Scoparia*, Haw.), and *Pterophorus*, are new to science. Of the Hemipterous genera, *DICTYONOTA*, a group of *Cimicidæ*, is characterized as distinct from *Tingis*, on account of the third joint of the *antennæ* being the thickest, and these organs being consequently by no means clavate. *Neides* (*Berytus*, Fab.) is illustrated by a new species, *Neid. elegans*. Of the Dipterous insects figured one only, the *Cecidomyia verna*, is novel.

The publication of a second edition of the first number of Mr. Curtis's work, affords evidence that it has met with the encouragement and support it deserves. This is distinguished from the first edition by the increased quantity of letter-press, the genera being illustrated more fully, and the whole of the species contained in each of them being characterized, their habitats and times of appearance mentioned, &c. so as to form succinct Monographs, so far as the British Entomologist is concerned, of the groups comprehended in it.

Spicilegia Zoologica; or Original Figures and short Systematic Descriptions of New and Unfigured Animals. By JOHN EDWARD GRAY, F.G.S., &c. 4to.

WITHIN the compass of a single sheet Mr. Gray has here given characters and descriptions of numerous zoological subjects, comprising specimens of nearly every class of the animal kingdom; and in the six accompanying plates he has illustrated his text by upwards of seventy figures. The latter are executed in a simple style, consisting, in many instances, of almost a mere outline; and are occasionally, from their deficiency in strength, scarcely adequate to convey correct ideas of the objects intended to be represented. Generally, however, they are deserving of praise, as sufficient, if not for ornament, at least for most useful purposes in the study of the Naturalist. They represent, among the *Mammalia*, the *Cynocephalus niger*, Desm., a species hitherto unfigured, and here given from an individual which was recently alive in the Menagerie at the Tower; on which it should have been remarked that the generic name applied to it by M. Desmarest is erroneous, as it evidently belongs to the *Magots*, or that division of *Macacus*, Lacep., in which the tail is reduced to a mere tubercle: the *Lagothrix Humboldtii*?, figured from a living specimen: the *Delphini Capensis*, *Heavisidii*, and *obscurus*, inhabitants of the seas in the neighbourhood of the Cape of Good Hope, and regarded by the authour as altogether new to science: and the *cranium* of *Arctocephalus lobatus*, which differs considerably in some of its measurements from that of the congeneric *Phoca ursina*. The whole of these are concisely described in the

text, as are also the *crania* of two other new species of *Delphinus*, the *Delph. longirostris* and *Delph. acutus*. In this genus Mr. Gray proposes several new subgenera with the following characters: DELPHINUS; "Capite globoso; rostro depresso, capite longiore; dentes cylindrici, curvati;" of this *Delph. Delphis* may be regarded as the type: GRAMPUS; "capite globoso; rostro depresso, longitudine capitis; dentes cylindrici, curvati;" typical species *Delph. Grampus*, Linn.: BELUGA; "capite depresso, attenuato; rostro longitudine capitis in eodem plano;" formed by the *Delph. leucas*, Pall.: and PHOCÆNA; "capite globoso; rostro capite brevior; dentes compressi spatulati;" comprehending the *Delph. Phocæna*, Linn.

The *Reptilia* illustrated are the *Testudo Bellii*, a new species, the animal and shell of which are figured: the *Chamæleones Brookesiana*, Gray, *dilepis*, Leach, and *Tigris*, Kuhl, all of which are now represented for the first time: and the *Phyllodactylus pulcher*, the type of a new genus of *Geckotidæ* which is thus characterized: PHYLLODACTYLUS; "Digiti 5—5, graciles, compressi, ultimo articulo squamâ latâ foliaceâ longitudinaliter fissâ, ungues recurvatos vaginante; pori femorales nulli; caudâ cylindricâ subtus serie squamarum majorum."

Among the *Mollusca* many new species are characterized, especially in the genus *Chiton*; and the information in this department is rendered peculiarly valuable by the descriptions of the animals, hitherto doubtful or imperfectly known, of several interesting genera, including *Mitra*, *Tornatella*, and *Sigaretus*. Appended to the latter is an indication of all the species observed by Mr. Gray as belonging to that genus. The animal of *Vermetus* is also described from the *Verm. maximus*, a species hitherto unnoticed, which constitutes the second of the group, and fully establishes the correctness of Adanson's description, and of the consequent location of the genus by Lamarck. The only new genus proposed is among the *Veneridæ*, GLAUCONOME, "Testa equivalvis; umbones subanteriores; periostraca tenuis dura: dentes cardinales tres in utraque valvâ, laterales nulli: impressio siphonalis longissima:" the species on which it is founded, the *Glauc. Chinensis*, being described as new. It is an inhabitant of fresh water.

Of *Cirrhipeda* four are figured as the types of so many genera pro-

posed some time since by Mr. Gray, and the characters formerly given of them are repeated in the text.

Only three Annulose animals are noticed. Two of these are represented as constituting a new type among the *Coccidæ*, to which the name of *CEROPLASTES* is assigned, with the following characters, "Mas. Coccis similis? Fæm. inflata, cerifera, pellucida, laminis 7 tecta, paribus 2 lateralibus, unicâ centrali dorsali, 1 anteriori, aliâ denique posteriori; laminarum marginalium nucleo infero submarginali, dorsalis subcentrali." Both the new species comprehended under this description are from South America, and appear to be closely allied to those which produce lac. The other annulose animal is also new, and forms a new subgenus of *Nebaliadæ* among the *Crustacea*; *CERATASPIS*, "Thorax maximus, tuberculatus, animal contractum omnino includens; abdomen articulis 7, ultimis 2 longis, reliquis annularibus; ultimo paribus 2 pinnarum caudalium; pedes 12 vel 14, longi, graciles, ciliati, appendiculati; antennæ longissimæ, setacæ; oculi magni, pedicellati, approximati." The only species, which is designated as the *Cer. monstrosus*, is from the Coast of Brasil.

Among the *Radiata* Mr. Gray describes five species of *Siphunculus*, Linn., three of which appear to be new; and characterizes a new genus, *THEMISTE*, which seems to be intermediate between *Siphunculus* and *Holothuria*, with the former of which it agrees in internal organisation. He also characterises *Isaurus*, an Actiniadous genus indicated by M. Savigny, of which several species are figured in the Description de l'Égypte, but which had not been previously defined; and describes a new species. He also gives a character and description of a new species of *Lunulites*, Lam., interesting as the first recent race hitherto noticed in that group.

The materials selected by Mr. Gray for illustration in the present part, which, it is stated, will be succeeded by others at irregular intervals, are chiefly from the stores of the British Museum.

ART. LXII. *Proceedings of Learned Societies on subjects connected with Zoology.*

ROYAL SOCIETY.

May 22, 1828.—A letter was read from Thomas Andrew Knight, Esq., addressed to the President, containing *An account of some Circumstances relating to the Economy of Bees.*

In a former Paper, the authour stated his having observed that, several days previously to the settling of a swarm of Bees in the cavity of a hollow tree adapted for their reception, a considerable number of those insects were incessantly employed in examining the state of the tree, and particularly of every dead knot above the cavity which appeared likely to admit water. He has since had an opportunity of noticing, that the bees who performed this task of inspection, instead of being the same individuals, as he had formerly imagined, were in fact a continual succession of different bees: the whole number in the course of three days being such as to warrant the inference, that not a single labouring bee ever emigrates in a swarm without having seen its proposed future habitation. He finds that the same remark applies not only to the permanent place of settlement, but also to the place where the bees rest temporarily, soon after swarming, in order to collect their numbers.

The swarms which were the subjects of Mr. Knight's experiments showed a remarkable disposition to unite under the same queen. On one occasion, a swarm which had arisen from one of his hives settled upon a bush, at a distance of about twenty-five yards; but instead of collecting together into a compact mass, as they usually do, they remained thinly dispersed for nearly an hour, after which, as if tired of waiting, they singly, and one after the other, and not in obedience to any signal, arose and returned home. The next morning a swarm issued from a neighbouring hive, and proceeded to the same bush upon which the other bees had settled on the preceding day, collecting themselves into a mass, as they usually do when their queen is present. In a few minutes afterwards a very large assemblage of bees rushed from the hive from which the former swarm had issued, and proceeded directly to the one which had just settled, and instantly united with them. The authour is led from

these and other facts to conclude that such unions of swarms are generally, if not always, the result of previous concert and arrangement.

He next proceeds to mention some circumstances which induce him to believe that sex is not given to the eggs of birds or to the spawn of fishes or insects, at any very early period of their growth. Female ducks, kept apart from any male bird till the period of laying eggs approached, when a musk drake was put into company with them produced a numerous offspring, six out of seven of which proved to be males.

The mule-fishes found in many rivers where the common trout abounds, and where a solitary salmon is present, are uniformly of the male sex: hence the spawn must have been without sex at the time it was deposited by the female.

Mr. Knight states that he has also met with analogous circumstances in the vegetable world, respecting the sexes of the blossoms of monoicous plants. When the heat is excessive, compared with the quantity of light which the plant receives, only male flowers appear: but if the light be in excess, female flowers alone are produced.

Nov. 20.—A paper was read, entitled *An Account of some Experiments on the Torpedo*: by Sir Humphry Davy, Bart., F.R.S., &c.

The authour, after noticing the peculiarities discovered by Walsh in the electricity of the Torpedo, and the opinion of Cavendish that it resembles the action of the electrical battery weakly charged, adverts to the conjecture of Volta, who considered it as similar to that of the galvanic pile. Being on the coast of the Mediterranean in 1814 and 1815, the authour, desirous of ascertaining the justness of Volta's comparison, passed the shocks given by living Torpedos through the interrupted circuit made by silver wire through water, but could not perceive the slightest decomposition of that fluid; the same shocks, made to pass through a fine silver wire, less than one-thousandth of an inch in diameter, did not produce ignition. Volta, to whom the authour communicated the results of these experiments, considers the condition of the organs of the Torpedo to be best represented by a pile of which the fluid substance was a very imperfect conductor, such as honey, and which, though it communicated weak shocks, yet did not decompose water.

The authour also ascertained that the electrical shocks of the Torpedo, even when powerful, produced no sensible effect on an extremely deli-

cate magnetic electrometer. He explains these negative results, by supposing that the motion of the electricity in the torpedinal organ is in no measureable time, and wants that continuity of current requisite for the production of magnetic effect.

LINNEAN SOCIETY.

June 3, 1828.—A paper was read, *On a new genus of Rodentia: by* Joshua Brookes, Esq., F. R. & L. S.

THE type of the genus here proposed, to which the name of *Lagostomus* is assigned by the authour, is the animal described by M. Blainville and by M. F. Cuvier, as the *Dipus maximus*. Their opportunities of observation having been confined to the living animal, minute examination of which was prevented by its fierceness, were insufficient to determine with certainty the group to which it ought to be referred. On the death of this individual its remains passed into the possession of Mr. Brookes, who obtained from it a stuffed skin and a skeleton. The existence in the latter of three metatarsal bones showed that it could not be regarded as a *Dipus*, and this circumstance, and the peculiar structure of the crowns of the molar teeth have induced the authour to consider it as constituting a new genus. He enters fully into an osteological description of its skeleton, which he compares and contrasts in many particulars with that of *Dipus Sagitta*; and in some respects with those of other rodent quadrupeds: and furnishes, in conclusion, the distinguishing generic characters.

June 17.—The reading of Mr. Brookes's paper was concluded.

A paper was read, entitled *Description of a species of Tringa, killed in Cambridgeshire, new to the British Islands and to Europe: by* William Yarrell, Esq., F.L.S.

The authour describes a singularly marked *Tringa* which was shot in Cambridgeshire in the month of September, 1826. This bird is rendered more than usually interesting, from the circumstance, that it is not only new to this country, but is acknowledged by the best Ornithologists to be also entirely new to Europe. It is described by M. Vieillot, under the name of *Tringa rufescens*, as having been found in Louisiana, and a

single specimen deposited in the Paris Museum has furnished the only records known.

A description of the plumage, and the measurements of various parts, are given in detail; and the paper concludes with a list of the more recent additions to British Ornithology, accompanied by references to the authorities from whom the first notices of these addenda have emanated.

Nov. 4.—A paper was read, entitled *Description of a new species of Phalangista*: by Thomas Bell, Esq., F. R. & L. S.

In this the authour describes from two living specimens in the possession of John Morgan, Esq., F. L. S., a species closely allied to the *Phal. nana* of Geoff. He designates it as the *Phal. gliriformis*, *Phal. dorso rufo-cinerea*, *gula fulvâ*, *macula post aurem utrinque albâ*: *auribus nudis*. In the last section of the character will be found its principal distinction from the species formerly described. A detailed description of it is given, and the authour enters fully into an account of its habits, as observed in a state of captivity, which correspond very nearly with those of the Dormouse, *Myoxus avellanarius*.

Nov. 18.—A paper was read entitled a *Catalogue of the Land and Fresh-water Shells found in the neighbourhood of Swansea*: by J. G. Jeffreys, Esq., in a letter addressed to L. W. Dillwynn, Esq.

Dec. 2.—The reading of the above paper was concluded.

A paper was read *On an undescribed species of Pheasant*: by Mr. Benjamin Leadbeater.

This bird, which is named by the authour *Phasianus Amherstiae*, as a token of respect to the distinguished lady by whom it was first brought to England, is a native of Cochin-China, and in general form approaches the Golden Pheasant. Its markings and measurements are fully described by Mr. Leadbeater.

Dec. 16.—A Paper was read, entitled *Observations on some species of the genera Tetrao and Ortyx, natives of North America, with descriptions of four new species of the former, and two of the latter genus*: by David Douglas, F.L.S., &c.

The characters of these new species have already been given in our Analytical Notice of the Transactions of the Linnean Society, at page 490.

Feb. 3, 1829.—*Some Observations on the Common Bat of Pennant*,

with an attempt to prove its identity with the *Pipistrelle* of French authors: by the Rev. Leonard Jenyns, M.A., F.L.S., were read.

The Common Bat of our country having been referred by every systematic writer from the time of Pennant to the present day to *Vespertilio murinus*, Linn., Mr. Jenyns points out the great difference between our Bat and that to which continental authors give the Linnean name, both in colour, general appearance, the shape of the auricle and its operculum, and in the relative dimensions and absolute size. He considers the species of the foreign authors to be the *Vesp. murinus*: and he states that all our English writers, including Griffith and Fleming, have only repeated Pennant's description, or translated Linnæus's specific character. He then concludes that our Common Bat is the *Pipistrelle* of Daubenton and succeeding writers.

The author adds some interesting observations on the habits of Bats: each species, he finds, have their peculiar place of concealment; also that the same increase of temperature which will revive them from torpidity early in the winter, will not have that effect (nor will even a much higher one) after they have been rendered completely torpid by severe frost.

ZOOLOGICAL CLUB OF THE LINNEAN SOCIETY.

June 10, 1828.—Mr. Yarrell exhibited preparations of the *tracheæ* of several birds, including those of the *Tetrao Urogallus*, Linn., of the *Crax Alector*, Linn., and of the *Platalea Leucorodia*, Linn. He remarked that the deviation from the simple form of a cylindrical tube passing directly from the *larynx* to the *bronchiæ*, which is common to the greater number of birds, commences among the ratorial group, that of the *Tetrao Urogallus* exhibiting one of its earliest stages. In this there is merely an elongation of the *trachea* without any marked fold, a portion of that organ lying loose among the muscles and cellular substance of the neck. The deviation from the typical form increases and becomes in *Crax*, and especially in *Numida*, Linn., a distinct fold. Among the *Grallatores* it attains a yet higher degree of development, particularly in the *Gruidæ*. In *Platalea* it is formed by a strongly marked fold, which, however, lies loose in the cavity of the *thorax*, and is not attached

to, or inserted in, bone. In many of the birds of this order it resumes the simple form; and in none of them does it undergo any material alteration at its bronchial extremity. The enlargement of the *trachea* at this part takes place only among the *Natatores*, in the sub-family *Anatina*, Vig.; it is also here among the birds of the sub-family *Anserina*, Vig., that the maximum of elongation occurs, of which the *Anas semipalmata* furnishes a remarkable example. Mr. Yarrell adverted to the muscles of voice, and made some observations respecting them. On this occasion his remarks were general, but he proposed at a future period to return to the detailed consideration of this subject.

A Paper *On the Tringa rufescens, Vieill., a species new to the British Islands and to Europe*: by William Yarrell, Esq., F.L.S., &c., was read. The bird was exhibited to the meeting, and its peculiar characteristics were pointed out on the specimen by Mr. Yarrell. This is probably the second individual which has yet fallen under the notice of Ornithologists, and appears to be unique in this state of its growth.

June 24.—Mr. Hawkins communicated for exhibition a part of the bottom of a vessel in which were implanted two portions of the lengthened upper mandible of a species of *Xiphias*, Linn. They penetrated through the copper sheathing and were firmly fixed in the solid oak to the depth of several inches. One of the portions appeared to be the termination of the mandible, and was broken off obliquely; the obliquity of the fracture probably giving to the extremity which remained attached to the fish a sufficient degree of sharpness to enable it again to enter the wood to an equal depth with that effected by the first blow. The vessel in which it was discovered had returned from a voyage to the East Indies.

Mr. Yarrell exhibited a skeleton of the Trumpeter, *Psophia crepitans*, Linn., and several other skeletons illustrative of each of the five divisions of both the orders *Rasores* and *Grallatores*. He dwelt upon the value of the characters derived from the bones generally as furnishing indications for arrangement, and particularly noticed the importance of the *sternum* and its appendages as affording support and attachment to the bones of the shoulders, surface for the origin of the large and powerful muscles from the exercise of which the great and distinguishing character of the class is derived, as well as protecting and sustaining the

most important *viscera*. The nine orders of birds as defined by M. Blainville from the character of the *sternum* and its appendages were noticed, as were also the generic divisions of Dr. F. J. Sherminier, determined by the form of the same parts.

The Trumpeter, Mr. Yarrell observed, had been placed by Linnæus and Blumenbach after the Rails, and by other systematic writers either among the Gallinaceous Birds or with the Cranes. On comparing its skeleton with those of the genus *Rallus*, Linn., it was shown to possess less affinity to that group than to any of the species of the more true Waders or the Gallinaceous birds; and an extended examination of its osteology showed that it partook equally of the characters of those two large divisions. To judge, therefore, from the skeleton, the true situation of the bird appeared to be at the point of contact of the two circles described by the orders *Rasores* and *Grallatores*.

Mr. Yarrell having purposely confined his remarks to the osteology of the bird, Mr. Vigors adverted to the confirmation furnished by it of the correctness of the views which he had advanced in his Essay on the Natural Affinities that connect the Orders and Families of Birds. He had there been induced by the consideration of the external characters and habits alone to regard the genus *Psophia* as constituting the connecting link between the *Rasores* and the *Grallatores*; and the anatomical investigations which had that evening been submitted to the Club having led to the same conclusion, the propriety of this location in the system might now be considered to be fully established.

November 11.—Mr. Yarrell exhibited a drawing of a rare British fish, the *Sparus lineatus* of Montagu, whose description and figure in the second volume of the Wernerian Transactions appear to be the only original notices hitherto given of it. He also mentioned that he had recently seen a specimen of the *Scolopax Sabini*, Vig., killed in Ireland, which agreed in every respect with the individuals formerly exhibited to the Club.

Mr. Bell made some observations relative to the habits of the Toad, *Bufo vulgaris*, Daud., particularly as regarded its mode of feeding. He also stated that he had had several opportunities during the last summer of observing the fact recorded by Schneider, that Toads devour the skin which they shed. In one instance he witnessed the whole process of the

shedding of the cuticle : it became divided longitudinally along the back and the abdomen ; by the action of the hinder leg on one side the skin was detached as far as the fore-leg ; the same operation was next effected on the other side ; the loosened *exuviae* were then drawn forwards by the combined action of the mouth and of the anterior legs, and were immediately swallowed. In others of the Batrachian Reptiles, the *Ranae* and *Salamandrae*, no swallowing of the *exuviae* took place.

A *Description of a new species of Phalangista*: by Thomas Bell, Esq., F. R. & L. S., was read by the authour.

November 25.—Mr. Bell exhibited several Tortoises of the genera *Hydraspis*, *Emys*, and *Terrapene*, for the purpose of illustrating by the living animals, the correctness of the views advanced by him in several papers relating to the *Testudinata*, published in the Zoological Journal. He dwelt especially on the length of the neck in *Hydraspis*, which, as well as the legs, was incapable of being retracted within the shell, and afforded a striking mark of distinction between the animals of this genus, and those of *Emys*, in which the limbs and neck are capable of complete retraction. He also showed that the *Testudo Europæa* of the older authours is a *Terrapene*, its shell being furnished with a sternal valve.

A paper *On an undescribed species of Pheasant*: by Mr. B. Leadbeater, F.L.S., was read, and the bird, the *Phasianus Amherstiae*, was subsequently exhibited.

November 29.—At the Anniversary Meeting, held this day, the following Members were elected as Officers and Committee, for the ensuing year: N. A. Vigors, Esq., F.R.S., &c., *Chairman*; J. F. Stephens, Esq., *Treasurer*; E. T. Bennett, Esq., *Secretary*; T. Bell, Esq.; J. E. Bicheno, Esq.; W. J. Broderip, Esq.; J. Brookes, Esq.; J. Morgan, Esq.; W. Yarrell, Esq.

During the continuance of the ballot, the Chairman, Joshua Brookes, Esq., delivered an Address on the progress of Zoological Science during the past year, which was ordered to be printed for distribution among the Members of the Linnean Society.

December 9.—The Chairman, N. A. Vigors, Esq., entered into a series of remarks in illustration of the importance of attending in zoological researches to characters apparently minute, and therefore frequently

considered as trivial. He observed that the neglect of these minute particulars by authours whose views have been eulogised as enlarged and comprehensive, had led to errors, not merely as regarded species and genera, but even as to the station in nature of animals, whose real affinities were capable of being readily ascertained by means of these marks alone. In illustration of these general observations, he adverted particularly to the history of our acquaintance with the birds constituting the genus *Cryptonyx*, Temm. Although the essential character of two birds of this group was seen and noted by Dr. Latham, the absence of the claw from their hind toes appeared to that ornithologist to be so trivial a circumstance that it did not even induce the suspicion of any relation between them, much less that they were, as they were shortly after shown to be, the sexes of the same species. In the General History of Birds they were referred to different genera, and located in distant parts of the system, the male being characterized as the *Columba cristata*, and the female as the *Perdix viridis*. In the Index Ornithologicus, these two nominal species were, however, united into one, as the *Perdix coronatus*. But, although that authour had seen a specimen, which now no longer exists, of another species of *Cryptonyx*, his *Columba Cambaiensis*, he still left the latter with the Pigeons, while the other was placed with the Partridges. In the minute particular, as it appeared to the older authour, in which these birds agree, is to be found the essential character of the genus which has since been formed of them by M. Temminck, under the name of *Cryptonyx*: and this neglected point of their structure not only shows their immediate connexion with each other so as to form a distinct group, but also indicates their situation in nature, in almost immediate apposition with *Hemipodius* and the typical *Rasores*, in which not only the claw, but the whole of the hind toe is wanting, as unnecessary to the economy of birds, which neither perch nor clutch their prey. The Chairman exhibited to the meeting specimens of the male and female of the *Cryptonyx cristatus*, Temm.; of the *Crypt. ocellatus*, *Tetrao ocellatus*, Raffles; and of two new species of the genus which he has since described, (page 349,) the *Crypt. niger*, and another, somewhat approaching the description given of the *Crypt. Cambaiensis*, but differing from it in size and colour.

April 23, 1829. — Mr. Yarrell exhibited a *cranium* of the Crossbill, *Loxia*

curvirostra Linn., and pointed out its peculiarities. He explained particularly the form of the condyle and the mode of articulation of the lower jaw, and showed that these were adapted to admit of a considerable extent of lateral motion, while in various other *crania* of birds which he exhibited the motion was vertical alone. He also pointed out the means by which the lateral motion was confined within certain limits. In further illustration of the subject, he exhibited drawings of the muscles of the head and jaws, which were considerably larger on the side to which the lower jaw inclines, and of the tongue of the bird, and dwelt on the important uses to which they were applied in the obtaining of its food: the jaws spreading apart the strobiles of the cone, and the tongue, strong and scoop-like at its extremity, raising the seed from the depth in which it is imbedded.

Mr. Yarrell also exhibited specimens of the various species of *Clupea* inhabiting the British coasts, including the Herring, the Pilchard, the Sprat, the Shad, and the Whitebait, and remarked on the differences existing between them, and on their habits, adverting especially to those of the latter species, recently described by him in the *Zoological Journal* as the *Clupea alba*. He also exhibited specimens of two fishes not hitherto admitted into our Fauna, the *Cottus Bubalis*, Euphr., and the *Solea Pegusa*, *Pleuronectes Pegusa*, Lacep. The former appeared to be common on our coasts, and had probably been hitherto confounded with the *Cottus Scorpius*, Linn. Of the Sole a single specimen alone was yet known to have occurred, which was obtained by Mr. Yarrell at Brighton. He further stated his opinion that there existed in England two species of fresh-water Eel, *Muræna Anguilla*, Linn., and exhibited specimens remarkably distinct in many respects, and particularly in the form of the head, which in one was thick and blunt, and in the other was narrow and pointed.

GEOLOGICAL SOCIETY.

April 18, 1828.—A paper was read *On a collection of Vegetable and Animal Remains, and Rocks, from the Burmese Country, presented to the Geological Society by J. Crawfurd, Esq.: by the Rev. W. Buckland, D.D., V.P.G.S., F.R.S., &c.*

Mr. Crawfurd collected these specimens during his voyage up the Irawadi in a steam-boat, on an embassy to Ava, in the latter part of the year 1826. The authour considers them to be of high importance, as affording an answer to the curious, and till now undecided question, whether there be, or be not, in the southern regions of Asia, any remains of fossil quadrupeds analogous to those which are found so widely dispersed in the diluvium of northern Asia, and of Europe and America.

The evidence which Mr. Crawfurd has imported, consists of several chests full of fossil wood and fossil bones, and of specimens of the strata that are found along the course of the Irawadi, from Prome up to Ava, being a distance of nearly 500 miles. The greater part of the fossil wood is beautifully silicified; other specimens of it are calcareous; they are mostly portions of large trees, both monocotyledonous and dicotyledonous, and were found along the whole valley of the Irawadi from Ava to Prome. The bones were all collected from a small district near some wells of petroleum, about half way between these towns, and on the left bank of the river. From Mr. Clift's examination, it appears, that although we have among them no remains of fossil elephants, we have the same fossil *Pachydermata* that are found associated with elephants in Europe, namely, Rhinoceros, Hippopotamus, Mastodon, and Hog. We have also two or three species of *Ruminantia* resembling the Ox, Antelope, and Deer, with the addition of the Gavial and Alligator, and two fresh-water tortoises, namely, *Trionyx* and *Emys*.

The teeth of the *Mastodon* belong to two unknown species of that genus, both of them approaching in size to the largest elephant. Mr. Clift has designated them by the names of *Mastodon latidens* and *M. elephantoides*. The teeth are from animals of all ages; and there are many fragments of ivory, derived probably also from the *Mastodon*.

The remains of the *Mastodon* are by far the most abundant in this collection, and amount to about 150 fragments.

Of the *Rhinoceros* there are about 10 fragments.

Of a small species of Hippopotamus, 2.

Of the Hog; 1; and of the Ox, Deer, and Antelope, about 20.

Of the Gavial and Alligator, about 50.

Of the *Emys*, 20; and *Trionyx*, 10.

One fragment of *Emys* is so large, that the animal of which it formed a part, must have been several feet in width.

The state of preservation of these bones is very perfect, from their being penetrated with hydrate of iron, and thereby rendered strong. Not one of them is silicified, though they have been erroneously stated to be so, in some of the periodical journals.

The district in which they were found is a little north of the town of Wetmasut, and is composed of barren sand-hills and beds of gravel intersected by ravines, and cemented occasionally into a breccia by carbonate of lime, and sometimes by hydrate of iron. Over the surface of these hills were scattered the fragments of bones and wood, some quite naked and loose, others half buried in the sand and gravel. Many fragments of wood lay also at the bottom of the ravines. About one-third of the bones have been slightly rolled; and the rest had all been broken before they were lodged in the places where Mr. Crawford found them, and where they appear to have been dispersed and buried, by the action of the same waters that produced the diluvial sand and gravel, whence they have since been washed out, and left bare by the action of rains and torrents.

Concretions of sand and gravel adhere to many of the bones, but they contain no traces of shells, and differ mineralogically from all the rock specimens in this collection, which we recognize as belonging to tertiary and freshwater strata.

Indications of freshwater formation were found in one spot only, not far from the fossil bones, and they consist of a marly blue clay, abounding with shells of a large and thick species of *Cyrena*.

The tertiary rocks are: 1st, a dark slaty limestone, containing many shells that have been identified by Mr. Sowerby with those of the London clay; 2nd, a yellow sandy limestone containing shells, and resembling the *calcaire grossier*; and 3rd, a soft greenish sandstone resembling the sandy beds of our plastic clay formation.

This London clay and *calcaire grossier* afford an additional locality of

these strata to those indicated by the specimens described by Mr. Colebrooke, in Vol. I, Part 1, second series of the Geological Transactions, which had already established the existence of this formation in the N. E. border of Bengal.

Mr. Crawford states distinctly, that it is impossible to refer the situation of the bones, or the origin of the hills containing them, to any operations of the existing river: these hills are sixty feet above the level of its highest flood; the effect of its actual operations, he observes also, is distinctly visible in the shifting islands of mud and sand that abound along the whole course of the river within this high-flood level, and in the great alluvial delta that extends from a little below Prome to Rangoon and the gulf of Martaban.

The recent bones and recent wood which he observed to be stranded on some of these islands, were not in a state of progress towards becoming mineralized, but were falling rapidly to decay.

The existence of so many animal remains analogous to those that occur in the diluvium of Europe, in a matrix which so nearly resembles that diluvium, and which so decidedly differs from the alluvium, and fresh-water, and tertiary strata of the adjacent country, seems to authorize us to refer this matrix to a similar diluvial deposit in the valley of the Irawadi, reposing irregularly upon the tertiary and other stratified rocks, that form the basis of that district.

On the same evening, after the ordinary business of the Society had been transacted, a special general meeting was held, when the President having stated that the Lords Commissioners of His Majesty's Treasury had been pleased to transfer to this Society some of the apartments in Somerset House:—

It was resolved unanimously, That a Subscription be immediately entered upon to defray the expense of the necessary repairs in the apartments recently granted to the Society in Somerset House, and of the removal thereto.

May 2.—A letter was read from J. B. Pentland, Esq., addressed to W. H. Fitton, M.D., P.G.S., respecting the fossil remains of some animals from the N. E. border of Bengal.

The authour has discovered among the mutilated fragments of bones

obtained from the tertiary deposits on the Bramahpootra River, in the small state of Cooch-Behar, presented to the Society some years ago, by David Scott, Esq., and referred to in a former volume of the Transactions, the remains of four distinct species of *Mammalia*, making an interesting addition to the list already published by Mr. Colebrooke, viz.—

1. A species of the genus *Anthracotherium* of Cuvier, which the authour proposes to distinguish by the name of *Anth. Sillistrense*, a specific denomination derived from one of the many names by which the great Bramahpootra River appears to have been designated by ancient geographers.

2. A small species of the order *Ruminantia* allied to the genus *Moschus*.

3. A small species of herbivorous animal referrible to the *Pachydermata*, but more diminutive than any of the fossil or living species of that family at present known.

4. A carnivorous animal of the genus *Viverra*.

May 16.—A paper was read *On the Old Conglomerates and other secondary Deposits on the North Coasts of Scotland*, by the Rev. Adam Sedgwick, V.P.G.S., &c., and R. J. Murchison, Esq., For. Sec. G. S., in which the authours notice the fossil fishes of the secondary deposits of Caithness, &c. These seem to be contained almost exclusively in the calcareo-bituminous schist. They do not appear to be confined to any particular part of it, but were found in various localities, some in the lowest and others in the highest part of the series; and in many places scales and imperfect impressions exist in the greatest abundance. Some imperfect specimens were examined during a preceding year by the Baron Cuvier, who found that they all exhibited a pointed tail (with the rays exclusively on the lower side, as in the fish of the copper-slate of Thuringia), and notwithstanding the great imperfection of the specimens, he concluded that they were of the order *Malacopterygii abdominales*, and analogous to the bony Pike. Since that time much more perfect specimens have been procured, which have been examined by Mr. Pentland; who has not only been enabled to confirm the conjectures of Baron Cuvier, but has ascertained two new genera, each containing two species. The first genus, *Dipterus*, has a double dorsal fin, and the other fins are nearly in the same position as in the *Esocii*. One of the species, *Dipterus macrolepidon*, is remarkable for the size of its scales, which some-

times exceed half an inch in diameter. The second genus is nearly allied to *Amia* and *Lepisosteus*. The body is covered with hard quadrangular scales, disposed in oblique rows. In all the species the peculiar formation of the tail, before alluded to, is the same.

Along with the fish were found the remains of a *Testudo*, nearly allied to *Trionyx*, and one specimen of a vegetable impression: but not a single fossil shell or zoophyte has yet been discovered in any part of the county. It adds to the interest of this singular assemblage of organic remains, that they all resemble the inhabitants of fresh-water.

The formations in the lower region of East Ross also contain subordinate beds of calcareo-bituminous schist; and though fossils are much more rare than in Caithness, yet a few examples of fish-scales, and a fragment of a *Testudo* resembling a *Trionyx*, have been found between the North Sutor and Tarbet Ness.

The authours remark that the great central deposit, containing the ichthyolites, does not appear to be perfectly identical with any formation hitherto described. It seems in some measure to occupy the place of the coal formation. Many parts of it resemble grauwacke in mineralogical character; and from its enormous developement, it can hardly be compared with the copper-slate of Germany. None of the fish of Caithness are identical with the fish of the copper-slate.

June 6.—A letter to the President was read, from Gideon Mantell, Esq., F.G.S., &c. enclosing a list of the fossils of the county of Sussex.

This list, which is taken principally from specimens in the authour's own collection, enumerates the fossils, first, of the alluvial and diluvial deposits; and, successively, those of the London clay, the plastic clay, chalk, chalk-marle, firestone, gault, Shanklin sand, and Hastings deposits, including the Ashburnham beds.

Subjoined is a comparative table; one of the most remarkable features of which, is the preponderance of the number of species in the marine formations over those of the beds assumed to be of fresh-water origin, in a ratio of not less than six to one; the testaceous *Mollusca* forming two-thirds of the whole, while in the fresh-water strata, the proportion is reversed. Thus the marine deposits contain upwards of two hundred and forty species of shells, and the two fresh-water formations but twenty-two

species. In the other classes and orders, equally striking differences are observable.

On the other hand, the marine formations are destitute of the characteristic fossils of the fresh-water formations, viz. birds, terrestrial and fresh-water reptiles, shells and vegetables. The authour, in short, concludes that a comparison of the living inhabitants of our lakes and rivers, with those of the ocean, would not offer more striking discrepancies.

June 20.—An extract was read of a letter from Samuel Hobson, Esq., to Dr. Roget, F.G.S., Sec. R.S., &c. (dated at New Orleans, 6th April, 1827,) and enclosing an account of some gigantic bones, by Samuel W. Logan, M.D.

The place where these bones had been found is not mentioned; but at the date of the letter, they were exhibited publicly at New Orleans. Dr. Logan describes them as consisting of one of the bones of the *cranium*, fifteen or twenty *vertebræ*, two entire ribs and a part of a third, one thigh-bone, two bones of the leg, and several large masses of a cancellated structure.

The cranial bone was twenty feet and some inches in its greatest length, about four feet in extreme width (for the bone tapers to a point), and it weighed twelve hundred pounds. Dr. Logan inclines to think that this is the temporal bone.

The *vertebræ*, consisting of a body, oblique, transverse, and spinous processes, gave sixteen inches as the mean diameter, and twelve inches as the depth of the bodies; while the passage for the spinal cord measured nine inches by six. The spinous processes stand off backwards and downwards, fourteen inches in the dorsal, and somewhat less in the lumbar *vertebræ*, three of which latter are entire.

The ribs, well formed and in a perfect state of preservation, measured nine feet along the curve, and about three inches in thickness.

The thigh-bone, measured in length, gave only one foot six inches, but is very thick. The bones of the leg are of similar dimensions, but perhaps a little more slender.

It had been conjectured that the animal to which these remains belonged was amphibious, and perhaps of the Crocodile family; and the conjecture appeared to Dr. Logan to be justified by the great length and flatness of the head (judging from the single specimen of the cranial bone), and the shortness of the limbs. It was also supposed that the animal,

when alive, must have measured five and twenty feet around the body, and about one hundred and thirty feet in length.

A letter was read from Charles Stokes, Esq., F.G.S., F.R.S., to W. J. Broderip, Esq., Sec. G.S., explanatory of three drawings of *Echini*, representing, 1. A specimen of *Galerites albo-galerus*, Lam., from the chalk, in which the plates of the mouth, consisting of five pairs, are preserved *in situ*; 2. A *Cidaris*, also from the chalk, in which portions of the plates of the mouth and the teeth are visible: they are displaced, but exhibit a system quite analogous to that of the recent *Cidaris*; and, 3. A *Cidaris* from Stonesfield, in which the anal plates are in the best preservation.

November 7 and 21.—A paper *On the Geology of Nice*, by H. T. De la Beche, F.R.S., L.S., and G.S., was read, in which the authour, after describing the situation of Nice, enters into a detailed account of the diluvium and the strata in its neighbourhood.

The diluvium (if indeed it can be so considered) is peculiar; in general it takes the form of breccia, either diffused irregularly or occupying clefts; appearing however in both situations to be intimately connected. Most of the diffused fragments correspond mineralogically with the rocks on which they rest; some few are rounded, and seem to have been transported from a distance. The cement varies in hardness and colour with the substratum. Where the breccia reposes on dolomite or light-coloured limestone, it is so hard as to be blasted by gunpowder, is reddish and vesicular; the vesicles being lined with calcareous crystals. Where it rests upon gray secondary limestone, or on any of the tertiary beds, it is soft, friable, and almost white. Between Ville-franche and Hospice, the substratum is a sand, full of shells so like those of the Mediterranean as to have been called *sub-fossil*: some of these shells retain traces of their native colour; the rest are bleached. This sand-bed at Ville-franche is ten feet at least above the sea: at Baussi Raussi, where it descends to that level, the breccia exhibits pebbles of serpentine as well as limestone: the limestone pebbles being perforated by *Lithodomi*, and the cement containing sub-fossil shells. None of these breccias contain bones.

The other variety of the diluvium is lodged in fissures. A vein on the south-east of the Castle Hill has its northern side perforated by *Lithodomi*, and yields two different kinds of pebbles; in the blue limestone of the

lower part, and the magnesian above. This spot, therefore, affords evidence of four distinct epochs. 1. When the sea, higher than at present, introduced *Lithodomi* into the fissure. 2. When the lower part of the fissure was filled with pebbles transported from a distance. 3. When its upper part was filled with the broken bones of animals, shells terrestrial and marine, and with fragments, principally but not solely, of contiguous rocks. 4. When the sea attained its present level.

The fossils under the breccia seem to have been quietly deposited by a sea that stood several feet higher than the present Mediterranean. To explain this difficulty, some authours imagine that the Mediterranean has sunk, by forcing its passage through the Straits of Gibraltar; but this supposition the authour conceives to be improbable.

Tertiary rocks consisting of sand, sandstone, and a conglomerate of various rolled pebbles, shell marl, calcareous gritstone and breccia, and gray marl, occupy an extensive area on the west and north-west of Nice.

The shell marl here mentioned is that which Brocchi has described; and it contains, in the Sub-Alps, the same fossils as in the Sub-Appenines.

In the calcareous breccia are angular pieces of the contiguous limestone and dolomite perforated by *Lithodomi*; adhering to which are sometimes found the lower valves of *Spondyli*, quite perfect, notwithstanding the delicate texture of their edges. The cement contains three species of *Pecten*; with remains, perhaps, of a Saurian. Care must be taken not to confound this latter breccia, which rises more than a thousand feet above the sea, with the diluvial breccia above described.

On reviewing the tertiary beds, the authour remarks in their probable history three distinct epochs; viz. two of repose, and one of violent disturbance.

The Secondary rocks of Nice consist of two great formations; the upper one composed of siliceous, argillaceous, and calcareous particles intimately mixed, but in very variable proportions; some of the beds abounding in green grains; which circumstance, together with the nature of their fossils, induces the authour to rank the formation to which they belong with the green-sand of England. Nummulites, however, which are rarely found in the green-sand of this country, are found plentifully in that of Nice. The strata are very much disturbed and contorted; so that an unguarded observer might often suppose them to be inferior to rocks on which they are in reality incumbent.

The green-sand is succeeded by a lower formation, which the authour refers to the Jura-limestone or oolite. In this he has found, occasionally, *Terebratulæ*; in addition to which, Mr. Allan states that it contains ammonites, pectens, an echinus, and, near the lighthouse at St. Hospice, numerous corals. In mineralogical character, this stratum is very unlike the English rocks which it is supposed to represent; its principal members being compact limestone, with, occasionally, flint, dolomite, and gypsum.

Dec. 5.—A paper was read, *On the Excavation of Valleys, as illustrated by the Volcanic Rocks of Central France*, by Charles Lyell, Esq., V.P.G.S., F.R.S., &c. and R. I. Murchison, Esq., For. Sec. G.S., F.R.S., &c., wherein was included a detailed account of the deposits at Mont-Perrier or Boulade; where the fossil remains of various extinct quadrupeds are found, alternating with beds of transported materials of different kinds, which rest against the sloping side of a hill to the height of between 200 and 300 feet. This hill itself is essentially composed of tertiary marls, capped with basalt; but the basalt does not here overlie the alluvions, as has been asserted. Since the sand and gravel containing the fossil bones, found on two different sides of the mountain, are overlaid by a vast mass of trachytic breccia, it is concluded, that the Elephant, Rhinoceros, Hippopotamus, Hyæna, Tiger, Wild Cat and other quadrupeds, whose remains have been recently disinterred, must have been inhabitants of this district, before the most recent cones and lavas of Auvergne had appeared, or the valleys had been excavated to their present depth; and even before the fires of Mont Dor were extinguished.

Jan. 2, 1829.—A letter was read, addressed to R. I. Murchison, Esq., For. Sec. G.S. &c. by G. W. Featherstonhaugh, Esq., F.G.S., *On the Series of Rocks in the United States*, in the course of which the authour remarks, that no regular search for bones has yet been made in the caves of the United States. The only fossil bones hitherto found in any cave in that country, are those of the *Megalonyx*; although the bones of the Megatherium, Elephant, Mastodon, Ox and Horse, have been discovered in other situations. But so little attention has been paid to the circumstances under which these remains occurred, that it is impossible to decide whether they were lodged in alluvial or diluvial deposits. In the authour's opinion, no fossil remains of the Hyæna, Rhinoceros, Hippopotamus, Bear, or Tiger, have ever yet been found in the United States.

A letter was read, addressed to Dr. Fitton, President of the Geological Society, by Samuel Woodward, Esq., respecting some remarkable fossil remains found near Cromer, in Norfolk.

The authour notices the limited extent of the marine formation of Eastern Norfolk, and is of opinion that its rejectamenta may point out the boundary of a former sea in that district.

The marine remains, denominated Crag, are found at Cromer, and westward of that town, at Coltishall, and around Norwich. To the eastward of these situations, instead of marine shells, a layer of ligneous and mammalian remains is found reposing on the chalk. The authour considers that a line drawn from Cromer, or a little east of it, and passing in a south-east direction towards Lake Lothing by Lowestoff, will very nearly describe the course of the antediluvian shore; to the eastward of which, immense numbers of the fossil remains of the Elephant, Horse, Deer, &c. mingled with the trunks, branches and leaves of trees, have been found, even to the distance of twenty miles out at sea; and on the Knoll-sand the tusk of a Mammoth (drawings of which are annexed to this letter) was found in the year 1826, resembling those recently brought to England from Behring's Straits.

Jan. 16.—An *Appendix* was read to Mr. De la Beche's paper, on the *Geology of Nice*, by the Rev. W. Buckland, D.D., &c.

After bearing testimony to the correctness of the description given by Mr. De la Beche of the immediate neighbourhood of Nice, the authour communicates his own observations made along the high road from that city to the Col de Tende, for the distance of about fifty miles. Among other particulars he mentions that the hill on the south of Scarena, twelve miles N. E. of Nice, presents a section of the green-sand formation, with nummulites, turrilites, and its other usual fossils, alternately with compact gray limestone destitute of fossils. At Mont Brause the same beds of green-sand occur loaded with ammonites and belemnites.

Feb. 6.—A paper was read, *On the discovery of a new Species of Pterodactyle; and also of the Fæces of the Ichthyosaurus; and of a black substance resembling Sepia, or Indian Ink, in the Lias at Lyme Regis; by the Rev. W. Buckland, D.D., F.R.S., Professor of Mineralogy and Geology in the University of Oxford.*

This specimen of Pterodactyle was discovered, in December last, by

Miss Mary Anning, and was found to belong to a new species of that extinct genus, hitherto recognized only in the lithographic Jura-limestone of Sollenhofen, which the authour considers as nearly coeval with the English chalk.

The head of this new species is wanting, but the rest of the skeleton, though dislocated, is nearly entire; and the length of the claws so much exceeds that of the claws of the *Pterodactyli longirostris* and *brevirostris*, of which the only two known specimens are minutely described by Cuvier, as to show that it belongs to another species, for which the name of *Pterodactylus macronyx* is proposed. A drawing of this fossil by Mr. Clift accompanies the paper. The authour had for some time past conjectured, that certain small bones found in the lias at Lyme Regis, and referred to birds, belong rather to the genus Pterodactyle. This conjecture is now verified. It was also suggested to him, in 1823, by Mr. J. S. Miller of Bristol, that the bones in the Stonesfield-slate, which have been usually considered as derived from birds, ought to be attributed to this extraordinary family of flying reptiles: Dr. Buckland is now inclined to adopt this opinion, and is disposed to think still further, that the coleopterous insects, whose *elytra* occur in the Stonesfield-slate, may have formed the food of those insectivorous Pterodactyles. He conceives also, that many of the bones from Tilgate Forest, hitherto referred to birds, may belong to this extinct family of anomalous reptiles: and, from its presence in these various localities, he infers that the genus Pterodactyle was in existence, throughout the entire period of the deposition of the great Jura-limestone formation, from the lias to the chalk; expressing doubts as to the occurrence of any remains of birds before the commencement of the tertiary strata.

Fossil Faeces of the Ichthyosaurus.—The authour concludes from an extensive series of specimens, that the fossils, locally called Bezoar-stones, that abound at Lyme, in the same beds of lias with the bones of *Ichthyosaurus*, are the faeces of that animal. In variety of size and form they resemble elongated pebbles, or kidney-potatoes, varying generally from two to four inches in length, and from one to two inches in diameter; some few being larger, others much smaller. Their colour is dark gray; their substance, like indurated clay, of a compact earthy texture; and their chemical analysis approaches to that of album græcum. Undi-

gested bones and scales of fishes occur abundantly in these fæcal masses. The scales are referrible to the *Dapedium politum*, and other fish that occur in the lias; the bones are those of fish, and also of small *Ichthyosauri*. The interior of these bezoars is arranged in spiral folds; their exterior also bears impressions received from the convolutions of the intestines of the living animals. In many of the entire skeletons of young *Ichthyosauri*, the bezoars are seen within the ribs and near the pelvis: these must probably have been included within the animal's body at the moment of his death. The authour found, three years ago, a similar ball of fæcal matter, in the collection of Mr. Mantell, from the strata of Tilgate Forest, which abound in bones of *Ichthyosauri* and other large reptiles; and he conjectures that these bezoars exist wherever the remains of *Plesiosauri* are abundant.

Fossil Sepia.—An indurated black animal substance, like that in the ink-bag of the cuttle-fish, occurs in the lias at Lyme Regis; and a drawing made with this fossil pigment, three years ago, was pronounced by an eminent artist to have been tinted with *Sepia*. It is nearly of the colour and consistence of jet, and very fragile, with a bright splintery fracture; its powder is brown, like that of the painter's *Sepia*; it occurs in single masses, nearly of the shape and size of a small gall-bladder, broadest at the base and gradually contracted towards the neck; these are always surrounded by a thin nacreous case, brilliant as the most vivid Lumachella; the nacre seems to have formed the lining of a fibrous thin shelly substance, which together with this nacreous lining was prolonged into a hollow cone like that of a belemnite, beyond the neck of the ink-bag; close to the base of the ink-bag there is a series of circular transverse plates and narrow chambers, resembling the chambered alveolus within the cone of a belemnite; but beyond the apex of this alveolus, no spathose body has been found. The authour infers, that the animal from which these fossil ink-bags are derived, was some unknown Cephalopode, nearly allied in its internal structure to the inhabitant of the Belemnite; the circular form of the septa showing that they cannot be referred to the Molluscous inhabitant of any *Nautilus* or *Cornu-ammonis*.

ZOOLOGICAL SOCIETY.

April 29.—At the anniversary meeting held for the election of officers for the ensuing year, Baring Wall, Esq., M.P., Vice-Pres., in the Chair, a Report was presented by the Council, in which were enumerated the various steps that have been taken since the last Anniversary in furtherance of the objects of the Society.

Since that period a charter has been obtained, by which the Society has been incorporated under the name of The Zoological Society of London. Under the provisions of this instrument, which correspond generally with those by which other similar societies are governed, the members nominated in it have proceeded to associate to themselves others, who have already joined that institution to the number of 1326. In the Fellows the whole property of the Society is vested and they have also the right of electing the Council and Officers, and of confirming the Bye Laws which are to be proposed by the Council. A code of Bye Laws is in preparation, and will be submitted for approval to the general meeting of the Society, which will take place early in June. Meetings will be held for the future once in each month for the election of Fellows, for the receiving of reports on the progress and state of the establishments, and for the communication of any interesting information resulting from experiments conducted under the authority of the Society.

The finances of the Society are in a very satisfactory state. From the audited accounts, it appears that the receipts of the last year have amounted to £11,515., while the expenditure has been only £10,044. 19s. 4d., leaving, with the surplus on the 1st of January, 1828, a balance in hand of £2,313. 14s. In the expenditure is included the sum of £6,068. 11s. 3d. for works, and buildings, and labour at the Garden established in the Regent's Park; about £350. for the purchase of animals, and upwards of £1,100. for the keep of animals, including the salaries of the keepers. The large balance has been reserved in consequence of a resolution of the Council to lay aside and invest as permanent capital, with the view of securing the stability of the Society, one-fifth part of the whole of the receipts from all sources. The books of accounts will be constantly open to the inspection of the Fellows.

The arrangement of the Museum in Bruton Street has occupied much of the attention of the Council. Additional cases have been erected wherever space could be obtained, but the limited accommodations abridge

the power of exhibiting the collections to advantage. Every room is now fully occupied, and not only are the objects crowded to excess, but the greater portion of the specimens is necessarily kept for safety out of view. With one or two trifling exceptions, the whole of the additions made during the last year, many of which are of the utmost importance to science, have been presented by the friends of the Society. Arrangements have been made for facilitating the inspection of every part of the collection, until such time as the increasing resources shall authorise the erection of a museum on a larger scale, and on a plan commensurate with the importance of this great object of the institution, a time which the Council hope is not far distant. The objects now exhibited embrace an instructive as well as an attractive series in every branch of Zoology, but more particularly in the groups of *Mammalia*, *Birds*, and *Insects*. A catalogue of the more important of these has been published; and a more detailed list, accompanied with scientific notices of all the species, is in preparation.

The Garden in the Regent's Park is the principal source of attraction and of expense. Much has been required to counteract the injurious effects on the animals and on vegetation produced by the ungrateful nature of the soil; and some losses have been occasioned by the want of proper accommodation during the inclemency of the winter, from securing which the Council were prevented by circumstances beyond their power to controul. Various additional buildings have been erected, including a house and inclosure for Pelicans, a hut with yards for Cows and Sheep, a range of cages for Owls, an aviary for small birds, another aviary for Hawks, a shed and inclosure for Beavers, a house and yards for Kangaroos, &c. &c., and other works are now in progress towards completion. The number of species and varieties of living animals now in the Garden is 158, of which 62 are Quadrupeds and 96 are Birds. Measures have been taken to add to them, especially by the acquisition of the larger and stronger Quadrupeds, and these will be brought forward and exhibited as speedily as dens and inclosures can be prepared for them. The number of visiters to the Garden during the last year was 112,226.

For the prosecution of experiments in breeding and in the domestication of foreign animals, a primary object of the Society as rendering it more directly and practically useful, arrangements have been made for forming an establishment at such a distance from London as should ensure

a quietness not to be obtained in the Regent's Park, while at the same it might be easily accessible; a farm has accordingly been obtained near Kingston, consisting of a house with some convenient buildings, and about 33 acres of land, the soil of which is very light, and peculiarly favourable for rearing birds, and which is well supplied with very abundant springs, and with some excellent ponds. During the present year, but few results can be expected from this new acquisition, from the late period at which it was occupied; but the repairs will be proceeded with, stock will be procured, and proper receptacles formed. The application of the Farm to the purposes and objects of the Society will be under the following heads: 1st. In affording a convenient relief and assistance to the Menagerie in the Park, by removing from it such Quadrupeds and Birds as may require retirement to bring forth and rear their young; also in receiving the duplicates of the collection which it may be expedient to keep in hand to replace those which are exhibited in the Park, when necessary; and likewise to maintain such as require a more extended range than the Garden at present admits of, or which it is necessary to allow to remain at liberty. 2. The rearing various domesticated Birds and Quadrupeds, both of ornamental as well as useful varieties, either with a view of having their kinds true and free from mixture, or of effecting improvements in the quality or properties of those which are used for the table, and likewise in domesticating subjects from our own or foreign countries, which have not hitherto been inmates of our poultry or farmyards. 3. The breeding and trying experiments on Fishes. 4. The conducting experiments on all matters relating to breeding and points of animal physiology connected therewith. The range of such is very various and extensive, and many of them will require much time to complete, though some may be brought to a conclusion within a year or two. The great point of attention in these will be a careful and correct record of facts, accompanied with statements of the precise object intended to be ascertained by the institution of the experiment. The conclusions from these may be then drawn by persons of science who have given attention to the subject. It is remarkable that there have never been published any correctly recorded facts, on which the opinions at present entertained by physiologists on many of these matters can be supported. It is to be hoped that the Zoological Society may be the instrument of settling many questions of this description in a more satisfactory manner.

ART. LXIII. *Scientific Notices.*

*Notice of a new species of Antelope, by HENRY WOODS, Esq., F.Z.S.,
A. L. S.*

Mr. Cross has in his possession at present an Antelope, brought from the neighbourhood of the Cape of Good Hope, the general form and colouring of which appear sufficiently peculiar to warrant its being considered as a new species; at least I have not been able to meet with either a figure or description bearing any close resemblance to it. The following are its principal characters: size, that of a goat: horns round, black, with one annulus at the base, diverging laterally and again converging slightly at the apices: profile view nearly straight, slanting back, and very slightly inclining forwards at the points. Head large; muzzle hairy; body thick and short; a white disk on the buttocks; upper half of tail white, its termination furnished with long, scanty black hairs; limbs long and delicate; general colour dull fawn, variegated with deep brown and isabella. The most distinguishing mark of this animal is a dark gray stripe of an extraordinary form, commencing between the horns, and proceeding down the centre of the face to the muzzle; from which I would propose, as its specific name, *Antilope personata*. Its appellation among the Dutch colonists, is *Bompte-bok*.

A more complete description, accompanied by a figure, will appear in the next Number.

Notice of a new Species of Elater.

ELATER PUNCTO-LINEATUS.

Black; head and thorax finely punctate, slightly pubescent; elytra punctate, with numerous longitudinal rows of excavated spots: antennæ serrate, of the ♂ slightly more than those of the ♀. Length, $\frac{3}{4}$; breadth, $\frac{1}{3}$, of an inch.

A pair was taken (supposed ♂ and ♀) in meadows near Twickenham, Surrey, June, 1827.

J. PELERIN.

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*** The new species described in this Volume, together with the species newly characterized, are distinguished by the *Italic* character.



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ERRATUM.

Page 272, line 5 et seqq., for *Niquas* read *Niguas*.





