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S. F. BAIRD.

PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

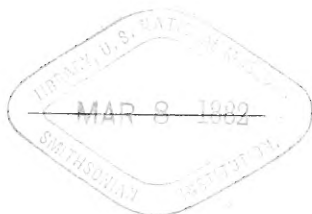
OF THE

/// ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

1867.



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ERRATA ET EMENDANDA.

- Page 15, line 20, for "*S. fasciatus*" read "*T. fasciatus*."
 „ 97, line 23, for "*C. concatenalis*" read "*B. concatenalis*."
 „ 282, line 24, for "*Roach*" read "*Loach*."
 „ 292, line 10, for " $1\frac{1}{2}$ from end of snout" read "*from 1 to $\frac{3}{4}$ from end of snout.*"
 „ 296, line 1, for "*cocoa*" read "*cocsa*."
 „ 396, line 23, for "Plate XXV." read "Plate XXIV."
 „ 512, line 13, for "*Isodictya*" read "*Orthodictya*."
 „ 522, line 33, for "*Abila*" read "*Palisia*."
 „ 569, line 32, for "fig. 1" read "fig. 2."
 „ 570, line 15, for "fig. 2" read "fig. 1."

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PROCEEDINGS
OF THE
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OF THE
ZOOLOGICAL SOCIETY OF LONDON.

January 10, 1867.

A. R. Wallace, Esq., F.Z.S., in the Chair.

Mr. P. L. Slater exhibited some specimens of birds from the recent collections of M. Adolphe Boucard, C.M.Z.S., in Southern Mexico*, and pointed out the characters of a new species of Finch, of which examples had been obtained by M. Boucard in the vicinity of La Puebla. This was proposed to be called

— ZONOTRICHIA BOUCARDI, sp. nov. (Plate I.)

Supra cinerea, plumis medialiter brunneis cinereo late marginatis; pileo fere omnino rufo, cinereo paulum mixto; linea superciliari ante oculos et ciliis oculorum albis: genis et cervicis lateribus pure cinereis: remigibus et rectricibus intus nigricantibus, extus brunnescenti-cinereo marginatis, alarum secundariis colore magis brunnescente et latius marginatis; tectricibus extus dorso fere concoloribus: subtus albicanti-cinerea, gutture toto albo, striga utrinque nigra; ventre medio lactescenti-albo, utrinque cum crisso fulvescente tincto: rostro superiore nigro, inferiore

*. See P. Z. S. 1865, p. 397.

una cum pedibus pallidis: long. tota 6·4 poll. Angl, alæ 2·7, caudæ rectr. med. 3, lat. 2·5, tarsi 0·8.

Hab. In Mexico meridionali, Orizaba (*Botteri*); La Puebla (*Boucard*).

“*Obs.* I have had three indifferent skins of this species (collected by M. Botteri near Orizaba) for several years without being able to identify it satisfactorily. M. Boucard’s recent collections having contained excellently prepared examples, I have been enabled to make a better examination of it, and to satisfy myself that it is, as far as I can tell, undescribed. It is a short-winged species, and may perhaps be placed in the genus *Peucea*; but for the present it is better to leave it with *Zonotrichia*. The fourth and fifth primaries are longest, but barely exceed the third and sixth. The first is rather shorter than the longest secondaries. The colours of the head and upper back much resemble those of *Peucea æstivalis*, but the red markings are rather brighter in tint in the present bird.”

The Secretary read the following extracts from letters received from Mr. Edward Bartlett, dated November 5th, 1866, Xeberos, Yurimaguas, Huallaga River, Peru:—

“I have made a four months’ expedition through the Missions of the High Amazons, and have been very successful in collecting Birds, Mammals, Fishes, Insects, and Shells; I have obtained some fine Humming-birds, and I hope some of them will be new.”

“I have also what I believe to be a new species of Spider Monkey, a tremendous beast when alive. It has a straight, erect, golden-yellow crest, a white stripe on each side of the face, belly and inside flanks brownish yellow, back black; I obtained it in the mountains. The Indians regarded it as a great prize. I crossed the mountains, taking with me three Indians, from Chyamatos to the Pampas on the other side; I went in search of the Cock-of-the-Rock (*Rupicola*), but was not very successful; I, however, obtained this rare Monkey; and afterwards I visited a small Indian town (three days’ journey from Chyamatos) in order to secure a young one of this species. The Indians had it alive, and prized it very much. I, however, succeeded in getting the ugly little beast, which is alive and well; it does not differ in marking from the adult, but is not so bright in colour. From here I intend to visit the mouth of the Huallaga, and pass up the Amazons to the First Falls and to the Indian towns on the upper river. This I shall do in a canoe, as I find this the best plan. Afterwards I return to Nauta and try for Porpoises and Manatees in and near the mouth of the Ucayali River, as this is the only chance I have of getting these animals.”

“I have had perfect health during the last five months: but food is frightfully dear—a small fowl 2s., a very little pig 20s.; and my appetite is alarming. I hope to send home the collections I have made in January next by the steamer.”

The following papers were read:—

1. Remarks on an Antelope from the White Nile, allied to or identical with the *Kobus sing-sing* of Gray. By JAMES MURIE, M.D., F.G.S., Prosector to the Society.

(Plate II.)

Before entering into the subject of the present paper, I feel it my duty to pay a slight tribute to the memory of a noble-minded and gallant, although little-known, White-Nile traveller, the Baron Wilhelm von Harnier, a native of Hesse Darmstadt.

Having planned a journey into Central Africa, for the double purpose of hunting and collecting objects of natural history, to enrich the Museum of the capital of his native Duchy, he proceeded, at his own expense, by way of Egypt and Nubia to Khartoum, where, after a brief sojourn, he embarked in a native boat with hunters and stores for land travel, and started on an expedition up the White Nile. Possessing great inherent talent as an artist, and a fair share of information as a naturalist, Baron Harnier sketched with truly scenic effect the inhabitants, country, and animals of the region which he was exploring. Unfortunately for the interests of zoology and geography, death snatched him off too early in his career; nevertheless he had already produced sufficient material in portfolios of drawings and notes to enable his brother (Baron von Harnier, of Ehzel, Hesse) to give to the world a posthumous volume, 'Reise am Obern Nil,' 1865. This work, almost unknown in our country, forms (I can safely say from personal knowledge of that river) the most splendid volume of its kind, so far as truthful plates are concerned, delineating the peculiar scenery and savage tribes bordering the White Nile. Notwithstanding the successful journeys and works of our daring and enterprising fellow-countrymen Captains Speke and Grant, Sir Samuel Baker, and others, I have no hesitation in saying that Baron Harnier's posthumous volume will carry down to posterity a more vivid impression of the Nile valley and its inhabitants, just previously to the sweeping away of its savagery and the introduction of semicivilization through the hordes of Arab and Egyptian adventurers, than any book yet published on the subject.

As, however, I do not mean to give a memoir of his life, I shall further merely allude to the sad manner of his death, as evincing a degree of courage highly creditable to the German nation. He had spent but a few months in slowly ascending the stream, and reached the Kytch and Aliab country, between lat. 6° and 7° N., where he made a stay at the Catholic Mission Station, enjoying the hospitality of Herr Morlang, a native of the Tyrol. One morning he went off to shoot buffalos, when a wounded animal rushed at the hunters (as these creatures are often wont when badly hurt and unable to get away), singling out and attacking a poor Arab attendant, who ran imminent chance of a cruel death without any succour from his frightened fellow-servants. But the Baron, brave and generous to a fault, dashed with unloaded gun to his assist-

ance, and, while saving the life of his servant, perished himself in the attempt.

Among Harnier's collection of objects transmitted to Germany were two skins of a large Antelope. One of these has been mounted, and now forms an elegant specimen in the Ducal Museum of Darmstadt; and as this specimen possesses some interest from its probably representing or being closely allied to an animal shot by our lamented countryman the late Capt. Speke in Uganda* (the head and horns of which are deposited in the British Museum), I have ventured to bring the following notice of them before our Society.

I am indebted to Prof. Dr. Kaup for permission to examine the stuffed and dried skins; and the very accurate water-colour drawing which I here exhibit to the Meeting is due to the artistic efforts of his skilled assistant and conservator, F. Kerz of Darmstadt. The accompanying lithographic plate (Pl. II.) is a reduced copy of that drawing, and demonstrates more clearly than would a description the appearance of the animal.

It will be seen that in the general aspect of the form and coloration it approaches nearly to the Waterbuck (*Kobus ellipsiprymnus*); but it wants the whitish elliptical band over the croup and hips, so peculiar to that species; while this specimen has lightish-coloured rings above the hoofs, which is not the case in *K. ellipsiprymnus*. In other respects, as to horns and the umber-brown tint of the hair, the two bear a close resemblance.

Compared with Rüppell's description and figure† of *Antilope defassa* it agrees completely. But as Dr. Gray (P. Z. S. 1850, p. 131, and Knowsley Menagerie, 15) considers the *A. defassa* of Rüppell to be but a synonym of his *Kobus sing-sing*, Harnier's Antelope therefore would thus come under the latter appellation.

Moreover, from my own examination of a living *K. sing-sing* in the Antwerp Zoological Gardens (labelled *Antilope unctuosa*, Laur., a synonym), and two stuffed specimens in the British Museum, together with the head brought from Uganda by Capt. Speke identified with *K. sing-sing* by Dr. Selater‡, I confess, although at first having some misgivings as to the identity of the two White-Nile specimens in Darmstadt with the Sing-Sing of West Africa, that I cannot adduce proof of their separateness, but rather evidence of their specific affinity.

The peculiar greasy-like cuticular transpiration in the living Sing-sing, well named *A. unctuosa* by Laurillard, was a point which at first particularly struck me; for in both skins in the Darmstadt Museum, there is neither to the touch nor look any appearance or remnant of such a secretion, whereas in the mounted specimens in the British Museum, and even in the head from Uganda, this character is to a certain extent notable. The cause of this secretion may be worthy of investigation; it is so copious in the live animal that the

* Journal of the Discovery of the Source of the Nile, 1863, p. 471.

† 'Neue Wirbelthiere zu der Fauna von Abyssinien gehörig' (1835-40), Säugethiere, vol. i. p. 9, pl. 3.

‡ Figured in 'Proc. Zool. Soc.' 1864, p. 102.

skin appears as if drenched with water, or, rather, burnished with oil.

Its being wanting in the skins from the Nile, if it did originally exist, might be accounted for by the manner of their preparation (namely, partial drying in the scorching sun), or by the intermixture of sandy particles among the hairs.

Again, in regard to colour, the West-African specimens (horned male and hornless female) in the British Museum, the head from Uganda, and the animal alive in Antwerp all have more or less of a *yellowish* brown or russet tinge, considerably lighter in shade than either of the two skins which Dr. Kaup has provisionally named *Antelope harnieri*, and which exhibit a kind of dark umber tint.

The short hair of the skin of these Nilotic animals, also, shows a contrast with the comparatively shaggy coat of the Senegal specimens. But this variety in colour and length of hair only bears out what Dr. Gray has remarked upon this point, in his description of the species (P. Z. S. 1850, p. 131). The mounted specimen in Darmstadt (that here figured) is said to be in the dress of the rainy season; the other dried skin, with even still shorter hairs, is considered to bear the coat of the dry season; but neither have the abundance or length of hair of the Senegal specimens of the Sing-sing.

Notwithstanding the differences mentioned above, which may either be attributed to variety, season, or geographical distribution, the proportions of body, head, and horns are such that no distinct line of demarcation can be drawn between the Antelopes obtained from the White Nile by Baron Harnier and the Sing-Sing inhabiting the more westerly part of the same continent.

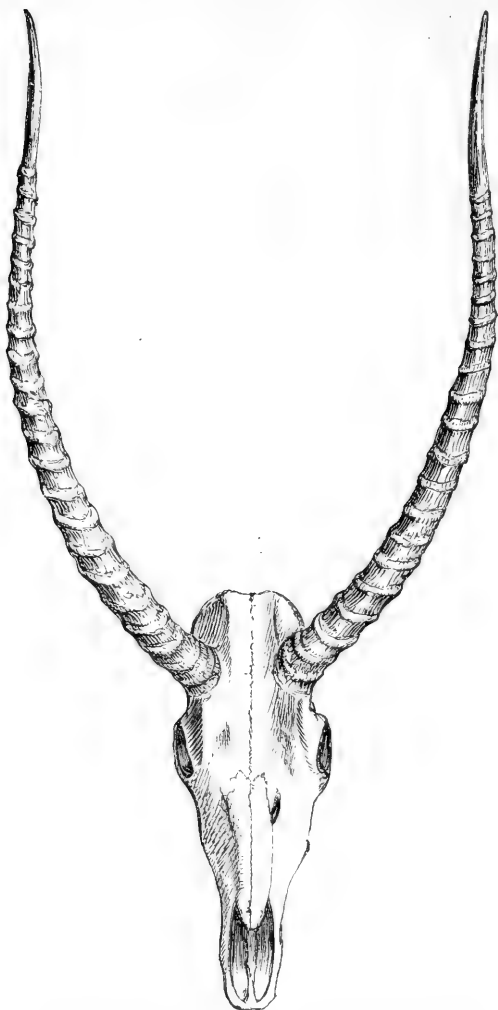
The following table illustrates in inches some of the approximate measurements of the stuffed animals:—

	Darmstadt specimen.	Brit. Mus. specimen.	Speke's spec.
Height at the shoulder	45 $\frac{3}{4}$	45 $\frac{1}{2}$..
Length of body, rump to front of shoulder. . .	52
— of head, from between the horns to tip			
of muzzle	13 $\frac{1}{2}$	13	..
— of tail	16	11	..
Horns, in length	23 $\frac{1}{2}$	22	24
—, girth at their roots	7 $\frac{1}{2}$	8	7 $\frac{3}{4}$
—, number of rings on each.	8
Length of ears	20	24

The figures of the horns and skull of Baron Harnier's specimen now exhibited (see figs. 1 & 2, pp. 6 & 7) are also copied from the pencil drawings of Herr Kerz, and are reduced to about a seventh of their natural size.

In the manner in which the horns branch outwards and backwards, and with only a slight tendency to return forwards at the tips, they agree with Capt. Speke's animal. They at the same time have a nearer resemblance to those of A. Smith's typical South-African specimen of *Kobus ellipsiprymnus*, now in the British Museum, than to the *Kobus sing-sing* in the same collection. The latter male animal,

Fig. 1.



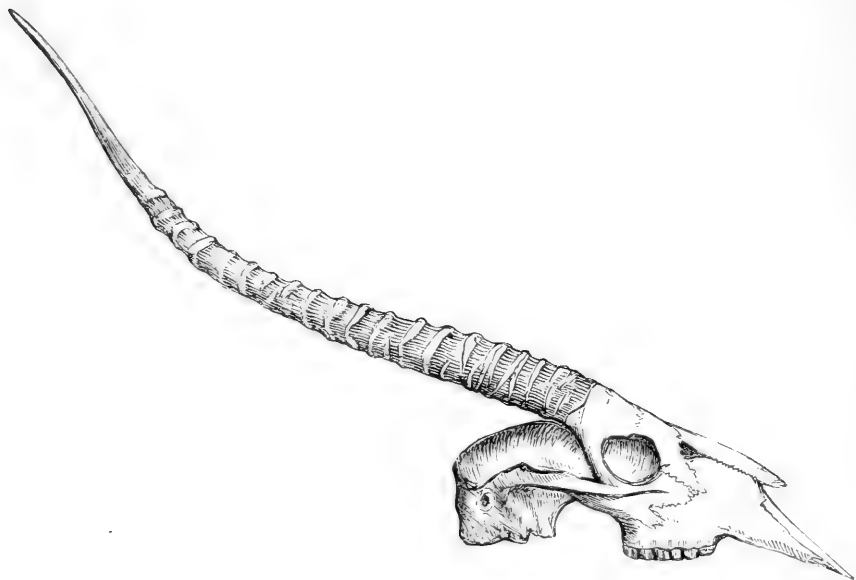
Front view, skull and horns of Harnier's Sing-sing.

I learn from Mr. Gerrard, was originally in the Earl of Derby's menagerie at Knowsley, and afterwards for some years in the Society's Gardens in the Regent's Park. In this stuffed specimen the left horn is injured at the tip, and both horns have a more flattened or horizontal backward direction and almost no forward recurve at the tip, as in the head from Uganda, or even in the allied species *K. ellipsiprymnus* in the same series.

It may be mentioned that Capt. Speke gives an illustration (*op. cit.*) of the N'samma Antelope, which appears to be the native name in Uganda for the *Kobus sing-sing*.

Sir Samuel Baker, in his interesting 'Albert Nyanza, Great Basin of the Nile' (1866, vol. ii. pp. 15, 16), tells of an Antelope shot by him near the Asua River, 3° 12' W., which he calls the Mehedehet Antelope. He says the Mehedehet weighs about 500 lb., stands 13 hands high, and has rough brown hair like the Sambur Deer of India. This description in some respects agrees with the Sing-sing, although the woodcut of the head given is not in perfect correspondence with Speke's or the present figures.

Fig. 2.



Skull and horn of Harnier's Sing-sing, in profile.

In conclusion, the foregoing remarks may be said to lead to the inference that the Antelope to which the name of *Kobus sing-sing* has been assigned appears to range in Africa from Senegambia on the west to Abyssinia on the east, and to be found, with slightly varying characters, as far south as Uganda, close upon the equator.

In some senses the Waterbuck (*Kobus ellipsiprymnus*) would seem to be its representative in South Africa, and the Nile specimens or variety of Sing-sing be a kind of intermediate link between its North-west-African congeners and this allied species of the southernmost end of the continent.

On the other hand, further tracing analogies, the Lechè (*Adenota*

lechè) might be said to be the South-African prototype of the West-African *Æquitoon* (*Adenota kob*), notwithstanding that these forms are found within a short distance of a parallel northern latitude. In the one case the animals inhabiting the southern equinox are darker and larger than those of the northern equinox. Examples might be given of other animals presenting analogous shades of difference: for instance, the Giraffes found north and south of the equatorial line have by some naturalists even been considered specifically distinct; and other authors point out like shades of difference in the Elephant &c.

How far such suggestions are surmise, and how much based on wider generalizations, more extended facts would better determine; but such thoughts do arise on considering what has been shown to occur in the fauna of other extensive continents, *e. g.* in the insects and birds of South America.

2. On *Cygnus buccinator*, Richardson, and *Cygnus passmori*, Hincks. By JAMES MURIE, M.D., F.G.S., Prosector to the Society.

The Rev. W. Hincks, F.L.S., Professor of Natural History in the University of Toronto, Canada, communicated to the Linnean Society, on the 21st January 1864*, a short but suggestive paper, wherein he gave to a specimen of Trumpeter Swan the name of *Cygnus passmori*. In a letter dated 10th of April, and subsequently read on the 5th of May of the same year, he, however, threw out hints of the possibility of an error of judgment on his part, as further investigation led him to believe that the difference in individual specimens which he at first was inclined to regard as specific might really not be such, but rather be attributable to gradation of form connected with age.

The facts brought forward by that gentleman, so far as I know, have thus been left in uncertainty; and hence arises the interrogation, Are there characters sufficiently distinct and constant to warrant a separation of the Trumpeter Swan into two species? or is the variation in individual form merely a modification or progression of growth as suggested by Prof. Hincks?

I will in the present paper endeavour to answer these questions, at least as far as the evidence goes which the examination of three specimens affords.

These were added to the Zoological Society's Collection in the Regent's Park on the 10th of May 1866, and assumed to be the true Trumpeter Swan (*Cygnus buccinator* of Richardson). Two of the birds died a short time after their arrival, and afforded me an opportunity of examining that part of the skeleton in which the chief grounds of specific separation are found, viz. the sternum, which in

* Published in the 'Journal of the Proceedings of the Linnean Society,' vol. viii. (1865), pp. 1-7.

each case was carefully compared with Yarrell's* and Hincks's figures of *C. buccinator* and *C. passmori* respectively.

First.—In connexion with external characters, I shall give a comparison of the specimen still alive in the Gardens with Hincks's and Yarrell's descriptions, premising that the two birds which died presented characters perfectly identical with their companion, excepting it may be in their dimensions, which were not taken.

The specimen under consideration, as a whole, seems to combine some of those characters attributed to *C. buccinator*, and others more distinctly connecting it with *C. passmori*. The entire body, including wing-feathers, upper part of head, and neck are pure white, and without any admixture of the ferruginous tint on the head and neck said to be constant and characteristic of *C. buccinator*, while it is also wanting in the pale grey of the same parts and fawn-coloured wing-tips of *C. passmori*. The legs and feet are black, but between the webs of the latter there is a somewhat lighter tinge of the dark hue. The beak is jet-black, as well as the naked skin posterior to it. This black skin only reaches the eye, as shown in the figure taken from the photograph of *C. passmori* given by Hincks, and not surrounding it, as that author says it does in what he considers the true *C. buccinator*.

The contour of the upper mandible, compared with the outline woodcuts in the same paper (*l. c.* figs. 1 & 2, page 6), appears intermediate between the concavity of *C. passmori* and the convexity of his *C. buccinator*, being rather a straight line than otherwise.

The weight of the live bird is 20 lb.; but it must be taken into account that it is in very poor condition, and only recovering from the effects of transport; nevertheless it is 2 lb. heavier than the specimen of *C. passmori*, although 10 lb. less than what Hincks gives of *C. buccinator*; so that, if in fair condition, it may be assumed that it would attain a medium weight between these two.

The measurements of the several parts of the body, again, are intermediate between the species, or at least greater than in *C. passmori*,—which the subjoined table illustrates in inches. The first and last columns represent Prof. Hincks's data; the middle one the specimen which has come under my observation.

	<i>C. passmori</i> . Zool. Soc. sp. <i>C. buccinator</i> .		
Length from tip of beak to end of tail	51	52	60
— of head in line of the meeting			
of mandibles	7 $\frac{1}{4}$	7 $\frac{1}{2}$	9 $\frac{1}{2}$
Distance from the back of the eye to			
tip of beak	5	5 $\frac{1}{4}$	5 $\frac{3}{4}$
— between hind point of nostril			
and tip of beak	2	2 $\frac{1}{2}$	3

It is true that Yarrell, in his paper already quoted, gives the dimensions of *C. buccinator* as somewhat greater than the above; but his measurements were taken from a stuffed specimen, while he adds

* Transactions of the Linnean Society, vol. xvii. pp. 1–4, tab. 1.

that two other skins of the same species examined by him afforded smaller dimensions.

Secondly.—Respecting the osteological evidence afforded by the sternum, it may be stated that both the dead birds exhibit a difference in the shape and relative height of the elevated bony lamella enclosing the convolution of the trachea, likewise in the general dimensions of the entire sternum, as also in its outline figure when viewed from the inside including the posterior sinuses; moreover the osseous rings of the trachea, previous to entering the carina, are not the same in each specimen. These marks of variation, whatever their value, may require a separate description. I shall first mention, for the benefit of other inquirers, that the entire skeleton of the one bird is now deposited in the British Museum, at present beside the stuffed specimens of the genus *Cygnus*; the sternum of the other forms part of the osteological series in the Museum of the Royal College of Surgeons.

The accompanying figures represent these two sterna seen from

Fig. 1.

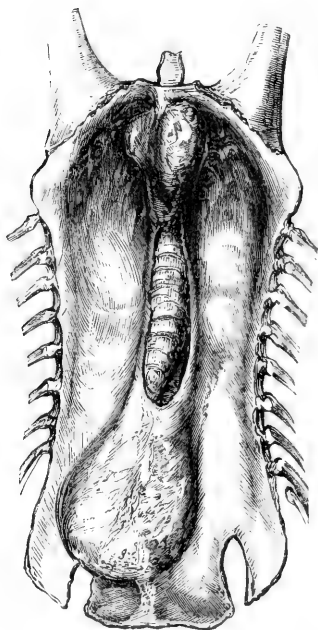
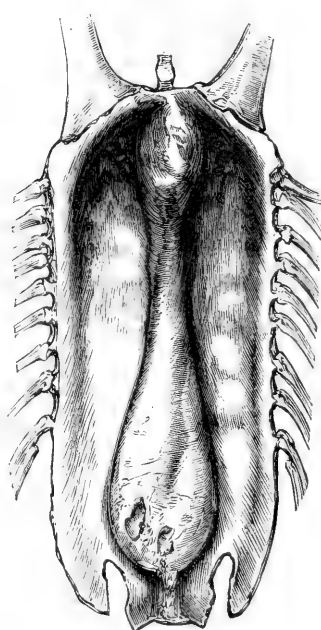


Fig. 2.



Sterna of Trumpeter Swans.

above (or inside), but without the trachea and distended bronchiæ, which are preserved intact in both the original specimens.

The specimen represented in fig. 1 is the sternum of the male bird

now in the College. The trachea in it, as Yarrell (*loc. cit.*) has described and most beautifully figured in a profile section of *C. buccinator*, comes down the neck, enters the keel, runs backwards to near the posterior end of the sternum, loops round and returns, entering the second highly raised hollow protuberance on the dorsum, again dipping ere it makes its exit under the furcula.

So far this all agrees with what Prof. Hincks says of *C. passmori*; but this author lays stress on the shape and size of the bony expansions lodging the bent trachea, and describes afresh the structure in what he believes to be the true *C. buccinator*.

The College specimen has the posterior osseous expansion 3·1 inches long, and 1·2 broad at its greatest diameter. This expansion is of an oval shape, rather truncated behind, and placed very much to the left side of the median line, excentric in this particular. Its right side is lowest; at ·6 inch from that edge, and almost at what corresponds to the middle of this part of the sternum, is a slightly depressed longitudinal furrow; from this to the left margin the bony expansion rises more quickly, until attaining a maximum height of $\frac{6}{10}$ of an inch above the horizontal sternal plate; the left edge is nearly perpendicular.

Between the anterior end of the posterior and the posterior end of the anterior osseous protuberance, the superficial protecting lamina of bone is wanting, here exposing the trachea.

The anterior, smaller but much more elevated hollow is somewhat heart-shaped, the indented broader end forwards; but here a narrow isthmus of bone joins it to the anterior sternal arch. On its left superficies it is somewhat low and flattened, where rests the laterally compressed termination of the trachea, before giving off the enlarged globiform bronchiæ.

On the right moiety the bone rises $\frac{3}{4}$ of an inch higher, and is as it were compressed on either side, but has a high arched form when viewed in profile. The dimensions of this bony protuberance are 1·5 inch from before backwards, and fully 1 inch in its greatest transverse diameter. It is raised a little more than an inch above the highest level of the outer sternal plate of bone, to which the foremost ribs are attached.

The two posterior sternal emarginations are finger-shaped, and above an inch deep. The left one is overlapped and partially hidden by the after tracheal protuberance (see fig. 1). The greatest length of the entire sternum is $8\frac{1}{2}$ inches; the extreme breadth, viz. posteriorly, equal to 4 inches.

The side view agrees in the main with Yarrell's figure; Hincks's does not display the details of structure so accurately.

Looked from from above or inside, as in the figure (fig. 1), the two costal edges have a long but shallow concave outline, so as to produce a tendency to a sand-glass form.

In the total length of the sternum and in the height and inclination to the right of the anterior protuberance it thus corresponds to Hincks's description of his *C. buccinator*; but the breadth agrees with *C. passmori* and with Yarrell's *C. buccinator*. The tracheal

rings I shall mention hereafter, but here only point out they are like Yarrell's plate, and not Hincks's figure of them in his *C. buccinator*.

The second figure (fig. 2) represents the sternum of the skeleton in the British Museum, contrasted with that of its companion bird (fig. 1). The disposition and inflexions of the trachea correspond to the one first described, and with it confirm the accuracy of Yarrell's distinctions between the Hooper, with one vertical sterno-tracheal convolution, Bewick's Swan, with a single horizontal one, and the Trumpeter with two, one in each of these directions.

In the specimen in question (fig. 2) the posterior tracheal osseous eminence is situated nearly equidistant between the right and left sides. Its length is not so sharply defined as in the other; but its measurements correspond to about 3 inches long and $1\frac{1}{2}$ broad. Neither is it so lop-sided in form, and it wants the posterior truncation present in its fellow bird, while its surface rises from each margin equally, until attaining in the middle a height of $\frac{1}{2}$ an inch above the level of the horizontal sternal plate. There is a very slight foramen or deficiency of bone towards the left side.

The anterior tracheal bony prominence is ovoid, and not heart-shaped as in the College specimen. The depression or shelf upon which the end of the trachea and bronchiæ rest is not so broad nor by any means so scooped out as in the other. The greatest height which the bone reaches in this cavity is but $1\frac{1}{2}$ inch, and the sides are less perpendicular.

The sterno-tracheal elevations in the points mentioned above, particularly the height of the anterior and less magnitude of the posterior, agree closely with those of *C. passmori*.

The posterior sternal emarginations in the British Museum specimen are both uncovered, and neither of them is so deep or smooth-edged as in the companion bird. The greatest length of the sternum is $8\frac{1}{4}$, and its breadth behind $3\frac{1}{4}$ inches.

The costal edges run almost parallel; the terminal manubrial and ensiform plates are comparatively the narrowest; and the sternum altogether is shallower inside, or at least shelves more gradually towards the middle.

Over and above these strictly sternal differences, the rings of the trachea in the two birds present variation. In the British Museum specimen the bony rings, from the bend of the neck to where the trachea enters the keel, are intermittingly broad and narrowed or wedge-shaped on the upper and lower halves; in other words, each half of the ring is unequal in breadth and dovetailed to those on either side of it, just as Hincks has depicted (*loc. cit.* p. 6. f. 8) in the trachea of his *C. buccinator*, where it divaricates at the bronchiæ. In the College specimen the rings are nearly uniform in breadth, or very sparingly show this peculiar kind of wedge-shape. In both specimens the trachea, after its emergence from the sternum, has wider, regular rings, such as Yarrell's sectional view illustrates; but the College specimen has here and there a tendency to revert to the unequal form.

This tracheal character reverses the similitude exhibited by the two sterna to *Cygnus passmori* and *C. buccinator* respectively. Moreover it would seem that no two sterna of all mentioned are identical in every point.

Finally.—The foregoing details regarding external and internal points of variation, if taken together and placed in juxtaposition with those of the authors mentioned, lead partly to the decision thrown out by Prof. Hincks himself, that there is a variability "or succession of degrees of development according to age;" in the Trumpeter Swan (*Cygnus buccinator*) it may be also in sex, although I am rather of opinion that it is an individual difference not always dependent on age or sex. Whichever of these may have most weight, the distinctions which he at first attributed as specific appear in reality not to be valid.

In favour of this view, we have three specimens all agreeing in common, and yet differing slightly from his and Yarrell's accounts of the colouring. For the rufous coloration does not necessarily imply specific value, as it is well known to ornithologists in general that many of the *Anatidae* are more or less subject to an occasional rufous tinge, the reason of which is not satisfactorily ascertained. The Teal and Pintail are often conspicuous in this respect, and the head is generally so affected.

Much dependence cannot be placed on the weight or even on the measurements of the body, as age and condition seriously affect them.

In birds the sternum is the bone in which most dependence can be placed as indicating affinities, or even specific difference*; and this, along with the disposition of the trachea, is markedly so in the genus *Cygnus*, as Yarrell has well demonstrated. But here in *C. buccinator* we have in the variation no essential typical alteration, but simply a gradual growth and change in size of the parts, together with a certain amount of individual and developmental difference.

When it has been shown that in another species of *Cygnus* (*C. lewickii*) the osseous expansion destined to protect the enclosed loop of the trachea alters considerably, but within certain limits, from the young to the adult stage†, and that this alteration in size and relative position in the specimens of *C. buccinator* and in the so-named *C. passmori*, referred to or described in this paper, only exhibits the counterpart of such a change, it prepares us to believe, on the evidence adduced in our data, that Yarrell's and Hincks's bird are one and the same, and that *Cygnus buccinator* is alone the proper specific name to be retained by naturalists.

* Prof. Owen truly says the sternum is "the main characteristic of the bird" (On the Anatomy of the *Apteryx*, Trans. Zool. Soc. vol. ii. p. 290).

† See Trans. Linn. Soc. vol. xvi. (1833) p. 447, tab. 25, where Yarrell figures three differently aged birds, manifesting a gradual increase of the tracheo-sternal protuberance.

3. On the Fishes of Cachar.

By Lieut.-Colonel R. L. PLAYFAIR, F.Z.S.

(Plate III.)

I have received from Major Stewart, Superintendent of Cachar, a small but interesting collection of the Fishes of that region. He informs me that "they are from rivers, lakes, and ponds;" but he does not specify the particular specimens from each of these sources.

Cachar is one of the most eastern provinces of British India, and lies within the watershed of the Burhampooter; as might be expected, therefore, its fish-fauna is very similar to that of Assam. The collection contains about thirty species, twenty-six of which I have determined; the remainder are *Cyprinidæ*, either too small for correct identification or apparently new; these I have made over to Dr. Günther, who is at present engaged on that family, which will form part of the seventh volume of his 'Catalogue of Fishes.'

1. AMBASSIS RANGA.

Chanda ranga, Buch. Ham. p. 113, pl. 16. f. 38.

Ambassis ranga, Cuv. & Val. ii. p. 183; Günth. Fish. i. p. 228.

2. GOBIUS GIURIS.

Russell, pls. 50, 51, 53.

Gobius giuris, Buch. Ham. p. 51, pl. 33. f. 15; Günth. Fish. iii. p. 21.

3. NANDUS MARMORATUS.

Coinis nandus, Buch. Ham. p. 96, pl. 30. f. 32.

Nandus marmoratus, Günth. Fish. iii. p. 367.

4. OPHIOCEPHALUS PUNCTATUS.

Ophiocephalus punctatus, Bl. Schn. p. 237; Cuv. & Val. vii. p. 404; Günth. Fish. iii. p. 469.

O. lata, Buch. Ham. pp. 63, 367, t. 34. f. 18.

O. indicus, McClell. Calc. Journ. Nat. Hist. ii. p. 583.

5. OPHIOCEPHALUS STEWARTII, sp. n. (Pl. III.)

D. 39-40. A. 27. L. lat. 50. L. transv. 5/9.

Shields on the upper surface of the head large. Some larger teeth in the lower jaw, and on the vomer and palatine bones. The height of the body is contained six times and two-thirds, and the length of the head four times in the total length. Scales on the cheeks very large, there being only seven in a longitudinal series between the eye and the gill-opening. The maxillary reaches beyond the vertical from the posterior margin of the orbit. The length of the snout is one-fifth, the width of the interorbital space is one-third, and the breadth of the head is three-fifths of the length of the head. The pectoral does not reach the anal, and is somewhat more than half

the length of the head. The length of the ventrals is less than half that of the pectorals.

Colour brownish black above, lighter below; most of the scales behind the roots of the pectorals have a round black spot in the centre. In immature specimens, 5 inches long, these spots are not perceptible. Fins dark, immaculate. In young examples the pectorals have transverse darker cross bands. Length $9\frac{3}{4}$ inches.

6. ANABAS SCANDENS.

Perca scandens, Daldorff, Trans. Linn. Soc. iii. p. 62.

Cojus cobojus, Buch. Ham. pp. 98, 370, pl. 13. f. 33.

Anabas scandens, Günth. Fish. iii. p. 375.

7. TRICHOASTER FASCIATUS.

Trichogaster fasciatus, Bl. Schn. p. 164, t. 36; Günth. Fish. iii. p. 387.

Trichopodus colisa, Buch. Ham. pp. 117, 372, pl. 15. f. 40.

? *T. bejeus*, Buch. Ham. pp. 118, 372.

? *T. cotra*, Buch. Ham. pp. 119, 372.

? *T. lalius*, Buch. Ham. pp. 120, 372.

Of the four specimens of *Trichogaster* received from Cachar, two correspond to the commonest Indian form, *S. fasciatus*, while two others differ considerably from it both in form and coloration. As, however, this fish is very widely spread over India, and is subject to considerable variations, I hesitate to describe the latter as a new species.

TRICHOASTER FASCIATUS, var.

D. $\frac{16}{8-9}$. A. $\frac{14-18}{14-16}$.

Body much more elevated than in the previous variety; its height is contained once and four-fifths in the total length without caudal; the length of the head is two-fifths of the same. Præorbital serrated. Caudal subtruncated. The dorsal and anal fins much more elevated than in any previously described variety; the fourth spine of the anal is the longest, the others decrease in length posteriorly; the longest spine of the dorsal (the last) is two-fifths, and the longest of the anal (the fourth) is one-third of the height of the body. The ventral filament reaches as far as the termination of the anal.

Colour of the body uniform silvery; the posterior parts of the vertical fins marked with blackish. Length 2 inches.

I have carefully examined the original drawings of Buchanan Hamilton's species in the British Museum; but this cannot be referred to any of them.

8. CLARIAS MAGUR.

Macropteronotus magur, Buch. Ham. pp. 146, 374, pl. 26. f. 45.

Clarias batrachus, Bleek. Atl. Ichth. Silur. p. 103, t. 98. f. 2.

C. magur, Günth. Fish. v. p. 17.

9. SACCOBRANCHUS SINGIO.

Silurus singio, Buch. Ham. pp. 147, 374, pl. 37. f. 46.

Saccobranchus singio, Cuv. & Val. xv. p. 400, pl. 445; Günth. Fish. v. p. 30.

10. EUTROPICHTHYS VACHA.

Pimelodus vacha, Buch. Ham. pp. 196, 378, pl. 19. f. 64.

Bagrus vacha, Cuv. & Val. xiv. p. 392.

Eutropichthys vacha, Günth. Fish. v. p. 38.

11. SCHILBICHTHYS GARUA.

Silurus garua, Buch. Ham. pp. 156, 375, pl. 21. f. 50.

Schilbe garua, Cuv. & Val. xiv. p. 379, pl. 413 (not good).

Schilbichthys garua, Günth. Fish. v. p. 57.

12. CRYPTOPTERUS LATOVITTATUS, sp. n.

Br. 12. D. 4. A. 56-58. P. $\frac{1}{11}$. V. 7.

The height of the body is about equal to the length of the head, or one-fifth of the total length (without caudal). Nape of neck convex. The dorsal is situated behind the vertical from the base of the ventral, and before that from the origin of the anal. Eye situated near the lower profile of the head. Cleft of mouth nearly twice as broad as long; lower jaw strongly prominent; vomerine teeth in a short narrow band. The maxillary barbels extend as far as the extremity of the pectoral. Mandibular barbels absent. Pectoral much shorter than the head; its spine is strongly denticulated on its inner side, and is little more than half as long as the head. Ventrals about once and a half as long as the eye. Caudal forked to about half its length; it is longer than the pectoral spine.

Colour silvery; an irregular oblong blackish patch along the commencement of the lateral line. Length $4\frac{1}{2}$ inches.

13. MACRONES CAVASIUS.

Pimelodus cavasius, Buch. Ham. pp. 203, 379, pl. 11. f. 67.

P. seengtee, Sykes, Trans. Zool. Soc. ii. p. 374, pl. 66. f. 2.

Macrones cavasius, Günth. Fish. v. p. 76.

14. BARBUS SOPHORE.

Cyprinus sophore, Buch. Ham. pp. 310, 389, pl. 19. f. 86; Cuv. & Val. xvi. p. 388.

15. LABEO PANGUSIA.

Cyprinus pangusia, Buch. Ham. pp. 285, 386; Cuv. & Val. xvi. p. 429.

Gobio pangusia, McClell. Ind. Cyprin. p. 279, 362, pl. 24. f. 1.

16. CIRRHINA DYOCHEILUS.

Labeo dyocheilus, McClell. Ind. Cyprin. pp. 268, 330, pl. 37. f. 1; Cuv. & Val. xvi. p. 461.

17. *CROSSOCHILUS REBA*.*Cyprinus reba*, Buch. Ham. pp. 280, 386.*Cirrhitina dussumieri*, Cuv. & Val. xvi. p. 291, pl. 480.*C. reba*, Cuv. & Val. xvi. p. 292.18. *CROSSOCHILUS LATIUS*.*Cyprinus latius*, Buch. Ham. pp. 345, 393.*Gonorrhynchus macrosomus*, McClell. Ind. Cyprin. p. 372, pl. 43.
f. 7; Cuv. & Val. xvi. p. 411.19. *CYPRINUS RASBORA*.*Cyprinus rasbora*, Buch. Ham. pp. 329, 391, pl. 2. f. 90.20. *CYPRINUS MOLA*.*Cyprinus mola*, Buch. Ham. pp. 334, 392, pl. 38. f. 92; McClell. Ind. Cyprin. pp. 293, 407; Cuv. & Val. xvi. p. 440.21. *CYPRINUS BACAILA*.*Cyprinus bacaila*, Buch. Ham. pp. 265, 384, pl. 8. f. 76; Cuv. & Val. xvi. p. 460.*Ospariius bacaila*, McClell. Ind. Cyprin. pp. 295, 414.22. *CYPRINUS COTIO*.*Cyprinus cotio*, Buch. Ham. pp. 339, 393, pl. 39. f. 93; Cuv. & Val. xvii. p. 76.*Abramis cotio*, McClell. Ind. Cyprin. pp. 288, 388.23. *COBITIS DARIO*.*Cobitis dario*, Buch. Ham. pp. 354, 394, pl. 29. f. 95; Cuv. & Val. xviii. p. 85.*Schistura dario*, McClell. Ind. Cyprin. pp. 306, 444.24. *NOTOPTERUS KAPIRAT*.*Gymnotus notopterus*, Pallas, Spic. Zool. vii. p. 40, t. 6. f. 2.*G. kapiarat*, Bonnat. Encycl. Méth. p. 37, pl. 24. f. 83.*Notopterus kapiarat*, Lacép. ii. p. 190; Val. in Bélanger, Zool. Voy. Ind. p. 391, pl. 5. f. 1.*Mystus kapiarat*, Buch. Ham. pp. 235, 382; Gray, Ill. Ind. Zool.*Notopterus pallasii*, Cuv. & Val. xxi. p. 130.25. *ENGRAULIS TELARA*.*Clupea telara*, Buch. Ham. pp. 241, 382, t. 2. f. 72.*Engraulis telara*, Cuv. & Val. xxi. p. 56, pl. 608.26. *ALOSA MICROLEPIS*.*Clupea indica*, Gray, Ill. Ind. Zool.*Alausa microlepis*, Cuv. & Val. xx. p. 439.

4. On *Hyalonema mirabile*.

By J. S. BOWERBANK, LL.D., F.R.S., &c.

(Plates IV. & V.)

Hyalonema was named and described by Dr. J. E. Gray in the Society's 'Proceedings' for 1835, p. 63, from a specimen sent from China to the India House in London; under the name of the Glass Plant, and subsequently in a paper published in the Society's 'Proceedings' for 1857, p. 279, entitled "Synopsis of the Families and Genera of Axiferous Zoophytes or Barked Corals." The author designates it as a Coral, and describes it as follows:—

"Family 1. HYALONEMADÆ.

"Coral subcylindrical, rather attenuated, and immersed in a fixed sponge. Axis in the form of numerous elongated, slender, filiform, siliceous fibres, extending from end to end of the Coral, and slightly twisted together like a rope. Bark fleshy, granular, strengthened with short cylindrical spicula; polypiferous cells scattered, rather produced, wart-like, with a flat radiated tip.

"1. HYALONEMA, Gray.

"The character of the family.

"1. HYALONEMA MIRABILIS.

B.M.

"*Hyalonema mirabilis*, Gray, Syn. B.M. 1830, 118.

"*Hyalonema sieboldii*, Gray, Proc. Zool. Soc. 1835, 63; Dana, Expedition, 642.

"Japan (*Sir Hans Sloane; Siebold*).

"The Coral, as it is usually seen, consists of three distinct portions of very different texture and appearance—the axis, bark, and the sponge."

The author then proceeds to describe each of these parts in detail, and in page 282 he writes, "The sponge to which it is attached has no real connexion with the Coral, except as affording it the means of support, and is of the common structure." And subsequently he states it as his opinion that "There can be no doubt, after the examination of the two specimens in the British Museum, one in my own collection, one in Paris, and several in the Leyden Museum, that the bark evidently belongs to the axis, and that this Coral is a true Zoophyte, and not a sponge covered with a parasitic Zoophyte, as it is regarded by M. Valenciennes (see Milne-Edwards, British Corals, 81)." In the first sentence quoted the author asserts that the sponge is a part of the Coral; in the commencement of the following paragraphs he decidedly denies the connexion existing between them; but I presume that the latter is the real opinion of the author. In the 'Annals and Magazine' for October, 1866, Dr Gray corrects

his former opinion that *Hyalonema* belonged to the "Barked *Alecyonaria*," and announces his belief that it should be arranged with the *Zoanthidæ*.

In the Society's 'Proceedings' for 1864, p. 265, M. Barboza du Bocage, Director of the Museum of Natural History at Lisbon, has described a specimen of *Hyalonema*, which was found off the coast of Portugal, near the mouth of the River Sado. This specimen does not appear to have had any portion of a basal sponge appended to it. The author designates the protuberant organs on the coriaceous coat of the spiral column as polypes; and describes what he conceives to be a row of twenty tentacles around the central orifice, and a second circle within the first one of conical elevations which appear to him to be rudimentary tentacles, which he describes thus:—"Les tentacules sont de forme triangulaire, comprimés des deux côtés, à bords parfaitement lisses, et à pointe mousse et arrondie. Ceux du premier rang sont plus larges à la base; et leur bord antérieur est plus convexe, et en forme de bourrelet arrondi."

The author subsequently obtained two other specimens of the same species, and described them in the same work for November 1865: in p. 663 he writes:—"Quoique l'hypothèse du parasitisme des polypes soit aujourd'hui en faveur, soutenue qu'elle est par de grandes autorités scientifiques, les résultats de mes observations sur les spécimens du Portugal me semblent plus favorables à l'hypothèse contraire." The author then proceeds to give the reasons for this conclusion under five separate heads.

The observations of M. Barboza du Bocage do not throw much light on the subject of the disputed nature of *Hyalonema*; and the proofs he offers under five separate heads go rather to prove the spongy nature of *Hyalonema* than its polypiferous nature. In no. 1 he merely states that no spongy base has been found on the Portuguese specimens; but this may also be stated of the greater number of specimens from Japan. He also states, in no. 2, that the corium polypigerum in one specimen from Portugal envelops the whole of the axis entirely, from the smallest extremity, for two- or three-fifths of its length. And this is just the condition of the specimen, supposing its lower portion to have been enveloped by a basal spongy mass, as is the case with the most perfect specimens from Japan; and the gradual diminution in the size of the oscula (polypiferous orifices of the author) is quite in accordance with their characters as oscula of an extended cloacal appendage to a sponge of such a structure. In no. 3 the author describes the structure of the corium polypigerum, or coriaceous bark of Gray, in terms which apply equally well to the similar parts of *Hyalonema mirabile*, in which siliceous spicula are also abundant, intermixed with extraneous particles of sand; but the intermixture of the latter would greatly depend on its local surroundings while living. In no. 4 the granulated appearance of the surface of the corium is described as "due to the presence of an infinite number of regular spicula dispersed in masses and bristling with points." And in no. 5 he states that each polype is sustained by a siliceous structure of filiform spicula, disposed

longitudinally, and at equal intervals on the internal sides of the cavities.

Thus under the last two heads we have a description of forms of siliceous spicula and modes of their disposition in perfect accordance with well-known spongy organization; and in truth the whole of the author's descriptions of the Portuguese specimens are strongly in favour of their spongy nature, both as regards the material of which the spicula are composed, as well as in their mode of disposition on the outer surface of the corium or bark, which is in perfect accordance with the external defensive systems so frequently observed among sponges.

No specific characters of *Hyalonema lusitanicum* are given to distinguish it from *H. mirabile*; and it would not at all surprise me if, upon a further knowledge of the characters of the former, it were to prove to be the same species as the latter; no forms of spicula are given to enable us in the slightest degree to separate the one from the other.

Other naturalists have published works on *Hyalonema*—Prof. John Frederick Brandt of St. Petersburg in 1859, Prof. Max Schultze in 1860, and Dr. Leidy of the United States; but as I have not seen the specimens described by these authors I shall confine my observations to the type ones of the genus in the British Museum and others which I have had the opportunity of closely examining. The opinions of the authors who have written on these subjects vary considerably from each other; but none of them, I believe, entertained the idea that *Hyalonema* was neither more or less than a sponge in all its parts.

In 1860, while searching for new forms of spicula and other structural peculiarities of the sponges to assist me in the construction of a systematic nomenclature by which the species might be described, as plants are in botanical science, I became acquainted with the specimens of *Hyalonema* in the British Museum; and in the course of a minute examination of the one with the basal mass of sponge I found numerous forms of siliceous spicula which I had not before seen, and which I afterwards figured and described in the 'Philosophical Transactions of the Royal Society of London' for 1862. Figures 3, 4, 5, and 6 in plate 31, and figures 12, 20, 30, 34, 35, 36, 37, and 38 in plate 36, are all from the specimen in the British Museum; and the result of this examination of the specimen was a strong conviction that the whole of the parts formed but one animal, and that it was truly a sponge. This conviction I published in the third part of my paper "On the Anatomy and Physiology of the *Spongiada*," in the 'Philosophical Transactions of the Royal Society' for 1862, p. 1113; and as the description of the genus given by Dr. Gray applied only to a part of the animal instead of to the whole of it, I deemed it necessary to enlarge the generic characters so as to embrace the whole of the most important parts of its structure, in the following manner:—

"Skeleton an indefinite network of siliceous spicula, composed of

separated elongated fasciculi reposing on continuous membranes, having the middle of the sponge perforated vertically by an extended spiral fasciculus of single elongated and very large spicula, forming the axial skeleton of a columnar cloacal system."

I did not attempt any description of its specific characters, as my object at that time was the description of generic characters only. I now propose entering fully upon the consideration of the minute structures of every part of this complicated and curious animal, and to endeavour to give such descriptions of them as may serve to distinguish it as a species from any other of its congeners.

HYALONEMA MIRABILE, Gray.

Sponge.—Massive, sessile. Surface even. Oscula mammiloid, more or less elevated; terminations depressed, corrugated in radiating lines, numerous, dispersed over the surface of a single central elongated cloacal column projected from the middle of the sponge upward; dermis of the cloaca coriaceous, thick, composed of two layers—outer layer arenaceous, inner layer spiculous; spicula acerate, and cylindro-cruciform, apically or entirely spinous, various in size and proportions: axis of the column a single large spiral fasciculus of very long fusiformi-acerate spicula, each extending from its base to near its apex; spicula asperated near the base. Skeleton lamelliform; spicula fusiformi-acerate, long and slender, apices obtusely terminated; or fusiformi-subcylindrical. Defensive spicula:—external inflato-fusiformi-acerate, hemispinous distally; spines ascending. Internal defensive spicula spiculated cruciform; spicular ray ascendingly and entirely spinous; cruciform rays spinous. Tension spicula inflato-acerate, long and very slender. Interstitial spicula attenuato-rectangulated, hexradiate, large and small; and fimbriated multihamate birotulate, in two systems: the primary one very large and stout; hami cultelliform, fimbriated at the base of the inner surface; shaft cylindrical, entirely tuberculated, tubercles stout; spicula dispersed. The secondary system:—spicula smaller than those of the primary one; hami very long, apices nearly meeting; neither fimbriated nor cultelliform, congregated. Interstitial spicula cylindro-cruciform, terminally or entirely spined; radii short and very stout; spines conical, acute, and very large. Retentive spicula quadrihamate, minute; hami simple, elongate, attenuated.

Colour, undetermined in the living state.

Hab. Japan.

Examined in the dried state.

The most perfect specimens I have seen are that in the British Museum (which has the long spiral cloacal column immersed in the basal mass of the sponge to very near its proximal extremity, as represented in the Society's 'Proceedings' for 1857, plate ix., Radiata), and two smaller ones now exhibited (see Pl. IV. figs. 1 & 2). For the loan of the first of these I am indebted to my friend Capt. C. Tyler, and for the second to the kindness and liberality of my friend Mr. Henry Lee. One other specimen in a similarly perfect state

of preservation is in the collection of the Bristol Museum. Numerous other specimens are now known, of which the spiral cloacal column alone has been preserved by the Japanese fishermen who took them; and of such specimens I have had nineteen in my possession. Of these, five had none of the coriaceous dermis around the spiral column. Three specimens from the collection of my friend Capt. Charles Tyler had portions of the basal mass of sponge closely adhering to the proximal end of the column, and one of these three has every appearance of having been accidentally withdrawn from the original basal mass of sponge some time previously to its being taken by the Japanese, as there is, about $\frac{3}{4}$ of an inch above the proximal end of the spiral column, a small bulbous mass of the sponge remaining, nearly an inch in length (Pl. IV. fig. 1). This small mass has secreted a new thin brown dermal membrane, which is continued upward for about an inch, closely surrounding the spiral column. It then throws out ten or twelve of the mammiform oscular bodies in the course of about another inch of its progress upwards, the remainder of the spiral axis being in a denuded state. The membrane surrounding the bulbous mass of sponge and that closely embracing the spiral column above it are continuous and identical in structure, thus affording unmistakeable evidence of their forming parts of one and the same animal. The specimen represented in Pl. IV. fig. 2 has the spiral column enveloped by the corium from its junction with the distal end of the basal sponge for about 2 inches upward, but it does not enter its substance. The dermal membrane of the sponge is entirely wanting.

Two of the nineteen specimens had their distal terminations entirely covered by the coriaceous dermis of the column; and several of them had the thinning off of the proximal extremity of the dermis of the column at the point of its junction with the thin dermal membrane of the distal end of the basal mass of the sponge; so that between the whole of the specimens there is no part of the entire sponge which is not duly represented.

The basal mass of the sponge in the British Museum collection is of a compressed massive form; it is $5\frac{1}{2}$ inches in height, $3\frac{3}{4}$ inches in width, and nearly $1\frac{1}{4}$ inch in thickness; the total height, including the cloacal column, is 20 inches. The base of the spiral axis of the cloacal appendage is at or near the base of the sponge; and it passes thence in a vertical direction through its substance, emerging at its distal extremity. The surface of the spongy mass has every appearance of having been smooth and even.

The great cloacal organ and its oscula are exceedingly interesting in their structure. While the spiral axis of the cloaca is surrounded by the basal spongy mass, it has no dermal investment of any kind; but as soon as it emerges from its distal extremity the thin dermal membrane of the sponge is continued over the surface of the column, and gradually thickens in its course upward, until it assumes the form of a stout coriaceous investment, and it then becomes composed of two distinct layers, the outer one being thickly studded with grains of sand and other extraneous substances, which do not

appear to touch each other, but are separately enveloped by keratode in the manner that is so prevalent in the genus *Dysidea*, Johnston. The inner layer has few such adventitious matters imbedded in it; but in place of such material there are numerous cylindro-cruciform and other siliceous spicula dispersed throughout its whole length. From this thick coriaceous dermis the oscula are projected abundantly; they are dispersed over its surface without any appearance of order. In some specimens they are nearly uniform in size, seldom exceeding about a line in height, while in others they vary in that respect to a very considerable extent. In one specimen in my possession a few only are as short as a line, while others vary from 6 lines in height to scarcely an elevation of the apex of the organ above the dermis of the cloaca. The apical terminations of these organs also vary considerably; they are more frequently slightly oval than circular, and in many instances they are quite as much oval as those figured by M. Barboza du Bocage from his *H. lusitanicum*, described in the Society's 'Proceedings' for 1864, p. 264.

I cut off the corrugated apical portion of several of these oscular bodies and mounted them in Canada balsam: the outer surface in most of them was so thickly studded with closely adhering grains of sand that no part of the dermal surface could be distinctly seen; but in some the central orifice was partly open, and the radiating structure was more than usually distinct. In these specimens it was apparent that the radiating ridges within the outer surface do not extend from the circumference to the centre, but only to the outer margin of a central circular membrane with concentric lines of minute corrugations. These structures, therefore, have every character of contractile organs, supplying the place of muscles, so as to enable the animal to open and close the oscular orifice at its pleasure. Within the outer portion of the apex of the osculum, at about the distance of one-third or one-fourth of its diameter, there is situated a second membranous diaphragm, of much less complicated structure than the outer one. This also was not entirely closed; the inner margin of this membrane also exhibited a series of numerous concentric corrugations, forming a flat circular band around the orifice, from the outer margin of which lines of thickened membrane radiated towards the outer margin of the organ; and they gradually expanded laterally, uniting and forming the extreme circumference of the perforated diaphragm, thus exhibiting a series of contractile membranes for the opening and closing of the inner diaphragm in a similar manner to that of the outer one. The radial lines of the inner diaphragm do not correspond with those of the outer one, and they are not so numerous. The apical and the inner diaphragms are connected by a circular series of dissepimental membranes, the planes of which are at right angles to the upper and lower diaphragms; so that the internal aspect of this complicated valvular structure bears no very distant resemblance to the dissepimental structures of many seed-vessels of plants, supposing sections at right angles to their axes to have been made. Sections of this valvular structure in its natural condition are represented in Pl. IV.,

fig. 3 representing a view of the interior of the distal portion of a section through the middle of the valve at right angles to the central axis of the oscular tube, by direct light; fig. 4 represents the proximal diaphragm of the same specimen mounted in Canada balsam. The action of these two valvular diaphragms appear to be more or less independent of each other; and the radiating motive fibres, comparatively few in number and very different in their structure from those of the apical valve, are readily visible in their natural condition when immersed in water or Canada balsam. This is not the case with the motive organs of the more complicated apical valve, which are deeply immersed in the substance of the apical diaphragm, and which cannot be displayed until the internal dissepimental structures and the membrane above, which covers them, are removed by the action of a solution of caustic potass for about eight hours—Brander's solution one part and distilled water three parts being of about the required strength. When these impediments have been removed, the series of motive fibres present a very interesting appearance. The whole consists of numerous spindle-shaped fibres, one end of each being attached to the outer circumference of the corrugated apical area, and the other end to the inner circle of the same part, leaving a circular inner area of transparent membranous structure, the middle of which has the natural orifice of the osculum in its centre, usually in a closed and puckered condition. This parallel radial series of motive filaments, represented in Pl. IV. fig. 5, is doubtless not in its natural condition, the action of the potass having probably increased the motive filaments to two or three times their natural diameter; so that, when in this state they are forced by pressure or other means through the outer orifice of the osculum, they may have been very readily mistaken for tentacula. The radial motive fibres in the specimen under consideration appear to consist of a strong external membrane filled with dense amber-coloured keratode, apparently the same substance as that of which the corium is composed. The inner membrane, covering the under surface of this radial series of fibres, is apparently a much more delicate tissue than that of the dissepiments of the valvular structure beneath; and the fragments disrupted by the action of the potass are crowded with minute elongated spiral cells; but these cells are not peculiar to this portion of the membranous structures of the corium, as I have found them also in parts of that organ which were not connected with the oscular tubes. Their position, immersed deeply in the sarcodous membrane lining the inner surface of the apical valve, and closely covered by the distal end of the dissepimental structures, and also completely immersed in the sarcodous membrane of the inner corium, would seem to indicate them to have some other office in the economy of the animal than that of urticating organs as suggested by Prof. Max Schultze.

In the membrane forming the inner diaphragm, and in the parietes of the tubular part of the osculum, there are frequently found cylindro-cruciform and other spicula of the same description as those imbedded in the inner corium. These peculiar forms of spicula

imbedded in such large quantities in the latter tissue might, by a great stretch of imagination, be thought to have been selected from other extraneous matters around and thus appropriated; but this solution of their presence in the valvular structure of the supposed polype, deeply imbedded in its sarcodous membranes, is certainly inadmissible. In the valvular structures they are in a position in which secretion alone can account for their presence; and their appearance under such circumstances incontrovertibly connects them with the corium on which the so-called polypes are based; so, in like manner, their abundant presence in the inner corium, and still more profuse occurrence in the basal sponge, connects the corium and basal sponge unmistakably together. We have therefore, by means of these peculiar and very striking forms of spicula, a sequence of proof of a most conclusive character that the whole of the structures present in the most perfect specimens of *Hyalonema* are parts of one and the same animal.

Professors Brandt, Bocage, and Max Schultze, in their respective papers on *Hyalonema*, believed that they had detected tentacula within the heads of the oscular projections; and the former two have each figured what they regard as those organs with powers of about 4 or 5 linear. The figures of the supposed tentacles of the first and second named authors differ exceedingly; and if each be correct, their supposed polypes cannot belong to the same genus. The former author does not seem to have much faith in the reality of what he depicts, as in the description of the figure 8. tab. 2, in his work, he writes, "quoad tentacula expansa idealis." I have no doubt that by soaking the oscular projections in a solution of caustic potash, and by pressure or a little clever manipulation on the softened and half-destroyed tissues of the valvular structure within them, their motive fibres, which pass inward from the inner surface towards the central diaphragm, may be loosened and withdrawn from the apical orifice, and so disposed by pressure or otherwise as to readily deceive an observer whose mind was previously occupied by a foregone conclusion.

I am well acquainted with the polype-cases of *Zoanthus couchii* in the form of *Dysidea papillosa*, Johnston. They are stout open tubes, composed of sand cemented together by animal matter, and they have nothing within them like the elaborate keratose valvular apparatus that we find in the distal ends of the oscular projections in *Hyalonema*; in fact their apices are permanently open when the polypes, their former occupants, are destroyed. Nor have they at any time any appearance of tentacles upon them. Those organs at all times appertain to the soft retractile polypes, and not to the polydroids that they inhabit. It has been suggested that *Hyalonema* really consists of the basal spongy mass, the spiral column of spicula, and the inner sheath that surrounds it; while the outer sheath is a parasitical Zoanthoid Coral. But a careful examination of the identity of their structures as to forcibly negative this supposition.

The peculiarities of the structures of these oscular organs somewhat resemble those of the inhalant organs of *Geodia Barretti*, described and figured in the 'Philosophical Transactions of the Royal Society' for 1862, pl. 32. figs. 3, 4 & 9a, pp. 788, 792, 794, and also in 'Monograph of British Spongiadæ,' pl. 19. figs. 301, 302, and pl. 28. f. 354a.

The spicula forming the spiral column of the sponge are the longest organs of this description that I have ever seen. They are composed of numerous concentric layers, and are very similar in their structure to the large spicula in *Tethea cranium* or *Euplectella aspergillum*, Owen. The asperation of the bases of the spicula is usually produced by a partial desquamation of the concentric layers, apparently for the purpose of giving the base of the column a stronger adhesive power to the central mass of the sponge. In form they are identical with those of the skeleton fasciculi of the basal mass of sponge, but vastly enlarged in their size and proportions to adapt them to their own especial office in the economy of the animal. The normal condition of these spicula is that of smooth cylinders; but when immersed in the basal mass of the sponge, and also in the lower part of the corium, they undergo a remarkable alteration in shape, assuming very frequently the form of the well-known structure of the hairs of the Bat. In this case the alteration in form is effected by the projection of a series of thin superposed layers of membrane following each other, and secreting silex rapidly and increasingly as they advance, until, each having progressed about the space of 4 or 5 diameters of the central spiculum, they terminate abruptly with a strongly denticulated margin. The silex intervening between the external coat of these coronated masses and the surface of the axial spiculum is not composed of concentric layers as in the latter, but it is as solid in appearance as a mass of glass, as represented (Pl. V. figs. 16, 17).

These curious forms may be seen deeply moulded in the substance of the lower part of the inner corium in which such spicula have been imbedded. This singular structure is apparently to endow that portion of the spiculum with greater prehensile powers than could be obtained by a more or less amount of desquamation of the proximal portions of the spiculum.

The curious cloacal column of this sponge is not without a parallel in the history of the *Spongiadæ*, as in the British genus *Ciocalypta*. In *C. penicillus* we have a series of cloacal columns projected from the basal mass of the sponge, each of which has a central axis of spicula connected together in a longitudinal direction, which extends from the base to the apex of each of the columns. A rather stout dermal membrane envelopes each of them, but is not closely adherent to the central axis as in *Hyalonema*; on the contrary, it is supported from contact with it by a series of short stout pedicels of spicula, the bases of which are immersed in the central axis, and their apices radiate in every direction, forming at their junction with the dermal membrane a most effectual support to it. The spaces between the central column and the dermal membrane, when seen by the aid

of the microscope, closely resemble a beautiful and elaborately constructed Gothic crypt. In this sponge the oscula are simple orifices, not projecting beyond the dermal membrane as in *Hyalonema*. But the same purpose prevails in both descriptions of cloacal organ, that of discharging the fæcal matters at a distance from the inhalant surface of the sponges. A section of one of the fæcal columns of *Ciocalypsa penicillus* is represented of the natural size in the 'Philosophical Transactions of the Royal Society of London' for 1862, pl. 73. f. 4; and a magnified view of a portion of the same column is represented by fig. 5; and also in 'Monograph of British *Spongiadae*,' vol. i. pl. 30. figs. 360 and 361.

Elongated cloacal projections from sponges are by no means uncommon organs. In large specimens of *Halichondria panicea* and several other British species of sponges such organs are frequently put forth; but in these cases the distal extremity is always open, and the production of these organs are the exception, not the rule: but the contrary is the case in the British genus *Polymastia*, very similar in its skeleton-structure to *Alcyoncellum*, Quoy et Gaimard (*Euplectella*, Owen, Trans. Zool. Soc. Lond. vol. iii. p. 203).

In *Polymastia mammillaris* (*Halichondria mammillaris*, Johnston) there are frequently on a single specimen from forty to fifty of these cloacal organs, springing from a sponge about 2 inches in length and breadth and not $\frac{1}{2}$ inch in thickness, but attaining 1 inch in height, with a diameter of rarely more than 2 lines, the distal terminations being always closed; the minute oscula are dispersed on all parts of the cloaca, as in the corresponding organ in *Hyalonema*. Other British species of the same genus approach still closer to the form and peculiarity of *Hyalonema*. In *Polymastia spinula* the basal portion is exceedingly thin; and the cloacal projections, seldom exceeding two in number, are about an inch in length, being in height at least twenty times the length of the thickness of the basal sponge.

In a third species of the same genus (*P. bulbosa*) we have a still closer approach in form to *Hyalonema*, the basal mass of the sponge being bulbous, in the form of a small onion, with a single long slender cloacal tubular appendage crowning its summit, with a length rather greater than the height of the bulbous mass beneath it (Monograph of British Sponges, vol. ii. p. 61). The structure of the column of *Hyalonema*, considered as a sponge, is not so anomalous as it at first appears. In truth it is only one of several varieties of such cloacal appendages, all of which approximate closely to each other in form. In *Polymastia* we have the cloacal organ hollow and closed at its apex, but supported by an external network of siliceous spicula, with the oscula dispersed over its surface. In *Euplectella aspergillum*, Owen, the skeleton is very similar to that of *Polymastia*, with the difference of the oscula being congregated at its distal extremity. In *Ciocalypsa* the cloacal organs closely approximate to those of *Hyalonema*. Their parietes are thin, like those of *Euplectella*, Owen, with a central axis of spicula supporting the organ in an erect position; in *Hyalonema* the spicula composing the column are exceed-

ingly long and comparatively few in number, and do not appear to be connected with the parietes of the organ; while in *Cicocalyptra* they are short and very numerous, and the axis is connected with the sides of the cloaca. Thus, when we consider the spiral column and its delapidated dermal coating alone, as it is usually received from the Japanese, and without reference to the basal mass of sponge belonging to it in its natural condition, the species presents an exceedingly anomalous appearance; but when the entire animal is considered and compared with other sponges, the anomaly is dissipated, and it is seen to present very few anatomical and no physiological differences from a numerous series of well-known sponges.

The dermal membrane of the basal portion of the sponge in the British Museum has been nearly entirely destroyed, a few fragments only remaining *in situ*. It appears to have been thin, pellucid, and aspiculous, or with a few adventitious spicula attached to its surface. The numerous inflato-fusiformi-acerate external defensive spicula do not appear to perforate it in the natural condition of the sponge; but the fragments of the membrane *in situ* were so small as scarcely to allow of speaking on this point decisively.

The spicula of the skeleton are exceedingly variable in length and proportions, and are often curved to a very considerable extent, or they are flexuous; and amongst them there are occasionally found exceedingly large fusiformi-acerate spicula, the diameters of which are equal to that of six or seven of the ordinary spicula of the skeleton; and at irregular intervals we find very large attenuato-rectangulated hexradiate spicula, which probably served to connect the flakes or layers of the skeleton together (Pl. V. fig. 1*a*).

I found but one small group of the external defensive spicula *in situ*; but this was exceedingly characteristic. The spicula (Pl. V. fig. 5) are very numerous and closely packed together in parallel lines, and they are apparently projected about half their length beyond the outer surface of the mass of the skeleton. These spicula represent the shaft of an attenuated rectangulated hexradiate spiculum, with the inflation at about the middle of the shaft, whence the four lateral radii of that form of spiculum would spring. But the striking peculiarity of their structure is the mode of their adaptation as external defensive spicula, by the projection from all parts of the distal half of the shaft of numerous small spines at ascending angles of about 20 degrees to the long axis of the spiculum; while on the proximal half of the spiculum there is rarely even the rudiment of a spine to be detected. The central inflation of the spiculum is usually projected beyond the external surface of the mass of the skeleton. A secondary series of defensive spicula are projected from the surface of the mass of the skeleton, and these consist of spiculated cruciform spicula ascendingly and entirely spinous. They are also exceedingly numerous, their cruciform bases all being nearly in the same plane, and their spicular radii nearly parallel to each other, the apices reaching to about the central inflations of the large external defensive spicula. These secondary external defensive spicula are in reality the internal defensive spicula of the sponge. They are perfectly novel in their

form, and are of a complicated and very interesting structure. They consist of a short stout cruciform base, with a long spicular ray ascendingly and entirely spinous, projected at right angles from the centre of the basal radii. The spines on the spicular ray are similar in form and mode of disposition to those of the external defensive spicula, but very much longer in proportion to the size of the spiculum, frequently exceeding in their length the diameter of the shaft on which they are based (Pl. V. fig. 6, and fig. 1*b in situ*).

The radii of the cruciform bases are also slightly spiculated towards their apices. They are thickly distributed on the fasciculi of the skeleton, and frequently equally so on one side of the interstitial membranes, probably that which forms the surfaces of the interstitial spaces, and they are especially abundant near the exterior of the sponge.

The four basal radii appear firmly cemented to the membrane—but not immersed in its substance, as they do not appear to leave their impression when removed from it, nor do they bring any portion of the membrane away with them.

In some part of the tissues these spicula are very much modified in form. In ordinary cases we find the basal radii short and stout, and not more than a fourth or a fifth of the length of the spicular ray; while in other cases the basal rays are very nearly as long as the spicular one, the only difference in their structure being that the latter is very strongly spinous, while the former have the spines comparatively very slightly produced.

The interstitial membranes, when not covered with spiculated cruciform spicula, are often abundantly furnished with long slender flexuous acerate tension spicula, with a central inflation indicative of their being an incipient condition of either rectangulated hexradiate or rectangulated triradiate forms; and the latter one occasionally is found among them (Pl. V. fig. 7).

The interstitial spicula of this sponge are very numerous, and exceedingly various in size and form. They are of three very distinct descriptions:—first, rectangulated hexradiate, large and small (Pl. V. figs. 8, 9); second, fimbriated multihamate birotulate (Pl. V. figs. 2, 3); and third, cylindro-cruciform (Pl. V. figs. 10, 11, 12, 13, 14).

The first of these forms abound immediately beneath the apparent line of the dermal membrane in the large basal mass of the sponge; the greater portion of them are large, and they are disposed with a considerable approach to regularity, and amongst them there are frequently groups of the smaller variety of this form (Pl. V. fig. 8). They are also rather abundant near the basal portion of the spiral column of the cloacal system of the sponge, and they are found more sparingly dispersed in all parts of the basal mass. Generally speaking the whole of the six radii are fully produced; but occasionally pentradiate forms are found.

The second form or fimbriated multihamate birotulate spicula are generally found dispersed amid the interstitial tissues of the large basal mass of the sponge. There are usually not more than one or

two together; but occasionally they occur in groups of ten or twelve, without any approach to a definite arrangement (Pl. V. fig. 1). These spicula are comparatively large and stout. They have eight rays at each end of the shaft, the two groups of radii curving towards each other to such an extent that each forms the half of a regular oval figure, the opposite apices being separated to the extent of about the length of one of the radii. Each ray is in form like a double-edged obtusely pointed knife bent near the handle in the direction of a line at right angles to the inner surface of one of its flat sides; and each ray is strengthened and connected with the shaft of the spiculum by a stout curved web of silex, which extends from a little below the inner surface of the ray to a point on the shaft about opposite to its middle. The edges of each ray are also slightly curved inward (Pl. V. fig. 2). The smaller or secondary system of birotulate spicula differ somewhat from the larger ones in structure. They are not fimbriated at the base, as those of the larger ones are, nor have the radii the same distinct cultelliform figure (Pl. V. fig. 3). Their position in the sponge is also different. The larger ones are always irregularly dispersed; while those of the smaller system are usually congregated in considerable numbers around the large skeleton-fasciculi, their direction being coincident with the axial line of the fasciculus (Pl. V. fig. 4); a few, comparatively, are dispersed, but this mode of position appears to be rather the exception than the rule. The shaft is cylindrical, and has short stout tubercles dispersed over all its parts, and the radii are so long in their proportions that the opposing apices very nearly touch each other.

The third form of interstitial spiculum, the cylindro-cruciform one (Pl. V. figs. 10, 11, 12, 13, 14), appears to appertain more especially to the cloacal system; they are found abundantly dispersed near the inner surface of the coriaceous dermis of the spiral column of the sponge; but they occur in by far the greatest number between the basal portion of the spicula of the spiral column, and in their immediate neighbourhood, intermixed with the large hexradiate spicula of the interstitial tissue of the great basal mass of the sponge; and at the top of this mass the spiral column is surrounded by a profusion of them.

The radii are short and very stout in their proportions, their length varying from twice to five or six times their own diameter; and the four rays are frequently of different lengths. They are profusely covered with large, stout, more or less conical spines, and especially so at their distal extremities. In all these characters they vary to a considerable extent even in the same group. They appear to be more matured in the basal portions of the sponge than in the coriaceous dermis of the spiral column; in the latter position they are frequently represented by short, stout, entirely spined cylindrical spicula (Pl. V. fig. 10); but between this rudimentary state and the completely cruciform spiculum specimens may be found in every intermediate stage of development. Occasionally a spiculum may be found with a fifth ray, indicating that the cruciform spiculum is in truth only a modification of the regular hexradiate type of the inter-

stitial spiculum (Pl. V. fig. 14). The occurrence of this peculiar form of spiculum in the inner surface of the coriaceous dermis of the spiral column, and also dispersed amid the tissues of the basal mass of the sponge, unmistakeably connects the two as portions of the same individual.

The quadrihamate spicula are a variety of form that I have not seen before. The hami are comparatively very long and slender. They are exceedingly minute, requiring a linear power of at least 700 to define them well. They are irregularly and rather sparingly dispersed on the interstitial membranes (Pl. V. fig. 15).

From the few patches of sarcode remaining attached to parts of the skeleton, it is probable that it has been both dense and abundant. The fragments preserved are of a deep amber-colour.

It is probable that there are more species of the genus than the one described above, as among the material brought up from 2200 fathoms by the soundings in the Indian Ocean, from the 'Herald,' I have seen three distinct varieties of form of multihamate birotulate spicula of a very similar size and character to those found in *H. mirabile*, but with such structural variations as to indicate their origin in different species.

The internal structures of this sponge are strongly indicative of carnivorous habits. The loosely constructed reticulated skeleton would readily admit of the entrance of small annelids; and when once within the precincts of the sponge their escape would be almost impossible. The powerful cultelliform radii of the fimbriated birotulate spicula entering their bodies would securely hold them as prey; and every writhing effort they made would contribute to their destruction by a succession of impalements on the spiculated rays of the numerous spiculated cruciform spicula around them, bleeding them to death from numerous punctured and lacerated wounds for the nutrimentation of the sponge; and it will readily be seen that every one of these elaborately constructed organs that I have described are admirably adapted to the purposes that I have assigned to them.

I cannot agree with Dr. Gray in considering *Hyalonema* as allied to either the *Gorgoniadæ* or the *Zoanthidæ*. We know of no compound polypidom, among the *Coralliidæ* or *Zoanthidæ*, or any other division of Zoophyta, in which there is any approach to the secretion of a siliceous skeleton. In all of them, however varied the form may be, that part of the animal is either purely keratose or kerato-calcareous, while in *Hyalonema* the whole of the skeleton is siliceous; and this fact alone should have served to distinguish it from *Gorgonia*. I do not know of any zoophytes which have tentacula upon the polype-cases instead of upon the retractile polype; and in *Zoanthus* their position is undoubtedly upon the latter-named part of the animal. The form of the oscular mamillæ on the spiral cloacal appendage of the animal is very like the polypidom of some *Gorgoniæ*; but this similarity is not enough to justify the assumption that it belongs to that tribe of zoophytes, especially as, in *Pachymatisma Johnstonia* and other sponges, we find

the oscula simulating the forms of the polypidom of many species of *Gorgonia*.

The genus *Grantia*, with its calcareous skeleton, affords perhaps among the *Spongiadæ* the nearest approach to the structure of the *Gorgoniadæ*; but there is no possibility of confounding these sponges with any known species of that group; while, on the contrary side of the question, the basal portion of *Hyalonema* is nearly assimilated by the peculiarities of the structure of its spicula with the genera *Acyoncellum*, Quoy et Gaimard, and *Dactylocalyx*, Stutchbury; and the singular cloacal appendage projected from the midst of the sponge has its physiological and, to a certain extent, its anatomical parallel in our British genus of sponges, *Ciocalypta*. That the long spiral spiculous extension, or cloaca, of *Hyalonema* is intimately connected with, and forms a part of, the skeleton of the sponge cannot reasonably be doubted after a careful examination of the large specimen in the British Museum, in which it will be seen that the skeleton of the basal portion of the sponge enters between, and embraces the long fibres of, the spiral organ, without the intervention of any part of the thick sandy cortex. This dermal coat in the British Museum specimen is in good preservation for several inches in length above the spongeous mass at its base; but not a vestige of it remains within the mass, nor is there any space between it and that portion of the spiral column passing through it that serves to indicate that it had ever been present in that position; on the contrary, the sponge embraces the base of the column closely and completely. But if any further evidence of their organic connexion were needed, we have it abundantly furnished by Capt. Tyler's specimen (represented in Pl. IV. fig. 1), in which it is seen that the dermal membrane of the small mass of basal sponge is continued from its distal end up the column, and that it is from this continuous membrane embracing the spiral column that the protuberant oscula are given off. In the specimen represented by fig. 2. Pl. IV. the distal end of the basal sponge and the proximal one of the corium are coincident in their terminations, and it is distinctly observable that no part of the corium enters the basal mass of sponge.

I have not seen the specimen of *Hyalonema mirabile* in the Bristol Museum; but I am informed by my friend Capt. Charles Tyler, who has seen it, that it has a basal mass of sponge very like that of the British Museum one. From portions of the basal mass of the Bristol Museum specimen, presented to Capt. Tyler at the time of his inspection of it, I have obtained precisely the same forms of spicula that exist in the basal portion of the British Museum specimen. I have before stated that, among the specimens in the collection of my friend Capt. C. Tyler, there were three of the spiral columns that had portions of the basal mass closely adhering to them; and on microscopically examining these portions of the sponges they were found to agree in their organization in every respect with the structures obtained from the two larger and more perfect specimens of the sponge, and also with that represented by fig. 2. Pl. IV. No reasonable doubt can therefore be entertained that these specimens

are all of the same species, and that the basal mass and the spiral cloacal organ are truly parts of the same individual.

The external mammillated coriaceous dermis of the cloacal system in the dried condition closely embraces the spiral column of spicula, but I could not detect any organic connexion between them. It is probable, from its reticulated structure in some parts, that there was a considerable intervening space between the spiral column and the external envelopment while in the living state, and that the present condition is due to the contraction of the coriaceous coat while drying.

DESCRIPTION OF PLATES IV. & V.

PLATE IV.

- Fig. 1. *Hyalonema mirabile* in the cabinet of Capt. Charles Tyler, having a small basal mass of sponge covered with the dermal membrane, which is continued up the spiral column, and from which protuberant oscula are put forth. Natural size.
- Fig. 2. A specimen of the same species of Sponge presented to me by Mr. H. Lee. The basal mass of sponge is without the dermal membrane, but having the commencement of the corium corresponding with the distal end of the spongeous mass. Natural size.
- Fig. 3. A section at right angles to the long axis of one of the oscular organs, just below the corrugated terminal disk, exhibiting a view of the interior of the upper portion of the dissepimental form of the complicated valvular structure within the apical termination of the oscular tube. The central membrane containing the natural orifice is slightly involved, showing on its outer surface a portion of the sand imbedded. By direct light, magnified 50 times linear.
- Fig. 4. The lower portion of the valvular structure of the same section, showing the inner diaphragm, or valve, with its motive filaments. The valve partly open, and its membranous structure having a cruciform spiculum imbedded in its substance at *a*. By transmitted light in Canada balsam, magnified 50 times linear.
- Fig. 5. The apical termination of one of the oscular tubes cut off immediately beneath the corrugated apex, after maceration in solution of potass, showing the circular arrangement of the motive fibres of the outer valve of the osculum *in situ*, and the attachment of their apices to the outer margin of the central oscular membrane, their basal portions curving downward at the outer margin of the corrugated apex of the organ to their respective basal attachments. Mounted in water and viewed by transmitted light, magnified 50 times linear.

PLATE V.

- Fig. 1. One of the lamellæ of the skeleton from the basal mass of sponge of *Hyalonema mirabile* in the British Museum, exhibiting the general structure of the skeleton and the mode of disposition of the fimbriated multihamate birotulate spicula, the spiculated cruciform, and the various forms of interstitial spicula. *a*. One of the largest of the attenuato-rectangulated hexradiate interstitial spicula *in situ*, with a group of three fimbriated multihamate birotulate spicula, and spiculated cruciform spicula dispersed on the transparent interstitial membranes. *b*. Skeleton-fasciculi, with a row of spiculated cruciform spicula based on one of them. Magnified 50 times linear.
- Fig. 2. A fimbriated multihamate birotulate interstitial spiculum of the primary system. Magnified 175 times linear.
- Fig. 3. An elongo-recurvate dentato-birotulate interstitial spiculum of the secondary system. Magnified 308 times linear.

- Fig. 4. A group of the same form of spicula as No. 3, *in situ* around a skeleton-fasciculus, from the specimen of *Hyalonema* in the Bristol Museum. Magnified 108 times linear.
- Fig. 5. An inflato-fusiformi-acerate external defensive spiculum hemispinous distally. Magnified 108 times linear.
- Fig. 6. A spiculated cruciform internal defensive spiculum. Magnified 175 times linear.
- Fig. 7. Inflato-acerate tension spiculum. Magnified 108 times linear.
- Fig. 8. Large attenuato-rectangulated hexradiate interstitial spiculum. Magnified 90 times linear.
- Fig. 9. Small attenuato-rectangulated hexradiate interstitial spiculum. Magnified 90 times linear.
- Figs. 10, 11, 12, 13, 14. Various states of development of the cylindro-cruciform interstitial spicula, common to the basal mass of sponge and the coriaceous investment of the spiral column of the cloacal system. Magnified 175 times linear.
- Fig. 15. Attenuato-rectangulated triradiate tension spiculum, occasionally found dispersed among the other tension spicula. Magnified 90 times linear.
- Fig. 16. Asperated or jointed condition of portion of the long acerate spicula of the spiral axis of the cloacal system. Magnified 108 times linear.
- Fig. 17. A detached joint from a specimen similar to that represented by fig. 16, from which a portion has been fractured longitudinally, exhibiting the uniform solidity of the incrusting silex. Magnified 108 times linear.
- Fig. 18. Quadrihmate retentive spiculum.

5. Note on the Identity of certain Species of *Lycenidæ*.

By ARTHUR G. BUTLER, F.Z.S.

An observation in the second part of Mr. Hewitson's valuable work on 'Diurnal Lepidoptera,' p. 53, has induced me to compare the description of *Hesperia freja*, in Fabricius's 'Entomologia Systematica,' iii. p. 263. n. 19, with the numerous specimens of *Lycenidæ* in the collection of the British Museum; and I am now fully satisfied that this species, which Mr. Hewitson has placed provisionally at the end of the genus *Hypolycæna*, is perfectly identical with the well-known *Myrina jaffra* of Godart, figured in Horsfield's 'Catalogue,' pl. 3. figs. 5, 5 a.

The only apparent defects in the description given by Fabricius consist in the misapplication of the term *apex* to the anal area of the hind wings (a substitution of frequent occurrence in early descriptions), and in the somewhat loose account of the position of the transverse lines on the front wings,—the internal discal line, which in some specimens is almost submarginal, being described as central. The corrected description would be as follows:—

"*Magna in hac familia. Antennæ atræ. Palpi albi, apice nigri. Corpus fuscum. Alæ anticæ supra fusæ, immaculatæ, subtus albæ limbo, lineola transversa discali strigique postica fulvis. Posticæ fusæ, areæ anali albæ fascia lata nigra. Caudæ duæ, anterior longissima alba, posterior brevior nigra margine albo.*

"*Subtus albæ striga postica valde undata atra. Margo strigis fulvis nigrisque. Apex alæ prominet fascia lata, læte cærulea, quæ utrinque terminatur puncto magno atro.*"

There appear to be two distinct forms of this species, the less common one being, I believe, exclusively confined to Canara; it differs from the more widely distributed form (the true *Hesperia freja* of Fabricius) in having the subanal black band on the upperside of the hind wings nearly divided in the centre, thus forming two quadrate spots; on the underside it differs in the almost entire absence of yellow colouring in the front wings, and in the addition of a small intermacular subanal spot in the hind wings. I would suggest that the latter form should henceforth bear the name of *jaffra* (if it be worthy of any name at all), as this will prevent the possible addition of another synonym to Lycænidine nomenclature.

I believe that the insect figured by Mr. Hewitson, at pl. 21. f. 6, is the female of a very slight local variety* of *H. erylus* of Godart, as we have the male of it in the National Collection. *H. tmolus* of Felder may also prove to be nothing more than a local form of this insect†.

Trimen's *erylus* is the *philippus* of Fabricius (var. *certhis*, Doubl.). *Amblypodia selimnus* of Doubleday's list is represented by two shattered butterflies, one of which is the Ceylon form of the true *longinus* of Fabricius, and the other the Ceylon form of *pseudo-longinus* of Doubleday. These two species are placed as one by Mr. Hewitson; they differ as follows:—

IOLAUS LONGINUS, Fabricius.

♂. *Alis supra cæruleis nitidis, anticis area apicali et costa fuscis; posticis apice costaque fuscis, margine interno fusco-pallido: subtus fusco-albidis; anticis seriebus liturarum duabus, interna nigrarum, externa fuscarum: posticis fuscis duabus marginalibus fuscis a venis interruptis; serie discali liturarum nigrarum valde irregulari; maculis duabus nigris analibus, interna angulum attingente, intus lunula flava cinctis, anali extus cæruleo rorata, puncto intermaculari cinereo. Exp. alar. unc. $1\frac{1}{16}$ – $1\frac{1}{8}$.*

♀. *Alis supra violaceis pallidis; marginibus costali, apicali et externa anticarum, et costali posticarum, fuscis; posticis linea marginali a venis interrupta, altera maculari submarginali tertique discali liturali nigro-fuscis; margine interno albedo: alis subtus albidis, velut in mari scriptis, maculis autem posticarum analibus majoribus. Exp. alar. unc. $1\frac{3}{16}$ – $1\frac{5}{8}$.*

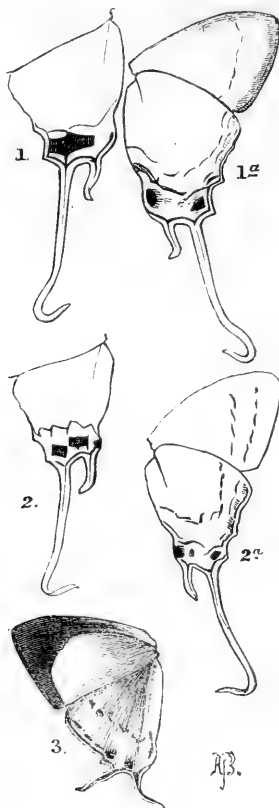
Hab. India.

IOLAUS PSEUDO-LONGINUS, Doubleday.

♂. *Alis viridi-cæruleis pallidioribus, posticis multo brevioribus, margine interno albedo: alis subtus albidis, anticis seriebus liturarum apud costam minime arcuatis, interna posticarum*

* Our specimens, both male and female, differ from the typical form in the greater length of the hind wings and the more marked submarginal white line; the position of the bands on the underside is slightly altered: the male has the marginal black band on the upperside much wider at the apex of the front wings; and the front wings in the female have a straighter outer margin.

† This was at first Mr. Hewitson's opinion (*vide* Diurn. Lep. ii. p. 49. n. 2).



Figs. 1, 1a. *Myrina freja*, Fabr.
2, 2a. Local form, *jaffra*.
3. *Iolais pseudo-longinus*, Doubl.

minus irregulari; *maculis analibus parvis late flavo intus marginatis*; *puncto intermaculari albicante*. *Exp. alar. unc.* $1\frac{7}{16}$ — $1\frac{1}{2}$.

♀. *Alis pallidioribus violaceis, anticis disco, et posticis apice albicantibus*; *posticis serie discali liturarum medium alarum approximante, serie submarginali maculari tenuiore, costa minus fuscescente*; *alis subtus velut in mari*. *Exp. alar. unc.* $1\frac{5}{8}$.

Hab. Java; Moulmein.

Var. *Posticis feminae serie liturarum discali serieque submarginali velut in I. longino positis*.

Hab. Ceylon.

I cannot but think that these differences are sufficient to warrant the separation of these two insects as constant and distinct local forms.

6. Description of a New Genus of Diurnal Lepidoptera belonging to the Family *Erycinidæ*. By A. G. BUTLER, F.Z.S.

The species representing the present genus have hitherto been included in the genus *Taxila* of Westwood; they are, however, so strikingly distinct from it, that I think it absolutely necessary to separate them. The arrangement of the disco-cellular veins is very unlike that of either *Taxila* or the allied genus *Sospita*; the antennæ and wing-cells also differ in length. I therefore propose for this form the name of *Dicallaneura*.

The genus *Taxila* has hitherto contained three distinct forms, one of which must, I think, be henceforth placed with *Sospita*, as it shows a very great resemblance to the latter in neurulation and in other less important structural details. These forms may be distinguished as follows:—

Genus TAXILA.

1. *Alæ subtrigonatæ; posticæ angulo anali producto et a cauda brevi tenui terminato; cella anticearum elongata, apice paulo concavo, posticarum brevioris lata: corpus robustum, capite magno, antennis elongatis.*

1. T. DURGA, Kollar;

2. T. EGEON, Westwood; *cum aliis.*

2. *Alæ latæ, breves; anticæ subtrigonatæ, costa convexa, apice rotundato; posticæ margine postico convexo, sinuato (rarius medio minime producto*); cella anticearum brevi lata, apice paulo bisinuato, posticarum brevi, lata, venis disco-cellularibus specierum singularum plus minusve forma variantibus: corpus parvum, capite parvo, antennis brevioribus.—? SOSPITA, Hewit.*

1. T. DRUPADI, Horsfield;

2. T. ORPHNA, Westwood†;

3. T. THIUSTA, Hewitson;

4. T. TENETA, Hewitson; *cum aliis.*

DICALLANEURA‡, gen. nov.

3. *Alæ latæ, breves, anticæ marginibus convexis; posticæ costa convexa, margine postico minime sinuato et post medium cauda obtusa producta; cella anticearum lata, brevi, apice valde excavato, posticarum lata, brevi, venis disco-cellularibus obliquis: corpus robustum, capite magno, antennis elongatis.*

* ♀. *T. drupadi*, Horsfield.

† Three species are confounded under this name.

‡ δικάλλα, νεῦρον.

1. *T. PULCHRA*, Guérin.

2. *T. DECORATA*, Hewitson. (Fig. 1.)

The allied genus *Sospita* (*Abisara*, Felder) contains three forms, all of them very similar in neuration, but differing in the form of the wings.

Genus *SOSPITA*.

Division 1.

Alæ posticæ cauda media cuneata.

1. *S. TANTALUS*, Hewitson; (Fig. 3.)

2. *S. ECHERIA*, Stoll;

3. *S. (ABISARA) KAUSAMBI*, Felder (= *præcedenti*?);

4. *S. LYDDA*, Hewitson; *cum aliis*.

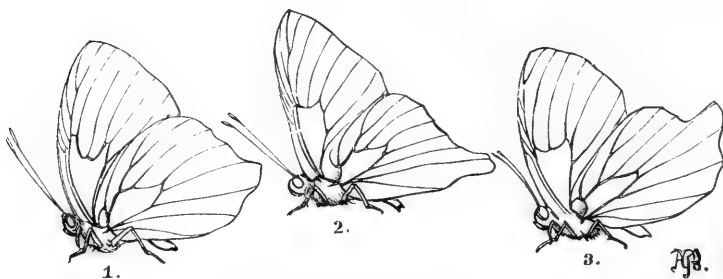


Fig. 1. *Taxila decorata*, Hewits.

2. *Dodona onida*, Hewits.

3. *Sospita tantalus*, Hewits.

Division 2.

Alæ posticæ cauda valde elongata media.

1. *S. SUSA*, Hewitson;

2. *S. NEOPHRON*, Hewitson; *cum aliis*.

Division 3.

Alæ magnæ, venis disco-cellularibus anticarum minime magis convexis; alæ posticæ margine integro: corpus robustum, capite magno, antennis magis elongatis.

1. *S. FYLLA*, Hewitson.

2. *S. SEGECIA*, Hewitson.

3. *S. WALLACEI*, Hewitson.

4. *S. STATIRA*, Hewitson.

The genus *Dodona* is very closely allied to *Taxila*, the chief distinctions being as follows :—

Genus DODONA.

Alæ posticæ angulo anali magis producto, cauda obsoleta.

1. *D. ADONIRA*, Hewitson.
2. *D. DIPŒA*, Hewitson.
3. *D. ONIDA*, Hewitson. (Fig. 2, p. 38.)

7. Characters of Four New Species of Australian Land-shells.

By JAMES C. COX, C.M.Z.S.

HELIX RETIPORA.

H. testa perforata, lenticulari, undique valde et confertim costulato-striata, lineis concentricis minutissimis decussatis, quasi reticulata, solidula, nitidiuscula, rubro-cornea, subtus pallidior; spira late depresso-conoidea, obtusa, sutura mediocriter impressa; anfractibus 4, regulariter accrescentibus, planato-convexiusculis, ultimo mediocri, non descendente, infra convexo; apertura obliqua, fere rotundato-lunata; peristomate simplici, regulari, margine columellari supra dilatato, reflexo, umbilicum semitegente.

Diam. maj. 0·21, min. 0·17, alt. 0·11 unc.

Hab. Flinders Range, South Australia (*Masters*).

Allied, but not very closely, to *H. sericatula*, and not resembling any South Australian *Helix* yet described.

PUPA LINCOLNENSIS.

P. testa sinistrorsa, rimata, elliptico-oblonga, tenuissime oblique striata, albida seu rufo-cornea; spira obtusa; anfractibus 6, convexiusculis, ultimo cæteros nequaquam æquante; apertura fere verticali, lunato-circulari; peristomate incrassato, expanso, albo, marginibus distantibus, columellari recto, sinistro supra obtuse angulato; pariete aperturali dente subcentrqli, prominente, obtuso, albo munito.

Long. 0·13, diam. 0·08 unc.

Hab. Port Lincoln, South Australia (*Masters*).

This belongs to the section or subgenus *Pupilla*.

BULIMUS MASTERSI.

B. testa imperforata, ovato-conica, solidiuscula, rugoso-plicata, ad suturam præsertim sulcis spiralibus interruptis sculpta, flavicante seu rufo-brunnea, fasciis (e lineis coalescentibus formati) longitudinalibus plurimis albis quasi murreis ornata; spira parva, convexo-conica, obtusa, sutura impressa; anfractibus 4, modice convexis, ultimo spiram quater superante, basi

rotundato; apertura modice obliqua, angulato-ovali, intus fascias externas pallide exhibente; peristomate simplici, recto, tenui, margine columellari supra brevissime calloso, albo.

Long. 0·74, diam. 0·45 unc.

Hab. Port Lincoln, South Australia (*Masters*).

The coalescent porcellaneous bands on a darker ground constitute the most prominent feature of this pretty species, whose nearest ally is *B. trilineatus* of Western Australia.

TRUNCATELLA SCALARINA.

T. testa imperforata, fusiformi-turrita, lævi, nitida, alba; spira decollata, sutura constricta; anfractibus 4 saltem, convexis, valde longitudinaliter et regulariter costatis, ultimo tres præcedentes æquante; apertura obliqua, oblongo-ovata; peristomate continuo, libero, calloso et expanso (supra præsertim), et infra faciem bilabiatam exhibente, margine dextro curvato, infra rotundato, superiore fere recto; operculo —?

Long. 0·23, diam. 0·11 unc.

Hab. Port Lincoln (*Masters*).

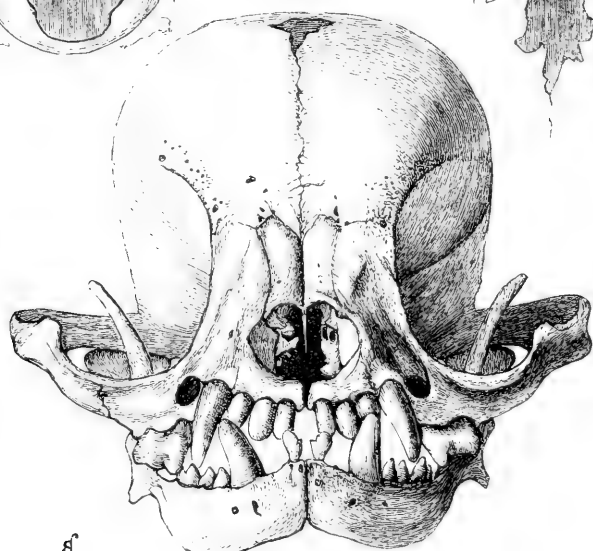
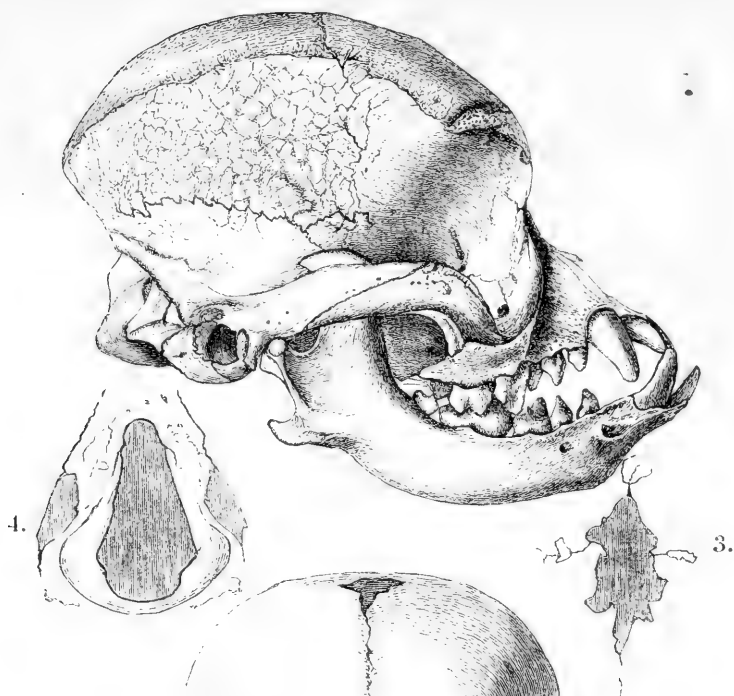
This remarkable shell, reminding one somewhat of a *Scalaria*, occurs in a semifossil state in the same district where the recent, smaller, and smoother *T. marginata*, Küster, appears to be plentiful.

8. On the Skull of the Chinese Pug-nosed Spaniel or Lap-dog. By DR. J. E. GRAY, F.R.S., V.P.Z.S., &c.

Dr. W. Lockhart has kindly presented to the British Museum the skull with the atlas vertebra attached, and the penis bone, of a "Chinese pug-nosed Lap-dog, of a breed greatly admired among the Chinese." The skull is peculiar for the very large size, broad ventricose and subcubical form of the brain-case, for the great shortness of the face, and the shelving, almost horizontal, position of the nasal apertures; the bones of the face are regular, symmetrical; the forehead is rather concave; the hinder part of the face and the back of the lower jaw are very broad behind; the nasal bones are well developed, and extend up behind between the orbits nearly to the forehead; the teeth are well developed and in good condition; the hinder parts of the tooth-line are very far apart, from the great breadth of the short palate; the two hinder upper grinders, which are under the front edges of the zygomatic arch, are placed angularly with regard to each other.

	in. lin.
Length of the skull.....	3 3
—— of the brain-case.....	2 5
Height of the brain-case.....	1 9
Width of the brain-case over the ears.....	2 0
—— of the skull over the zygomatic arches	2 10
—— of the forehead behind the orbits	0 9

1.



2.

Skull of Chinese Pug-nosed Lap-dog.

Skull fully developed; the ossification is imperfect, having a rather large irregular aperture or fontanel on the crown of the head between the parietal bones (fig. 3, p. 41). The occipital foramen is very large; it is much produced upwards behind towards the crown; the upper part is narrow, occupying the greater part of the height of the narrow supraoccipital bone, and on each side is a large half-oval aperture (fig. 4, p. 41). The lateral wings of the atlas vertebra are very large and broad, and much expanded behind.

The skull of an Italian Greyhound and of a Beagle in the British Museum have the foramen magnum large, and extending upwards in the supraoccipital bone towards the crown; but the extension is much broader and shorter than in the Chinese Pug Spaniel, where it is narrower, and extends nearly to the upper edge of the supraoccipital bone.

These skulls also have an imperfection in the ossification, or a perforation, on the outer sides of the occipital bones and the squamous bone, but these are not quite so large as they are in the Chinese skull; and in one of the skulls the right aperture is smaller than the other.

Miss Saunders of Reigate has a specimen of this Dog alive. It is a small long-haired Spaniel, with slender legs, and rather bushy tail curled up over its back. It differs from the Pug-nosed Spaniel called King Charles's Spaniel in the hair being much longer and more bushy, the tail closely curled up, and the legs being smaller and much more slender. The nose of the Chinese or Japanese Pug is said by some to be artificially produced by force suddenly or continuously applied: but that is certainly not the case in the skull that is in the British Museum; for the bones of the upper jaw and the nose are quite regular and similar on the two sides, showing no forced distortion of any kind, such as is to be observed in the skulls of some Bulldogs; for I believe that some "fanciers" are not satisfied with the peculiarity, and do sometimes try to increase the deformity by force.

Miss Saunders has sent me the following particulars of her dog:— "He is called a Japanese Pug Dog: they say he was the origin of the King Charles's breed; but I do not know if this be correct. He is of a very jealous disposition, and timid, being afraid of the noise of a train, the popping of a coal from the fire, and any other sudden noise. He pretends to be very brave in attacking strangers or the gardeners; but the moment they turn upon him he is off like a shot, till he is at a safe distance, when he barks loudly.

"When first he arrived from Japan (the spring of 1864) he would not tread on grass; but he is now quite accustomed to our lawn, and will run about like other dogs. He prefers cold weather, and is always better in health, though, excepting once, he has never been ill since his arrival in England. He does not like strong light, his eyes looking watery and not quite open if he be in sunlight; but of an evening his eyes look very large and bright; and if in a good temper he will roll himself in the curtains or under our dresses, growling and barking with pleasure. Damp weather does not agree

with him ; and if his hair gets wet he is almost sure to take cold, unless thoroughly dried, which process he cannot bear. His temper is most uncertain, as he may be lying in your lap and quite peaceful, and if you touched him very likely he would snap ; he bites his best friends ; in fact he is a small tyrant, so we are more or less afraid to touch him. He feeds on cabbage-stalks boiled ; but in summer he likes cucumbers, both rind and inside ; this is his greatest delicacy. He will eat beetroot, lettuce-stalks, asparagus-stalks, white of egg, and fish : he is very fond of meat ; but we do not give him much, as we find a vegetable diet so much more wholesome for him. He has a trick of spinning round and round until he is apparently giddy, when he will roll over on his side and get up again ; he does this for his dinner or when he is hungry. He follows when we take him for a walk very well ; but being so small he cannot go fast, and it is a tedious process to get him along. If we have been away from home or out for a few hours he shows his joy by running about in a wild sort of way, snorting and wheezing ; but if we were to pat him he would bite us.

“He certainly does not appreciate the usual way people pet dogs, like patting, fondling, &c.

“His length of body is about 15 inches, and height about 10 inches.”

Dr. W. Lockhart has kindly sent me the following :—

“The Pug-nosed Dog, the skull of which I sent you, probably originated in Pekin and North China, and was taken thence to Japan, whence it was brought to Europe ; and thus this breed is called Japanese : I do not know whether you will agree with this idea, I merely state what I think is the fact of the case. There are two kinds of Pug in China :—one a small black-and-white, long-legged, pug-nosed, prominent-eyed dog ; the other long-backed, short-legged, long-haired, tawny-coloured, with pug-nose and prominent eyes. Sometimes in these dogs the eyes are so prominent that I have known a dog have one of his eyes snapped off by another dog in play. The preference for vegetable food is a fact ; but I think it is a result of education, as most of them will take animal food ; this is usually kept from them so that their growth and organization may be kept down. The sleeve dog is a degenerated long-legged variety of Pug rigidly kept on low diet, and never allowed to run about on the ground ; they are kept very much on the top of a kang or stove bed-place, and not allowed to run about on the ground, as it is supposed that if they run on the ground they will derive strength from the ground and be able to grow large. Their food is much restricted, and consists chiefly of boiled rice. They are very subject to corneitis and ulceration of the cornea from deficient nutrition. They exhibit very little personal attachment to the person who feeds them.

“From Mongolia a noble black dog, as large as a full-sized Newfoundland, is brought to Pekin ; he is used as a sheep-dog. From Shantung is brought a beautiful black, long-haired, long-backed, long-legged terrier, very much like a black Skye.”

9. On the Lepidopterous Insects of Bengal.

By FREDERIC MOORE.

[Continued from Proc. Zool. Soc. 1865, p. 823.]

(Plates VI. & VII.)

The first part of this "List of the Lepidopterous Insects of Bengal" appeared in the Society's 'Proceedings' for December 1865; and in it were enumerated 629 species, pertaining to the first three tribes of the order.

In the present and concluding portions the remaining tribes, viz. the Noctues, Pyrales, Geometres, &c., are treated of, and the names and descriptions of 960 species belonging to these groups are given, of which number about 250 are characterized for the first time.

For the specimens used in the compilation of this list I am mostly indebted to Messrs. A. E. Russell and W. S. Atkinson, of the Bengal Civil Service, both of whom kindly placed collections at my disposal, other species being contained either in the collections of the British Museum or in my own. All these have been compared with the species described by Mr. Walker in the British Museum Catalogues, the result of which has been the reduction of various generic and specific names of that author to the rank of synonyms.

The total number of species of the Lepidopterous Insects of Bengal that are recorded in this memoir in each tribe are as follows:—

Papiliones	409
Sphinges.....	50
Bombyces	387
Noctues	288
Pseudo-deltoides	27
Deltoides	34
Pyrales	73
Geometres	288
Crambices	18
Tortrices.....	7
Tineines	35
Total	1616

Tribe NOCTUES.

Fam. CYMATOPHORIDÆ.

Genus GONOPHORA, Bruand.

GONOPHORA INDICA, n. sp.

Pale fawn-colour: fore wing with the base uniform pale fawn-colour, bordered by an oblique silvery-white line, and traversed by a white basal streak, which is crossed by a narrow line; middle of the costa white, beneath which the wing is pale ferruginous, with delicate undulating transverse striæ, and a series of four narrow pale-bordered darker zigzag discal lines, bordered externally by a sub-

marginal white band; a darker curved pale-inner-bordered streak before the apex; a marginal row of narrow pale lunules: hind wing darker fawn-colour, palest on the disk. Head, thorax, and abdomen pale ferruginous.

Expanse $1\frac{3}{4}$ to 2 inches.

Bengal. In Coll. A. E. Russell.

Genus THYATIRA, Hübn.

THYATIRA BATIS, Linn. Syst. Nat. i. 2. p. 286.

T. ALBICOSTA, n. sp.

Greyish brown: fore wing varied pinkish and greenish white along the costa, beneath which are numerous transverse narrow undulating dark-brown pale-bordered lines; two indistinct reniform discal marks; a curved streak beneath the apex, and a marginal undulating narrow line: hind wing with a discal and two subbasal pale bands; cilia greyish white. Head and thorax brown. Abdomen pale greyish brown.

Expanse $2\frac{3}{5}$ inches.

Bengal. In Coll. A. E. Russell.

Genus OSICA, Walk.

OSICA UNDULATA, n. sp.

Brown: fore wing dark ferruginous brown, suffused with grey broadly from posterior angle; numerous transverse blackish pale-bordered undulating lines, and a marginal lunulated line: hind wing brownish fawn-colour. Head and front of thorax dull yellow. Thorax grey. Abdomen pale brown.

Expanse $2\frac{1}{4}$ inches.

Bengal. In Coll. A. E. Russell.

Fam. BRYOPHILIDÆ.

Genus BRYOPHILA, Treit.

BRYOPHILA ALBISTIGMA, n. sp.

Greyish green: fore wing with darker transverse undulating pale-bordered lines; two dots within the cell and border of large reniform mark, submarginal and marginal row of spots silvery white, the latter row with black central dots: hind wing pale pinkish fawn-colour, with a narrow brown pale-bordered discal band. Body greyish green.

Expanse 1 inch.

Bengal. In Coll. A. E. Russell.

Fam. BOMBYCOIDÆ.

Genus DIPHTERA, Ochs.

DIPHTERA ATROVIRENS, Walk. Catal. Lepid. Het. B. M. xxxii. Suppl. ii. p. 614.

Darjeeling.

D. NIGROVIRIDIS, Walk. Catal. Lepid. Het. B. M. p. 615.

Darjeeling.

D. PRASINARIA, Walk. ib. p. 615.

Darjeeling.

D. VIGENS, Walk. ib. p. 616.

Darjeeling.

D. PALLIDA, n. sp. (Pl. VI. fig. 6.)

Pale sap-green : fore wing with spots along the costa, a short streak from the base below the costa, descending beneath and proceeding along the posterior margin and ascending irregularly upwards, beyond which are three streak-like spots ; at the extremity of the cell is a quadrate spot with pointed angles, beyond which is also a streak-like spot ; a transverse irregular line black ; the latter bordered inwardly, and the other markings outwardly with silvery white ; a marginal row of black white-bordered dots : hind wing pale greenish white. Head and thorax pale green. Thorax with a spot on each side in front and others on the top black. Abdomen pale grey, with delicate black dorsal spots.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

D. DISCIBRUNNEA, n. sp. (Pl. VI. fig. 14.)

Pale dull green : fore wing with numerous spots along the costa, spots within and beneath the cell, base of wing, and transverse discal marks black ; those at the base, at the extremity of the cell, and the transverse discal series interspersed with brown ; a marginal series of small blackish lunules : hind wing pale greyish brown, with broad darker brown marginal and narrow discal bands. Head and thorax green, fringed with small blackish-brown spots. Abdomen greyish brown.

Expanse $1\frac{3}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Genus *ACRONYCTA*, Ochs.

ACRONYCTA PRUINOSA, Guen. Noct. i. p. 53.

Silhet.

A. FLAVALA, n. sp.

Male. Fore wing greyish cupreous brown, with some short blackish streaks at the base, a black oblique transverse subbasal, discal, and submarginal sinuous grey-bordered lines, each terminating on the costa ; reniform mark small, grey, the space above it being also grey : hind wing yellow, with a broad submarginal pale brown band, which extends upwards along the abdominal margin to the base. Cilia of fore wing brown, of hind wing whitish. Head and thorax greyish white, speckled with black. Abdomen pale brown ; dorsal

tufts and tip darker. Underside glossy yellow : fore wing with a broad brown marginal band and large discal spot : hind wing with brown submarginal band.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

A. INDICA, n. sp.

Male. Dusky black : fore wing with a basal, double subbasal, a small circular white-centred orbicular mark, and a large quadrate reniform mark, three transverse discal lunulated lines, and a marginal row of spots black, more or less bordered with white : hind wing pale greyish brown. Palpi, head, and thorax hoary. Abdomen brown.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. F. Moore.

Genus GAURENA, Walk.

GAURENA FLORENS, Walk. Cat. Lep. Het. B. M. xxxii. Suppl. ii. p. 620.

Darjeeling.

G. FLORESCENS, Walk. ib. p. 620.

Darjeeling.

Fam. LEUCANIDÆ.

Genus MYTHIMNA, Hübn.

MYTHIMNA CERVINA, n. sp. (Pl. VI. fig. 18.)

Greyish fawn-colour : fore wing with ill-defined basal marks, a transverse recurved double line one-fourth from the base and a straighter similar double line one-fourth from the apex, and a sub-marginal series of small lunular spots chocolate-brown ; the upper portion of the interspace between the transverse double lines also chocolate-brown, which contains two reversely oblique reniform marks, the inner one being greyish fawn-colour in the centre, the other dusky : hind wing and abdomen pale greyish brown. Head and thorax greyish fawn-colour, with chocolate-brown streaks. Cilia and tip of abdomen pinkish brown.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell.

Genus LEUCANIA, Ochs.

LEUCANIA EXTRANEA, Guen. Noct. i. p. 77.

Calcutta.

L. EXSANGUIS, Guen. Noct. i. p. 83.

Silhet.

L. CONFUSA, Walk. Cat. Lep. Het. B. M. ix. Noct. p. 105.

L. EXTERIOR, Walk. ib. p. 106.

L. DESIGNATA, Walk. ib. p. 107.

L. VENALBA, n. sp.

Pale brownish ochreous: fore wing with the veins white, their interspaces with parallel narrow pale fawn-coloured lines; a pale diffused fawn-coloured streak from the base to the apex, which is divided at the apex by a pale oblique streak; a similar streak along the posterior margin; two dark dots below the cell, and an indistinct transverse discal series of dots: hind wing white. Head and thorax brownish ochreous, with hoary bands. Abdomen paler.

Expanse $1\frac{1}{4}$ inch.

Bengal. In Coll. A. E. Russell.

L. PULCHERRIMA, n. sp. (Pl. VI. fig. 7.)

Pale greyish fawn-colour: fore wing with the costa pale purplish fawn-colour; a greenish-brown fascia from the base of the costa to middle of the disk and thence ascending to the apex; a purplish-white streak bordering the outer margin of the fascia, from the discal angle of which it extends, in one direction, in a straight line with an ascending branch to the exterior margin of the wing, and in the other direction to the middle of the posterior margin, the ascending branch of the former being bordered above with greenish brown; a well-defined silvery-white longitudinal streak within the cell, beyond which is a white-speckled black reniform mark: hind wing pale greyish fawn-colour. Head, thorax, and abdomen greyish fawn-colour.

Expanse, ♂ $1\frac{1}{8}$, ♀ $1\frac{1}{4}$ inch.

Darjeeling. In Coll. A. E. Russell.

L. DECISSIMA, Walk. Cat. Lep. Het. B. M. xxxii. Suppl. ii. p. 624.

Darjeeling.

TYMPANISTES, n. g., Moore.

Body robust. Abdomen cylindrical, extending beyond the hind wings. Proboscis moderate. Antennæ stout, setaceous, long, extending beyond the middle of the costa. Legs slender; femora slightly pilose beneath; hind tibiæ with four moderately long spurs. Abdomen with a horny-like cavity at the base beneath, and a fan-like appendage above it on each side. Palpi erect, slender, long, extending above the head, slightly pilose; third joint long, cylindrical, two-thirds the length of the second. Fore wing long; costa moderately arched at the base, thence straight to the apex, which is slightly acuminate; exterior margin oblique, angle rounded; posterior margin convex near the base. Hind wings somewhat quadrate; anterior margin straight; exterior margin produced and rounded in the middle.

TYMPANISTES PALLIDA, n. sp. (Pl. VI. fig. 1.)

Male and *female* semitransparent, glossy: fore wing pale dull yellow, with three or four transverse indistinct dusky lunulated lines and a discal dot, and a marginal row of brown dots: hind wing pale white, with a more or less visible row of marginal dots. Head and thorax dull greenish. Antennæ testaceous. Abdomen and legs pale testaceous above, white beneath. Underside pale silky white.

Expanse $1\frac{3}{4}$ inch.

Darjeeling. In Coll. W. S. Atkinson, Esq.; F. Moore.

Note.—"This species makes a clicking noise as it flies. It has a drum-apparatus underneath."—*W. S. Atkinson*, Darjeeling, Aug. 1862.

T. TESTACEA, n. sp. (Pl. VI. fig. 2.)

Male and *female* testaceous, paler beneath: fore wing varied with suffused patches of green and pinkish testaceous, and with numerous delicate short transverse striæ; two irregular transverse indistinct dusky streaks, between which is a black discal spot; a submarginal zigzag dusky line, and a marginal row of black dots: hind wing and abdomen pinkish testaceous; cilia pinkish white. Head green. Thorax greenish testaceous.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Genus *AUCHMIS*, Hübn.

AUCHMIS SIKKIMENSIS, n. sp. (Pl. VI. fig. 15.)

Brownish fawn-colour: fore wing purplish along the costa, silvery grey beneath the costa; a black line from middle of the base interruptedly ascending to, and bordering the lower half of, a reniform stigma, and thence ascending in broken dashes to beneath the apex, the space beneath which from the base is dark greenish brown; obliquely on the exterior margin are three or four ascendingly decreasing dark-bordered silvery-grey lanceolate marks; a blackish streak along middle of posterior margin; a transverse series of indistinct black discal spots: hind wing pale, with broad brown marginal border. Thorax purplish fawn-colour, with brown-bordered black stripes. Abdomen greyish brown.

Expanse $1\frac{3}{5}$ inch.

Darjeeling. In Coll. A. E. Russell.

Remark.—Closely allied to *A. perspicillaris* of Europe.

Genus *HERMONASSA*, Walk.

HERMONASSA CONSIGNATA, Walk. Cat. Lep. Het. B. M. xxxii. Suppl. ii. p. 632.

Darjeeling (*W. S. Atkinson*).

PROC. ZOOL. SOC.—1867, No. IV.

Fam. GLOTTULIDÆ.

Genus POLYTELA, Guen.

POLYTELA GLORIOSÆ, Fabr. (Guen. Noct. i. p. 113).

Larva feeds on grass (July 19th); the same evening it went into the earth; ten days after the moth appeared.—*Lady Rose Gilbert's Notes.*

Genus GLOTTULA, Guen.

GLOTTULA DOMINICA, Cram. Pap. Exot. iv. pl. 399. f. H.

Larva feeds on *Crinum paniculatum*, *Zephyranthus*, &c.—*E. Blyth.*

Genus CHASMINA, Walk.

CHASMINA CYGNUS, Walk. Cat. Lep. Het. B. M. ix. Noct. p. 147.

Fam. GORTYNIDÆ.

Genus GORTYNA, Ochs.

GORTYNA CUPREA, n. sp. (Pl. VI. fig. 8.)

Male dark ferruginous: fore wing with orbicular and reniform marks large, distinct, yellowish; exterior to each is a transverse blackish ashy-bordered line, which colour extends along the costa; some yellowish marks near the base; a submarginal lunulated yellowish line: hind wing blackish cupreous, paler along anterior margin; cilia pale cupreous. Head and thorax ferruginous. Abdomen ashy above, tuft and beneath ferruginous.

Expanse $1\frac{3}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Genus HYDRÆCIA, Guen.

HYDRÆCIA NAXIAOÏDES, n. sp.

Dark greenish brown: fore wing with two outwardly oblique darker brown chalybeous-outer-bordered transverse lines, the inner line straight and one-third from the base, the outer line waved and one-third from the apex; a submarginal row of irregularly disposed brown spots bordered outwardly by a chalybeous line: hind wing and abdomen plain brown. Head and thorax dark greenish brown. Cilia pale pinkish brown.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

Fam. XYLOPHASIDÆ.

Genus XYLOPHASIA, Steph.

XYLOPHASIA FLAVISTIGMA, n. sp.

Male ferruginous: fore wing suffused with blackish brown along the costa, across the basal half of the wing and in irregular longi-

tudinal streaks on the exterior margin, the latter with pale borders; a pale space below the apical half of the costa containing two round yellowish spots, one at the extremity of the cell, the other beyond; small spots along the costa, two marks within the cell, short streaks and transverse lines below the cell black: hind wing pale greyish brown, with broad darker brown marginal band. Head and thorax blackish brown, the latter ferruginous in the middle. Abdomen brown.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell.

X. LEUCOSTIGMA, n. sp.

Female ferruginous: fore wing varied with pale ferruginous and dark ferruginous brown; a dark basal curved double line enclosing a pale space, a transverse sinuous double line beyond, irregular transverse discal lunulated lines, and submarginal row of lanceolate marks; orbicular mark pale; a large irregular-shaped pale-bordered white reniform mark: hind wing and abdomen reddish fawn-colour. Head and thorax varied pale ferruginous and dark ferruginous brown. Cilia ferruginous.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell.

Genus DIPTERYGIA, Steph.

DIPTERYGIA INDICA, n. sp.

Female dark reddish brown: fore wing mottled with blackish brown, a greyish elongated patch disposed exteriorly along posterior margin, bordered above by an irregular blackish line: hind wing and abdomen brown. Head and thorax dark reddish brown.

Expanse $1\frac{1}{5}$ inch.

Darjeeling. In Coll. F. Moore.

Genus SPODOPTERA, Guen.

SPODOPTERA CILIUM, Guen. Noct. i. p. 156.

Larva feeds on the Doobh Grass (*Cynadon dactylon*).—*A. Grote, Esq.*

Genus PRODENIA, Guen.

PRODENIA CILIGERA, Guen. Noct. i. p. 163.

P. glaucistriga, Walk. Cat. Lep. Het. B. M. ix. Noct. 197, ♀.

? *P. retina*, Boisd.

Larva very destructive to cabbages.—*A. Grote, Esq.*

P. infecta, Walk. ib. p. 196.

P. insignata, Walk. ib. p. 197.

P. lectula, Walk. ib. xv. Noct. p. 1679.

Genus CALOGRAMMA, Guen.

CALOGRAMMA FESTIVA, DONOV. Epit. Ins. New Holl.

C. picta, Guen. Noct. i. p. 166 (Voy. Coquille, ii. pl. 19. f. 7).Larva feeds on *Crinum* and Liliaceous plants.—*A. Grote, Esq.*

Fam. EPISEMIDÆ.

Genus HELIOPHOBUS, Boisd.

HELIOPHOBUS DISSECTUS, Walk. Cat. Lep. Het. B. M. xxxii. Suppl. ii. p. 656.

Fam. APAMIDÆ.

Genus MAMESTRA, Ochs.

MAMESTRA INFAUSTA, Walk. Cat. Lep. Het. B. M. ix. Noct. p. 237.

Silhet.

M. CHALYBEATA, Walk. ib. xxxii. Suppl. ii. p. 665.

Darjeeling (*W. S. Atkinson*).

M. METALLICA, Walk. ib. p. 666.

Darjeeling (*W. S. Atkinson*).

M. NIGROCUPREA, n. sp.

Male glossy blackish cupreous: fore wing with indistinct black transverse subbasal, discal, and submarginal lunulated lines; orbicular and reniform marks black, the latter partly pale-centred: hind wing pale cupreous brown, darkest exteriorly. Abdomen brown.

Expanse $1\frac{1}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

M. SUFFUSA, n. sp.

Male and *female* dark glossy fawn-coloured brown, suffused with chalybeous: fore wing with two transverse subbasal blackish sinuous lines; orbicular marks within the cell and three discal lunulated lines, a submarginal pale outer-bordered dark wavy line, and a marginal row of blackish points bordered within with chalybeous speckles. Reniform mark white in the male, pale brown in the female. Head and thorax dark brown. Hind wing and abdomen pale fawn-coloured brown; anal tuft pale ferruginous brown. Cilia greyish brown.

Expanse, ♂ $1\frac{3}{4}$, ♀ 2 inches.

Bengal. In Coll. A. E. Russell; F. Moore.

M. ALBOMACULATA, n. sp.

Male and *female* dark fawn-coloured brown: fore wing with several indistinct blackish transverse lunulated lines more or less bordered with whitish speckles; a series of small spots along the costa, large irregular-shaped reniform mark, a marginal row of dots,

and distinct spots on cilia white : hind wing and abdomen pale brown. Head and thorax dark brown ; a large white spot at the base of the thorax. Cilia brown, edged with white.

Expanse, ♂ $1\frac{2}{10}$, ♀ $1\frac{4}{10}$ inch.

Darjeeling. In Coll. A. E. Russell ; W. S. Atkinson.

M. ALBIRENA, n. sp.

Male dark greyish brown : fore wing with small spots on the costa, a few disposed near the base ; a discal row of dots, a submarginal and marginal wavy line, pale greyish brown ; reniform mark composed of a short white upright streak and a separate lower spot, which is constricted on its inner side : hind wing brown, with a paler marginal wavy line. Exterior margins of the wings scalloped ; the apex of fore wing slightly falcated. Head, thorax, and abdomen greyish brown.

Expanse $1\frac{5}{8}$ inch.

Calcutta ; Darjeeling. In Coll. A. E. Russell ; W. S. Atkinson.

M. SIKKIMA, n. sp.

Male and *female* dark fuliginous brown : fore wing with a short subbasal longitudinal streak, beyond which is a transverse sinuous double line, the discal lunulated lines, and a submarginal row of short longitudinal streaks black, more or less with greenish-grey borders ; orbicular and reniform marks large and greenish grey : hind wing pale fuliginous brown, darkest exteriorly. Head and thorax blackish ; thorax with a slight ferruginous collar fringed with white. Abdomen brown.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. A. E. Russell ; F. Moore.

Genus PERIGEA, Guen.

PERIGEA TRICYCLA, Guen. Noct. i. p. 226.

Silhet.

P. APAMEOÏDES, Guen. Noct. i. p. 229.

♂. *P. canorufa*, Walk. Catal. Lep. Het. B. M. xxxii. Suppl. ii. p. 683.

♀. *P. illecta*, Walk. ib. p. 684.

Larva feeds on *Cereopsis*.—*A. Grote, Esq., Calcutta.*

Genus AMYNA, Guen.

AMYNA SELENAMPHA, Guen. Noct. i. p. 406 ; Walk. Cat. Lep. Het. B. M. xv. p. 1696.

A. spoliata, Walk. ib. xiii. p. 1050.

Silhet.

Fam. NOCTUIDÆ.

Genus AGROTIS, Ochs.

AGROTIS SUFFUSA, Gmel. (Guen. Noct. i. p. 268).

Genus *EPILECTA*, Hübn.*EPILECTA PULCHERRIMA*, n. sp. (Pl. VI. fig. 3.)

Male and *female* blackish cupreous brown: fore wing with two basal, one discal, and two marginal black-bordered yellowish-green transverse lunulated lines, the discal row with the lower lunules exteriorly pointed with white; reniform spot yellow; four small whitish spots on costa before the apex: hind wing cupreous brown, with a broad irregular golden-yellow discal band. Cilia of hind wing broad, brown in the middle of the margin, the rest yellow. Head, thorax, and anal tuft blackish brown. Abdomen brown, the segments with narrow pale yellowish band.

Expanse $1\frac{7}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Genus *TRIPHÆNA*, Ochs.*TRIPHÆNA SEMIHERBIDA*, Walk. Cat. Lep. Het. B. M. xi. Noct. p. 743.Genus *GRAPHIPHORA*, Ochs.*GRAPHIPHORA C-NIGRUM*, Linn. (Guen. Noct. i. p. 328).*G. CERASTIOIDES*, n. sp.

Male and *female* dark purple fawn-colour: fore wing with two darker transverse subbasal indistinct double lines, orbicular mark, and a transverse discal double line, the latter with an outward row of indistinct dots and a submarginal pale line; reniform mark distinct and reddish-centred: hind wing and abdomen pale fawn-colour; tip of abdomen and cilia pale reddish. Head and thorax dark purple fawn-colour.

Expanse $1\frac{1}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson; Brit. Mus.

G. FASCIATA, n. sp.

Male and *female* pale testaceous: fore wing with a dark fascia across the middle and along the exterior margin; an ill-defined blackish basal, subbasal, and discal transverse narrow lunulated lines, the last having an outer row of blackish dots, beyond which is a wavy pale-bordered line and a row of marginal dots; a blackish spot within the cell; reniform mark distinct, brighter testaceous above, blackish below, partly bordered with white: hind wing pale fawn-colour. Head, thorax, and abdomen pale testaceous.

Expanse $1\frac{3}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; F. Moore.

G. BASISTRIGA, n. sp.

Male greyish testaceous: fore wing with a diffused dark longitudinal streak from the base, which spreads along the posterior margin; two subbasal dusky double lines, the second of which proceeds to near the posterior angle; orbicular and reniform marks, discal and

submarginal double lines, and costal spots dusky, between the latter is a double row of blackish dots; a single blackish dot near base of the cell: hind wing pale yellowish testaceous, with an indistinct discal streak. Head grey, thorax dark, and abdomen pale testaceous. Cilia pinkish testaceous.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. W. S. Atkinson; Brit. Mus.

G. RUBICILIA, n. sp.

Male and *female* yellowish testaceous: fore wing with a slight dark fascia diffused across the middle, and a streak obliquely before the apex; reniform mark, a marginal row of narrow longitudinal dusky streaks transversely divided in the middle and bordered inwardly by a narrow pale line: hind wing pale pinkish fawn-colour. Head and front of thorax greenish yellow; hind part of thorax testaceous. Abdomen pale testaceous, tuft reddish. Cilia pale reddish.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Genus OCHROPLEURA, Hübn.

OCHROPLEURA FLAMMATRA, Gmel. (Guen. Noct. i. p. 327).

Agrotis basiclavus, Walk. Cat. Lep. Het. B. M. x. Noct. p. 346.

O. RENALIS, n. sp.

Male brownish fawn-colour: fore wing with a transverse basal and subbasal double lines, between which is a diffused streak, a slight spot beneath the cell, the space before the orbicular and reniform marks blackish, both being greyish-centred and with their borders black; two transverse series of ill-defined dusky dots: hind wing and abdomen pale brown; anal tuft pale ferruginous. Head and thorax brown; thorax with a slight blackish collar.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. A. E. Russell.

O. SPILOTA, n. sp.

Female dull testaceous: fore wing with the costa broadly testaceous yellow; the veins lined with yellowish; a longitudinal spot within the cell, a transverse lunule at the extremity, and a longitudinal spot beneath the cell, and two or three smaller basal spots jet-black, each with a pale yellow narrow border; exterior margin with a series of black dots: hind wing pale yellowish testaceous. Head, thorax, and abdomen testaceous.

Expanse $1\frac{2}{10}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

O. TRIANGULARIS, n. sp.

Female dark chocolate-brown: fore wing with a broad basal costal streak, including the orbicular mark and the inner border of the reniform mark, yellowish ferruginous, which is bordered below by a

jet-black line extending at the base into a large triangular streak ; two transverse pale discal wavy lines ; a short black descending spot from the costa before the apex terminated by a pale submarginal line : hind wing and abdomen pale chocolate-brown. Head and thorax chocolate-brown ; front of thorax yellowish ferruginous, bordered by a broad jet-black collar.

Allied to *O. musiva*.

Expanse $1\frac{5}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson ; F. Moore.

O. COSTALIS, n. sp.

Pale pinkish testaceous : fore wing with a broad testaceous-white costal streak bordered below by a parallel black streak interrupted by well-defined small pale-centred orbicular and reniform marks ; exterior margin with a row of black dots : hind wing white. Head and front of thorax pale pinkish testaceous, divided by a black line, two small black spots between the base of the antennæ ; hind part of thorax dark pinkish testaceous. Abdomen pale testaceous.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. W. S. Atkinson ; Brit. Mus.

Fam. ORTHOSIDÆ.

Genus ORTHOSIA, Ochs.

ORTHOSIA CURVIPLANA, Walk. Catal. Lep. Het. B. M. xxxiii. Suppl. iii. p. 715.

Darjeeling (*W. S. Atkinson*).

O. EXTERNA, Walk. ib. p. 715.

Darjeeling (*W. S. Atkinson*).

Genus DABARITA, Walk.

DABARITA SUBTILIS, Walk. ib. x. Noct. p. 479.

Larva feeds on the Jamoon tree (*Eugenia jambolana*).—*A. Grote*, *Esq.*

Fam. HADENIDÆ.

Genus AGRIOPIS, Boisd.

AGRIOPIS LEPIDA, n. sp.

Male greyish white : fore wing with a subbasal and subapical ferruginous-brown patch, both irregularly bordered by a black line, the latter having inner blackish parallel lines crossing the disk ; a black dot between the patches ; exterior margin ferruginous brown, with a blackish dotted wavy marginal line, the dots being white exteriorly : hind wing white, with a pale brown exterior border. Cilia of both wings alternate pale brown and white.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell.

A. DISCALIS, n. sp. (Pl. VII. fig. 2.)

Male and *female* greyish white: fore wing with basal, medial, and discal transverse pale brown lunulated lines, the medial and discal lines suffused with darker brown at their costal end, and joined by a black longitudinal irregular discal streak, forming a curved subapical streak; some blackish marks on the costa near the base, the furthest forming an interrupted transverse line: hind wing paler white, with broad pale brown exterior band; cilia alternate pale brown and white. Abdomen pale brown at the apex.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell; F. Moore.

Genus *PHLOGOPHORA*, Ochs.*PHLOGOPHORA INDICA*, n. sp.

Female pinkish fawn-colour: fore wing with a dark brown medial oblique band, above which the discal marks join at their base, with a blackish upper space between them; two subbasal minute spots, between which are two short transverse lines; a diffused streak ascending from near the base of posterior margin, two transverse discal lunulated lines brown, the outer line being medially bordered by dark brown, beyond which the margin is ashy: hind wing paler, with diffused dark marginal lines. Head, thorax, and abdomen pinkish fawn-colour.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

Genus *EUPLEXIA*, Steph.*EUPLEXIA ALBOVITTATA*, n. sp. (Pl. VI. fig. 16.)

Male and *female* dark fuliginous black; exterior margin scalloped: fore wing with an irregular-margined partly transverse subbasal band, and a broad transverse discal band silky white, both with an anterior brownish mark, and the outer band speckled with brown; outer margin of orbicular and inner margin of reniform mark bordered with white; a row of brownish marginal lunules, the extreme scalloped margin being black: hind wing fuliginous; a streak and the cilia at anal angle and two small quadrate spots above white; cilia alternate brown and white. Head and thorax dark fuliginous black, speckled with white. Base of abdomen white, lower part fuliginous.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

E. DISCISIGNATA, n. sp. (Pl. VI. fig. 9.)

Male and *female*. Fore wing pale yellowish green, the base and lower part of the disk varied with ferruginous brown and blackish speckles; an ashy-brown patch crossing the middle from the costa to below the cell, on the inside of which is an elongated oblique black pale-bordered spot, and on the outside is a similar but more irregular-

shaped spot, both being jet-black, the latter bordering the two inner sides of a white brown-speckled reniform mark; the disk transversely varied with brown streaks, the exterior margin being broadly ashy brown: hind wing pale brown, with a narrow marginal ferruginous line; two or three short white streaks ascending from near anal angle. Head and thorax ashy brown. Abdomen pale brown; tuft darker. Cilia dark brown.

Expanse, ♂ $1\frac{1}{8}$, ♀ $1\frac{3}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

E. STRIATOVIRENS, n. sp.

Male and *female* ferruginous brown: fore wing with a transverse basal sinuous line, two transverse discal lines, the posterior margin between the latter, and a submarginal streak from before the apex pale green, the space before the orbicular and reniform marks and beneath the last dusky brown; reniform mark chequered with white and green lines; exterior margin dusky brown: hind wing pale brown; two short white marginal streaks from anal angle. Head and thorax ashy brown. Abdomen pale brown.

Expanse, ♂ $1\frac{1}{8}$, ♀ $1\frac{3}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson; Brit. Mus.

Genus EUROIS, Hübn.

EUROIS AURIPLENA, Walk. Cat. Lep. Het. B. M. xi. Noct. p. 557.

E. CRASSIPENNIS, Walk. ib. p. 558.

Silhet.

Genus HADENA, Treit.

HADENA MEGASTIGMA, Walk. ib. xxxiii. Suppl. iii. p. 738.

Darjeeling.

II. ALBINOTA, n. sp.

Male greenish brown: fore wing with some marks at the base, along the costa, two transverse indistinct medial lunulated lines, and a zigzag submarginal line; a patch composed of the orbicular and reniform marks and a lower space, costal and exterior margins, pale green; a short pearly-white spot beneath the orbicular mark; a small ferruginous patch near the posterior angle: hind wing cupreous brown. Head and thorax greenish brown. Abdomen brown, with pale ferruginous tuft.

Expanse $1\frac{3}{8}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

H. ATROVIRENS, n. sp.

Male and *female*. Fore wing dark green, with a blackish patch at the base of posterior margin, and another across the disk; some basal and discal marks, two medial transverse lines of lunules, submarginal diffused streaks, and zigzag marginal line black; the sub-

marginal streaks bordered within by ferruginous; orbicular and reniform marks large and green-centred: hind wing fuliginous brown, with a marginal and discal pale line. Head and thorax dark green, varied with brown. Abdomen brown; tuft in the male pale ferruginous.

Expanse, ♂ $1\frac{3}{5}$, ♀ $1\frac{1}{2}$.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

H. AUROVIRIDIS, n. sp. (Pl. VI. fig. 11.)

Male golden green: fore wing with a row of white spots with black borders along the costa; basal zigzag transverse line, two lines beneath the cell, orbicular mark, two zigzag discal lines, and a marginal wavy line white, the interspace of the basal line, lower discal, orbicular and reniform marks, and the outer submarginal line dark brown: hind wing pale cupreous brown, with whitish marginal line. Head and thorax brownish green. Abdomen brown.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

H. TENEBROSA, n. sp.

Male blackish brown: fore wing marked with numerous irregular longitudinal narrow black streaks; a small orbicular mark and an elongated apical patch dull ferruginous brown: hind wing blackish cupreous brown; cilia greyish brown. Head and thorax ferruginous brown, with numerous blackish-brown scales. Abdomen blackish brown; tuft ferruginous.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

H. ALBIDISCA, n. sp. (Pl. VI. fig. 17.)

Male. Fore wing pale ferruginous, suffused with greenish posteriorly; a white zigzag transverse basal and lunulated subbasal and discal lines; a zigzag marginal and a wavy marginal line white; the basal alternately patched, the subbasal exteriorly and the discal interiorly, the submarginal and marginal exteriorly bordered with black; middle of the disk suffused with blackish brown; orbicular mark black, bordered exteriorly with white; a large reniform mark and streak beneath it white: hind wing pale cupreous brown, with an indistinct spot and discal band; cilia pale ferruginous. Head and thorax ferruginous. Abdomen paler.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. F. Moore.

H. LANCEOLA, n. sp.

Female dull brownish green: fore wing with two subbasal transverse zigzag black double lines joined in the middle by a short streak, the outer line having a longitudinal pointed black-centred mark, forming a spear-head; orbicular and reniform marks black-centred; a transverse discal double row and a submarginal line of dusky lu-

nules : hind wing pale brown. Head and thorax dull greenish brown. Abdomen brown.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. F. Moore.

Genus CHECUPA, n. g., Moore.

Palpi stout, short, erect, covered with short adpressed hairs ; third joint minute, conical. Antennæ minutely serrated. Proboscis short. Legs robust, densely clothed with short hairs ; hind tibia with four elongated appendages. Body very robust ; thorax thick, broad, densely pilose beneath. Abdomen elongated, flat, extending one-third beyond the hind wing, tufted ; fourth, fifth, and sixth segments produced laterally, the fifth being prolonged into a hollow upright horn-like projection. Fore wing long ; costa nearly straight ; exterior and posterior margins rounded ; no trace of angle. Hind wings trigonate ; apex produced, rounded ; abdominal angle lobed.

CHECUPA FORTISSIMA, n. sp. (Pl. VI. fig. 5.)

Male and *female* greenish black, brown beneath : fore wing with the base, large orbicular and reniform marks, a streak beneath, posterior and exterior margins golden green, slightly marked with short blackish transverse streaks ; a submarginal and marginal row of longitudinal black streaks divided by a line of white lunules : hind wing cupreous brown. Head and thorax golden green. Abdomen brown, tipped with greenish. Legs green ; tarsi brown.

Expanse $2\frac{2}{10}$ inches.

Darjeeling. In Coll. W. S. Atkinson ; F. Moore.

Genus SARBANISSA, Walk.

SARBANISSA INSOCIA, Walk. Cat. Lep. Het. B. M. xxxiii. Suppl. iii. p. 746.

Darjeeling (*W. S. Atkinson's Coll.*).

Fam. XYLINIDÆ.

Genus CUCULLIA, Ochs.

CUCULLIA TENUIS, n. sp.

Male blackish cupreous brown : fore wing elongated, very narrow, wrinkled apically ; a small black spot near the base : hind wing pale cupreous brown. Palpi black. Head and thorax blackish cupreous, and abdomen pale cupreous brown.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. W. S. Atkinson ; F. Moore.

Fam. HELIOTHIDÆ.

Genus HELIOTHIS, Guen.

HELIOTHIS ARMIGERA, Hübn. (Guen. Noct. ii. p. 181).

H. PELTIGERA, Treit. (Guen. Noct. ii. p. 180).

Fam. ACONTIDÆ.

Genus XANTHODES, Guen.

XANTHODES TRANSVERSA, Guen. Noct. ii. p. 211.

X. INTERSEPTA, Guen. ib. p. 212.

X. IMPELLENS, Walk. Cat. Lep. Het. B. M. xv. Noct. p. 1752.

X. INNOCENS, Walk. ib. p. 1752.

X. IMPARATA.

Xanthia imparata, Walk. ib. x. Noct. p. 467.

Genus CANNA, Walk.

CANNA PULCHRIPICTA, Walk. ib. xxxiii. Suppl. iii. p. 790, pl. 6. f. 10.

Darjeeling.

Genus ACONTIA, Ochs.

ACONTIA OLIVEA, Guen. Noct. ii. p. 217.

Bengal.

Larva feeds on the Brinjal (*Solanum melongena*).—A. Grote, Esq.

A. TROPICA, Guen. ib. p. 217.

A. SIGNIFERA, Walk. Cat. Lep. Het. B. M. xii. p. 793.

Calcutta (*W. S. Atkinson*).

Fam. ERASTRIDÆ.

Genus ERASTRIA, Ochs.

ERASTRIA ? VENULIA, Cram. Pap. Exot. ii. pl. 165. f. D.

Fam. ANTHOPHILIDÆ.

Genus ANTHOPHILA, Ochs.

ANTHOPHILA HÆMORRHOIDA.

Micra hemirhoda, Walk. Cat. Lep. Het. B. M. xxxiii. Suppl. iii. p. 799.

Anthophila roseifascia, Walk. ib. p. 803.

Fam. ERIOPIDÆ.

Genus CALLOPISTRIA, Hübn.

CALLOPISTRIA EXOTICA.

Eriopus exotica, Guen. Noct. ii. p. 294.

Darjeeling (*W. S. Atkinson*).

Fam. EURHIPIDÆ.

Genus ANUGA, Guen.

Syn. *Piada*, Walk.

ANUGA CONSTRICTA, Guen. Noct. ii. p. 308.

A. LUNULATA, n. sp.

Female greyish brown: fore wing with the costal half pale, the hinder half dark greyish brown, marked with numerous transverse darker brown lunules: hind wing dark greyish brown, whitish at the base; a ferruginous dark-bordered streak and contiguous spots from the anal angle. Body greyish brown.

Expanse $1\frac{3}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Genus EUTELIA.

EUTELIA, sp?

Genus VARNIA, Walk.

VARNIA IGNITA, Walk. Cat. Lep. Het. B. M. xxxiii. Suppl. iii. p. 825.

Silhet.

V. INÆQUALIS, Walk. ib. p. 828.

Silhet.

Fam. PLUSIDÆ.

Genus ABROSTOLA, Ochs.

ABROSTOLA SUBAPICALIS, Walk. ib. xii. Noct. p. 883.

Ingura recurrens, Walk. ib. xv. p. 1779.

Calcutta.

Genus PLUSIA, Ochs.

PLUSIA AURIFERA, Hübn. (Guen. Noct. ii. p. 335).

Larva found on common cabbage.

P. VERTICILLATA, Walk. Cat. Lep. Het. B. M. xii. Noct. p. 923.

Calcutta.

Larva found on geranium.—*A. Grote, Esq.*

P. AGRAMMA, Guen. Noct. ii. p. 327.

P. inchoata, Walk. Cat. Lep. Het. B. M. Suppl. iii. p. 841.

Larva feeds on the Kuddoo (*Lagenoica vulgaris*), apparently on the leaf-tendrils.—*A. Grote, Esq.*

P. SIGNATA, Fabr. (Guen. Noct. iii. p. 345).

P. FURCIFERA, Walk. Cat. Lep. Het. B. M. xii. p. 927.

P. ORNATISSIMA, Walk. ib. xv. p. 1786.

P. GEMMIFERA, Walk. Cat. Lep. Het. B. M. xii. p. 934.

P. SEMIVITTA, n. sp. (Pl. VI. fig. 13.)

Male and *female* greyish brown, paler beneath : fore wing slightly suffused with cupreous from middle of the costa and below the apex ; an elongated slightly oblique longitudinal discal silvery mark, beneath which is an oblique square dark brown band bordered on each side by a pale line, the outer line extending upward to the costa before the apex : hind wing and abdomen pale cupreous brown. Head and thorax greyish brown, the latter with narrow brighter brown collar.

Expanse $1\frac{1}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson ; F. Moore.

Fam. CALPIDÆ.

Genus *PLUSIODONTA*, Guen.

Syn. *Deva*, Walk.

PLUSIODONTA CHALSYTOIDES, Guen. Noct. ii. p. 360.

Deva conducens, Walk. Cat. Lep. Het. B. M. xii. Noct. p. 963. Calcutta.

Larva bred on *Clypea* and *Cissampelos*.—*A. Grote, Esq.*

Genus *ORÆSIA*, Guen.

ORÆSIA PROVOCANS, Walk. ib. p. 943.

Silhet.

O. RECTISTRIA, Guen. Noct. ii. p. 363.

O. EMARGINATA, Fabr. (Guen. ib. p. 363).

Genus *CALPE*, Treit.

CALPE MINUTICORNIS, Guen. ib. p. 374.

Fam. HYBLÆIDÆ.

Genus *HYBLÆA*, Fabr.

HYBLÆA PUERA, Cram. Pap. Exot. ii. pl. 103. f. D, E.

Larva reared on *Bignonia* and on *Callicarpa*.—*A. Grote, Esq.*

H. CONSTELLATA, Guen. Noct. ii. p. 391.

H. FIRMAMENTUM, Guen. ib. p. 392.

Genus *PHYCODES*, Guen.

Syn. *Tegna*, Walk.

PHYCODES HIRUNDINICORNIS, Guen. ib. p. 389.

Tegna hyblæella, Walk. Catal. Lep. Het. B. M. xxxv. Suppl. v. p. 1810.

Larva abundant on banyan (*Ficus indica*).—*A. Grote, Esq.*

Fam. GONOPTERIDÆ.

Genus COSMOPHILA, Boisd.

COSMOPHILA XANTHINDYMA, Boisd. (Guen. Noct. ii. p. 396).

Cirradia variolosa, Walk. Cat. Lep. Het. B. M. xii. p. 750.

Larva feeds on *Hibiscus*.—A. Grote, *Esq.*

Genus ANOMIS, Hübn.

ANOMIS FULVIDA, Guen. Noct. ii. p. 397.

A. GUTTANIVIS.

Gonitis guttanivis, Walk. Cat. Lep. Het. B. M. xiii. p. 1003.

Genus OSSONOBIA, Walk.

OSSONOBIA TORPIDA, Walk. ib. xxxv. Suppl. v. p. 1966.

Remark.—The genus *Ossonobia* is closely allied to *Scoliopteryx*, Germ. (*Gonoptera*, Latr.).

Fam. AMPHIPYRIDÆ.

Genus AMPHIPYRA, Ochs.

AMPHIPYRA MONOLITHA, Guen. Noct. ii. p. 414.

Genus NÆNIA, Steph.

NÆNIA CUPREA, n. sp.

Male blackish cupreous brown, chalybeate-washed : fore wing with three or four short coppery-red costal bars with black borders ; costal and discoidal vein coppery red ; orbicular and reniform marks with a narrow yellowish border, the space before each and spot beneath black ; one basal and two medial irregular transverse lunulated double black lines ; a submarginal and a wavy marginal coppery line, the former bordered within by a row of broad black lunules : hind wing pale cupreous brown. Head and thorax blackish brown varied with ferruginous. Abdomen greyish brown, tips ferruginous. Cilia of hind wing pale ferruginous.

Expanse $2\frac{1}{8}$ inches.

Bengal. In Coll. A. E. Russell.

N. CHALYBEATA, n. sp.

Female blackish cupreous brown : fore wing with numerous chalybeate speckles ; the discal veins lined with chalybeous ; a basal and subbasal zigzag chalybeate line, a discal and submarginal lunulated chalybeate line, each with a dark border ; exterior margin chalybeous ; orbicular and reniform marks dark, centred with chalybeate speckles, reniform mark large and with a copper-coloured border : hind wing dull pale cupreous brown, with a narrow whitish marginal

band ; cilia brown, speckled with white. Head and thorax blackish brown. Abdomen brown.

Expanse $2\frac{2}{3}$ inches.

Bengal. In Coll. F. Moore.

Fam. TOXOCAMPIDÆ.

Genus TOXOCAMPA, Guen.

TOXOCAMPA TETRASPILA.

Remigia tetraspila, Walk. Cat. Lep. Het. B. M. xxxiii. Suppl. iii.
p. 1018.
Darjeeling.

T. COSTIMACULA, Guen. Noct. ii. p. 429.

Remigia triangulata, Walk. ib. p. 1017.
Silhet.

Fam. POLYDESMIDÆ.

Genus PANDESMIA, Guen.

Syn. *Cerbia*, Walk.

PANDESMIA QUÉNAVADI, Guen. Noct. ii. p. 438.
Silhet.

Genus POLYDESMIA, Boisd.

POLYDESMIA BOARMOIDES, Guen. Noct. ii. p. 441.

Alamis brevipalpis, Walk. Cat. Lep. Het. B. M. xiii. p. 1051.

P. SCRIPTILIS, Guen. Noct. ii. p. 442.
Silhet.

P. OTIOSA, Guen. ib. p. 442.
Silhet.

Fam. HOMOPTERIDÆ.

Genus ALAMIS, Guen.

ALAMIS ALBICINCTA, Guen. Noct. iii. p. 4.

A. OPTATURA.

Remigia optatura, Walk. Cat. Lep. Het. B. M. xv. p. 1848.

A. CONTINUA, Walk. ib. xxxiii. Suppl. iii. p. 877.

A. GLAUCINANS, Guen. Noct. iii. p. 6.

Genus HOMOPTERA, Boisd.

HOMOPTERA INFLIGENS, Walk. l. c. xiii. Noct. p. 1068.
PROC. ZOOL. SOC.—1867, No. V.

Fam. HYPOGRAMMIDÆ.

Genus BRIADA, Walk.

BRIADA PRÆCEDENS, Walk. Cat. Lep. Het. B. M. xiii. p. 1098.

B. VARIANS, n. sp. (Pl. VI. fig. 12.)

Female blackish brown : fore wing with transverse basal, subbasal, and discal black-bordered yellow wavy narrow lines ; reniform mark elongated, yellowish, with black centre ; space beyond the discal line golden yellow, margined by a transverse pure-white narrow line, outside of which is a blackish pale-bordered transverse streak interrupted in the middle by a suffused streak proceeding to the middle of exterior margin : hind wing and abdomen greyish brown ; cilia with pale inner line. Head and thorax ferruginous brown.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell ; F. Moore.

B. CERVINA, Walk. ib. xxxv. Suppl. v. p. 1968.

Genus CALLYNA, Guen.

CALLYNA SIDEREA, Guen. Noct. i. p. 113.

Silhet.

C. MONOLEUCA, Walk. l. c. xv. p. 1667.

Darjeeling (*W. S. Atkinson*).

Fam. CATEPHIDÆ.

Genus COCYTODES, Guen.

COCYTODES CÆRULEA, Guen. Noct. iii. p. 41.

Silhet.

C. MODESTA, Van der Hoeven, Lép. Nouv. pl. 7. f. 8.

C. immodesta, Guen. Noct. iii. p. 42.

Genus CATEPHIA, Ochs.

CATEPHIA LINTEOLA, Guen. ib. p. 44.

Genus ERCHEIA, Walk.

ERCHEIA TENEBROSA, n. sp.

Male blackish brown : fore wing with an elongated curved ferruginous apical streak, which is margined and marked with black lines ; reniform mark and a parallel line beyond dull ferruginous ; posterior margin broadly ferruginous, with numerous dark speckles, the division of colour marked by a black irregular line ; a black wavy line and some irregular streaks ascending from before the posterior angle : hind wing fuliginous black, with two white spots from above anal angle ; cilia with two elongated white streaks. Underside whitish

testaceous: fore wing streaked with black on posterior margin; broad transverse discal and submarginal blackish bands: hind wing with discal spot, an irregular sinuous narrow medial and broad submarginal band; exterior border of both wings with short longitudinal blackish streaks and marginal row of dots; cilia as above.

Expanse $2\frac{1}{8}$ inches.

Bengal. In Coll. A. E. Russell.

Remark.—This insect is very much like *Achæa subsignata*, from Sierra Leone.

Genus ANOPHIA, Guen.

ANOPHIA ACRONYCTOIDES, Guen. Noct. iii. p. 47.

Genus ERYGIA, Guen.

Syn. *Calicula*, Walk.

ERYGIA APICALIS, Guen. Noct. iii. p. 50.

Calicula exempta, Walk. Cat. Lep. Het. B. M. xv. p. 1808.

Genus ODONTODES, Guen.

ODONTODES BOLINOIDES.

Briada bolinoides, Walk. ib. Noct. p. 1802.

Steiria subfasciata, Walk. ib. Suppl. iii. p. 922.

S. quadristrigata, Walk. ib. p. 923.

—? *inordinata*, MS. B. M. Cabinet.

Genus STICTOPTERA, Guen.

STICTOPTERA ILLUCIDA, Walk. l. c. p. 918.

Calcutta (*W. S. Atkinson*).

S. GRISEA, n. sp.

Male greyish brown: fore wing speckled with grey at the base, medially, and along exterior margin; orbicular and reniform marks black; a black spot below and a transverse wavy line beyond the former, and a similar line beyond the latter, exterior to which is a submarginal recurved interrupted series of grey inner-bordered black lunules, and a marginal row of blacker lunulated spots: hind wing diaphanous, purplish grey, with a broad marginal brown band. Head and collar on thorax ferruginous brown; thorax greyish brown. Abdomen brown.

Expanse $1\frac{5}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson.

Fam. HYPOCALIDÆ.

Genus HYPOCALA, Guen.

HYPOCALA DEFLORATA, Fabr. (Guen. Noct. iii. p. 76).

H. EFFLORESCENS, Guen. Noct. iii. p. 77.

H. ROSTRATA, Fabr. (Guen. ib. p. 74).

H. SUBSATURA, Guen. ib. p. 75.

Fam. CATOCALIDÆ.

Genus CATOCALA, Ochs.

CATOCALA NEPCHA, n. sp.

Fore wing ferruginous brown; basal half with irregular-shaped black marks; a square white spot closing the cell, adjoining which is a narrow transverse white band bordered within with black; a sub-marginal series of triangular black spots; and a marginal series of black lunules with grey inner borders; cilia greyish brown: hind wing ochreous yellow, with broad black marginal band; cilia greyish brown, spotted with greyish white. Underside—fore wing yellow at the base; the rest black, with a broad medial large white patch and a smaller one beneath it at the posterior angle: hind wing as above, but with a broad white medial patch having a black inner streak from anterior margin. Antennæ yellow. Head black. Thorax ferruginous brown. Abdomen yellow, with dorsal and lateral row of blackish-brown spots.

Expanse $2\frac{3}{4}$ inches.

Darjeeling. In Coll. A. Grote, Esq.

C. DOTATA, Walk. Cat. Lep. Het. B. M. xiii. p. 1212.

Fam. OPHIDERIDÆ.

Genus OPHIDERES, Boisd.

OPHIDERES MATERNA, Linn. (Cram. Pap. Exot. ii. pl. 174. f. B, pl. 267. f. E).

O. FULLONICA, Linn. (Guen. Noct. iii. p. 111).

Noctua dioscoreæ, Fab. Sp. Ins. ii. p. 212.

Phalæna-Noctua pomona, Cram. pl. 77. f. C.

O. CAJETA, Cram. Pap. Exot. i. pl. 3. f. A-C.

O. SALAMINIA, Cram. ib. ii. pl. 174. f. A.

O. HYPERMNESTRA, Cram. ib. iv. pl. 323. f. A, B.

O. PLANA, Walk. Cat. Lep. Het. B. M. xiii. p. 1226.

Fam. PHYLLODIDÆ.

Genus PHYLLODES, Boisd.

PHYLLODES CONSOBRINA, Westw. Cab. Orient. Ent. pl. 28. f. 2.

P. USTULATA, Westw. ib. pl. 28. f. 1.

P. FASCIATA, n. sp.

Male greenish brown : fore wing with a dark brown line from the apex to beneath an irregular elongated transverse discal pale mark ; a short basal, two discal, and a third subapical transverse glossy-purple diffused bands, the discal band bordering the lower margin of the apical line and being confluent on the hind margin of the wing : hind wing plain brown exteriorly, the discal portion being black and having a broad irregular transverse orange-yellow band. Head and front of thorax ferruginous ; hind part of thorax and abdomen plain brown.

Expanse $5\frac{1}{2}$ inches.

Bengal. In Coll. A. E. Russell.

Genus *POTAMOPHORA*, Guen.

POTAMOPHORA MANLIA, Cram. Pap. Exot. i. pl. 92. f. A.

Genus *LYGNIODES*, Guen.

LYGNIODES HYPOLEUCA, Guen. Noct. iii. p. 125.

L. CILIATA, n. sp.

Male. Both wings of a uniform blackish velvety brown, bordered by well-defined cream-coloured cilia. Underside duller brown, with a discal line of ill-defined white-speckled spots, and a submarginal row of blackish spots, each bordered with a dentiform white mark ; a blackish subbasal spot on both wings, and a white subapical spot on fore wing. Cilia as above.

Expanse 3 inches.

Bengal. In Coll. A. E. Russell.

Fam. *EREBIDÆ*.Genus *OXYODES*, Guen.

OXYODES CLYTIA, Cram. Pap. Exot. iv. pl. 399. f. 9.

Genus *SYRNA*, Guen.

SYRNA ALBILINEA, Walk. Cat. Lep. Het. B. M. xiv. p. 1261.

Silhet.

S. CÆLISPARSA, Walk. ib. p. 1262.

Assam.

S. CURVILINEA, n. sp. (Pl. VI. fig. 4.)

Female ferruginous brown : fore wing to the middle blackish ferruginous brown, marked with three very narrow transverse white lines, the first and second lines curved inward, the third obliquely straight and interrupted by an elongated constricted reniform mark ; the second and third line is inwardly bordered by a similar lunulated

line, the interspace with a white discal dot, and in some specimens partly suffused with pale purplish white; a dark irregular submarginal ill-defined band which is medially confluent with the exterior margin, bordered without by a transverse sinuous black line; a marginal row of white-marked black dots: hind wing greyish cupreous brown, with decreasing pale ferruginous-brown black-bordered anal streaks, and marginal blackish white-marked dots; cilia ferruginous brown, with pale inner line. Underside dull ferruginous brown. Both wings with two transverse indistinct discal bands; a marginal row of black dots.

Expanse $2\frac{1}{8}$ inches.

Bengal. In Coll. A. E. Russell; F. Moore.

S. RECTILINEA, n. sp.

Male dark testaceous brown: fore wing with a medial darker brown oblique transverse band, straightly bordered on each side by a double slightly wavy white line, the outer line interrupted by a constricted reniform white mark; basal line white, indistinct; an irregular submarginal ill-defined dark band bordered without by a blackish sinuous line; a marginal row of white slightly black-marked dots: hind wing with a broad submarginal blackish decreasing band and two narrow inner lines; a marginal row of black-marked white dots; cilia with pale inner line. Underside with broad submarginal diffused dusky band, and inner pale-bordered black inner band; a pale-bordered black discal spot on hind wing; a marginal row of black dots.

Expanse $2\frac{1}{8}$ inches.

Bengal. In Coll. A. E. Russell.

S. CYANIVITTA, n. sp.

Male dark ferruginous brown: fore wing with an oblique transverse bluish-grey band, bordered on each side by a pale line, the outer line broken by a narrow reniform mark; subbasal line indistinct; an ill-defined transverse submarginal greyish-brown band irregularly bordered exteriorly by a black sinuous line; a narrow marginal bluish-grey sinuous line, the inner points being but slightly tipped with black: hind wing greyish cupreous brown, with a slight short white-bordered black streak from anal angle, and a narrow wavy marginal line; cilia ferruginous brown. Underside uniform brown.

Expanse $2\frac{1}{8}$ inches.

Bengal (*Sherwill*). In Coll. F. Moore.

Genus *TAVIA*, Walk.

TAVIA SUBSTRUENS, Walk. Cat. Lep. Het. B. M. xiv. p. 1276.

T. PUNCTOSA, Walk. ib. xxxiii. Suppl. iii. p. 939.

T. DUBITARIA, Walk. ib. p. 939.

T. CALIGINOSA, Walk. ib. p. 940,

T. ALBILINEA, Walk. Cat. Lep. Het. B. M. xxxiii. Suppl. iii. p. 940.

T. SUBMARGINATA, Walk. ib. p. 941.

T. BIOCULARIS, n. sp.

Male dark purplish fawn-colour: fore wing with several transverse undulating chalybeous-bordered black lunulated lines; submarginal points yellowish, black-marked, the lower white; costal dots yellowish; orbicular spot small, black-bordered, and with whitish centre; reniform spot prominent, circular, composed of black outer border, inner pure-white ring, and orange-yellow centre, and having a white dot above and below it: hind wing purple brown, slightly suffused with chalybeous.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell.

T. CATOCALOÏDES, n. sp. (Pl. VII. fig. 3.)

Male ferruginous grey: fore wing with two very undulating transverse double lunulated brown lines—the first subbasal, the other beyond the middle, with the space between ferruginous and covered with short transverse blackish striæ; orbicular and reniform marks pale; a similar-coloured band across the disk, bordered without by a blackish line, which is nearly confluent in the middle with the exterior margin; submarginal spots large, brownish white and blackish-bordered: hind wing ferruginous yellow, from the base to the middle ferruginous brown, bordered by a black outer band; a broad submarginal discal band, blackish anteriorly, but formed of blackish-ferruginous striæ posteriorly; submarginal spots hardly apparent, being replaced by a blackish lunulated line; cilia interlined. Under-side ferruginous yellow: fore wing with three short medially transverse diffused black bands: hind wing with diffused discal and two narrow medial bands and large discal spot black; submarginal dots black; cilia blackish.

Expanse 3 inches.

Bengal (*Sherwill*). In Coll. F. Moore.

Genus *ANISONEURA*, Guen.

ANISONEURA SALEBROSA, Guen. Noct. iii. p. 161.

Silhet.

A. HYPOCYANA, Guen. ib. p. 162.

Silhet.

Fam. *OMMATOPHORIDÆ*.

Genus *SPEIREDONIA*, Hübn.

SPEIREDONIA FEDUCIA, Stoll, Cram. Pap. Exot. Suppl. v. pl. 36. f. 3.

Silhet.

S. ZAMIS, Stoll, Cram. Pap. Exot. Suppl. v. pl. 36. f. 11.
Silhet.

S. RETRAHENS, Walk. Cat. Lep. Het. B. M. xiv. p. 1294.
Sericia parvipennis, Walk. ib. p. 1297.

Genus PATULA, Guen.

PATULA MACROPS, Linn. (Cram. Pap. Exot. ii. pl. 171. f. A, B).
Noctua bubo, Fabr. (Donov. Ins. China, pl. . f. 1).

P. BOOPIS, Guen. Noct. iii. p. 178.
Silhet.

Genus ARGIVA, Hübn.

ARGIVA HIEROGLYPHICA, Drury, Ins. Exot. ii. pl. 2. f. 1 ; Don.
Ins. Ind. pl. 54. f. 2.

Phalæna mygdonia, Cram. pl. 174. f. F.
P. hermonia, Cram. pl. 74. f. E.

A. CAPRIMULGUS, Fabr. (Guen. Noct. iii. p. 180).

Genus NYCTIPAO, Hübn.

NYCTIPAO CREPUSCULARIS, Linn. (Clerck, Icon. pl. 53. f. 1-4 ;
Cram. ii. pl. 159. f. A, pl. 160. f. A).

N. GEMMANS, Guen. Noct. iii. p. 182.
Silhet.

N. GLAUCOPIS, Walk. Cat. Lep. Het. B. M. xiv. p. 1306.
Silhet.

N. OBLITERANS, Walk. ib. p. 1307, ♂.
N. exterior, Walk. ib. p. 1306, ♀.

Genus OMMATOPHORA, Guen.

OMMATOPHORA LUMINOSA, Cram. Pap. Exot. iii. pl. 274. f. D.

Fam. HYPOPHYRIDÆ.

Genus SPIRAMA, Guen.

SPIRAMA HELICINA.

Speiredonia helicina, Hübn. Samml. exot. Schmett. iii. f. 437-8.

S. COHÆRENS, Walk. Cat. Lep. Het. B. M. xxiv. p. 1321.
? *S. retorta* (Linn.).

S. TRILOBA, Guen. Noct. iii. p. 197.
Hypopyra mollis, Guen. ib. p. 198.

Genus HYPOPYRA, Guen.

Syn. *Maxula*, Walk.

HYPOPYRA VESPERTILIO, Fabr. (Guen. Noct. iii. p. 199).

H. FENISECA, Guen. ib. p. 200.

Silhet.

H. OSSIGERA, Guen. ib. p. 201.

H. UNISTRIGATA, Guen. ib. p. 201, pl. 21. f. 1.

Maxula idonea, Walk. Cat. Lép. Het. B. M. xiv. Noct. p. 1327;
xxxiii. Suppl. iii. p. 1096.*Angerona poeusaria*, Walk. ib. xx. Geometr. p. 243.

Genus HAMODES, Guen.

HAMODES AURANTIACA, Guen. Noct. iii. p. 203.

Genus ENTOMOGRAMMA, Guen.

ENTOMOGRAMMA FAUTRIX, Guen. Noct. iii. p. 204.

Genus BEREGRÆ, Walk.

BEREGRÆ REPLENENS, Walk. l. c. xiv. p. 1315.

Fam. BENDIDÆ.

Genus HULODES, Guen.

HULODES CARANEA, Cram. Pap. Exot. iii. pl. 269. f. E, F.

H. RESTORENS.

Hypopyra restorens, Walk. Cat. Lep. Het. B. M. xiv. p. 1328.? *Hulodes drylla*, Guen. Noct. iii. p. 209, pl. 24. f. 10.

H. INANGULATA, Guen. ib. p. 210.

Silhet.

H. PALUMBA, Guen. ib. p. 211.

Remigia colligens, Walk. l. c. xxxiii. Suppl. iii. p. 1019.

Fam. OPHIUSIDÆ.

Genus SPHINGOMORPHA, Guen.

SPHINGOMORPHA CHLOREA, Cram. Pap. Exot. ii. pl. 104. f. C.

S. sipyla, Guen. Noct. iii. p. 222.

Genus IONTHA, Doubleday.

IONTHA UMBRINA, Doubleday, Entomologist, p. 298.

Silhet.

Genus LAGOPTERA, Guen.

LAGOPTERA HONESTA, Hübn. Samml. exot. Schmett. ii. Noct. iii. 1. f. 1, 2.

Balasore.

L. MAGICA, Hübn. ib. iii. f. 535.

Maungbhoom.

L. DOTATA, Fabr. (Van der Hoeven, Léop. Nouv. pl. 4. f. 3).

Genus OPHIODES, Guen.

OPHIODES TRAPEZIUM, Guen. Noct. iii. p. 231.

O. SEPARANS, Walk. Cat. Lep. Het. B. M. xiv. p. 1357.

O. TRIPHÆNOIDES, Walk. ib. p. 1358.

O. CUPREA, n. sp.

Female greyish cupreous brown; luteous and glossy beneath: fore wing numerously studded with black scales; two transverse pale luteous lines, which are widely separate on the costa, but contiguous on the hind margin; reniform spot brown, with a pale luteous line; a transverse submarginal less distinct luteous line terminated anteriorly by two jet-black dentate spots; cilia brown, with a narrow pale inner line: hind wing luteous brown, with a cupreous gloss; exterior border dark brown; cilia luteous.

Expanse 2 inches.

Bengal (*Sherwill*). In Coll. F. Moore.

Genus OPHISMA, Guen.

OPHISMA GRAVATA, Guen. Noct. iii. p. 237.

O. MATURESCENS, Walk. Cat. Lep. Het. B. M. xiv. p. 1382.

Genus COTUZA, Walk.

Syn. *Ginea*, Walk.; *Sympis*, part., Guen.

COTUZA UMMINIA.

♀. *Phal. Noctua umminia*, Cram. Pap. Exot. iii. pl. 267. f. F.

Ophisma umminia, Walk. Cat. Lep. Het. B. M. xiv. p. 1384.

♀. *Sympis subunita*, Guen. Noct. iii. p. 344; Walk. *l. c.* xv. p. 1549.

♂. *Cotuza drepanoides*, Walk. ib. p. 1552.

♀. *Ginea removens*, Walk. ib. p. 1638.

Remark.—The larva of *C. umminia* differs considerably from that of *Sympis rufibasis*, and is very similar in appearance to the larva of the genus *Naxia*.

C. DEFICIENS. (Pl. VII. fig. 1.)

Ophisma deficiens, Walk. ib. xiv. p. 1383.

Remigia perfidiosa, Walk. Cat. Lep. Het. B. M. xiv. p. 1511.
Ophisma cumulifera, Walk. MS. B. M. Coll.

Genus *HEMEROBLEMMA*, Hübn.

HEMEROBLEMMA PEROPACA, Hübn. Samml. exot. Schmett. iii. f. 541-2.

Ophisma lætabilis, Guen. Noct. iii. p. 241.

Genus *ACHÆA*, Hübn.

ACHÆA MELICERTE, Drury, Ins. i. pl. 23. f. 1 ; Cram. Pap. Exot. iv. pl. 323. f. C, D.

A. MERCATORIA, Fabr. (Cram. Pap. Exot. iv. pl. 323. f. E).

Genus *SERRODES*, Guen.

SERRODES CAMPANA, Guen. Noct. iii. p. 252.

Genus *NAXIA*, Guen.

NAXIA CIRCUMSIGNATA, Guen. ib. p. 255.
Silhet.

N. ONELIA, Guen. ib. p. 258.

Ophiusa obumbrata, Walk. l. c. xxxiii. Suppl. iii. p. 969.
O. umbrosa, Walk. ib. p. 968.

N. CALEFACIENS, Walk. ib. xiv. p. 1405.

N. CALORIFICA, Walk. ib. p. 1406.
Silhet.

Genus *CALESIA*, Guen.

CALESIA COMOSA, Guen. Noct. iii. p. 258.

C. GASTROPACHOIDES, Guen. ib. p. 258.

Genus *HYPÆTRA*, Hübn.

HYPÆTRA NOCTUOIDES, Guen. Noct. iii. p. 259.
Silhet.

II. *GAMMOIDES*.

Trigonodes gammoides, Walk. l. c. xv. p. 1833.
Poaphila hamata, Walk. MS. B. M. Coll.

Genus *ATHYRMA*, Hübn.

ATHYRMA POLYSPILA, Walk. Cat. Lep. Het. B. M. xxxiii. Suppl. iii. p. 966.
Silhet.

A. DIVULSA, Walk. Cat. Lep. Het. B. M. xxxiii. Suppl. iii. p. 966. Silhet.

A. TESSELLATA, n. sp.

Male greyish brown : fore wing with a large patch from the base to the middle and a broad transverse discal band blackish brown, bordered by a pale yellow narrow line, the space between them being grey, the former intersected by an irregular-quadriform narrow yellow line, and the latter crossed by yellowish and traversed in its entire length by a nearly straight line terminating near the produced angle of the former ; a marginal row of similar-coloured dentiform spots bordered with a narrow pale yellow line : hind wing greyish brown. Head and thorax blackish brown, narrowly fringed with pale yellow. Abdomen grey. Cilia spotted with brown.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

Genus *OPHIUSA*, Guen.

OPHIUSA MYOPS, Guen. Noct. iii. p. 265.

O. SIMILLIMA, Guen. ib. p. 266.

Silhet.

O. JOVIANA, Cram. Pap. Exot. iv. pl. 399. f. B.

O. ALBIVITTA, Guen. Noct. iii. p. 271.

O. ACHATINA, Sulz. Ins. pl. 22. f. 4 ; Cram. Pap. Exot. iii. pl. 288. f. A.

O. FULVOTENIA, Guen. Noct. iii. p. 272.

Silhet.

O. ARCTOTENIA, Guen. ib. p. 272.

Silhet.

O. STUPOSA, Fabr. (Cram. Pap. Exot. pl. 273. f. E, nec pl. 288. f. A).

Silhet.

Genus *GRAMMODES*, Guen.

GRAMMODES STOLIDA, Fabr. (Guen. Noct. iii. p. 276).

G. AMMONIA, Cram. Pap. Exot. iii. pl. 250. f. D.

G. MYGDON, Cram. ib. ii. pl. 156. f. G.

G. NOTATA, Fabr. (Walk. Cat. Lep. Het. B. M. xiv. p. 1445).

Genus *FODINA*, Guen.

FODINA ORIOLUS, Guen. Noct. iii. p. 274.

F. FULLULA, Guen. ib. p. 275.

Fam. EUCLIDIDÆ.

Genus TRIGONODES, Guen.

TRIGONODES HYPPASIA, Cram. Pap. Exot. iii. pl. 250. f. E.

Fam. REMIGIDÆ.

Genus REMIGIA, Guen.

REMIGIA ARCHESIA, Cram. Pap. Exot. iii. pl. 273. f. F, G, ♀.

Ph. Noct. virbia, Cram. ib. f. H, ♂.

Remigia bifasciata, Walk. Cat. Lep. Het. B. M. Suppl. iii. p. 1014.

R. FRUGALIS, Fabr. (Guen. Noct. iii. p. 314).

Chalciope lycopodia, Geyer, Zutr. Exot. Schmiett. 25. f. 897.

Genus FELINIA, Guen.

FELINIA TERMINIGERA, Walk. l. c. xv. p. 1850.

F. SPISSA, Guen. Noct. iii. p. 322.

Silhet.

Tribe PSEUDO-DELTOIDES.

Fam. THERMESIDÆ.

Genus SYMPIS, Guen.

SYMPIS RUFIBASIS, Guen. Noct. iii. p. 344.

Silhet. In Coll. A. Grote, Esq.

Larva feeds on the Lichee (*Nephelium litchi*); pupa within rolled end of leaf.

Genus THERMESIA, Hübn.

THERMESIA CREBERRIMA, Walk. Catal. Lep. Het. B. M. xv. p. 1574.

Silhet.

T. PRÆCIPUA, Walk. ib. xxxiii. Suppl. iii. p. 1056.

Silhet.

T. ARENACEA, Walk. ib. p. 1056.

Silhet.

T. CONSOCIA, Walk. ib. p. 1057.

Silhet.

T. RETICULATA, Walk. ib. p. 1062.

Drepanodes scitaria, Walk. ib. xxvi. Geom. p. 1488.

Anisodes pyrinia, Walk. ib. p. 1582.

Darjeeling (*W. S. Atkinson*).

Larva feeds on *Elæocarpus serratus*.—A. Grote, Esq.

Genus AZAZIA, Walk.

AZAZIA RUBRICANS.

Ophiusa rubricans, Boisd. (Guen. Noct. iii. p. 356).

Azazia rubricans, Walk. Cat. Lep. Het. B. M. xv. p. 1576.

Thermesia transducta, Walk. ib. xxxiii. Suppl. iii. p. 1058.

Genus SELENIS, Guen.

Syn. *Mestleta*, Walk.

SELENIS IRRECTA, Walk. ib. p. 1066.

Selenis niviapex, Walk. ib. p. 1069.

S. ABRUPTA.

Mestleta abrupta, Walk. ib. p. 829.

Larva feeds on *Zizyphus*, apparently only on the flowers.—*A. Grote, Esq.*

Genus MARMORINIA, Guen.

MARMORINIA SINGHA, Guen. Noct. iii. p. 372.

Silhet.

M. SHIVULA, Guen. ib. p. 372.

Silhet.

Genus MECODINA, Guen.

MECODINA LANCEOLA, Guen. ib. p. 373.

Silhet.

Genus SINGARA, Walk.

SINGARA DIVERSALIS, Walk. *l. c.* p. 1113.

Silhet.

Genus HYPERNARIA, Guen.

HYPERNARIA DISCISTRIGA, n. sp.

Female dull yellowish ferruginous, brownish apically, minutely irrorated with blackish scales: fore wing with an oblique brown line crossing both wings from the apex to the middle of abdominal margin, the line bordered within with ferruginous and a pale inner margin; three short costal diffused dusky streaks, and lunulated discal mark, before the latter is a black dot. Head and front of thorax blackish. Underside brighter-coloured, with two oblique lunulated dusky lines crossing both wings.

Expanse $2\frac{3}{8}$ inches.

Bengal. In Coll. A. E. Russell.

Remark.—This insect has much the appearance of *Ophisma atticola*, Walk. Cat. Lep. B. M. p. 1383.

Genus FASCELLINA, Walk.

FASCELLINA CHROMATARIA, Walk. Cat. Lep. Het. B. M. xx. Geometr. p. 215.

Nysis lata, Walk. MS. B. M. Coll.

F. VIRIDIS, n. sp. (Pl. VII. fig. 4.)

Female green, paler beneath, the hind wing being yellow: fore wing with a discal spot, oblique streak beneath, and a broad exterior patch from below the apex brown, the latter with a curved transverse discal narrow ferruginous-brown chain-like band: hind wing with a straight transverse band and a narrow curved discal line of ferruginous brown. Head and thorax green. Abdomen pale ferruginous brown. Underside—both wings basally and the hind wing exteriorly minutely striated with purplish brown: fore wing with an exterior dark purple-brown patch having a small yellow spot near posterior angle, along its inner margin is a transverse narrow black-bordered silvery lunulated line terminating before the costa: hind wing with a straight purple-brown band and curved line as above.

Expanse $1\frac{4}{5}$ inch.

Bengal. In Coll. F. Moore.

Fam. FOCILLIDÆ.

Genus ZETHES, Ramb.

ZETHES XYLOCHROMA, Walk. Cat. Lep. Het. B. M. xv. p. 1525. Silhet.

Z. PERTURBANS, Walk. ib. p. 1525.

Silhet.

Genus PHALACRA, Walk.

PHALACRA METAGONARIA, Walk. ib. xxxv. Suppl. v. p. 1639.

Larva in strong web in rolled leaf. Feeds on dates.—*A. Grote, Eq.*

Genus THYRIDOSPILA, Guen.

THYRIDOSPILA SPHERIPHORA, n. sp.

Female greyish fawn-colour: fore wing with two medial transverse ill-defined black narrow sinuous lines, each curved inward to the costa; between the bands is a parallel medial diffused blackish line passing the reniform mark; a triangular reddish-brown patch before the apex, which also descends the submargin; orbicular and reniform spots semitransparent and yellowish; orbicular spot with a small attached upper portion; reniform spot transversely narrow, bent in the middle and joined at each end to a semicircular blackish line; a submarginal row of blackish points and marginal row of lunules: hind wing reddish brown exteriorly; three indistinct narrow blackish transverse sinuous lines; cilia edged with grey. Underside

paler, specked with brown : fore wing somewhat ferruginous ; markings as above ; the transverse lines with diffused greyish outer borders. Legs grey, brown-speckled.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell ; F. Moore.

Genus PHURYS, Guen.

PHURYS OBLIQUA, n. sp.

Male brownish fawn-colour : fore wing with a blackish streak obliquely from the apex to the middle of the posterior margin, where it is the widest ; two short oblique subbasal reddish-brown streaks, a similar undulating streak bordering each side of the black one, beyond which are two other dusky streaks ; a small discal dot and reniform spot reddish brown : hind wing with five transverse dusky brown streaks, the second and fourth pale-bordered ; cilia with a pale inner line. Head and front of thorax reddish brown. Abdomen greyish brown.

Expanse $1\frac{7}{8}$ inch.

Bengal. In Coll. A. E. Russell.

P. STRIGATA, n. sp.

Female pale yellowish testaceous : fore wing with a narrow pale transverse line broadly bordered externally with brown from before the apex to before the middle of posterior margin, the rest of the wing covered with transverse lines of delicate brown strigæ ; a marginal row of brown dots : hind wing brownish basally, dark brown from the apex, the anal angle with short brown strigæ. Underside brighter-coloured, with delicate short strigæ ; both wings with a blackish discal spot and a suffused blackish-brown submarginal band, which on the fore wing branches out to the exterior margin.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. F. Moore.

Genus EGNASIA, Walk.

EGNASIA EPHYRODALIS, Walk. Cat. Lep. Het. B. M. xvi. Delt. p. 217.

E. TRIMANTESALIS, Walk. ib. p. 220.

Darjeeling.

E. VAGA.

Thermesia vaga, Walk. ib. xxxiii. Suppl. iii. p. 1057.

Silhet.

Fam. AMPHIGONIDÆ.

Genus LACERA, Guen.

LACERA CAPELLA, Guen. Noct. iii. p. 337.

Genus AMPHIGONIA, Guen.

AMPHIGONIA COMPRIMENS, Walk. Cat. Lep. Het. B. M. xv. p. 1540.
Silhet.

Tribe DELTOIDES.

Fam. PLATYDIDÆ.

Genus EPISPARIS, Walk. Cat. x. p. 476 (1856).

Syn. *Neviasca*, Walk. (1858); *Pradiota*, Walk. (1866).

EPISPARIS VARIALIS.

Neviasca varialis, Walk. Cat. Lep. Het. B. M. xvi. Delt. p. 7.

Episparis signata, Walk. ib. xxxiii. Suppl. iii. p. 1032.

E. SEJUNCTALIS.

Pradiota sejunctaria, Walk. ib. xxxiv. Suppl. iv. p. 1572.

P. ennomocoides, Walk. MS. B. M. Coll.

E. TORTUOSALIS, n. sp. (Pl. VII. fig. 5.)

Male purplish brown above, greyish brown anteriorly; numerous marked with short narrow black strigæ: fore wing with two medial transverse dark purple-brown narrow bands, the inner one bent outwardly in the middle, the exterior band broadly elbowed outwards and then retracting to the costa; both bands with a narrow whitish-outer-bordered line; between the bands is a very small indistinct white-bordered black "orbicular" spot and a narrow white "reniform" lunule; before the apex are two transverse narrow whitish lines with ill-defined dark bands between them, all retracting to the costa: hind wing with an irregular transverse whitish submarginal line, the space posteriorly between which and the exterior margin is ferruginous; a dark medial indistinct band. Underside greyish brown, narrow transverse strigæ numerous and distinct: fore wing with a dark chocolate-brown interiorly angled apical patch, with a whitish-bordered line; proceeding from the angle is an indistinct whitish streak to the base of the wing; orbicular spot white; reniform lunule with a black centre: hind wing with a whitish medial space, within which is a prominent black discal spot. Abdomen white at the base beneath. Middle tarsi white. Hind legs partly white.

Expanse $2\frac{1}{8}$ inches.

Bengal (*Sherwill*). In Coll. F. Moore.

Fam. HYPENIDÆ.

Genus DICHROMIA, Guen.

DICHROMIA OROSIALIS, Cram. Pap. Exot. pl. 275. f. D.

D. TRIPLICALIS, Walk. Cat. Lep. Het. B. M. xvi. Delt. p. 16.

Darjeeling.

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TALAPA, n. g., Moore.

Female robust. Palpi porrect, compressed, pilose; second joint recurved upwards and outwards, extending beyond the head; third joint two-thirds the length of the second, straight, slender. Antennæ very minutely pectinated. Legs slightly pilose; mid tibiæ with one pair and hind tibiæ with two pairs of long slender spurs. Body stout. Abdomen extending beyond the angle of the hind wing. Wings ample: fore wing broad; costa nearly straight; apex acute; exterior margin wavy, oblique, angled in the middle; hind wing broad; anterior angle rounded; exterior margin wavy, slightly angled hindward.

TALAPA CALIGINOSALIS. (Pl. VII. fig. 6.)

Remigia caliginosa, Walk. Cat. Lep. Het. B. M. xxxiii. Suppl. iii. p. 1017.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson; F. Moore.

ANORATHA, n. g., Moore.

Male and *female* slender. Palpi porrect, long, covered with short hairs of equal length, compressed; second joint straight, slightly recurved in the female, ascending upward and outward to the level of the vertex, and extending half its length beyond the head; third joint one-third the length of the second, fusiform. Antennæ minutely pectinated in the male, simple in the female. Legs very long, slender, mostly smooth; mid tibiæ with one pair and hind tibiæ with two pairs of long slender spurs. Body slender. Abdomen long, attenuated, and in the male extending nearly half its length beyond the angle of the hind wing. Wings long, narrow.

Male. Costa elongated, straight; apex slightly falcate; exterior margin very oblique, slightly angled in the middle; hind margin half the length of the costa. Hind wing arched at the base and near the apex; anterior margin extending considerably beyond the posterior angle of the fore wing; apex rounded; exterior margin produced and angled in the middle.

Female. Apex falcated; exterior margin less oblique, but more angled in the middle; posterior margin longer, two-thirds the length of the costa. Hind wing somewhat less produced apically; apex more acute; exterior margin recurved; abdominal margin longer.

ANORATHA COSTALIS, n. sp. (Pl. VII. fig. 9.)

Male and *female* cupreous brown.

Male. Costal border broadly pinkish white; an indistinct brown short oblique medial streak, a narrow reniform mark, and a distinct pinkish-white outer-bordered very oblique transverse narrow discal band; an irregular submarginal row of blackish spots with whitish outer borders: hind wing and abdomen pale cinereous cupreous brown, with an indistinct partly transverse discal pale streak. Front of head and sides of thorax fringed with white. Underside brown:

hind wing with narrow indistinct discal spot and outer recurved transverse band.

Female. Fore wing darker; costal and transverse discal band ochreous, both well defined; the black submarginal spots without white borders: hind wing with the transverse discal pale narrow band more distinct. Underside as in male.

Expanse $1\frac{7}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Genus HYPENA, Schr.

HYPENA LACESSALIS, Walk. Cat. Lep. Het. B. M. xvi. Delt. p. 59.

H. ABDUCALIS, Walk. ib. p. 66.

H. CONSCITALIS, Walk. ib. xxxiv. Suppl. iv. p. 1509.

Cherra Poonjee.

H. EXTENSA, Walk. ib. p. 1139.

H. TENEBRALIS, n. sp.

Male and female blackish cupreous brown: fore wing chalybeous-speckled, and indistinctly marked with short blackish strigæ; a medial transverse brown band with pale-bordered black marginal line; orbicular and reniform spots black; a submarginal row of posteriorly decreasing black spots, which are exteriorly bordered with white speckles; apex white-speckled, beneath which is a black streak: hind wing and abdomen paler brown. Abdomen with dark brown dorsal tufts. Underside uniform brown: fore wing with a white spot before the apex: hind wing with a black discal mark and two indistinct narrow outer bands.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. W. S. Atkinson; F. Moore.

H. CERVINALIS, n. sp.

Male and female fawn-colour: fore wing with numerous narrow transverse delicate indistinct black strigæ; two medial transverse ochreous-brown pale-bordered lines; orbicular spot white; reniform spot black; an indistinct black spot before the apex; marginal line dark; cilia with a pale inner line. Underside paler; short brown strigæ and blackish discal spot on the hind wing, which are less apparent on the fore wing. Palpi and front of head blackish.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell; W. S. Atkinson.

II. COSTINOTALIS, n. sp.

Male and female ferruginous; minutely and indistinctly black-speckled: fore wing with three equidistant pure-white costal spots; both wings with a black discal dot, outer transverse black-speckled wavy line, and marginal rows of dots; cilia reddish. Top of the head white. Antennæ with a row of white dots along the base of

the shaft. Underside pale brown; discal spot, outer transverse line, and marginal dots less defined than above.

Expanse 1 inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

II. CASTANEALIS, n. sp.

Male and *female* dull chestnut-brown: fore wing suffused with chalybeous, with two oblique medial transverse chalybeous-brown lines bordered by a chalybeate outer line, the inner line zigzag, the outer bent outward before its middle; a submarginal row of indistinct black spots with chalybeous outer borders; a chalybeous streak before the apex, and a similar patch at the posterior angle: hind wing and abdomen cinereous brown; marginal line darker. Palpi, front of head, legs, and costa beneath ochreous. Underside—fore wing cinereous brown: hind wing greyish brown.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

II. RECTIVITTALIS, n. sp.

Female pale testaceous: fore wing with numerous short delicate brown transverse strigæ; a distinct brown straight transverse submarginal narrow double band; a small black-marked white orbicular spot. Front of head and tuft of palpi above hoary. Palpi brown. Cilia brown. Underside paler, minutely speckled.

Expanse 1 inch.

Bengal. In Coll. A. E. Russell.

H. BASISTRIGALIS, n. sp.

Male and *female* greyish brown; exterior border of fore wing white-speckled: fore wing with a large cupreous-brown patch, the outer border of which has a double white marginal line commencing from the costa one-third from the apex, curving obliquely towards the exterior margin, where it is much bent, and then retracting to the posterior margin one-third from the angle, where it meets a white streak recurved from the base of the costa; a brown streak from the angle of the patch to the apex; a submarginal series of indistinct white-speckled spots; indistinct blackish orbicular and reniform spots. Underside paler: fore wing with an indistinct darker discal spot, and a white dot at the apex: hind wing brown-speckled, with a discal spot and paler outer line.

Expanse $1\frac{1}{4}$ inch.

Cherra Poonjee; Darjeeling. In Coll. W. S. Atkinson; F. Moore.

II. DIVISALIS, n. sp.

Female. Fore wing dark chestnut-brown; exterior border fawn-colour, with a transverse discal narrow slightly bent purple-white line, having a diffused pale purplish-pink outer border; a submarginal row of indistinct white-speckled black spots; a short recurved indistinct pale purplish-white streak from the base of the wing; an indistinct dusky streak below the apex: hind wing and abdomen

cinereous brown. Underside fuliginous brown: fore wing with two white-marked black subapical dots and indistinct transverse discal band: hind wing with a more distinct discal spot and outer curved band.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

H. LONGIPENNIS, Walk. Catal. Lep. Het. B. M. xxxiv. Suppl. iv. p. 1139.

Darjeeling.

Fam. HERMINIDÆ.

Genus HERMINIA, Latr.

HERMINIA HADENALIS, n. sp.

Male greyish brown: fore wing with two medial transverse black-speckled-bordered pale lines, a round black orbicular dot, and a triangular reniform spot; the inner line nearly straight, the outer recurved and at each end with an exterior black patch; a black zigzag submarginal line and a marginal row of dots: hind wing with indistinct blackish pale-bordered streaks from anal angle; a marginal row of black dots. Underside paler, with indistinct dark transverse sinuous pale-bordered lines and blackish discal spot; a row of marginal lunules. Palpi and legs dark brown.

Expanse $1\frac{3}{10}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

H. OCHRACEALIS, n. sp.

Female ochraceous, palest exteriorly: fore wing with a medial transverse subdued dusky band, which passes over an indistinct reniform spot; a similar submarginal band extending to the apex and passing through a black subapical spot; between the bands is a recurved series of black dots; exterior margin with a row of black dots: hind wing pale ochraceous white, with a narrow upper and a diffused lower blackish streak from above the anal angle; a narrow blackish lunular marginal line; cilia ochraceous. Abdomen dusky, with narrow white segmental bands; tip ochraceous. Underside ochraceous, black-speckled: fore wing dusky at the base; a black discal and subapical spot, and transverse sinuous line: hind wing with black discal spot, transverse sinuous line, and outer row of spots.

Expanse $1\frac{3}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

H. ? ALBIRENALIS, n. sp.

Male and *female* black brown: fore wing with three indistinct black medial transverse bands with chalybeate white-speckled borders, the outer borders sinuous and more prominently speckled; reniform spot white; a white-speckled zigzag submarginal line; a speckled patch below the apex, and a few speckles along the anterior margin: hind wing paler, with short indistinct black sinuous bands

with white-speckled borders from the anal angle; cilia with white spots. Underside paler, marked as above. Palpi in the male porrect, compressed; second joint long, slender, and bent at the apex, squamous, tufted above at the end; third joint short, one-third the length of the second, fusiform, tufted above: in the female erect, curved; first and second joints squamous; third joint very slender, naked, nearly the length of the second. Antennæ in the male fixed on a short pedestal, serrated and pectinated; base curved; shaft tumid near the base; in the female minutely pectinated.

Expanse, ♂ $1\frac{5}{8}$, ♀ $1\frac{1}{2}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Genus MASTYGOPHORA, Poey.

MASTYGOPHORA? SCOPIGERALIS, n. sp.

Male brown: fore wing with a pale yellowish-brown oblique transverse band with wavy dark brown borders, the exterior formed by a double line with posterior black streaks; within the band is a brown indistinct reniform streak; orbicular spot small, whitish. Both wings with a submarginal transverse wavy sinuous pale line with black points, and a less distinct similar marginal line. Underside ochreous white, with broad brown exterior borders, narrow transverse sinuous line and short discal streak, and a pale sinuous line crossing the exterior borders. Legs blackish. Tuft of palpi pale ochreous.

Expanse $1\frac{1}{2}$ inch.

Bengal (*Sherwill*). In Coll. F. Moore.

Remark.—This species may be known by its enormously lengthened palpi (in the male), the third joint of which has a brush-like tuft of very long silky hairs beneath.

Genus ECHANA, Walk.

ECHANA PLICALIS, n. sp. (Pl. VII. fig. 7.)

Male and *female* brownish fawn-colour, slightly glossy; costal fold darker: fore wing with two indistinct yellowish narrow imperfect denticulated lines—the first from beneath the fold, the other beyond it, both indistinctly crossing the hind wing, on the underside of which they are more distinct and have a dark inner border, there being also a short dark subbasal streak; cilia with a pale inner narrow line.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Remark.—The species of this genus may be known by the fore wing having in both sexes a large subfusiform costal raised fold above, and the dislocation of the contiguous veins.

Genus LOCASTRA, Walk.

LOCASTRA PHERECIUSCALIS, Walk. Cat. Lep. Het. B. M. xvi. Delt. p. 159.

Silhet.

L. CUPROVIRIDALIS, n. sp.

Female. Fore wing coppery green; two medial transverse black sinuous lines, the inner line with a black spot at the base and another above it; middle of the wing between the lines whitish, green-speckled; the orbicular and reniform spots black, conjoined; a marginal row of alternate black and white spots; cilia spotted with black opposite to the white marginal spots: hind wing white, with a broad fuliginous cupreous-brown exterior band. Thorax coppery green. Abdomen blackish, speckled with white. Palpi tipt with white. Underside white; both wings with a broad brown exterior band; discal spot on hind wing and base of costa brown; marginal dots white. Legs blackish green, each joint tipt with white.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Genus *BERTULA*, Walk.

BERTULA HISBONALIS, Walk. Cat. Lep. Het. B. M. xvi. Delt. p. 164.

Silhet.

B. BREVIVITTALIS, n. sp.

Male blackish brown: fore wing with two transverse narrow yellow bands, a small black orbicular spot, and a large reniform spot; first band upright, the second oblique; an irregular wavy submarginal yellowish line with a longitudinal short straight yellow streak below the apex; a marginal row of triangular black spots: hind wing paler, with rather indistinct blackish discal spot, a curved outer pale-bordered narrow yellow band, and submarginal similar sinuous band; a row of blackish marginal lunules. Palpi edged with yellow. Legs blackish, spotted with yellow.

Expanse $1\frac{2}{5}$ inch.

Bengal. In Coll. A. E. Russell.

B. CHALYBEALIS, n. sp. (Pl. VII. fig. 8.)

Male and female dark chestnut-brown, more or less suffused with chalybeous: fore wing with two narrow pale-inner-bordered darker brown oblique transverse bands, between which is a narrow reniform mark; an indistinct submarginal irregular wavy narrow brown band: hind wing with pale-bordered narrow transverse discal band, a less distinct inner discal mark, and outer submarginal irregular brown band; cilia greyish-speckled. Underside paler, speckled with grey. Thorax and palpi chestnut-brown, the latter fringed with white in the male.

Expanse $1\frac{5}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

B. STIGMATALIS, n. sp.

Male and female dark fuliginous brown: fore wing with two widely separated medial transverse blackish lines, the inner line nearly

straight, the outer wavy, both bordered exteriorly with a chalybeous-speckled double band; a chalybeous-speckled black band at the base of the wing, and two similar submarginal wavy bands; orbicular and reniform spots large, black; a marginal row of black lunules: hind wing and abdomen paler; some whitish-bordered black sinuous streaks from the anal angle; marginal lunular line blackish. Under-side brown: hind wing with two black discal spots and three outer indistinct sinuous bands. Palpi in the male stout, reflexed over the head, extending beyond the thorax, furnished with dense soft hairs along the length resting on the thorax; second and third joints slightly curved, of equal length; third joint ensiform: in the female slender, squamous, curved upwards; third joint subulate, nearly as long as the second. Antennæ in the male pectinated, the pectinations formed of fascicles of fine bristles; in the female minutely serrated.

Expanse $1\frac{3}{10}$ inch.

Bengal. In Coll. W. S. Atkinson; F. Moore.

Genus BOCANA, Walk.

BOCANA BASALIS, n. sp.

Female dark fuliginous brown: fore wing with the base dull ferruginous and brown-speckled; a submarginal row of small yellow spots: hind wing and abdomen pale fuliginous brown. Thorax streaked with ferruginous at the sides in front. Palpi ferruginous, black-speckled. Underside paler; costa and hind wing whitish-speckled: fore wing with the costa near the apex slightly ferruginous; a short whitish costal streak before the apex: hind wing with dark brown discal spot and two outer whitish-bordered narrow bands. Both wings above and beneath with a black lunular marginal line. Body and legs blackish brown; legs with ferruginous spots.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. A. E. Russell.

B. VIRIDALIS, n. sp.

Female dull green: fore wing thickly black-speckled, the speckles forming some black streaks at the base; a double wavy transverse line before the middle, and some transverse patches beyond and on the submargin; a black discal spot and a black-speckled white spot near the posterior angle: hind wing and underside dull pale cupreous brown. Legs, thorax beneath, and palpi ochreous white.

Expanse $1\frac{2}{8}$ inch.

Bengal (*Sherwill*). In Coll. F. Moore.

B. QUADRILINEALIS, n. sp.

Male brown: fore wing suffused with grey; four transverse dark brown narrow lines, the first subbasal and nearly upright, the others inwardly oblique; the second line between a black "orbicular" and a "reniform" dot; a submarginal indistinct zigzag brown line: hind wing cupreous brown. Anal tuft pale ochreous.

Expanse $1\frac{3}{4}$ inch.

Darjeeling. In Coll. W. S. Atkinson.

B. MURINALIS, n. sp.

Allied to *B. turpitalis*.

Female yellowish brown: fore wing somewhat greyish brown at the base; a brown subbasal transverse outwardly oblique narrow irregular line; a straight transverse discal sinuous line, and a pale-bordered straight submarginal line; a small dark brown orbicular and reniform spot: hind wing duller brown, with an indistinct narrow whitish streak from anal angle. Underside dull brown, with an indistinct discal spot, and two narrow outer transverse brown bands. Palpi blackish.

Expanse $1\frac{7}{10}$ inch.

Bengal. In Coll. F. Moore.

Tribe PYRALES.

Fam. PYRALIDÆ.

Genus PYRALIS, Linn.

PYRALIS LUCILLALIS, Walk. Cat. Lep. Het. B. M. xvii. Pyral. p. 268.

Darjeeling (*W. S. Atkinson*).

P. SUFFUSALIS, Walk. ib. xxxiv. Suppl. iv. p. 1235.

Calcutta (*W. S. Atkinson*).

Genus HERCULIA, Walk.

HERCULIA BRACTEALIS, Walk. ib. xix. Pyral. p. 808.

Genus AGLOSSA, Latr.

AGLOSSA ARGENTALIS, n. sp.

Female. Fore wing silvery white; two oblique medially transverse blackish sinuous lines, the interspace being fuliginous brown, except the costal portion nearest the apex; base of wing and exterior border partly fuliginous brown, the latter traversed by a white lunular line; a row of black marginal spots; cilia white, with fuliginous-brown edge and inner spots: hind wing cinereous. Head and thorax white, the latter with fuliginous spots. Abdomen cinereous brown. Palpi white above, fuliginous beneath. Underside cinereous brown: hind wing paler and with a short brown discal mark. Legs fuliginous, each joint tipped with white.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Fam. ENNYCHIDÆ.

Genus PYRAUSTA, Schr.

PYRAUSTA SILHETALIS, Guen. Delt. et Pyr. p. 166; Walk. Cat. Lep. Het. B. M. xvii. p. 311.

Botys silhetalis, Lederer, Wien. ent. Monat. vii. p. 364.

Genus RHODARIA, Guen.

RHODARIA CONCATENALIS, Walk. Cat. Lep. Het. B. M. xxxiv. Suppl. iv. p. 1284.

Darjeeling.

Fam. ASOPIDÆ.

Genus CHNAURA, Lederer.

CHNAURA OCTAVIALIS.

Syngamia octavialis, Walk. l. c. xvii. p. 334.

Chnaura octavialis, Lederer, Wien. ent. Monat. vii. p. 435, t. 17. f. 4.
Darjeeling (*W. S. Atkinson*).

Genus SAMEA, Guen.

SAMEA GRATIOSALIS, Walk. l. c. xvii. p. 357.

Darjeeling (*W. S. Atkinson*).

Genus AGATHODES, Guen.

AGATHODES OSTENTALIS.

Perinephela ostentalis, Geyer, Hübn. Zutr. Samml. exot. Schmett. f. 833.

Agathodes ostensalis, Guen. Delt. et Pyral. p. 208.

Genus TERASTIA, Guen.

TERASTIA DIVERSALIS.

Agathodes diversalis, Walk. l. c. xxxiv. Suppl. iv. p. 1307.

Darjeeling (*W. S. Atkinson*).

Genus LEUCINODES, Guen.

LEUCINODES ORBONALIS, Guen. Delt. et Pyral. p. 223.

Fam. HYDROCAMPIDÆ.

Genus OLIGOSTIGMA, Guen.

OLIGOSTIGMA CRASSICORNALIS, Guen. Delt. et Pyral. p. 261;
Walk. l. c. xvii. p. 433.

Hydrocampa crassicornalis, Lederer, Wien. ent. Monat. vii. p. 451.

Oligostigma tripunctalis, Walk. l. c. xxxiv. Suppl. iv. p. 1531.

Genus HERDONIA, Walk.

HERDONIA OSACESALIS, Walk. l. c. xix. p. 964.

Silhet; Darjeeling.

Genus HYDROCAMPA, Latr.

HYDROCAMPA PULCHRALIS, n. sp.

Male and female pale straw-yellow: fore wing with some small

ill-defined spots at the base ; a quadrate spot at the end of the cell, two larger spots beyond it, one being below the latter, and some outer very small indistinctly defined spots and a wavy marginal line, all the interspaces being dark brown : hind wing with a dark brown discal spot, and a marginal band enclosing a large anterior spot and smaller lower spots ; cilia alternate white and brown. Palpi above, head, and thorax brown. Abdomen with narrow white segmental bands. Underside paler. Palpi beneath and legs white. Fore tibiæ brown.

Expanse 1 inch.

Darjeeling. In Coll. A. E. Russell ; W. S. Atkinson.

Fam. SPILOMELIDÆ.

Genus LEPYRODES.

LEPYRODES GEOMETRALIS, Guen. Delt. et Pyral. p. 278.

L. LEPIDALIS, Walk. Cat. Lep. Het. B. M. xvii. p. 465.

L. PERSPICUALIS.

Zebronia perspicualis, Walk. l. c. xxxiv. Suppl. iv. p. 1347.

Botys flexissimalis, Walk. ib. p. 1426.

Darjeeling (*W. S. Atkinson*).

Genus PYCNARMON, Lederer.

PYCNARMON JAGUARALIS.

Spilomela jaguaralis, Guen. Delt. et Pyral. p. 283.

Zebronia jaguaralis, Walk. ib. xvii. p. 486.

Pycnarmon jaguaralis, Lederer, Wien. ent. Monat. vii. p. 441, t. 17. f. 11.

Darjeeling (*W. S. Atkinson*).

P. ABRAXALIS.

Zebronia abraxalis, Walk. l. c. xxxiv. Suppl. iv. p. 1349.

Darjeeling (*W. S. Atkinson*).

P. ZEBRALIS, n. sp. (Pl. VII. fig. 12.)

Male and *female* white : fore wing with eleven transverse narrow black bands ; cilia white : hind wing pale yellow, diffused with orange-colour externally ; two black basal streaks and three equidistant exterior spots, one being at the anterior angle, another above the anal angle, and the third midway between them ; a white submarginal line ; a black spot on cilia at the apex ; cilia pale ferruginous. Thorax black-streaked. Abdomen pale ferruginous, with black sub-terminal spots. Underside paler, marked as above. Legs and palpi white, with black spots.

Expanse $1\frac{2}{10}$ inch.

Darjeeling. In Coll. A. E. Russell ; W. S. Atkinson.

P. VIRGATALIS, n. sp. (Pl. VII. fig. 10.)

Male and female pearly white: fore wing with three small brown basal spots; a transverse subbasal band, two short bands from the costa, and two bands beneath them from the posterior margin; a similar band along exterior border: hind wing with four brown transverse bands, the middle two joined at their base, the outer band marginal. Thorax spotted with brown, three in front and five on the top. Abdomen with two basal spots and anal tuft brown. Underside paler, marked as above.

Expanse $\frac{7}{10}$ inch.

Bengal. In Coll. W. S. Atkinson; F. Moore.

P. AUROLINEALIS.

Zebronia aurolinealis, Walk. Cat. Lep. Het. B.M. xvii. Pyral. p. 478. Darjeeling (*W. S. Atkinson*).

P. PLUTUSALIS.

Zebronia plutusalis, Walk. ib. p. 478. Darjeeling (*W. S. Atkinson*).

P. BISTRIGALIS.

Zebronia bistrigalis, Walk. ib. xxxiv. Suppl. iv. p. 1348. *Z. inscriptalis*, Walk. MS. B. M. Coll.

P. DISCERPTALIS.

Zebronia discerptalis, Walk. ib. p. 1348. Darjeeling.

Fam. MARGARONIDÆ.

Genus GLYPHODES, Guen.

GLYPHODES STOLIALIS, Guen. Delt. et Pyral. p. 293. Darjeeling.

G. DIURNALIS, Guen. ib. p. 294. Darjeeling (*W. S. Atkinson*).

G. CÆSALIS, Walk. Cat. Lep. Het. B. M. xvii. Pyral. p. 499. Darjeeling.

G. LUCIFERALIS.

Botys luciferalis, Walk. ib. xxxiv. Suppl. iv. p. 1412. *G. lora*, MS. Darjeeling.

G. ACTORIONALIS, Walk. ib. xvii. Pyral. p. 498; Lederer, Wien. ent. Monat. vii. t. 14. f. 4.

Darjeeling.

G. LACUSTRALIS, n. sp. (Pl. VII. fig. 11.)

Male and *female* brownish ochreous: fore wing with a black-bordered pearly pinkish-white semitransparent irregular longitudinal medial streak extending from near the base beneath the cell to near the apex, crossed by an oblique black spot beneath an indistinct black discal spot; exterior border of white streak broadly margined with black and with an outer or submarginal lunular black line: hind wing pearly white, semitransparent, with a brownish ochreous outer border, which is margined within with black; cilia white. Palpi above, head, and sides of thorax brownish ochreous; top of thorax and base of abdomen pale yellowish; tip ochreous. Palpi and thorax beneath and legs white. Underside paler.

Expanse $1\frac{3}{8}$ inch.

Bengal. In Coll. W. S. Atkinson; F. Moore.

G. VAGALIS, Walk. Cat. Lep. Het. B. M. xxxiv. Suppl. iv. p. 1356. Darjeeling (*W. S. Atkinson*).

G. GASTRALIS, Walk. ib. p. 1354. Darjeeling.

Genus MARUCA, Walk.

MARUCA AQUATILIS, Walk. l. c. xviii. Pyral. p. 540.

Genus SYNCLERA, Lederer.

SYNCLERA TRADUCALIS.

Eudiotis traducalis, Zeller, Lep. Caffr. (1852) p. 54.

Synclera traducalis, Leder. Wien. ent. Monat. vii. p. 444.

S. retinalis, Leder. ib. 1857, p. 100.

Glyphodes univocalis, Walk. l. c. xviii. p. 499 (1859).

Genus PHAKELLURA, Lansdown Guilding.

PHAKELLURA INDICALIS.

Eudiotis indica, Saunders, Zool. ix. p. 3070.

Phakellura indica, Walk. l. c. xviii. p. 514.

P. gazorialis, Guen. Delt. et Pyral. p. 297.

P. TRANSLUCIDALIS, Guen. ib. p. 299.

Silhet.

P. SUPERALIS, Guen. ib. p. 299.

Silhet.

Genus CYDALIMA, Lederer.

CYDALIMA LATICOSTALIS.

Margarodes laticostalis, Guen. ib. p. 303.

Margaronia laticostalis, Walk. l. c. xviii. p. 528.

Cydalima laticostalis, Leder. Wien. ent. Monat. vii. p. 397.

Silhet.

C. CONCHYALIS.

Margarodes conchyalis, Guen. Delt. et Pyral. p. 303, pl. 8. f. 9.

Margaronia conchyalis, Walk. Cat. Lep. Het. B. M. xviii. p. 529.

Cydalima conchyalis, Leder. l. c. p. 397.

Larva feeds on *Echites antidysenterica*.—A. Grote, Esq.

Genus PACHYARCHES, Lederer.

PACHYARCHES AMPHITRITALIS.

Margarodes amphitritalis, Guen. l. c. p. 307.

Margaronia amphitritalis, Walk. l. c. xviii. p. 529.

Pachyarches amphitritalis, Leder. l. c. p. 398.

Silhet.

P. PSITTACALIS.

Parotis psittacalis, Hübn. Samml. exot. Schmett. f. 523.

Margarodes psittacalis, Guen. l. c. p. 308.

Margaronia psittacalis, Walk. l. c. xviii. p. 529.

Pachyarches psittacalis, Leder. l. c. p. 398.

P. POMONALIS.

Margarodes pomonalis, Guen. l. c. p. 309.

Margaronia pomonalis, Walk. l. c. xviii. p. 530.

Pachyarches pomonalis, Leder. l. c. p. 398.

P. MARTHESIUSALIS.

Margaronia marthesiusalis, Walk. l. c. xviii. p. 531.

Darjeeling (*W. S. Atkinson*).

Genus SISYROPHORA, Lederer.

Sisyrophora pfeifferæ, Leder. l. c. p. 399, t. 13. f. 13.

Darjeeling.

Genus MARGARONIA, Hübner.

Syn. *Margarodes*, Guen.

Margaronia transvisalis, Walk. l. c. xix. p. 976.

Darjeeling (*W. S. Atkinson*).

Genus HOTERODES, Guen.

HOTERODES CINEREALIS, n. sp.

Male and female silky cinereous: hind wing and abdomen whitish cinereous; anal tuft yellow: hind wing of female with an indistinct dusky marginal band. Palpi ochreous. Underside paler.

Expanse, ♂ $1\frac{3}{4}$, ♀ $1\frac{5}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Genus PYGOSPILA, Guen.

PYGOSPILA TYRESALIS.

Phalæna-pyralis tyres, Cram. Pap. Exot. iii. pl. 263. f. C.

Pygospila tyresalis, Guen. Delt. et Pyral. p. 312.

Genus EUGLYPHIS, Hübn.

Syn. *Neurina*, Guen.

EUGLYPHIS PROCOPIALIS.

Phalæna-pyralis procopialis, Cram. Pap. Exot. iv. pl. 368. f. E.

Euglyphis procopialis, Hübn. Verz. Schmett. p. 341; Walk. Cat. Lep. Het. B. M. xvii. p. 538.

Neurina procopialis, Guen. Delt. et Pyral. p. 314; Lederer, Wien. ent. Monat. vii. p. 395.

Genus FILODES, Guen.

Syn. *Pinacia*, p., Hübn.

FILODES FULVIDORSALIS.

Pinacia fulvidorsalis, Geyer, Hübn. Zutr. Samml. exot. Schmett. f. 643.

Filodes fulvidorsalis, Guen. Delt. et Pyral. p. 317; Leder. Wien. ent. Monat. vii. t. 12. f. 17.

Euglyphis fulvidorsalis, Walk. Cat. Lep. Het. B. M. xvii. Pyral. p. 539.

FILODES NIGROLINEALIS, n. sp.

Male bright ferruginous; fore wing with a narrow black streak between the veins; two black spots within the cell, and three others at the base of the wing; cilia dark cinereous brown: hind wing and abdomen dark cinereous brown. Underside paler, with the costa and apex also cinereous brown. Legs cinereous black. Palpi black, tipped with ferruginous. Proboscis black.

Expanse $1\frac{4}{10}$ inch.

Bengal. In Coll. A. E. Russell.

F. OCTOMACULALIS, n. sp.

Female dark fuliginous black. Thorax, abdomen, and base of fore wing metallic blue. Both wings with a large semitransparent white discal spot, and a smaller similar spot below the cell half-way from the base of the wing. Underside paler. Fore femora with a white spot at the base; all the tarsi white. First joint of the palpi white.

Expanse $1\frac{5}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Fam. BOTYDÆ.

Genus ASTURA, Guen.

ASTURA PUNCTIFERALIS, Guen. Delt. et Pyral. p. 320; Walk. Cat. Lep. Het. B. M. xviii. p. 548.

Botys punctiferalis, Lederer, Wien. ent. Monat. vii. p. 364.

B. evaxalis, Walk. l. c. p. 995.

Genus BOTYODES, Guen.

BOTYODES ASIALIS, Guen. l. c. p. 321; Lederer, l. c. t. 13. f. 8; Walk. l. c. p. 551.

B. FLAVIBASALIS, n. sp.

Male and *female* yellow; with a broad exterior marginal chalybeate cinereous-brown band, the inner border defined by a narrow black line: fore wing with the border of the band bent below an elongated transverse discal cinereous-brown spot; band of the hind wing with a straight inner border: fore wing with two small black basal costal spots, and a narrow transverse subbasal black line. Some black spots on the thorax. Underside paler, without the basal spots and transverse line. Femora and tibiae with a black spot at the apex.

Expanse $1\frac{4}{10}$ inch.

Bengal. In Coll. A. E. Russell; W. S. Atkinson.

Genus BOTYS, Latr.

BOTYS SCINISALIS, Walk. l. c. xviii. p. 648.

B. ILLISALIS, Walk. l. c. xviii. p. 653; Lederer, l. c. t. 9. f. 12. Darjeeling (*W. S. Atkinson*).

B. UNITALIS, Guen. Delt. et Pyral. p. 349; Walk. l. c. xviii. p. 655. *B. megapteralis*, Walk. l. c. xxxiv. Suppl. iv. p. 1407.

B. MULTILINEALIS, Guen. l. c. p. 337, pl. 8. f. 11; Walk. l. c. xviii. p. 661; Lederer, l. c. t. 11. f. 3.

Zebronia salomealis, Walk. l. c. xvii. p. 476; Suppl. iv. p. 1348.

B. DAMOALIS, Walk. Cat. Lep. Het. B. M. xviii. Pyral. p. 656.

B. AMYNTUSALIS, Walk. ib. p. 662.

Darjeeling (*W. S. Atkinson*).

B. INCISALIS, Walk. Catal. Lep. Het. B. M. xxxiv. Suppl. iv. p. 1410.

Darjeeling.

B. PLAGALIS, n. sp.

Male and *female* cinereous white: fore wing with a cinereous-brown costal band, discal spot, outer transverse line, and broad ex-

terior band: hind wing with a similar transverse discal line and outer band; cilia whitish anteriorly and with a brown inner line. Sides of head and thorax and third joint of palpi dark brown. Abdomen whitish; tip brownish. Underside paler.

Expanse $\frac{8}{10}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

B. INCOLORALIS, Guen. Delt. et Pyral. p. 333; Walk. Cat. Lep. Het. B. M. xviii. p. 656; Lederer, *l. c.* p. 364.

Silhet.

B. MACCALIS, Lederer, *l. c.* p. 466, t. 9. f. 14.

Silhet.

B. ZEALIS, Guen. *l. c.* p. 332; Walk. *l. c.* xviii. p. 656; Lederer, *l. c.* p. 364.

Silhet.

B. TULLALIS, Walk. *l. c.* xviii. Pyral. p. 649.

Silhet.

B. CALETORALIS, Walk. *ib.* p. 651.

Silhet.

B. PATULALIS, Walk. *ib.* xxxiv. Suppl. iv. p. 1405.

Darjeeling.

B. SUBTESSELLALIS, Walk. *ib.* p. 1406.

Darjeeling.

C. CONCATENALIS, Walk. *ib.* p. 1408.

Darjeeling.

Genus DYSALLACTA, Lederer.

DYSALLACTA NEGATALIS.

Phalangioides negatalis, Walk. *l. c.* xvii. Pyral. p. 468.

Dysallacta negatalis, Lederer, Wien. ent. Monatschr. p. 393, t. 13. f. 6.

Botys monesusalis, Walk. *l. c.* xviii. p. 653.

B. phanasalis, Walk. *ib.* p. 727.

Darjeeling (W. S. Atkinson).

DESCRIPTION OF PLATES VI. & VII.

PLATE VI.

Fig. 1. *Tympanistes pallida*, p. 49.

2. — *testacea*, p. 49.

3. *Epilecta pulcherrima*, p. 54.

4. *Synna curvilinea*, p. 69.

5. *Checupa fortissima*, p. 60.

6. *Diphtera pallida*, p. 46.

7. *Leucania pulcherrima*, p. 48.

8. *Gortyna cuprea*, p. 50.

9. *Euplexia discisignata*, p. 57.

Fig. 10. *Canna pulchripicta*, p. 61.

11. *Hadena auroviridis*, p. 59.

12. *Briada varians*, p. 66.

13. *Plusia semivitta*, p. 63.

14. *Diphtera discibrunnea*, p. 46.

15. *Auchmis sikkimensis*, p. 49.

16. *Euplexia albovittata*, p. 57.

17. *Hadena albidisca*, p. 59.

18. *Mythimna cervina*, p. 47.

PLATE VII.

- Fig. 1. *Cotuza deficiens*, p. 74.
 2. *Agriopsis discalis*, p. 57.
 3. *Tavia catocaloides*, p. 71.
 4. *Fascellina viridis*, p. 79.
 5. *Episparis tortuosalis* (♂), p. 81.
 6. *Talapa caliginosalis*, p. 82.

- Fig. 7. *Echana plicalis*, p. 86.
 8. *Bertula chalybealis* (♂), p. 87.
 9. *Anoratha costalis* (♂), p. 82.
 10. *Pycnarmon virgatalis*, p. 92.
 11. *Glyphodes lacustralis*, p. 93.
 12. *Pycnarmon zebralis*, p. 91.

[End of Part II.]

January 24, 1867.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

Mr. P. L. Slater called the attention of the Meeting to a specimen of a species of Ratel (*Mellivora*), obtained by the Society on the 3rd of August 1866 from a dealer in Liverpool, who stated that he had received it by the West-African Mail. This animal appeared to belong to a species different from either the Indian *Mellivora indica* or the South-African *M. capensis*, of both of which the Society's Menagerie had for several years contained living specimens. Dr. Gray had diagnosed these two species of *Mellivora* in a recent communication to the Society* as follows:—

Mellivora indica. Black; the back iron-grey; crown of the head white. India.

Mellivora capensis. Black; the back iron-grey; the crown and a broad stripe down each side of the back to the tail white. South Africa.

To these species, both correctly figured in the second series of Wolf and Slater's 'Zoological Sketches,' Mr. Slater proposed to add a third, founded upon the present specimen, to be diagnosed as follows:—

Mellivora leuconota (Plate VIII.). Smaller: black; back white, purer towards the crown. West Africa.

The following papers were read:—

1. On a New Geckoid Lizard from Ceylon.

By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

(Plate IX.)

The British Museum has lately received from Mr. Cutter some specimens of a Gecko from Ceylon, which appear to be undescribed and to form a distinct genus, which may be called *Geckoella*.

Toes five on each foot; they are thick at the base, with the ends more slender and rather compressed; the under surface is furnished

* See P. Z. S. 1865, p. 680.

with a series of larger entire scales, which are rather far apart; those of the underside of the thicker basal portion are the larger, and the scale at the end of the thick portion, before it becomes contracted, is the largest.

The thumbs and toes are furnished with sharp compressed claws. The back is covered with minute scales, with a very large number of larger, convex, rather trihedral, tubercles. The outer side of the forearm and thigh have tubercles like the back, but smaller in size. The tail, I suspect, in the perfect state is furnished with rings of trihedral tubercles; but in all the specimens in the Museum the tail has evidently been reproduced, and is covered with square smaller scales.

There are no preanal or femoral pores. The scales of the underside of the body and throat are rhombic and smooth. The pupil oblong, erect. The lips have a single series of labial shields, with four chin-shields under the front lower labial shields.

This genus differs from *Homonota* and *Nautilinus* in the back being tubercular, from *Eublepharis* in having no preanal pores, and in the pupil being oblong, erect. It is separated from *Nautilinus* also by the absence of the preanal pores.

GECKOELLA PUNCTATA. (Pl. IX.)

Upper surface of head, back, and tail dark chocolate-brown (in spirits); under surface paler. The temple, occiput, and back with numerous small white spots; those on the back placed in four longitudinal rows; those on the tail more or less confluent, and forming transverse rings. The dorsal spots are formed of several white scales. There is a single spot in the centre of the hinder part of the occiput. The outer sides of the legs are obscurely spotted. The crown of the head is covered with small uniform granular scales.

Hab. Ceylon. Brit. Mus.

2. Descriptions of some New or little-known Species of Fishes in the Collection of the British Museum. By Dr. ALBERT GÜNTHER, F.Z.S.

(Plate X.)

CENTROPRISTIS DISPILURUS.

Allied to *C. phæbe*.

D. $\frac{10}{12}$. A. $\frac{3}{7}$. L. lat. 45. L. transv. 5/14.

Præoperculum rounded, finely serrated behind, entire below, without projecting angle. Eye of moderate size, two-ninths of the length of the head. Belly with a broad white cross band. A small round black spot above and below on the root of the caudal fin.

Trinidad.

The height of the body is equal to the length of the head, and is comprised twice and three-fourths in the total length (without caudal). Diameter of eye much more than the width of the interorbital

space, but somewhat less than the extent of the snout, contained four times and one-half in the length of the head. Opercles scaly; the scales on the præoperculum in seven or eight series, much smaller than those on the operculum and rest of the body. Cleft of the mouth oblique, the upper maxillary reaching to the vertical from the centre of the eye; præorbital somewhat wider than the maxillary. Præoperculum rounded, finely serrated behind, entire below; sub- and interoperculum entire. Operculum with three flat short points, the upper and lower of which are concealed by the scales, the middle one being the longest and sharpest.

Dorsal fin commencing just above the extremity of the operculum; its spinous portion scarcely lower, but longer, than the soft; the fourth, fifth, and sixth spines are the longest, more than one-third the length of the head; the first spine is very short, half as long as the diameter of the eye. Soft dorsal rounded; the anterior and middle rays the longest, the sixth being not quite twice as long as the last spine. Caudal fin truncated, slightly rounded at the angles, about one-sixth of the total length. Anal with the soft portion narrow and deeper than the dorsal fin; second anal spine strong and long, two-fifths the length of the head; third anal spine much longer than the first. Pectoral long, rounded, reaching to above the vent, four-fifths of the length of the head. Ventrals not reaching to the vent.

Teeth villiform; several larger teeth in the outer series of both jaws. Vomerine and palatine teeth in narrow bands. Tongue toothless.

Brownish olive, with indistinct darker cross bands extending on the dorsal fin. A broad white cross band on the belly, before the vent, extending upwards to the level of the pectoral fin. A small deep-black spot behind the top of the last dorsal spine, on the middle of the two first dorsal rays; several other, irregular, more or less distinct spots on the dorsal fin corresponding to the cross bands on the body. The soft vertical fins with transverse series of small brownish spots. A small black round spot above and below on the root of the caudal fin. Pectoral red; ventral blackish.

Two specimens, 4 inches long.

PLECTROPOMA SUSUKI, Schleg.; Günther, Cat. Fish. i. p. 160.

This species was known from the Chinese and Japanese Seas only; and as the præoperculum has not been well described by Schlegel, I think it necessary to give a description taken from two fine examples, 12 inches long, sent by Mr. Krefft from Sydney.

D. $\frac{11}{14}$. A. $\frac{3}{8}$. L. lat. 110.

The depth of the body is contained thrice or twice and two-thirds in the total length (without caudal); the length of the head (opercular spine and membrane included) twice and two-thirds; snout moderately pointed, longer than the diameter of the eye. The cleft of the mouth is wide and oblique, the maxillary extending to the posterior margin of the orbit. Snout with minute rudimentary scales, upper maxillary and mandible scaleless; one-half of the præorbital with small distinct scales. Eye situated immediately beneath

the upper profile of the head; its diameter is contained five times and one-third in the length of the head, and equal to the distance between the eyes; forehead between the eyes convex. The other parts of the head are thickly covered with small scales. Præoperculum with the posterior margin finely serrated, and *with from two to five larger teeth on the lower limb.* Operculum with two flat prominent spines, the lower being smaller.

Dorsal fin rather elevated, no notch before the soft portion. Vertical fins covered with minute scales at their base and basal half. The first dorsal spine is above the base of the longest spine of the operculum, and is not quite one-half the length of the last spine; the second is rather more than twice as long as the first; the third and fourth are the longest, nearly half as long as the head; membrane between the spines very deeply notched: the length of the base of the soft portion is two-thirds of that of the spinous; it is slightly, if at all, inferior to the spinous portion in height, and has the upper margin convex. Distance between dorsal and caudal fins equal to the depth of the free portion of the tail. Caudal truncated, one-sixth of the total length.

The first anal spine is short, less than half the length of the second; the second is of moderate thickness, the third is the longest, much shorter than the first ray, and not quite one-third of the length of the head; the soft portion is rounded, and its distance from the commencement of the caudal is one-half of the depth of the body. Pectoral well developed, rounded, reaching to the level of the vent, its length being contained five times and one-half in the total; its base has very minute scales. Ventrals as long as or longer than the pectorals, inserted below the base of the pectorals; their spine is three-fifths of their entire length.

Teeth rather coarse, cardiform; a pair of canines in the front of both jaws; palatine teeth in narrow bands; vomerine teeth in a triangular patch.

Coloration as in the specimen figured by Schlegel.

XIPHOCHILUS FASCIATUS. (Plate X.)

D. $\frac{12}{8}$. A. $\frac{3}{10}$. L. lat. 29. L. transv. 4/10.

The height of the body is one-third of the total length, the length of the head nearly one-fourth. Head rather longer than high, compressed, the width of the interorbital space (which is flat) being equal to the diameter of the eye. Eye immediately below the upper profile, in the middle of the length of the head. Anterior and posterior canine teeth greenish blue. Scales on the cheek in six series. Opercular membrane of moderate extent. Pectoral fin without a notch behind, nearly as long as the head, extending to the vent. Caudal fin truncated. The ground-colour of the head and upper part of the trunk appears to have been reddish orange, of the hinder and lower parts greenish. Head and body with bluish-ashy cross bands, each edged with violet. Three such bands across the upperside of the head, two being narrow and in front of the eyes, the third broad

and between the eyes. Another band runs from the eye to the extremity of the maxillary and round the chin. The succeeding band encircles the head entirely; crossing the nape, and descending over the præoperculum, it reaches across the isthmus of the throat. Body with five cross bands, the posterior becoming broader, leaving only a narrow interspace between them:—the first from before the dorsal fin across the operculum; the second from the third, fourth, and fifth dorsal spines to behind the pectoral; the fifth occupies the space between the posterior dorsal and anal rays and nearly the whole of the free portion of the tail. Dorsal fin violet at the base, orange-coloured above, with violet tips to the rays and spines; anal and ventrals similarly coloured; pectoral and caudal fins orange-coloured.

Two dried examples, 8 inches long, of this species were received from Cape York, Australia.

CHAMPSODON (g. D. TRACHININORUM).

Body compressed, elongate, covered with minute granular scales. Cleft of the mouth oblique, very wide. Eye lateral, directed upwards. Two dorsal fins; ventral fins jugular; pectorals composed of very fine branched rays, united by a thin membrane. Teeth in the jaws in a single series, not closely set, of unequal size, those of the lower jaw longer than the upper ones. Vomerine teeth cardiform, in two separate patches; palatine teeth none. Gill-openings exceedingly wide. None of the bones of the head armed.

China Seas.

CHAMPSODON VORAX.

D. 5|20. A. 17. V. 1|5.

The head is compressed, nearly twice as long as deep, and its length is two-sevenths of the total (without caudal). The cleft of the mouth is exceedingly wide, extending behind the eye, and its width being much more than one-half of the length of the head. The lower jaw is bent upwards and projects far beyond the upper. The snout (without the projecting part of the lower jaw) is not much longer than the eye, the diameter of which is one-fifth or one-sixth of the length of the head. The eye is situated in a notch of the upper profile; the interorbital space slightly concave, and rather narrower than the eyes. Crown of the head scaly. Opercular margin very thin, flexible, radiated. The height of the body is contained five times and one-half in the total length (without caudal). Caudal fin emarginate. Pectorals much shorter than ventrals, which extend nearly to the vent. Coloration uniform.

A single specimen of this species, $2\frac{1}{2}$ inches long, and not in a good state of preservation, was presented by Vice-Admiral Sir E. Belcher to the British Museum.

MASTACEMBELUS CRYPTACANTHUS.

D. 24|100. A. 2|ca. 100.

Præoperculum with two spines. The maxillary extends to the

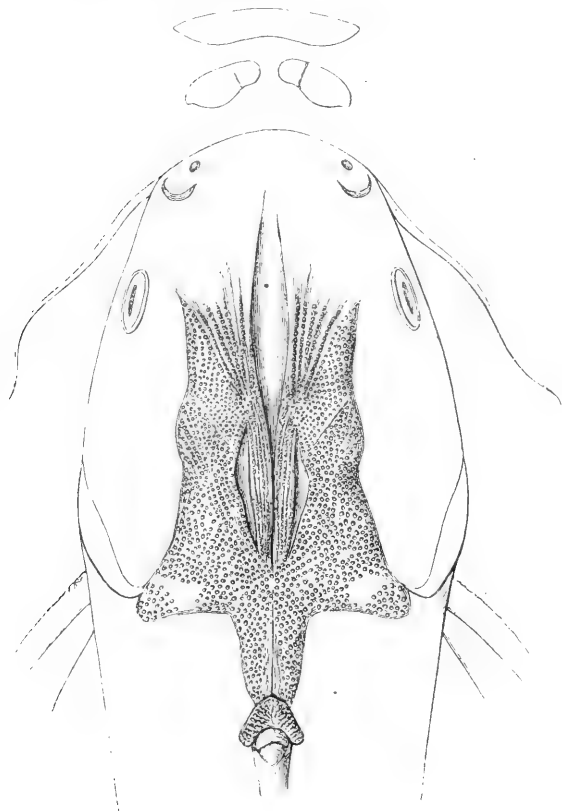
vertical from the front margin of the eye. Vertical fins united, the anal very low; dorsal spines small, feeble, almost hidden in the skin. Body much elongate, its greatest depth being one-half of the length of the head (without rostral appendage), which is one-tenth of the total. Brownish black; posterior part of the tail finely and irregularly punctulated with black.

A single specimen, 9 inches long, was presented by Dr. J. A. Smith with other fishes from the Camaroon country. The occurrence of Indian forms on the West Coast of Africa, such as *Periophthalmus*, *Psettus*, *Mastacembelus*, is of the highest interest, and an almost new fact in our knowledge of the geographical distribution of fishes.

ARIUS AUSTRALIS.

To judge from the description, this species would appear to be allied to *A. surinamensis*.

D. 1/7. A. 16-17. P. 1/10.



Arius australis.

The height of the body is contained from four times to four times and a half in the total length (without caudal), the length of the head thrice and a third or thrice and a fourth; the greatest width of the head is five-sixths of its length. Occipital process as long as or longer than broad, granulated, with a very obtuse median ridge, extending to the small basal bone of the dorsal fin. Eye of moderate size, much nearer to the snout than to the extremity of the operculum, the length of the snout being nearly one-half of that of the postorbital portion of the head; upper jaw somewhat longer than the lower. The teeth on the palate form a broad arched band, the vomerine patches being slightly separated from the palatine, and either perfectly continuous in the middle or but slightly interrupted. The maxillary barbels extend to, or sometimes not quite to, the root of the pectoral; the outer ones of the mandible to the gill-opening. Dorsal spines strong, half as long as the head, slightly serrated in front and behind. Adipose fin as long as or shorter than the dorsal, its length being less than one-third of the distance between the two fins. Pectoral spine stronger and a little longer than that of the dorsal fin; ventral fins more or less shorter than pectorals. Porus axillaris minute. Sides of the body silvery, upper parts uniform blackish.

Mr. Krefft has sent us three specimens of this *Arius*, the largest being 18 inches long. They were caught in the Hunter River, New South Wales, near Ash Island, by the Hon. A. W. Scott, M.A., and are also to be obtained in nearly all the streams further north.

3. Descriptions of some New Species of *Satyridæ* belonging to the Genus *Euptychia*. By ARTHUR G. BUTLER, F.Z.S., Assistant in the Zoological Department, British Museum.

(Plates XI. & XII.)

I am now enabled, through the kindness of Mr. Hewitson, to describe some beautiful new species of *Euptychia*, the names of which I introduced in my monograph of this genus in the Society's 'Proceedings' for 1866 (pp. 458 *et seq.*).

The first of these species is in some respects much like my *E. erigone*; it is perhaps most closely allied to *E. usitata*, and belongs to the same group with *E. myncea* and *E. camerta* of Cramer. It is included in my monograph under the name of *Euptychia themis*.

1. *EUPTYCHIA THEMIS*, Butler, MS. (Pl. XII. fig. 13.)

♂. *Alæ supra olivaceo-fuscæ: antica linea apud marginem undulata et margine ipso nigris; alis de linea undulata fuscescentibus; linea marginali ochreo-alba, puncto ocellari subapicali nigro-fusco; ciliis fuscis, radicibus pallidioribus: postica fascia antemarginali nigro-fusca undulata, lineam ochreo-albam*

includente; linea marginali albida; margine ipso nigro; ciliis ad venarum apices fusciscentibus, aliter velut in anticis; ocello magno subanali alteroque minimo ovali ad marginem internum propiore nigris flavo cinctis et chalybeo pupillatis, majore bipupillato: corpus olivaceo-fuscum, antennis ochreo-fuscis nigro annulatis.

Alæ subtus multo pallidiores, area apicali roseo-albicante; striis duabus mediis rufo-fusciscentibus late separatis, ad costam anticarum divergentibus, externa ad angulum ani posticarum angulata, et intus fusco paulum marginata; linea submarginali undulata et dentata, nigra; areola externa, præcipue ad marginem, lactea et lineam nigram, quæ apud angulum ani sat grossa fit, includente; hæc linea in anticis subintegra, in posticis autem angulis alternis undata et ad plicas alarum dentata est; margine ipso nigro; ciliis velut supra; fascia discali indistincta, ocellos includente, anticarum flavescente, posticarum fusciscente: anticæ ocellis quatuor apud apicem, nigris, flavo cinctis et chalybeo pupillatis, apicali minimo, secundo maximo, aliis duobus geminatis: posticæ ocellis sex, quinque antemarginalibus, unoque minimo lineam externam medium terminante, flavo cinctis et chalybeo bipupillatis, secundo et quarto maximis nigris: corpus cinerascens, antennis flavescens et nigro clavatis.

Exp. alar. unc. 2.

Hab. —? (Coll. Hewitson).

2. EUPTYCHIA VESTIGIATA, Butler, MS. (Pl. XII. fig. 17.)

♂. *Alæ supra olivaceo-fuscæ, striis duabus mediis bene separatis; stria denticulata antemarginali et linea altera submarginali nigro-fuscis; margine ipso nigro: posticæ ocellis duobus consuetis minutissimis, vix distinguendis, subanalibus, argenteo pupillatis: corpus nigro-fuscum, antennis nigris albido annulatis et flavo cinctis.*

Alæ subtus multo pallidiores, atomis plurimis fuscis roratæ; fuscis duabus mediis tenuibus flavis utrinque nigro cinctis, posticarum minus regularibus et ad marginem internum angulatis: posticæ linea simili, angulis alternis undata, submarginali; linea ad marginem communi ochreo-albida; margine et stria antemarginali nigris: anticæ ocellis tribus apud apicem parvis, apicali majore nigro, ochreo cincto et argenteo pupillato, secundo partim simili sed geminato, parte inferiore indistincta fusca, tertio ovali fusco indistincto; linea submarginali angulis alternis undata nigra: posticæ ocellis sex parvis ochreo cinctis et fusco circumcinctis, primo et sexto minimis; tertio et quarto fuscis argenteo roratis, aliis ebeninis argenteo bipupillatis: corpus cinerascens, antennis flavescens.

Exp. alar. unc. 1 $\frac{1}{8}$.

Hab. Minas Geraes, Brazil (Coll. Hewitson).

In some respects allied to *E. ambigua*, Butl., but in the double central lines more nearly resembling *E. nebulosa*; on the underside

much like a gigantic specimen of *E. binalinea*, and, excepting in the form of the central lines, very near to *E. grimon*, Godt.

3. EUPTYCHIA STRAMINEA, Butler, MS. (Pl. XII. fig. 9.)

♂. *Alæ supra olivaceo-fuscae, certo situ cupreo-fuscae: anticae elongatae, apice acuto; margine interno brevi; margine postico fuscescente, ciliis pallidis: posticae margine externo paulum undulato, post medium abrupte angulato; fascia lunulata submarginali, duabusque tenuioribus paulum sinuatis, fuscis; ocello subanali minimo subgeminato consueto indistincto; ciliis pallidis: corpus nigrescens, antennis ferrugineis.*

Alæ subtus ochraceae fusco rotatae, disco roseo-pallescente; lineis duabus mediis sat late separatis, continuis, subintegris, fuscis, externa intus ochreo-fusco marginata; linea submarginali lunulata aliisque duabus tenuioribus vix sinuatis fuscis; linea antemarginali ochrea; fascia indistincta fusca, ocellos includente: anticae ocello unico subapicali, posticae duobus subapicalibus duobusque subanalibus, apicali et anali minimis, nigris ochreo cinctis et argenteo pupillatis, internis posticarum bipupillatis: corpus albido-cinereum, pedibus ochreis, palpis fusciscentibus, antennis flavis.

Exp. alar. unc. 2.

Hab. Minas Geraes, Brazil (Coll. Hewitson).

This species is allied to *E. variabilis*, Butl. In outline it most nearly approaches to the Rio form; from this insect it chiefly differs in having only one very minute subanal ocellus on the upperside of the hind wings, and in the different position of the central lines and paler colouring on the underside.

4. EUPTYCHIA ANGULARIS, Butler, MS. (Pl. XII. fig. 8.)

♂. *Alæ supra lineis submarginalibus obsoletis; ocello posticarum ad angulum ani magis approximante; aliter velut in sp. præcedente: anticae apice subangulato: posticae margine externo post medium valde angulato, margine apicali obliquo vix sinuato; margine anali magis sinuato: corpus nigrescens, antennis nigris.*

Alæ subtus primo visu eis sp. præcedentis similimæ, pallidæ, fusco rotatae; lineis duabus subparallelis et subintegris fuscis, intus ochreo marginatis; margine postico fuscescente; margine ipso nigro; linea submarginali denticulata, et ad angulum ani posticarum sinuata, nigro-fusca: anticae ocellis quinque nigris punctiformibus obscure ochreo cinctis et chalybeo pupillatis: posticae ocellis sex nigris parvis, primo, tertio et quarto minimis, obscure ochreo cinctis et chalybeo pupillatis, sexto unipupillato, aliis bipupillatis: corpus cinerascens; pedibus femoribus albicantibus, tibiis tarsisque ferrugineis: caput palpis cinereis; antennis roseo-albidis, ferrugineo clavatis.

Exp. alar. unc. 2.

Hab. Minas Geraes, Brazil (Coll. Hewitson).

Allied to the preceding species, but differing in form and in the disposition of the markings on the wings.

5. EUPTYCHIA OCHRACEA, Butler, MS. (Pl. XI. fig. 5.)

Alæ supra olivaceo-fuscæ ; margine postico fuscescente : posticæ ciliis pallidis : corpus nigrescens, antennis nigris.

Alæ subtus ochraceo-fuscæ, fusco roratæ ; lineis duabus mediis, ad costas divergentibus, paulum irregularibus, externa intus obumbrata, extus a fascia communi discali flavo-ochrea latius marginata ; hac anticarum multo tenuiore et extus a fascia communi fusca (ocellos includente) marginata ; linea submarginali undulata ; linea marginali, extus ochreo marginata, et margine ipso nigro-fuscis : anticæ ocellis duobus punctiformibus obsoletis : posticæ ocellis sex nigris punctiformibus ochreo cinctis, secundo et quinto majoribus et argenteo roratis : corpus fuscum, pedibus pallidis, antennis ferrugineis.

Exp. alar. unc. 1 $\frac{7}{8}$.

Hab. Brazil (Coll. Hewitson).

Allied to *E. renata*, Cram., but in some respects more closely resembling *E. variabilis*, Butl.

6. EUPTYCHIA PRONOPHILA, Butler, MS. (Pl. XII. fig. 20.)

♂. *Alæ supra olivaceo-fuscæ ; margine externo paulum obscuriore ; ciliis cinereis : corpus nigrescens.*

Alæ subtus olivaceo-fuscæ : anticæ fascia lata discali pallidiore, utrinque fusco obscuriore cincta, intus subintegra, extus angulis alternis denticulata, ocellos quinque minimos includente, quorum quintus indistinctissimus est, secundus niger ochreo cinctus et albo pupillatus, alii albi fusco cincti et obscurius ochreo cincti ; areola marginali fusco-cinerascente ; linea indistinctissima fusca ; margine ipso nigro : posticæ lituris plurimis parvis lineisque duabus apud basin subparallelis irregularibus fuscis ; margine interno albo-cinerascente ; fascia discali triangulari alba, de margine anuli ad apicem currente, intus nigro-fusco irregulariter marginata ; fascia extus adjacente, velut in anticis pallida, ocellos quinque parvos includente ; horum primus, tertius et quartus albi fusco cincti et latius ochreo pallido circumcincti sunt, alii duo distincti nigri albo pupillati et flavo cincti sunt ; areola marginali fusco-cinerascente ; margine ipso nigro : corpus fuscescens, pedibus pallidis, antennis flavescentibus nigro acuminatis, palpis fuscis.

Exp. alar. unc. 1 $\frac{1}{8}$.

Hab. Rio Janeiro (Coll. Hewitson).

This interesting insect is not very closely allied to any of the known species of *Euptychia* ; it mimics the Venezuelan form of *Pronophila phytanis*, Hewits., in the triangular white band on the underside. It appears to belong to the same group as the preceding species, although it may possibly form a link between *E. nebulosa*, Butl., and *E. nossis*, Hewits.

7. EUPTYCHIA LITURATA, Butler, MS. (Pl. XII. fig. 18.)

♀. *Alæ pallide olivaceo-fuscæ ; margine externo obscuriore ; ciliis roseo-cinereis : corpus nigrescens.*

Alæ subtus obscuriores, a lituris plurimis brevibus fuscis marmoratæ; costis albo variis: anticæ pallescentes; ocello uno subapicali nigro, ochreo cincto, fusco tenuissime circumcincto et albo pupillato; aliis duobus minutissimis insecutis similibus; pupillis albis æqualibus: posticæ fascia discali pallidior ocellos quinque minimos iis anticarum similes, includente; horum secundus et quintus distinctiores sunt; margine externo nigro: corpus cinereo-fuscum, palpis pallidioribus.

Exp. alar. unc. $1\frac{5}{16}$.

Hab. —? (*Coll. Hewitson*).

Allied to *E. undulata*, Butler, but with differently formed wings and entirely different markings.

8. EUPTYCHIA VESPER, Butler, MS. (Pl. XII. fig. 19.)

♂. *Alæ supra olivaceo-fusæ; ocellis nonnullis vix distinguendis indistinctis, marginalibus, inter venas sub alarum plicis positus; ciliis fuscis roseo tinctis: corpus fuscescens; antennis fuscis, ferrugineo clavatis.*

Alæ subtus cupreo tinctæ; lituris plurimis fuscis marmoratæ; margine nigro: anticæ litura discali, linea submarginali ad costam arcuata et linea marginali obscurioribus fuscis; ocello unico subapicali nigro, ochreo pallido cincto et albo pupillato: posticæ ocellis quinque similibus, secundo et quinto permulto majoribus; linea discali irregulari, altera sinuata submarginali, cum prima ad angulum ani conjuncta, et tertia marginali minime sinuata fuscis obscurioribus; ocello minimo interno valde indistincto: corpus fuscescens, pedibus pallidis, antennis flavis albido fasciolatis.

Exp. alar. unc. $1\frac{7}{16}$.

Hab. —? (*Coll. Hewitson*).

Allied to the preceding species. This little insect is much like some of the species of *Ypthima* on the underside.

9. EUPTYCHIA ARMILLA, Butler, MS. (Pl. XII. fig. 21.)

♂. *Alæ supra olivaceo-fusæ, margine nigro; ocello apud angulum analem, marginali, valde indistincto: corpus fuscescens, antennis fuscis.*

Alæ subtus fusæ minime purpureo tinctæ, margine externo nigro: anticæ stria discali obscuriore irregulari duabusque submarginalibus subintegris fuscis; area apicali paulum ochracea, ocello nigro ochreo cincto et albo pupillato; punctis tribus subapicalibus albis: posticæ stria vulde irregulari discali duabusque paulum undulatis fuscis; ocellis sex discalibus distinctis nigris, flavo cinctis et albo pupillatis: corpus fuscescens, antennis flavis.

Exp. alar. unc. $1\frac{3}{8}$.

Hab. Minas Geraes, Brazil (*Coll. Hewitson*).

Allied to the preceding species. In the arrangement of the ocelli on the underside this insect somewhat reminds one of the African genus *Cænys*.

10. EUPTYCHIA FUMATA, Butler, MS. (Pl. XII. fig. 14.)

Alæ supra piceo-fuscæ, linea marginali pallidiore fusca : corpus nigro-fuscum.

Alæ subtus minime pallidiores : anticæ stria discali obscuriore subintegra obliqua, nec costam nec marginem internum attingente, linea submarginali undulata, linea marginali subintegra nigro-fuscis ; margine ipso nigro : posticæ fasciis duabus mediis minime irregularibus, externa cum stria anticarum continua, apud angulum ani angulata, et cum fascia submarginali conjuncta, hac angulis alternis undata, linea marginali paulo undulata, his omnibus nigro-fuscis ; margine ipso nigro ; ocellis sex cordiformibus ebeninis ochreo cinctis fusco circumcinctis et chalybeo roratis, primo, secundo et sexto minoribus, primo indistinctiore minimo : corpus nigrescens, palpis cinereis.

Exp. alar. unc. $2\frac{3}{16}$.

Hab. Rio Grande (Coll. Hewitson).

This species is nearly allied to *E. saundersii*, Butl., although quite distinct.

The accompanying plates illustrate the species described in the present paper, and also some of those referred to in my preceding paper on the same subject, which have not yet been figured.

DESCRIPTION OF PLATES XI. & XII.

PLATE XI.

- Fig. 1. *Euptychia pagyris*, P. Z. S. 1866, p. 497.
 2. — *ægrotæ* (♂), P. Z. S. 1866, p. 482.
 3. — *philippa*, P. Z. S. 1866, p. 485.
 4. — *metagera*, P. Z. S. 1866, p. 494.
 5. — *ochracea*, P. Z. S. 1867, p. 107.
 6. — *erycina*, P. Z. S. 1866, p. 496.
 7. — *gemma*, P. Z. S. 1866, p. 495.
 8. — *ocnus*, P. Z. S. 1866, p. 467.
 9. — *obscura*, P. Z. S. 1866, p. 487.
 10. — *pyracmon*, P. Z. S. 1866, p. 499.
 11. — *junonia*, P. Z. S. 1866, p. 495.
 12. — *argyrospila*, P. Z. S. 1866, p. 467.
 13. — *libyoidea*, P. Z. S. 1866, p. 487.

PLATE XII.

- Fig. 1. *Eup'tychia lethe*, P. Z. S. 1866, p. 465.
 2. — *nebulosa*, P. Z. S. 1866, p. 479.
 3. — *westwoodii*, P. Z. S. 1866, p. 481.
 4. — *hiemalis*, P. Z. S. 1866, p. 494.
 5. — *polyphemus*, P. Z. S. 1866, p. 488.
 6. — *picea*, P. Z. S. 1866, p. 481.
 7. — *mima*, P. Z. S. 1866, p. 500.
 8. — *angularis*, P. Z. S. 1867, p. 106.
 9. — *straminea*, P. Z. S. 1867, p. 106.
 10. — *similis*, P. Z. S. 1866, p. 463.
 11. — *vastata*, P. Z. S. 1866, p. 487.
 12. — *modesta*, P. Z. S. 1866, p. 473.
 13. — *themis*, P. Z. S. 1867, p. 104.

- Fig. 14. *Euptychia fumata*, P. Z. S. 1867, p. 109.
 15. — *byses*, P. Z. S. 1866, p. 490.
 16. — *periphas*, P. Z. S. 1866, p. 465.
 17. — *vestigata*, P. Z. S. 1867, p. 105.
 18. — *liturata*, P. Z. S. 1867, p. 107.
 19. — *vesper*, P. Z. S. 1867, p. 108.
 20. — *pronophila*, P. Z. S. 1867, p. 107.
 21. — *armilla*, P. Z. S. 1867, p. 108.

4. Descriptions of Thirty-two New Species of Marine Shells
 from the Coast of New South Wales. By GEORGE
 FRENCH ANGAS, F.L.S., C.M.Z.S., &c.

(Plate XIII.)

1. TROPHON HANLEYI, n. s. (Pl. XIII. fig. 1.)

Shell fusiform, pale brown, with a narrow white band at the angle of the whorls; spire turreted; whorls angulated at the upper part, longitudinally distant plicate, transversely ribbed, the ribs somewhat stronger on the plications and closely elevated scaled throughout, the last whorl produced into a moderately long open recurved beak; aperture small; columella arcuate, smooth, whitish; outer lip angulated near the middle, thin, crenated at the edge, and slightly dented within. Length 1 inch 2 lines, breadth 6 lines.

Adhering to the under surface of rocks at low water, Port Jackson (*Coll. Angas*).

2. CANTHARUS (TRITONIDEA) UNICOLOR, n. s. (Pl. XIII. fig. 2.)

Shell fusiform, thick, longitudinally plicately ribbed and transversely closely ridged, pale brown or whitish throughout; spire elevated; whorls seven, rounded; aperture ovate, ending in front in a short slightly recurved canal; columella arched; outer lip crenulated, thickened externally, and denticulated within. Length 6 lines, breadth 2 lines.

Found under stones at very low spring tides, at Camp Cove, Port Jackson (*Coll. Angas*).

3. PURPURA (STRAMONITA) NEGLECTA, n. s. (Pl. XIII. fig. 3.)

Shell angularly ovate, longitudinally nodosely plicate, transversely rather broadly ribbed; ribs distant, the interstices filled with rows of muricated scales, pale brown, the transverse ribs yellowish spotted with black; spire elevated; whorls five, angulated, concave above; aperture angulately oval; columella arcuated and a little flattened; outer lip thin, simple; interior violet. Length 9 lines, breadth $4\frac{1}{2}$ lines.

Found under stones at low water outside Port Jackson Heads (*Coll. Angas*).

4. MITRA (CAUCILLA) STRANGEI, n. s. (Pl. XIII. fig. 4.)

Shell ovately fusiform, rather thin, white, spirally closely ridged,

the ridges on the last whorl alternately larger and smaller, crossed by very fine longitudinal lines; spire elevated; whorls eight, slightly rounded; aperture rather more than half the length of the shell, narrow; columella three-plaited, the upper plait the largest; outer lip thin. Length 7 lines, diam. $2\frac{1}{2}$ lines.

Dredged in Middle Harbour, Port Jackson (*Coll. Angas*).

Several specimens of this pretty little *Mitra* were also obtained at Moreton Bay by the late Frederick Strange, to whose memory I have dedicated it.

5. *COLUMBELLA* (*MITRELLA*) *ALBOMACULATA*, n. s. (Pl. XIII. fig. 5.)

Shell elongately fusiform, rather solid, whitish, tinged with violet; lower portion of the whorls faintly reticulated with chestnut, with broad brown flames, thickly spotted with white below the sutures; whorls eight, flattened, basal whorl spirally ridged anteriorly; aperture rather narrow, two-fifths the entire length of the shell; columella arcuated, callous, transversely finely ridged in front; outer lip sinuated posteriorly, edge thin, thickened exteriorly, and dentated within. Length $5\frac{1}{2}$ lines, breadth 2 lines.

Under stones at low water, Port Jackson (*Coll. Angas*).

6. *ÆSOPUS* *FILOSUS*, n. s. (Pl. XIII. fig. 6.)

Shell elongately fusiform, pale fulvous or brown, with spots of darker brown and white below the sutures; spire acuminately turreted, apex a little obtuse; whorls eight, slightly convex, transversely finely sulcated throughout, last whorl nearly one-third the length of the shell; aperture moderate, ovate; columella arched; outer lip slightly thickened externally and denticulated within. Length $5\frac{1}{4}$ lines, breadth 2 lines.

Dredged in Port Jackson in 5 fathoms (*Coll. Angas*).

7. *ACUS* (*ABRETIA*) *BICOLOR*, n. s. (Pl. XIII. fig. 7.)

Shell subulate, whitish, the lower half of the last whorl chocolate-brown; whorls nine, nearly straight, more or less nodulous below the sutures, thin, longitudinally ribbed, or very finely striated, the ribs on the last whorl ceasing at the periphery; columella arcuate; aperture small, ovately lunar; outer lip thin, rounded. Length 8 lines, breadth 2 lines.

Dredged in Middle Harbour, Port Jackson (*Coll. Angas*).

8. *ACUS* (*ABRETIA*) *ASSIMILIS*, n. s. (Pl. XIII. fig. 8.)

Shell elongately fusiform, rather solid, light fulvous, stained at the lower part of the whorls with purplish chocolate; whorls nine; a little rounded, longitudinally ribbed; ribs rather broad, arcuate, ceasing at the periphery of the last whorl, the interstices here and there irregularly longitudinally striated; columella arcuate, slightly twisted at the base; aperture small, contracted towards the front; outer lip thin, simple. Length $5\frac{1}{2}$ lines, breadth $1\frac{1}{2}$ line.

Dredged in Port Jackson (*Coll. Angas*).

9. *TURBONILLA NITIDA*, n. s. (Pl. XIII. fig. 9.)

Shell sharply subulate, turreted, rather thin, white, shining; whorls thirteen, slightly convex, longitudinally prominently rather broadly ribbed, interstices smooth, narrow, ribs abruptly ceasing at the periphery of the last whorl; sutures impressed; aperture small, subquadrate; columella straight; outer lip thin, a little produced in front. Length 5 lines, breadth 1 line.

Dredged in Port Jackson (*Coll. Angas*).

10. *ODOSTOMIA LEVIS*, n. s. (Pl. XIII. fig. 10.)

Shell ovately conical, thin, subdiaphanous, shining, white; whorls seven, a little rounded, last whorl not quite half the length of the shell; sutures channelled; aperture oblong-ovate, a little produced anteriorly; columella fold transverse and strongly developed; outer lip thin, acute, simple. Length $3\frac{1}{2}$ lines, breadth $1\frac{1}{2}$ line.

Dredged in deep water in Port Jackson (*Coll. Angas*).

11. *ODOSTOMIA LACTEA*, n. s. (Pl. XIII. fig. 11.)

Shell elongate, rather thin, smooth, white, shining; whorls six, flattened; sutures impressed; aperture small, ovate, somewhat produced anteriorly, one-third the length of the shell; columella-fold strong and a little oblique; outer lip thin, simple. Length 3 lines, breadth 1 line.

Dredged in deep water, Port Jackson (*Coll. Angas*).

12. *ODOSTOMIA (PARTHENIA) PASCOEI*, n. s. (Pl. XIII. fig. 12.)

Shell ovately conical, rather thin, rimate, pale yellowish brown; whorls seven, longitudinally rather closely plicate, plicæ evanescent on the basal portion of the last whorl, transversely finely striated; whorls eight, somewhat convex, last whorl rather ventricose; sutures distinct; aperture ovate; columella-plait moderate, transverse, situated a little within the aperture; outer lip rounded, simple. Length 4 lines, breadth $1\frac{1}{2}$ line.

Dredged in deep water, Port Jackson (*Coll. Angas*).

13. *ODOSTOMIA (PARTHENIA) KREFFTI*, n. s. (Pl. XIII. fig. 13.)

Shell fusiformly turreted, moderately solid, very narrowly rimate, white; whorls nine, strongly and closely longitudinally plicate, plicæ rounded, scarcely evanescent at the base of the last whorl, very finely transversely striated, last whorl moderate; sutures channelled; aperture small, ovate; columella-plait transverse, rather conspicuous. Length $3\frac{1}{4}$ lines, breadth 1 line.

Port Jackson, deep water (*Coll. Angas*).

14. *STYLOPTYGMA AURANTIACA*, n. s. (Pl. XIII. fig. 14.)

Shell acutely elongate, rather thin, shining, fulvous orange, with a pale band next below the sutures, darker on the lower whorls, fading into white on the upper whorls, which are glossy and sub-transparent; spire turreted; whorls eight, very slightly convex,

finely transversely striated; sutures impressed; aperture small, narrowly ovate, somewhat produced anteriorly; columella nearly straight, whitish, the fold very small and rudimentary; outer lip simple. Length 3 lines, breadth $\frac{3}{4}$ line.

Dredged in deep water, Port Jackson (*Coll. Angas*).

15. *DRILLIA COXI*, n. s. (Pl. XIII. fig. 15.)

Shell acuminate turreted, pale fulvous; whorls nodosely angulated at the upper part, and encircled with rather distant somewhat nodulous raised striæ, between which are numerous fine thread-like lines; canal short, straight; outer lip thin; sinus moderate. Length 9 lines, breadth 3 lines.

Dredged in Port Jackson (*Coll. Angas*).

16. *DRILLIA METCALFEI*, n. s. (Pl. XIII. fig. 16.)

Shell acuminate clavate, pale fulvous; whorls with a fillet of slanting plicate nodules next the sutures, angulated with sharp plicate nodules at the upper part, longitudinally rather sharply ribbed, and cancellated with irregular raised striæ, which are broader at the lower part of the last whorl, where the longitudinal ridges terminate in a band of small nodules; canal short; outer lip thin; sinus rather broad and deep. Length $7\frac{1}{2}$ lines, breadth $2\frac{1}{4}$ lines.

Dredged in Port Jackson (*Coll. Angas*).

17. *CLATHURELLA ZONULATA*, n. s. (Pl. XIII. fig. 17.)

Shell fusiform, rather solid, light brown, banded with ashy grey below the sutures and at the base of the last whorl, encircled with rather distant fine brown lines, longitudinally nodosely plicate, and transversely closely ribbed; spire elevated; whorls seven, convex; aperture narrow; inner lip arcuate; outer lip thin, thickened externally; sinus moderate. Alt. 4 lines, diam. $1\frac{1}{2}$ line.

Dredged in Port Jackson in deep water (*Coll. Angas*).

18. *ALABA PHASIANELLA*, n. s. (Pl. XIII. fig. 18.)

Shell elongately conical, thin, semipellucid, whitish, encircled by several thread-like, more or less interrupted, brown lines, with a band of alternate white and brown spots above the sutures, and a few short longitudinal brown flames beneath them; whorls nine, nearly flat; aperture ovate; columella arcuate; outer lip simple, acute. Alt. 3 lines, diam. 1 line.

Dredged in Port Jackson (*Coll. Angas*).

19. *RISSOINA VARIEGATA*, n. s. (Pl. XIII. fig. 19.)

Shell elongate, solid, white, sometimes broadly banded with livid purple, or ornamented with zigzag chestnut markings; whorls seven, slightly convex, longitudinally plicate, plicæ ceasing at the periphery of the last whorl, transversely finely closely striate; sutures distinct; aperture semilunar, chestnut within; inner lip moderately callous;

outer lip thickened, white, a little sinuated posteriorly. Length 4 lines, breadth $1\frac{1}{2}$ line.

Port Jackson, deep water (*Coll. Angas*).

20. *RISSOINA TURRICULA*, n. s. (Pl. XIII. fig. 20.)

Shell elongately turreted, rather solid, whitish; whorls eight, slightly rounded, longitudinally strongly plicate, angulated at the sutures, the base of the last whorl furnished with a prominent spiral rib; aperture ovate; outer lip thickened and strongly sinuate. Length $2\frac{1}{2}$ lines, breadth $\frac{3}{4}$ line.

Port Jackson, deep water (*Coll. Angas*).

21. *RISSOINA SMITHI*, n. s. (Pl. XIII. fig. 21.)

Shell narrowly elongate, solid, whitish, sometimes banded with pale brown below the sutures; whorls seven, a little convex, longitudinally strongly and rather distantly plicate, the plicæ curved above and nearly obsolete at the base of the last whorl, transversely very finely and closely striated; aperture semilunar, sometimes violet within; outer lip white, thickened, and moderately sinuated behind. Length 3 lines, breadth 1 line.

Port Jackson (*Coll. Angas*).

22. *RISSOINA CINCTA*, n. s. (Pl. XIII. fig. 22.)

Shell small, narrowly elongate, rather solid, white, zoned with brown; whorls seven, convex, longitudinally distantly plicate, plicæ evanescent on the last whorl, transversely lirate throughout; aperture subovate; outer lip a little thickened, and slightly sinuate behind. Length $2\frac{1}{4}$ lines, breadth $\frac{3}{4}$ line.

Port Jackson, deep water (*Coll. Angas*).

23. *CAPULUS VIOLACEUS*, n. s. (Pl. XIII. fig. 23.)

Shell elevated, laterally compressed, recurved, oblong-ovate at the base, radiately striated; apex free, inclined to the right; internally with a very narrow rib, rounded at the edge, situated in the cavity of the shell and extending on either side nearly to the middle of the aperture; interior violet. Length 8 lines, breadth 3 lines.

(*Coll. Angas*.)

A single example of this curious shell was obtained by myself adhering to the edge of a stone at low-water mark at Long Bay, outside Port Jackson Heads.

24. *EUTROPIA (TRICOLIA) ROSEA*, n. s. (Pl. XIII. fig. 24.)

Shell minute, thin, shining, ovate, of a uniform deep rose-colour throughout; whorls four, somewhat flattened at the upper part, then convex; columella white; edge of the outer lip stained with a line of dark rose. Length $1\frac{1}{2}$ line, breadth 1 line.

From shell-sand in Coodgee Bay, New South Wales (*Coll. Angas*).

25. *EUTROPIA* (*TRICOLIA*) *VIRGO*, n. s. (Pl. XIII. fig. 25.)

Shell minute, rather thin, globosely conical, white; whorls four, the last whorl ventricose, and painted with fine undulating pink lines, darker at the sutures, where they are separated by several broad descending white flammules; the lower portion of the last whorl encircled by a row of white spots; columella slightly excavated, white. Length 1 line, breadth $\frac{3}{4}$ line.

From shell-sand, Coodgee Bay, New South Wales (*Coll. Angas*).

26. *GIBBULA* *COXI*, n. s. (Pl. XIII. fig. 26.)

Shell orbicularly conical, moderately umbilicated, rather solid, whitish, marbled with olive and pink, with a few broad pure white flames descending from the sutures and interrupted on the keels with brownish red; base reticulated with grey and minutely spotted with red; spire conical; whorls five, angular, with two prominent rounded keels, one next the suture, concave between the suture and the upper keel, and a little concave between the keels, finely spirally ridged and decussated with exceedingly fine and close oblique longitudinal lines; base convex, finely concentrically ridged and decussated like the whorls, the ridges increasing in size towards the umbilicus. Alt. 4 lines, diam. 4 lines.

Dredged in Port Jackson (*Coll. Angas*).

I have named this elegant little *Gibbula* in honour of Dr. Cox of Sydney, to whom we are indebted for the descriptions of many new species of Australian land shells.

27. *GADINIA* *CONICA*, n. s. (Pl. XIII. fig. 27.)

Shell convexly conical, white, strongly irregularly radiately ribbed; ribs about thirty-eight in number, concentrically ridged; apex sub-central; white within. Alt. $2\frac{3}{4}$ lines, length $3\frac{1}{2}$ lines, breadth 3 lines.

Coodgee Bay, outside Port Jackson Heads (*Coll. Angas*).

28. *LOPHYRUS* *SMARAGDINUS*, n. s. (Pl. XIII. fig. 28.)

Shell oblong-elliptic, elevated, most minutely punctured, dull bluish green, delicately freckled with olive, the hinder edges of the valves ornamented with very small white spots bordered with olive; the terminal valves and lateral areas faintly concentrically striated, the central valves carinated, with the dorsal areas faintly transversely striated, the lateral areas slightly elevated; mantle-margin pale green, marbled with black, and covered with small smooth imbricated scales. Length 6 lines.

Port Jackson (*Coll. Angas*).

29. *ONITHOCHITON* *RUGULOSUS*, n. s. (Pl. XIII. fig. 29.)

Shell elongately ovate, a little narrowed in front, raised and carinated, pale yellowish brown, the central areas of the valves faintly spotted with olive, the outer edges bordered with green, upon which

and extending inwards are concentric waved bands of olive-brown darker at the margin; lateral areas not raised, divided from the dorsal areas by radiating nodulous ribs, transversely rugosely costate; dorsal areas finely longitudinally ridged; mantle brown, variegated with ash-colour and clothed with very minute chaff-like scales. Length 8 lines.

Port Jackson (*Coll. Angas*).

30. *TONICIA CARPENTERI*, n. s. (Pl. XIII. fig. 30.)

Shell ovate, elevately convex, carinated, ashy white, ornamented at the hinder edges of the valves with pale spots, the spaces between which are very dark olive melting into confused bands of a paler hue, which extend nearly across the valves; valves rostrate, undulately concentrically subimbricately sculptured throughout; the lateral areas not raised, but separated from the dorsal areas by an elevated rib; posterior valve strongly gibbous, the umbo almost terminal; mantle-margin brown. Length 9 lines.

Port Jackson (*Coll. Angas*).

31. *LEUCOTINA ESTHER*, n. s. (Pl. XIII. fig. 31.)

Shell ovate, rather solid, scarcely rimate, whitish; whorls five, transversely grooved and crossed with very fine longitudinal lines; aperture oblong-ovate, half the length of the shell; columella white, straight, parietal fold hardly visible. Length $2\frac{1}{2}$ lines, breadth $1\frac{1}{4}$ line.

Port Jackson, deep water (*Coll. Angas*).

32. *CHELIDONURA ADAMSI*, n. s. (Pl. XIII. fig. 32.)

Head furnished in front with a short silky fringe; mantle terminating behind in two long bifurcate filaments; foot elevated on each side, embracing the head and mantle, rounded both in front and behind; colour velvet-black, with a white crescent on the hinder part of the mantle; the head and the outer edge of the foot are bordered with a line of brilliant blue; a line of the same colour, bifurcated in front, extends down the back; and the posterior filaments are ornamented in the middle with a similar line; parallel with these blue lines, and at a short distance from them, are lines of a gold-colour; and spots of the same appear above the white crescent on the back, and at the bifurcation of the posterior filaments. Shell internal, very small, thin, flat, with the right border terminating in a point. Length 2 inches.

Found in a rock-pool at low water at Vacluse Bay, Port Jackson.

This species may be identical with the individual alluded to by Quoy as having been met with at the Mauritius among numerous specimens of his *Bulla hirundinina*, but which was not described by him. I have named it in honour of my friend Mr. Arthur Adams, the founder of the genus *Chelidonura*.

DESCRIPTION OF PLATE XIII.

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| <p>Fig. 1. <i>Trophon hanleyi</i>, p. 110.
 2. <i>Cantharus (Tritonidea) unicolor</i>, p. 110.
 3. <i>Purpura (Stramonita) neglecta</i>, p. 110.
 4. <i>Mitra (Caucilla) strangei</i>, p. 110.
 5. <i>Columbella (Mitrella) albomaculata</i>, p. 111.
 6. <i>Æsopus filiosus</i>, p. 111.
 7. <i>Acus (Abretia) bicolor</i>, p. 111.
 8. ——— (<i>Abretia</i>) <i>assimilis</i>, p. 111.
 9. <i>Turbonilla nitida</i>, p. 112.
 10. <i>Odostomia levis</i>, p. 112.
 11. ——— <i>lactea</i>, p. 112.
 12. ——— (<i>Parthenia</i>) <i>pascoei</i>, p. 112.
 13. ——— (<i>Parthenia</i>) <i>kreffti</i>, p. 112.
 14. <i>Styloptygma aurantiaca</i>, p. 112.
 15. <i>Drillia coxi</i>, p. 113.</p> | <p>Fig. 16. <i>Drillia metcalfei</i>, p. 113.
 17. <i>Clathurella zonulata</i>, p. 113.
 18. <i>Alaba phasianella</i>, p. 113.
 19. <i>Rissoina variegata</i>, p. 113.
 20. ——— <i>turricula</i>, p. 114.
 21. ——— <i>smithi</i>, p. 114.
 22. ——— <i>cincta</i>, p. 114.
 23. <i>Capulus violaceus</i>, p. 114.
 24. <i>Eutropia (Tricolia) rosea</i>, p. 114.
 25. ——— (<i>Tricolia</i>) <i>virgo</i>, p. 115.
 26. <i>Gibbula coxi</i>, p. 115.
 27. <i>Gadinia conica</i>, p. 115.
 28. <i>Lophyrus smaragdinus</i>, p. 115.
 29. <i>Onithochiton rugulosus</i>, p. 115.
 30. <i>Tonicia carpenteri</i>, p. 116.
 31. <i>Leucotina esther</i>, p. 116.
 32. <i>Chelidonura adamsi</i>, p. 116.</p> |
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5. Notes on *Hyalonema lusitanicum*, and on the Genus in general. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

Professor Bocage having most kindly presented to the British Museum a very beautiful specimen of *Hyalonema lusitanicum* from the coast of Portugal, I am enabled to state that I believe it to be a most distinct species from the *Hyalonema sieboldii* of Japan.

The bundle of spicules is much more slender, consisting of fewer spicules, and the spicules are very much longer than in any specimens I have seen from Japan; and the sculpture on the surface of the spicules is much more distinct and coarse than that on the Japan spicules of the same thickness. A Japan specimen of two-thirds the length, for example, would contain twice, if not three times, as many spicules, and the coil or rope-like axis would be more than twice the diameter.

The polypes on the bark are much smaller, oblong-oval, longer than broad, and more crowded together, and are not of the circular form, nor are they nearly so much raised in the dry contracted state as those of the usual dry Japan specimens.

As remarked by Professor Bocage, the lower, more slender part of the axis is entirely covered with the bark, which is crowded all over to the very end of the base with the contracted polypes. The upper half has lost its bark.

As in the Japan species, the spicules of the coil of the upper part of the specimen are thicker than near the base; indeed the spicules of both species gradually increase from the base to near the upper end; so there can be no doubt that the part covered with the bark is the slender base of the spicules, which in the Japan species is naked and is immersed in the sponge.

The examination of Professor Bocage's specimens has satisfied

me that the coral from Japan and that from Portugal should be separated from each other as genera, having a different number of tentacles, and that they must live under very different circumstances. The differences have been pointed out by Professor Bocage in his papers on the Portuguese Coral in the Society's 'Proceedings.'

The genera may be thus defined:—

1. HYALONEMA, Gray, and Brandt?

Hyalochæta, Brandt.

Polypes with twenty tentacles in two series. The axis bare at the base, living sunk in the centre of a sponge, and separated from the sponge by a hard condensed coat. The bark strengthened externally with siliceous granules or sand.

All the perfect specimens which I have seen of this coral were attached to sponges; they are about twelve in number; and there are three figured by Brandt, and one by Schultze; so there can be no doubt that it is the natural habit of the coral. This seems to be the case with all the specimens that have been collected by naturalists.

The Japanese seem to destroy the bark, and separate the corals from the sponges, as they appear to consider the bundle of spicula the most interesting part of the coral; so that most of the specimens that are brought to this country either have only a small part of the bark attached to them, just enough to keep the spicula together, or are entirely stripped of it.

HYALONEMA SIEBOLDII.

Hyalonema sieboldii, Gray, P. Z. S. ii. (1835) p. 65; 1857, p. 279; Institute, 1835, p. 426; Ann. & Mag. N. H. 1850, vi. p. 306; 1866, xviii. p. 295; Perty, Allg. Naturg. iii. 1841, p. 796; Brandt, Bull. Scien. Acad. Sci. St. Pétersb. n. s. xvi. 1857; Mélang. Biol. ii. 606; Symbolæ, 14, t. 1. f. 1-10; Milne-Edwards, Coralliaires, i. 1857, p. 324; Max Schultze, Die Hyalonemen, 1860, t. 1. 2; Bowerbank, Brit. Sponges, i. 196.

Hyalonema mirabilis, Gray, P. Z. S. 1857, p. 279.

Var. ? *Hyalonema affinis*, Brandt, Symbolæ, 16, t. 2. f. 2 a, 2 b, 3 & 4.

Hab. Japan.

Professor Brandt has divided the *Hyalonema* from the Japanese seas into two genera, viz. *Hyalonema* and *Hyalochæta*, according to the prominence and clustering of the polypes. I have not seen any specimens which agree with Professor Brandt's *Hyalochæta possietii*, Bull. Sci. Acad. St. Pétersb. xvi. 1857; Mélan. Biolog. ii. 606; Symbolæ, 17, t. 2. f. 6-10.

In the British Museum there is a specimen, which was brought from Japan by Dr. W. Lockhart, that has some of the polypes clustered and more produced than the others. It is almost intermediate in form between the common state of *Hyalonema sieboldii* and the figure of *Hyalochæta possietii* given by Professor Brandt.

The want of more materials makes it impossible to come to any conclusion as to the distinctness of the genera or even of the species.

If one may judge from the figure of Professor Brandt, the polypes of the genus *Hyalochaeta* appear to be on the slender end of the axis of the coil of the coral, as in the Portuguese species. It would be desirable to know whether this form is ever found living in a sponge.

The specimen in the British Museum, obtained by Dr. W. Lockhart in Japan, which has some of the polypes prominent and clustered, has the bark only on the lower, more slender end of the coil, and in this respect agrees to some extent with Professor Brandt's figure. But the slender end of the coil projects like a pencil beyond the bark; and one is by no means sure that the bark, which is evidently very easily moved on the axis in the living or freshly gathered coral, may not have been slipped down towards that end of the coil; and I think that this may be the case, as I believe that it was obtained with the other Japanese specimens of *H. sieboldii* which Dr. Lockhart brought home. In this respect it differs from the Portuguese species and from the *Hyalochaeta* of Prof. Brandt; for in both of them the bark entirely covers the base of the axis, and evidently belongs to that part of the specimen.

2. HYALOTHRIX.

The polypes with forty tentacles in several concentric series, the outer series the largest. The axis, covered to the very base with the polype, bearing bark, and the bark strengthened with cylindrical filiform siliceous spicules, and with a smooth external coat without any imbedded granules.

This genus is at once distinguished from *Hyalonema* by the coral not living with its base immersed in a sponge. It lives evidently free; but how it keeps itself in an erect position so that all the polypes round the axis may obtain food is yet to be discovered.

1. HYALOTHRIX LUSITANICA.

Hyalonema lusitanicum, Bocage, P. Z. S. 1864, p. 265, pl. XXII.; 1865, p. 662; Gray, Ann. & Mag. N. H. 1866, xviii. p. 287.

Hab. Coast of Portugal (*Bocage*).

B.M.

After the study of all the specimens which I have been able to see from Japan, and of the Portuguese specimen, I still adhere to the opinion that I formed when I first described the genus, now more than thirty years ago, and which is so well supported by Prof. Brandt in his carefully prepared and well-studied memoir. I regard *Hyalonema* as a type of a peculiar family of Corals, formed by zoanthoid polypes, characterized by forming for their support a siliceous axis formed of many thread-like spicules coiled together into a rope-like form, each formed of numerous concentric laminæ, and surrounded and separated from one another by the corium of the community of polypes.

I am aware that M. Valenciennes has suggested that the rope-like coil or axis in the Japanese species is a part of the sponge, and regards

the polypes with which it is covered as a species of *Palythoa*; and Professor Max Schultze has supported this theory by a microscopic examination of the spicules of the sponge, of the axis, and the bark or *corium**.

Some of the arguments in favour of this view of the question may be thus condensed:—

I. *Silica is not exclusively secreted by sponges, as the advocates of the sponge-theory seem to believe, but is found mixed with corneous matter (as it is mixed in Hyalonema and Euplectella) in Gorgonia and Antipathes, and with calcareous matter in Madreporas.*

Mr. Children, in my paper "On the Chemical Structure of Sponges" (see *Annals of Philosophy*, 1825, ix. p. 431), in which I first showed that the spicules of some sponges are composed of silica, states that he found sufficient silica in the carefully prepared ashes of the axis of *Gorgonia flabellum* to form a globule before the blow-pipe. This proves that silica is found in the coral of the *Alcyonaria* or polypes with pinnate tentacles.

Professor R. Silliman, in the "Appendix to Dana, on the Structure and Classification of Zoophytes," states that in three genera of Madreporas (*Madreporaria*) which he examined he found that one contained nearly 9, another 12, and a third 23 per cent. of silica; he further states that "the silica exists in the coral in its soluble modification, and probably united to the lime." If nearly one-quarter of the solid parts of a calcareous coral of a zoanthoid polype consists of silica, there can be no reason that a zoanthoid polype might not produce a coral of pure silica without any calcareous material.

M. Milne-Edwards calls one genus of Antipathidæ *Hyalopathes*, because the axis is smooth and has a vitreous appearance; further, he believes that the axis differs in chemical composition from that of the other genera of Antipathidæ (see *Coralliaires*, vol. i. p. 323). I have not seen this genus; but it is to be observed that he forms for the *Antipathes* a group which he calls *Zoanthaires sclérobasiques*, and it is to this group that the *Hyalonemidæ* must be referred; indeed, from the manner in which M. Milne-Edwards refers to the genus, this is where he would have placed it if he had not been informed by M. Valenciennes that he considered it a sponge with a parasitic *Zoanthus*.

II. *The structure of the siliceous spicules of sponges is very similar to, almost identical with, the structure of the axis of Gorgonia*

* The truth of Dr. Bowerbank's assertion (also supported by Dr. William Carpenter), that the zoanthoid polype of this coral, described by Brandt, Schultze, Bocage, and myself, is only the *osculum* of the sponge, can be at once disproved by the examination of a specimen, or the study of the works of the authors cited, and can scarcely be considered an object of discussion. It is true Dr. Bowerbank has written a long and diffuse paper to attempt to prove his position, when a cut in the polype-cell could have settled the question. It is a pity he did not recollect King Charles's question about the fish and the water. I have made some observations on M. Valenciennes's and Dr. Bowerbank's theories in the 'Annals and Magazine of Natural History' for 1866, vol. xviii.

among the sclerobasic alcyonoid, and of *Antipathes* among the sclerobasic zoanthoid polypes.

The siliceous spicules of sponges (as for example, the very elongated filiform spicules of the genus *Euplectella*, which are most like those of *Hyalonema*) are formed of numerous very thin concentric coats formed of silica and horny matter; but this is exactly the structure of the axis of *Gorgonia* (of the alcyonoid polypes) and of *Antipathes* of the zoanthoid polypes.

In *Hyalonema* the coats are siliceous, mixed with horny matter; in *Gorgonia* the coats are either almost entirely horny or of horny matter mixed with a greater or less quantity of calcareous and siliceous matters. Though the axes of the *Gorgonia* and *Antipathes* are generally found with an expanded base, by which they are fixed to marine bodies, the *Pennatulæ*, which are free, have a fusiform axis, like the separate spicules that form the coil of *Hyalonema*.

I can only consider that the spicula of *Hyalonema* are the fusiform axes of a coral which, instead of having one axis to the community of polypes, has several coiled together like a rope, but separated from each other by a layer of corium.

The coil of the spicula in *Hyalonema* occupies the same position and answers the same purpose (that is of supporting the canal) as the axis of the sclerobasic alcyonoid and zoanthoid polypes—that is to say, the axis of *Gorgonia*, *Antipathes*, and *Pennatula*.

III. *The spicules of sponges are only covered with sarcodæ; while the spicules of the Hyalonema are each surrounded by a layer of corium exactly like the inner surface of the bark or corium of the polypes.*

The zoologist who regards the coil of spicules as part of the sponge considers the polypes on its surface a parasitic incrustation. If this were the case, the parasites would only form a layer on the surface of the coil without interfering with the coil of spicules on which it is placed; and the spicules of the coil, being part of the sponge, would only be covered with the sarcodæ of the sponge, which, in the sponge at the base of the *Hyalonema*, of which the coil is said to be a part, is very small in quantity, scarcely enough to unite the spicules of the sponge together, and scarcely visible on their surface. In *Hyalonema*, on the contrary, the bark that covers the coil consists of a thick hard fibrous corium covered with a thick external coriaceous coat, strengthened, as in *Palythoa*, with grains of sand or small spicules. The inner layer of corium near the spicules or coil is pierced by scattered small spicules; and the corium extends within the coil, surrounding each of the spicules with a thin fibrous coat, uniting them all into one mass of a much more solid and highly organized texture than the sarcodæ of any sponge I have examined.

The zoanthoid polypes that form the bark on the coil of spicula differ from those of the genus *Palythoa* and all other allied genera in having the inner coat of their polype-cells and the base from which they spring pervaded with siliceous spicules, similar in shape, but smaller and much shorter than the spicules of which the coil is formed.

I consider that this structure of the corium is enough to prove that it is the community of polypes that constitute the bark that forms the coil of spicules, and that they are too intimately connected with the spicules to be only parasitic on their surface.

IV. *The essential character of a sponge is, that it is permeated by canals for the circulation of the water which is emitted by oscules; and there is no such structure in Hyalonema.*

The sponge in which the Japanese *Hyalonema* is found is of the normal structure here noted. But there is no appearance of any canal in the coil of spicules; indeed they are all formed into a close mass, adherent together by the corium that surrounds each spicule.

There is no communication between the canals of the sponge to which the *Hyalonema* is attached and the axis of *Hyalonema*, which has been regarded as part of the sponge.

The sponge forms a condensed hard case, round the base of the coil which is inserted in the sponge, very different from the rest of the sponge, of a dense structure, and without any canal in it, as if to separate the base of the *Hyalonema* from it as completely as possible, evidently regarding the *Hyalonema* as an intruder, I suppose, the base being enclosed in the hard case without any canal, and the upper free part of the axis being entirely covered with the polype-bearing corium or bark (or with the mass of parasitic *Palythoa*, if that theory be the correct one); and I have seen specimens which show that in the perfect state of the animal the axis is so covered.

This bark being destitute of pores or other apertures, and the axis destitute of any canal, shows that the axis and bark cannot be any part of the "cloacal system," as Dr. Bowerbank states them to be in his characters of the genus, and, indeed, have no connexion with the sponge in which it lives.

In the perfectly formed specimen the coil of the axis reaches to the base of the sponge, the coil gradually tapering in thickness until it reaches the base, where it is like a small pencil of very thin spicules. This thin end or pencil is closed over by the sponge. I believe that the coral commences on the surface of the sponge; and that as the coral increases in size the basal portion perforates and descends in the sponge as the upper part of the axis ascends or enlarges in size.

In fact the coil of spicules forms no part of the organization, and has no organic connexion with the sponge in which it is placed, there being no water-current between it and the sponge, which is the essential character of sponges. It is to be observed that neither M. Valenciennes, Professor Max Schultze, nor Dr. Bowerbank attempt to prove that the coil is in any way organically connected with the sponge.

V. *The attachment to the sponge appears to be the habit of a single species; for the Portuguese species, which agrees with the Japanese in most of its essential characters, lives free in the sea, and has*

the small end of the coral, which in the Japan species is sunk in the sponge, covered with polypes like the rest of its surface.

Professor Max Schultze, who regards the coil of the Japanese species as part of the sponge and the polypes as a parasitic species of *Palythoa*, considers the polype an undescribed species of that genus. But the observation of Professor Brandt shows that it differs from all the species of the genus *Palythoa* in having the inner layer of the basal portion, which forms the bark of the coil and the cells of the polypes, strengthened with siliceous spicula, similar to, but smaller and shorter than the spicula of the coil; so that the animal must form a genus by itself, which has the peculiarity of secreting small spicules of the same kind and form as those which the advocates of the parasitic theory will not admit the polype secretes of a larger size so as to form the coil.

According to the observations of Professor Bocage, the polype of the Portuguese species differs from that of the Japan species in having a different number of tentacles; but it agrees with the Japan species in the inner layer of the corium secreting siliceous spicules. So the *Hyalonemata* of the two localities have polypes agreeing in forming siliceous spicules in the corium, and yet may be referred to different genera. Yet we are to believe that each is only parasitic on a coil of spicules which only differs from the spicules of their flesh in being larger and formed into a central coil! This I must regard as a very illogical conclusion, as it is more natural to suppose they secrete the spicules of the bark and the coil.

These two genera, according to the theory entertained by Valenciennes, Milne-Edwards, and Wyville Thompson, must belong to two very different groups of animals. These zoologists consider the "glass rope," because it grows out of a sponge* having somewhat similar siliceous spicula, to be only an extraordinary development of the spicula of the sponge, which is covered with a parasitic *Palythoa*! Therefore they regard it as a sponge. As the second genus does not grow out of a sponge, and therefore cannot be a development of the sponge-spicula, and therefore cannot be a sponge, I do not know to what group of animals they would refer it. I therefore think it much more reasonable to believe that both belong to a peculiar group of zoanthoid corals characterized by secreting an axis formed of siliceous thread-like spicules, consisting at present of two genera, one living free, and the other growing from a mass of sponge.

Thus a coral with an axis formed of a coil of siliceous spicules, exactly similar to that of *Hyalonema*, is found without being in connexion with any sponge; so that the coil cannot be a special development of the spicules of a certain sponge. In the latter case the coil-like axis is evidently secreted by the polypes which cover it. Are we to believe that the sponge forms the axis in one case, and

* Professor Brandt denies that the Japan *Hyalonema* lives in a sponge (*Hyalonema*, p. 14, note), and says he does not know how they are fixed (p. 14). Professor Max Schultze figures three specimens in sponges (t. 1, 2). We have two examples in the British Museum in sponges; and I have seen more than a dozen other specimens all growing in sponges.

the polypes (which equally cover the axis in both cases) in the other—that is to say, in two genera of the same family?

Some of the siliceous spicules found in the inner layer of the bark of the axis or coil of the Japanese species are similar in form to those which are found in the sponge on which it grows (see Schultze, t. 3. f. 11–14; Brandt, t. 3. f. 15, 16)*. They differ from the spicula in the sponge in being smaller in size, stouter, and more spinose; but when you see the very variable forms the spicules of the sponge assume, and how the forms blend into each, as well shown by Schultze, t. 1. f. 3, 4, the passage from the spicula of the sponge to those of the bark can easily be believed by a casual observer; but those of the bark and of the sponge each keep their own peculiar form and position, and are never found intermixed.

Some microscopists, who frequently pay little attention but to the “microscopic object,” and therefore take a narrow view of the affinities of animals, place great reliance on this similarity of the spicules of the polypes and the sponge, and regard them as the same. This would have weight, if the perfect organization and development of the polypes did not prevent me from accepting Dr. Bowerbank’s theory that the bark is part of the sponge. But, admitting as we must that the coil is covered with well-developed polypes, the existence of these cruciform or subcruciform spinulose spicules does not offer us any assistance to discover whether the polypes are parasitical or are the makers of the coil; and they have been observed by the advocates of each theory, as above quoted, only so far as one may argue that, if the polypes develop these cruciform siliceous spicules and also cylindrical ones in the bark, there is less difficulty in believing that they also develop the siliceous filiform spicules of the coil or axis.

Dr. William Lockhart states that the Japanese *Hyalonema* is found growing on the rocks off the island of Enosima, near the old capital Kamakura, and not far from Yokohama. The fishermen offer these sponges with their siliceous fibres for sale to visitors at the temples of Enosima.

The Japanese are intelligent and patient people, and they manufacture many articles of the coils of spicules of this coral. They sell them with one or more bands of coloured or gold paper put round them to keep them together, or they enclose the narrow base of the coil with spiral strips of paper, strips of cloth or ribbon, forming them into an aigrette; these are prepared for the general market. Oddly enough, when they, or some of the fishermen, must have stripped the bark off the coil, they prepare others evidently for the more scientific purchasers. Thus I have seen a specimen which had the thin lower end of the coil enclosed in a spiral band of paper covered over with a coil of string having knots at certain distances. This was all covered with sand and minute particles

* Professor Brandt considers the spicules to belong to different species, calling the one at the base *Spongia octancyra* (p. 14), and the other in the bark *Spongia spinicrucis* (p. 23).

of shell attached with cement, giving the whole the appearance of the true bark, the knots representing the polype-prominences,—and so well done that it deceived an intelligent collector.

The same collector brought me a specimen of a coil which had some of the natural bark on the middle part of the specimen ; but the narrow lower end was covered with strips of the bark wound round it in a spiral manner, so that the bark appeared to cover the base of the coil nearly to the end ; but when closely examined, the edges of the strips were distinctly visible.

I have seen another specimen in which the coil of spicules was scattered with small pieces of bark, generally containing a single polype, but in two or three cases two polype-cells ; and on the tips of some of the spicules were affixed in the same manner, with cement, a piece of bark containing a polype ; in one or two instances two such pieces were on the same spicule.

6. Additional Note on *Corallium johnsoni*.

By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

In the Proceedings of this Society for 1860 (p. 393, Radiata, pl. XVIII.) I described and figured a new species of Coral, which had been discovered by Mr. James Yate Johnson at Madeira, under the name of *Corallium johnsoni*.

The Rev. Henry H. Higgins, an active trustee of the Liverpool Free Museum, has most kindly sent to me for examination a small specimen of a Coral received from Mr. Johnson, from Madeira, which is evidently the same species, showing the coral in its young state. As the specimen is very unlike the old part of the coral that I figured, and also very dissimilar to the young branches of the *Corallium rubrum* of the Mediterranean, I have had the figure that Mr. Higgins most kindly sent with the specimen reproduced (see fig., p. 126).

The great peculiarity of this coral is that the polypes all arise from one surface, and I have no doubt that it grows out horizontally from the rocks, and that they arise from the upper surface of the branches.

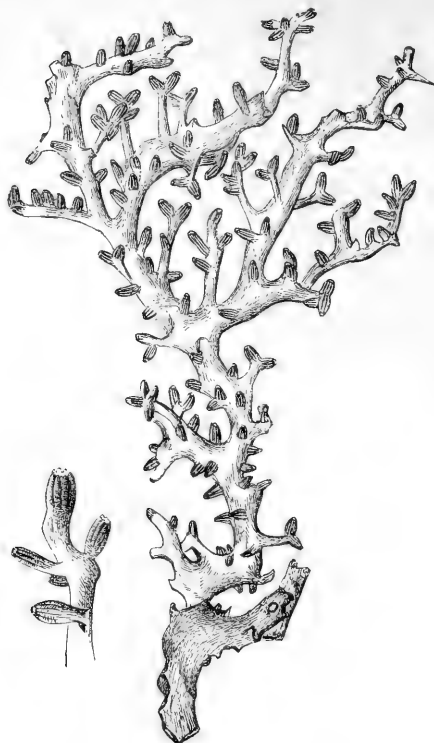
The polypes also differ from those of the *Corallium rubrum* of the Mediterranean in being very prominent from the bark, and of an ovate subcylindrical form, marked with longitudinal grooves, which are most distinct near the opening of the polype-cell.

I have little doubt that the above is the true explanation of the specimen ; but Mr. Johnson, who sent the specimen to Liverpool, labelled it “a zoophyte parasitic on a dead coral.”

The genus *Corallium* should be divided into three, as follows:—

1. CORALLIUM.

The polypes slightly elevated from the bark, and scattered on all sides of the branches.

*Hemicorallium johnsoni.*

CORALLIUM RUBRUM, Lam., M.-Edw. Corall. i. 204.

Madrepora rubra, Linn.

Isis nobilis, Pallas.

Hab. Mediterranean.

B.M.

2. PLEUROCORALLIUM.

“The coral branching in a plane. The polypes scarcely raised, confined to one surface, mostly near the apex of the very small branchlets, and often in twos.” The branchlets in the figure are chiefly confined to one edge of the branches.

PLEUROCORALLIUM SECUNDUM, Dana, Zoophytes, p. 641, t. 60: f. 1, 1 a.

Hab. Sandwich Islands?? (*Dana*).

3. HEMICORALLIUM.

The polypes prominent, ovate-cylindrical, often clustered, all distributed on one side of the branches.

HEMICORALLIUM JOHNSONI.

Corallium johnsoni, Gray, P. Z. S. 1860, p. 394.

B.M.

"Zoophyte parasitic on a coral."—*J. Y. Johnson, MS.**Hab.* Madeira (*J. Y. Johnson; Free Museum, Liverpool*).

7. On *Placospongia*, a New Generic Form of *Spongiadæ* in the British Museum. By Dr. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

The British Museum received in 1851, from Admiral Sir Edward Belcher, a specimen of a hard calcareous body said to have come from Borneo; and in the sale at Stevens's sale-room in 1852 we purchased two other specimens, from what was understood at the time to be the remaining part of the collection that had been formed by Admiral Sir Edward Belcher during the surveying voyage.

The bodies have much the appearance of the underground rhizome of a plant with a number of scars whence leaves or flowering branches have separated; but when more closely examined, it will be found that what appears to be a scar is a separate plate. And when so examined they have so much the appearance of a very large kind of Nullipore or *Melobesia* that, when I first observed them, I believed that they were probably corals covered with large plates of a *Melobesia*, differing in size and form on the various parts of the specimens, and giving them an angular appearance, caused by the overlapping of the different fronds of this calcareous Alga; and I therefore proposed to transfer them to the Botanical Collection in the British Museum.

An examination by the microscope at once dispelled this idea; for the surfaces of the white chalk-like plates, even under a low power, are seen to be distinctly areolated as if formed of small grains; and when the plates and the white chalk-like axis were more minutely examined under a higher power they were found to be entirely formed of transparent, more or less globular or oblong siliceous masses, with a regularly granulated surface, evidently formed of spicules radiating from the centre to the circumference, and forming the granular surface exactly like what are called the *ovaria* of *Geodia* and its allies. Also the space between the central axis and the plates in a transverse fracture was filled with a rugose yellow granular matter, which proved to be sarcode strengthened with bundles of siliceous pin-shaped spicules (with a distinct head and a tapering point), which diverge from the axis to the inner surface of the external plates.

After this examination there could be no doubt that this was a sponge differing in internal structure and external form from any sponge yet described. I therefore propose to form it into a genus, to be called *Placospongia*, which I regard as the type of a new family, and, indeed, of a separate group of sponges, which may be called *Stony Sponges*, thus characterized:—Sponge consisting of a hard central

axis covered externally with separate laminæ; the axis and laminæ composed of closely adherent siliceous globules with a granular surface, and separated from each other by a layer of sarcode armed with siliceous spicules.

The genus may be thus described :—

PLACOSPONGIA.

The sponge hard, angular, stony, angularly branched. The axis solid, formed of closely packed siliceous globules with an areolated tubercular surface, and covered with variously shaped hard plates of similar tubercular siliceous globules, having an areolated appearance on the surface under the microscope. The outer plates differ greatly in size and form; but they meet at the edges, and rarely one edge slightly overlaps the other, giving the sponge an angular appearance. The axis is separated from the superficial plates by a continuous layer of sarcode furnished with bundles of nearly parallel pin-shaped spicules, which form columns diverging at right angles from the outer surface of the axis to the inner surface of the outer plates. The external plates are increased in size by the addition of new matter on the circumference, leaving indistinct concentric lines of growth on the outer surface. It is the manner of growth that makes them look so like the fronds of a large *Melobesia*.

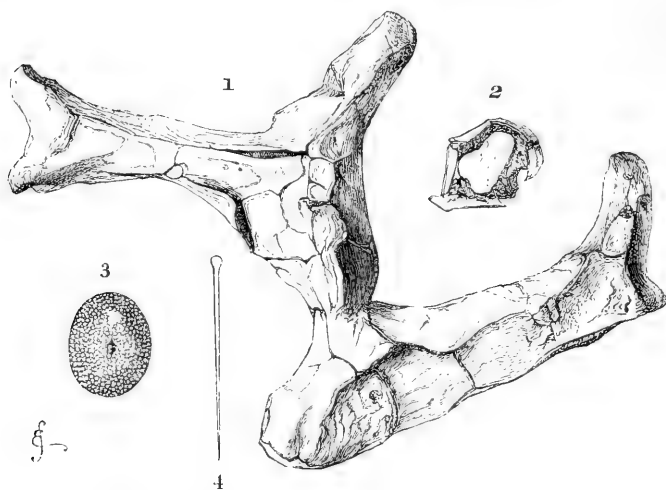


Fig. 1. *Placospongia melobesioides*, Gray.
 2. Cross fracture, showing the axis, sarcode, and outer laminæ.
 3. Siliceous globule.
 4. Pin-shaped spicule of sarcode.

PLACOSPONGIA MELOBESIOIDES.

Var. 1. Sponge thick, with short angular branches, chalky white.
Hab. Borneo. B.M.

Var. 2. Sponge slender, with a few distant angular branches, pale purplish red.

Hab. Borneo? (1851, *Capt. Sir E. Belcher*).

B.M.

The two varieties were purchased at the same time, in Stevens's sale-room, in 1852. They present just the same differences in colour as are to be observed in different specimens of *Melobesia* and *Coralina*; and there is no doubt that the purplish-red specimen will become white by exposure.

8. On some Collections of Birds from Veragua.

By OSBERT SALVIN, M.A., F.L.S., F.Z.S., &c.

(Plate XIV.)

The three collections of birds which form the materials for the present paper were collected at three different localities in Veragua, by Enrique Arcé, a native of Guatemala, who formerly worked for Mr. Godman and myself when travelling in the latter country. Having become proficient in bird-collecting, he undertook to go to Costa Rica, where he remained some months; he then proceeded to Panama, and thence to the ground where these collections were made. The first and largest was from a village called Santa Fé, which Arcé describes as situated twelve leagues on the Panama side of Santiago, the capital of Veragua; the next was from the neighbourhood of Santiago itself; and the third from a district beyond Santiago, which Arcé calls the "Cordillera de Tolé." Neither this district nor Santa Fé are marked in any map that I have seen. All three localities would seem to enjoy a "*tierra templada*," or cool mountain-climate, in their vicinity; and the presence of a Dipper (*Cinclus*) in the last named indicates that our traveller reached a considerable elevation. The collection also contains many birds which are found only in the lowlands, showing that Arcé also visited the hot forests of low elevation.

Before proceeding to enumerate the species contained in these collections, I will shortly mention the notices that have been published from time to time of the birds of this section of Central America, viz. that which is included between the political frontier of Costa Rica and the Panama Railway.

The first notice which I can find referring to the birds of Veragua is in the 'Proceedings' of this Society for the year 1850, p. 92, where Mr. Gould describes *Cephalopterus glabricollis* from a specimen obtained by the botanical traveller M. Warszewicz in the Cordillera of Chiriqui. In a subsequent paper, published in the same year (p. 162), six new species of *Trochilidae* (*Selasphorus scintilla*, *Thaumatias chionurus*, *Thalurania venusta*, *Sapphironia ceruleogularis*, *Erythrónota niveiventris*, and *Trochilus* (—?) *castaneiventris*) were described by the same gentleman from specimens furnished by M. Warszewicz, and collected between David and the Chiriqui Lagoon. A seventh species from the same collection was also described by

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Mr. Gould under the new generic name *Oreopyra*, as *O. leucaspis*, in the 'Proceedings' for 1860, p. 312. In the 'Proceedings' for the year 1853, p. 45, a new species of Toucan (*Aulacorhamphus cæruleogularis*) was defined by Mr. Gould from a specimen collected in Veragua by Dr. Berthold Seemann, who obtained it when travelling as naturalist to H.M.S. 'Herald.' Mr. Gould says this bird was accompanied by other ornithological rarities, of which unfortunately we have no record. In the year 1853, also, MM. Verreaux published their description of *Chasmorhynchus tricarunculatus* in the 'Revue Zoologique,' p. 193, from an immature specimen transmitted to them from Boca del Toro. The next notice we have is in the 'Annals of the New York Lyceum' for 1855 (vol. vi. p. 137), which contains a description by Mr. G. N. Lawrence of the beautiful Humming-bird (*Microchera albo-coronata*), with notes on its habits by its discoverer, Dr. J. K. Merritt, and also on those of *Eutoxeres aquila*, Bourc. These birds were obtained in the district of Belen, which lies to the south-eastward of the Chiriqui lagoon, on the Atlantic slope of the Cordillera. Our 'Proceedings' for 1856 contain two papers referring to Veraguan birds. The first is at p. 107, by Mr. Gould, where two new species are described (*Trogon aurantiiventris* and *Odontophorus veraguensis*) from specimens collected by Mr. Bridges near David. The second paper, by Mr. Sclater (p. 139), gives a complete list of Mr. Bridges's collection, which contained specimens of forty-six species, two of which are described as new, viz. *Thamophilus bridgesi* and *Geotrygon chiriquensis*. In this paper short notes on the habits of each species are supplied by Mr. Bridges. The next paper I have to notice is by Mr. G. N. Lawrence, on a collection transmitted to the Smithsonian Institution by Mr. F. Hicks from David. This paper, published in the 'Annals of the New York Lyceum,' viii. p. 174, enumerates thirty-nine species, three of which are introduced as new, viz. *Spermophila collaris*, *Elainea chiriquensis*, and *E. semiflava*.

Lastly, in the same journal (June, 1866), Mr. Lawrence describes what appears to be a very beautiful Pigeon, of the genus *Geotrygon*, apparently allied to the West-Indian forms *G. caniceps*, Gundl., of Cuba, and *G. cristata*, Temm. (Bp. Consp. ii. p. 70), of Jamaica. This bird was obtained by Dr. Merritt, the discoverer of *Microchera albo-coronata*, in the district of Belen, and seems to have remained unnoticed in his collection since the year 1852.

I now come to Arcé's collections, some of the new species of which have been already described in these 'Proceedings' by myself; but as these are incorporated into the subjoined list, I need not refer to them here.

There are twenty-three species of birds included in these collections which have not hitherto been noticed within the limits of the Central American fauna. Nine of these have been described as new from these specimens; and the rest are South American species, now shown to be of wider range. The new genera introduced are:—(*Tyrannidæ*) *Colopterus* and *Serpophagus*; (*Trochilidæ*) *Dorifera* and *Clais*; (*Cuculidæ*) *Neomorphus*; (*Cracidæ*) *Chamæpetes*.

The geographical position of the portion of Veragua we are now considering, situated as it is between Panama and Costa Rica, certainly suggests that its ornithological fauna would consist of species belonging to each fauna, with the addition of some few species peculiar to the district. Such appears to be actually the case. Rather more than one-half the birds are also found in Costa Rica, while rather less than two-thirds are found on the Panama Railway. About one in ten has not been hitherto seen beyond its limits. Rather less than three in seven extend beyond Panama into the southern continent of America, while three in seven extend northward into Guatemala, Mexico, or the northern continent of America.

These proportions show that this district most resembles the Isthmus of Panama as regards its birds, that it has a less strong affinity to Costa Rica, and that out of the wide-ranging species a rather larger proportion belongs to more northern regions than to southern. It would be necessary to compare closely the birds of this district with those of Costa Rica to ascertain accurately where the balance of their relationship lies. The presence of several peculiar forms, such as *Cephalopterus*, *Chasmorhynchus*, *Oreopyra*, *Microchera*, &c., suggests that Veragua belongs zoologically to Costa Rica, and that Panama maintains a strictly derivative fauna, and has at no period of the geological history of the isthmus ever been a centre of segregation. On the other hand, it is to Costa Rica and Veragua united that we must look to find the origin of most of the species now found on the Isthmus of Panama, it being evident that this district has for a long period occupied a position as an island, or one of the islands which lay between the two continents at a time when the two oceans were united by two or more channels. It is for geologists to tell us where these divisions were situated. An obvious one, separating Costa Rica, Veragua, and Panama from the southern continent, is the line from the Atlantic bay of San Blas across to the mouth of the Bayano on the Pacific.

Regarding Costa Rica, Veragua, and Panama as a whole, there are indications, in the Humming-birds at least, of some separation having existed between the extreme ends of the district, *Microchera albo-coronata* of the southern extremity being represented by *M. parvirostris* at the northern, *Chalybura isauræ* by *C. melanorrhœa*, *Thaumantias chionurus* by *T. cupreiceps*. As no instance of representative forms occurs in other groups of birds, it is perhaps more probable that the local distribution of particular plants from which these birds take their food limits the range of each race than that any actual geographical barrier has given cause to this divergence.

I hope shortly to return to this subject in a paper on some collections from Costa Rica; but I may state that my present view is that this district, viz. that included from the rise of the mountains to the northward of the line of the Panama Railway to the southern shore of the lake of Nicaragua and the river San Juan, forms the key to the peculiarities of the Central-American bird-fauna. Previously to the separation indicated between Costa Rica and the southern continent, but when the more northern strait, where the lake of

Nicaragua now stands, was open, the species of the northern portion of South America and Costa Rica were identical, and but few neotropical forms existed northward of the separation.

A further subsidence must then have isolated Costa Rica, where during a lengthened period most of the species have become slightly modified. A rise of land to the extent of the present contour of Central America then took place. The old straits, now land, have been occupied by contending allied races, sometimes the Costa Rican, and sometimes the southern race prevailing, occasionally the southern race penetrating through the country of its representative and driving it before it. Towards the south the Costa Rican species have soon met with their representative races, by which their range has been stayed; while northward, impeded by no such barrier, they have spread as far as climate and the supply of their necessary food would allow them, the most strongly defined limit in this direction being, probably, the northern boundary of the tropical virgin forest.

TURDIDÆ.

- +1. *CATHARUS GRISEICEPS*, Salvin, P. Z. S. 1866, p. 68.

Santa Fé, Veragua.

- +2. *CATHARUS FUSCATER* (Lafr.).

Myioturdus fuscater, Lafr. Rev. Zool. 1845, p. 341.

Catharus fuscater, Selater, Cat. A. B. p. 2; Salvin, P. Z. S. 1866, p. 69.

Cordillera of Tolé.

Arcé has sent a single male specimen of a *Catharus* which agrees closely with Mr. Selater's examples from Ecuador. The bill, however, is somewhat larger and, in this fresh specimen, of a brighter orange-colour. *C. fuscater* is no doubt the southern representative of *C. mexicanus* (Bp.) (Sel. Cat. p. 1), which occupies its place from Costa Rica to Mexico. Both species are inhabitants of the "*tierra caliente*," and appear to be decidedly scarce in the countries in which they are found.

- +3. *TURDUS GRAYI*, Bp.; Lawr. Ann. N. Y. Lyc. viii. p. 174.

Santa Fé, Veragua; David (*Hicks*).

Ranges as far southward as Panama. At Santa Martha *T. luridus*, Bp. Notes Orn. p. 28, replaces it, a species of which I have recently acquired a specimen, collected by the late Mr. Bouchard. This differs from a Panama specimen of *T. grayi* in having the under surface much paler, the crissum being nearly white. The upper surface, too, is more olivaceous and hardly shows a cinnamon tinge, the tail is squarer, and the dimensions, especially the feet, smaller. Total length 9, wing 4.5, tail 3.9 inches.

- +4. *TURDUS LEUCAUCHEN*, Selater, P. Z. S. 1858, p. 447; Baird, Rev. Am. B. p. 24.

Santa Fé and Cordillera de Tolé.

Veraguan specimens exhibit none of the marked characters which

distinguish *T. leucauchen* from *T. assimilis*, Cab., as pointed out by Dr. Baird, *l. c.*, and are even paler above than Costa Rican specimens which are referred to the former species by Baird. I am inclined to confine the term *assimilis* to the Mexican form, as described by Baird, and to refer all these intermediate forms to the Guatemalan *T. leucauchen*. The two more clearly defined species are distributed as follows:—*T. assimilis* is from Mexico only, *T. leucauchen* from the forests of Northern Vera Paz (Choctum, &c.), and from no other district of Guatemala. The intermediate forms, viz. those with olivaceous backs and partially fulvous under wing-coverts, are found in the highlands of Guatemala (Dueñas abundant, Coban a single specimen, and one from Choctum, the district of the true *leucauchen*), Costa Rica (Tucuriqui, 3000 feet), and Veragua. I cannot say that this arrangement is satisfactory; and had the work to be done over again I should prefer to regard all as one variable species, the representative of the South Brazilian *T. crotopezus*, Vieill., the Cayenne and Para *T. phæopygus*, Cab., and the Antillean *T. jamaicensis*, Gm.

I may here notice that the specimens in the collection of the Smithsonian Institution (22,360 and 32,684), marked "Mexico" by M. E. Verreaux, possibly came from Guatemala, and originally formed part of a collection which passed through my hands. I have seen specimens of other species with the locality similarly marked, which certainly were in this collection.

- † 5. *TURDUS OBSOLETUS*, Lawrence, Ann. of New York Lyceum, vii. p. 470; Baird, Rev. Am. B. pt. 1. p. 28.

Santa Fé, Veragua.

A single specimen from Santa Fé I believe to be the adult female of this species. I have little doubt that the male is black, and the species closely allied to *T. atroseviceus*, Lafr. R. Z. 1848, p. 3. In this female the crissum is white, while that of the female of all the allied species is coloured similarly to the abdomen. I append a short diagnosis of this specimen, as Mr. Lawrence's description was evidently taken from an immature bird:—

T. saturate brunneus, subtus pallidior: gula parce striata: ventre imo et crisso albis: tectricibus subalaribus et remigibus ad basin intus cinnamomeis: rostro nigro, pedibus obscure corylinis: long. tota 9, alae 4·9, caudæ 3·8 poll. Angl.

- † 6. *RHODINOCICHLA ROSEA* (Less.).

Furnarius roseus, Less.

Rhodinocichla rosea, Hartl. Journ. f. Orn. 1853, p. 33; Sclater, Cat. A. B. p. 147; P. Z. S. 1856, p. 140; Baird, Rev. Am. B. p. 91. Santa Fé; David (*Bridges*).

The proper systematic position for this curious bird seems to remain in considerable doubt. Diverse coloration of the sexes is not found in any genus of *Troglodytidae*, to which family both Baird and Sclater are inclined to refer it. It may prove that Dr. Hartlaub was not so far wrong after all in referring the female to the *Turdidae*. Though I never observed this bird in Guatemala, it ranges through-

out Central America from Mazatlan to Panama, and thence to Venezuela, &c.

CINCLIDÆ.

- + 7. *CINCLUS ARDESIACUS*, Salvin, *Ibis*, 1867, p. 121, pl. 2.

Cordillera de Tolé.

A full description of this species will be found in the 'Ibis,' as referred to above. In coloration this Dipper more nearly approaches North American specimens of *C. mexicanus* than Mexican, which seem to be always darker. (See Baird's 'Rev. Am. B.' p. 60.)

TROGLODYTIDÆ.

- 8. *MICROCERCULUS LUSCINIA*, Salvin, *P. Z. S.* 1866, p. 69.

Santa Fé and Santiago de Veragua.

Two specimens sent by Arcé agree accurately with one another, the species forming a distinct race from the northern *M. philomela*, Salvin, *P. Z. S.* 1861, p. 202.

- 9. *THRYOTHORUS LEUCOSTICTUS*, Cab.

Thryothorus prosthelencus, Sclater, *Cat. Am. B.* p. 20.

Microcerculus leucostictus, Sclater & Salvin, *P. Z. S.* 1864, p. 345.
Santa Fé, Veragua.

This species seems to enjoy an uninterrupted range from Cayenne, Ecuador, and New Granada to Mexico. I am quite unable to find constant characters to separate specimens from the latter country and Guatemala from those obtained from more southern localities.

- 10. *THRYOTHORUS RUFALBUS*, Lafr.; Sclater, *P. Z. S.* 1856, p. 140; *Lawr. Ann. N. Y. Lyc.* viii. p. 174.

David (*Bridges; Hicks*).

- 11. *THRYOTHORUS RUTILUS*, Vieill.; Baird, *Rev. Am. B.* p. 135.

Santa Fé and Santiago de Veragua.

This species has before been noticed on the Isthmus of Panama (*Lawr. Ann. N. Y. Lyc.* vii. p. 320).

- 12. *THRYOTHORUS THORACICUS*, Salvin, *P. Z. S.* 1864, p. 580.

Santiago de Veragua.

Three specimens from this locality differ in no way from the typical Costa Rican examples. This species, like many others hitherto considered purely Costa Rican, extends as far south as the termination of the higher mountains of that country, and tends to show that the real boundary of the Costa Rican fauna must be sought here.

- 13. *THRYOTHORUS CASTANEUS*, *Lawr. Ann. N. Y. Lyc.* vii. p. 321.

Thryophilus castaneus, Baird, *Rev. Am. B.* p. 133.

Santiago de Veragua.

This species has hitherto been only recorded from the Isthmus of Panama.

—14. *TROGLODYTES TESSELLATUS*, Lafr. et D'Orb.

Troglodytes inquietus, Baird, Rev. Am. B. p. 143; Lawr. N. Y. Lyc. viii. p. 174.

David (*Hicks*).

Mr. Scater and I have recently had an opportunity of comparing the type specimen of *T. tessellatus*, kindly lent us by the authorities of the Muséum d'Histoire Naturelle of Paris, with specimens of the Panama Wren, collected by M^cLeannan. They present inappreciable differences.

MOTACILLIDÆ.

+15. *ANTHUS PARVUS*, Lawr.

Anthus rufus, Lawr. Ann. N. Y. Lyc. vii. p. 322; Baird, Rev. Am. B. p. 156.

Anthus parvus, Lawr. Proc. Ac. Phil. 1865, p. 106.

Santa Fé.

I am quite unable to detect any tangible differences between a specimen, no doubt identical with the species described by Mr. Lawrence, collected by Arcé, one from the Amazon Valley, by Wallace, and a third from Bahia, the former equalling in size either of the others. I prefer leaving the question open; but I believe this Veraguan *Anthus* to be a species ranging widely over the continent of South America, and that it is identical with the bird referred by Scater, Cat. Am. B. p. 24, to *Anthus chii*, Vieill., Spix, Av. Bras. i. p. 75, pl. 76. f. 2, which, being founded on a bird described by Azara, is very probably the same as the *Petite Alouette de Buenos Ayres* of Buffon, Pl. Enl. p. 738, and, therefore, as *Alauda rufa*, Gm.

SYLVICOLIDÆ.

16. *MNIOTILTA VARIA* (L.); Scater, P. Z. S. 1856, p. 140; Lawr. Ann. N. Y. Lyc. viii. p. 174.

Santa Fé; David (*Bridges*; *Hicks*).

17. *HELMINTHERUS VERMIVORUS* (Gm.); Baird, Rev. Am. B. p. 179.

Santa Fé.

Already noticed as far south as Costa Rica (Baird, *l. c.*); but not yet observed beyond the locality here given. Arcé sent only one specimen.

18. *HELMINTHOPHAGA CHRYSOPTERA* (L.); Baird, Rev. Am. B. p. 175.

Santa Fé.

This species ranges southward into New Granada (Scater, P. Z. S. 1855, p. 143).

19. *HELMINTHOPHAGA PEREGRINA* (Wils.); Lawr. Ann. N. Y. Lyc. viii. p. 174.

David (*Hicks*).

20. *DENDRÆCA PENNSYLVANICA* (L.); Baird, Rev. Am. B. p. 191.

Santa Fé.

21. *DENDRÆCA BLACKBURNIÆ* (Gm.); Baird, Rev. Am. B. p. 189.

Santa Fé.

22. *DENDRÆCA ÆSTIVA* (Gm.); Lawr. Ann. N. Y. Lyc. viii, p. 174.

Rhimamphus æstivus, Sclater, P. Z. S. 1856, p. 141.

Santa Fé; David (*Bridges*; *Hicks*).

23. *OPORORNIS FORMOSUS* (Wils.); Baird, Rev. Am. B. p. 218.

Santa Fé.

- 24. *BASILEUTERUS MESOCHRYsus*, Sclater, P. Z. S. 1860, p. 251; Baird, Rev. Am. B. p. 250.

Santa Fé.

A specimen of this *Basileuterus* sent by Arcé agrees well with a Bogota specimen, which must be ascribed to *B. mesochrysus*, Schl., its wings considerably exceeding in length those of a Guatemalan specimen of *B. delatirii*, Bp., the bill being much larger, and the yellow of the under plumage brighter. I have little doubt Baird is right in referring the Costa Rican specimens to this race, which seems to maintain these constant differences. Northwards of Costa Rica its place is occupied by *B. delatirii*, Bp., which extends its range over the whole of Guatemala (South Mexico doubtfully). In South Mexico *B. delatirii* again gives way to *B. rufifrons*, Sw., a race which is also found very rarely in Guatemala (Salvin, Ibis, 1866, p. 192).

- 25. *BASILEUTERUS UROPYGIALIS*, Sclater, P. Z. S. 1861, p. 128, & 1865, p. 286, pl. x. f. 2; Sclater & Salvin, P. Z. S. 1864, p. 347; Baird, Rev. Am. B. p. 246.

Santa Fé.

Besides a specimen from the above locality, Arcé has, in a previous collection, sent a specimen of this species from Costa Rica; so that this representative of the section of *Basileuterus*, of which *B. semicervinus* is the type, belongs clearly to the Central American fauna.

26. *SETOPHAGA RUTICILLA* (L.); Lawr. Ann. N. Y. Lyc. viii, p. 174.

Santa Fé; David (*Hicks*).

- 27. *SETOPHAGA TORQUATA*, Baird, Rev. Am. B. p. 261.

Cordillera de Tolé.

I also possess a specimen from Costa Rica, the country whence Baird's types were obtained, collected by Arcé, agreeing with this Veraguan example.

VIREONIDÆ.

- 28. *VIREOSYLVA FLAVO-VIRIDIS*, Cassin; Baird, Rev. Am. B. p. 336.

Santa Fé; Cordillera de Tolé.

- 29. *HYLOPHILUS VIRIDIFLAVUS*, Lawr. Ann. N. Y. Lyc. vii. p. 324; Sci. & Salv. P. Z. S. 1864, p. 348; Baird, Rev. Am. B. p. 380.

Santa Fé.

- 30. *HYLOPHILUS DECURTATUS* (Bp.); Baird, Rev. Am. B. p. 381.

Hylophilus cinereiceps, Sci. & Salv. P. Z. S. 1860, p. 299.

- H. pusillus*, Lawr. Ann. N. Y. Lyc. vii. p. 323; Baird, Rev. Am. B. p. 381.

Santa Fé.

Prof. Baird recognizes the Guatemalan bird we described *l. c.*, as the *Sylvicola decurtata*, Bp. These Veraguan specimens confirm the view taken (P. Z. S. 1864, p. 348) that *H. pusillus*, Lawr., is identical with the northern bird; and in this Baird is strongly inclined to agree.

CEREBIDÆ.

31. *CEREBIA CARNEIPES*, Scater; Lawr. Ann. N. Y. Lyc. viii. p. 174.

Santa Fé, Santiago de Veragua, and Cordillera de Tolé; David (*Hicks*).

32. *CEREBIA LUCIDA*, Sci. & Salv.

Cerebia cyanea, Sci. P. Z. S. 1856, p. 140.

David (*Bridges*).

33. *CHLOROPHANES GUATEMALENSIS*, Scater.

Chlorophanes spiza (L.); Lawr. Ann. N. Y. Lyc. viii. p. 174.

Cordillera de Tolé; David (*Hicks*).

34. *CERTHIOLA LUTEOLA*, Cab.; Lawr. Ann. N. Y. Lyc. viii. p. 174.

David (*Hicks*).

TANAGRIDÆ.

35. *EUPHONIA ANNÆ*, Cassin, Proc. Acad. Phil. 1865, p. 172.

Euphonia rufivertex, Salvin, P. Z. S. 1866, p. 71, pl. vii.

Santa Fé.

Though Prof. Baird kindly forwarded me a proof sheet containing Mr. Cassin's description of this species, it did not arrive in time to stop the publication of the name I had assigned it, which must now stand as a synonym, Mr. Cassin's description having several months priority. There can be no doubt as to the identity of the species we each described. It is a well-marked species, the only other

member of the genus having a white crissum being *E. minuta**, Cab., which differs from *E. annæ* primo visu.

36. *EUPHONIA CRASSIROSTRIS*, Selater?; Lawr. Ann. N. Y. Lyc. viii. p. 174.

David (*Hicks*).

37. *EUPHONIA* —?

Cordillera de Tolé.

An immature female, which I am unable at present to determine.

38. *CALLISTE ICTEROCEPHALA*, Bp.

Callispiza frantzii, Cab. Journ. f. Orn. 1861, p. 87; Selater, Ibis, 1863, p. 451.

C. icterocephala, Bp.; Selater, Cat. Am. B. p. 65; Mon. Calliste, t. xvii.

Santa Fé and Cordillera de Tolé.

Dr. Cabanis, in describing *C. frantzii*, evidently had only female birds before him. Arcé has sent several specimens of both sexes. Of these the males differ in no way from specimens in Dr. Selater's collection, from Ecuador, which must undoubtedly be referred to *C. icterocephala*, Bp.

39. *CALLISTE GYROLOIDES*, Lafr.; Selater, P. Z. S. 1856, p. 142.

Santa Fé; David (*Bridges*).

40. *CALLISTE FRANCISCÆ*, Lafr.; Selater, P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.

Santa Fé and Cordillera de Tolé; David (*Bridges*; *Hicks*).

41. *TANAGRA DIACONUS*, Less.; Selater, P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.

Santa Fé; David (*Bridges*; *Hicks*).

42. *TANAGRA MELANOPTERA*, Hartl.

Santiago de Veragua.

This Tanager ranges northwards into Costa Rica, whence Arcé has sent specimens from Tucuriqui on the Atlantic slope. In Guatemala *T. abbas*, Licht., entirely supplants it.

43. *RAMPHOCÆLUS DIMIDIATUS*, Lafr.; Selater, P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.

Santa Fé; David (*Bridges*; *Hicks*).

44. *RAMPHOCÆLUS PASSERINII*, Bp.; Sel. P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.

David (*Bridges*; *Hicks*).

* I am not at all assured of the real difference between this species and *E. humilis*, Cab.; but having only one specimen of the latter I am hardly in a position to speak positively.

45. *RAMPHOCÆLUS ICTERONOTUS*, Lafr.

Santiago de Veragua.

+ 46. *PYRANGA HEPATICA*, Sw.

Santa Fé.

A Mexican species, rarely found in Guatemala, and here occurring at probably the southernmost point of its range.

47. *PYRANGA ÆSTIVA* (Gm.); Sclater, P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.Santa Fé; David (*Bridges; Hicks*).48. *PHENICOTHTRAUPIS RUBICA* (Vieill.)?

Santa Fé.

Arcé has sent several specimens of a *Phenicothraupis* which I can hardly distinguish from *P. rubica* of Brazil. They have the same general diffusion of red colouring over the under surface, the upper plumage also agreeing, the uropygium and margins of the rectrices being hardly appreciably less bright. I am at a loss to account for the presence of this bird here, as on both sides at Panama and in Costa Rica *P. fuscicauda*, Cab., is found, a race which is readily distinguishable by its dark coloration contrasting with the bright red of the throat. In Guatemala the genus is represented by *P. rubicoides*, which has also a bright-red throat, but less defined than in *P. fuscicauda*, the general plumage also being redder.

49. *LANIO LEUCOTHORAX*, Salvin, P. Z. S. 1864, p. 581; Cassin, Pr. Ac. Nat. Sc. Phil. 1865, p. 171.

Santa Fé, Santiago de Veragua, and Cordillera de Tolé.

The specimens from which my original description was taken were in bad condition. Better examples being included in these collections show that, besides the distinctions pointed out, *L. leucothorax* has the uropygium black, while in *L. aurantius* it is clear yellow. The Costa Rican and Veraguan bird is a well-marked and easily recognizable species.

50. *EUCOMETES SPODOCEPHALA*, Bp.

Santa Fé.

The limits bounding the ranges of this and its closely allied species *E. cristata*, DuBus, seem to be distinctly defined. On the Isthmus of Panama *E. cristata* occurs; while a short distance to the northward the present species takes its place and ranges as far as Guatemala, where, however, it is extremely rare, only one specimen having come under my notice. The type from which Bonaparte's original description was taken came from Nicaragua, from which locality and also from Costa Rica our collection contains examples.

51. *EUCOMETES CASSINII* (Lawr.).*Tachyphonus cassinii*, Lawr. Ann. N. Y. Lyc. vii. p. 297.*Eucometes cassinii*, ScL. & Salv. P. Z. S. 1864, p. 351, pl. xxx.

Santiago de Veragua.

52. *TACHYPHONUS DELATRII*, Lafr.

Santa Fé and Santiago de Veragua.

53. *ARREMON AURANTIROSTRIS*, Lafr.

Santa Fé.

—54. *BUARREMON CRASSIROSTRIS*. (Plate XIV.)

Buarremon crassirostris, Cassin, Proc. Acad. Sc. Phil. 1865, p. 170.

Buarremon mesoxanthus, Salvin, P. Z. S. 1866, p. 72.

Santiago de Veragua and Cordillera de Tolé.

As in the case of *Euphonia annæ*, Mr. Cassin's description of this bird has several months priority over mine. In comparing the species with *B. castaneiceps*, ScL. P. Z. S. 1859, p. 441, I have, I believe, indicated its true affinity. These two species constitute a very marked section of the genus *Buarremon*, which comprises several distinct groups.

55. *BUARREMON BRUNNEINUCHUS* (Lafr.).

Santiago de Veragua ; Cordillera de Tolé.

Though strictly an inhabitant of mountainous regions, this species is remarkably constant in its characters, specimens from Mexico, Guatemala, Costa Rica, and Ecuador not differing in any appreciable degree.

56. *SALTATOR MAGNOIDES*, Lafr. ; ScL. P. Z. S. 1856, p. 142.

Saltator intermedius, Lawr. Ann. N. Y. Lyc. viii. p. 175.

Santa Fé ; David (*Bridges ; Hicks*).

Two male specimens from Santa Fé have a slightly fulvous tinge on the under plumage, and more than is usually noticeable in Guatemalan specimens of this bird. This is, I have little doubt, the bird Mr. Lawrence has separated under the name of *S. intermedius*. In our article on the "Birds of Panama," Mr. Slater and I united this bird with *S. magnoides* ; but Mr. Lawrence, in his list of Mr. Hicks's Chiriqui collection (Ann. N. Y. Lyc. viii. p. 175), maintains the opinion he formed as to their distinctness. The question at issue concerns the constancy of the characters Mr. Lawrence points out. They are as follows :—(1) In *intermedius* the feathers of the occiput are mingled with olive-green, (2) the white of the throat extends to the chin, (3) the fulvous of the throat is less bright but twice as extensive, (4) the black band of the chest one-third as wide as in the *magnoides*, (5) under plumage tinged with fulvous instead of clear cinereous, and (6) the crissum darker. I have before me eleven specimens from Guatemala, two from Costa Rica, three from Veragua, and three (two males and a female) from Panama, in all nineteen specimens. (1) All specimens have olive-green feathers on the occiput ; but in Guatemalan specimens the remaining feathers are in general (not in all specimens) blacker. (2) In several of our Guatemalan specimens the white of the throat extends to the bill, in others it does not, nor does it in one of the Panama specimens. (3) As regards the brightness of the fulvous of the throat there is a consider-

able variation, hardly two specimens being alike; the same may be said of the extent of the same colour. (4) The black band varies very much in width, both it and the extent of the fulvous depending very much upon the way in which the skin is made up, and hence a character of doubtful value; two of the Veraguan specimens have scarcely any band, while the third has a broad one. (5) Guatemalan specimens are in general of a clearer cinereous colour below; Costa Rican specimens hardly so much; Veraguan specimens are two of them tinged with fulvous, and one almost as cinereous as Guatemala skins; both the male Panama specimens are quite like the Guatemalan. (6) The crissum of the Veraguan specimens is slightly darker than Guatemalan, not so the Panama.

The fact of the matter is, that wherever *Saltator magnoides* is found it varies in some degree as regards a few minor points. If *S. intermedius* were admitted to rank as a species, we should have a number of specimens which might with equal propriety be assigned to either. None of our northern specimens have the sexes marked so that I can depend upon them; hence the question as to the distinction between the sexes cannot be discussed.

57. *SALTATOR ISTHMICUS*, Sclater; *Scl. & Salv. P. Z. S.* 1864, p. 351.

Saltator striatipectus, Lawr. *Ann. N. Y. Lyc.* viii. p. 175.
Santa Fé; David (*Hicks*).

58. *PITYLUS GROSSUS* (L.).
Santa Fé.

59. *PITYLUS POLIOGASTER*, DuBus.
Santa Fé and Santiago de Veragua.

60. *GUIRACA CONCRETA*, DuBus.
Santa Fé.

At Panama the southern form of this Finch (*G. cyanoides*, Lafr.) occurs, showing that the Central American race has its range sharply defined, the present locality being its southernmost limit.

61. *ORYZOBORUS FUNEREUS*, Sclater.
Santa Fé.

A single specimen from this locality agrees accurately with our Guatemalan examples of *O. funereus* and with Sclater's type. According to Mr. Lawrence the species of this form occurring on the Panama Railway is *O. athiops*, Scl.

62. *SPERMOPHILA SEMICOLLARIS*, Lawr.
Santa Fé.

63. *SPERMOPHILA COLLARIS*, Lawr. *Ann. N. Y. Lyc.* viii. p. 176.
David (*Hicks*).

† 64. PHONIPARA PUSILLA (L.).

Santa Fé.

65. VOLATINIA JACARINA (L.); Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Hicks*).

66. CYANOSPIZA CIRIS (L.); Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Hicks*).

67. EMBERNAGRA STRIATICEPS, Lafr.

Embernagra conirostris, ScL. P. Z. S. 1856, p. 143.Santa Fé; Cordillera de Tolé; David (*Bridges*).This species is also found in Costa Rica; but further to the northward is replaced by *E. chloronota*, Salv.

68. EUSPIZA AMERICANA (Gm.); ScL. P. Z. S. 1856, p. 142.

David (*Bridges*).

69. OCYALUS WAGLERI, G. R. Gray.

Santa Fé.

70. CACICUS MICRORHYNCHUS, ScL. & Salv. P. Z. S. 1864, p. 353; Lawr. Ann. N. Y. Lyc. viii. p. 180.

Santa Fé; Santiago de Veragua; Cordillera de Tolé.

The most northern locality for this bird yet noticed is Greytown, Nicaragua, whence Mr. Holland has sent specimens to the Smithsonian Institution.

71. CASSICULUS PREVOSTI (Less.).

Santa Fé.

72. ICTERUS BALTIMORENSIS (L.); ScL. P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Bridges*; *Hicks*).

73. ICTERUS SPURIUS (L.); Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Hicks*).

† 74. ICTERUS GIRAUDI, Cassin.

Santa Fé.

75. STURNELLA LUDOVICIANA (L.); ScL. P. Z. S. 1856, p. 142.

Sturnella mexicana, Lawr. Ann. N. Y. Lyc. viii. p. 176.David (*Bridges*; *Hicks*).

I doubt if there be more than one species of this form.

† 76. SCLERURUS MEXICANUS, ScL. P. Z. S. 1856, p. 290.

Santiago de Veragua and Cordillera de Tolé.

This species has not been noticed before as occurring so far south, though specimens of the second Central American bird of this genus (*S. guatemalensis*) have been sent from Panama. The two examples contained in these collections are neither of them in good condition; they appear to differ slightly from our Guatemalan specimens, the uropygium being somewhat darker and the bill shorter.

+ 77. *SYNALLAXIS ALBESCENS*, Temm. Pl. Col. 227. f. 2; ScL. Cat. Am. B. p. 151.

Santa Fé.

A single example of a *Synallaxis* agrees closely with Sclater's specimen from Trinidad, which he ascribes to *S. albescens*, Temm. Four species of *Synallaxis* have been recorded as occurring in Central America, viz. *S. erythrothorax*, ScL., of South Mexico and Guatemala; *S. pudica*, ScL., Panama; *S. albescens*, Temm., Veragua; and *S. nigrifumosa*, Lawr. Ann. N. Y. Lyc. viii. p. 180, Greytown, Nicaragua. I have not seen specimens of this last mentioned. It seems to be very closely allied to *S. pudica*, perhaps the male of that species; a specimen with the sex so marked from Panama differs from the female in the greater intensity of the smoky-black tinge of the under plumage and in the brighter shade of chestnut, distinctions upon which Mr. Lawrence rests the claim of the species he describes to specific rank.

+ 78. *XENOPS MEXICANUS*, ScL.

Santa Fé.

Also noticed on the Panama Railway.

+ 79. *AUTOMOLUS CERVINIGULARIS*, ScL.

Santa Fé.

Mr. McLeannan, according to Mr. Lawrence, also procured this species on the Isthmus of Panama, where, however, another of this form (*A. pallidigularis*, Lawr.) occurs.

+ 80. *PHILYDOR FUSCIPENNIS*, Salvin, P. Z. S. 1866, p. 72.

Santiago de Veragua.

This is the second species of this genus now known to occur in Central America, the other being *P. rufobrunneus*, Lawr. (Ann. L. N. Y. viii. p. 127), from Costa Rica.

+ 81. *MARGARORNIS BRUNNESCENS*, ScL.

Cordillera de Tolé.

A single specimen sent by Arcé only differs from Sclater's type of *M. brunnescens* in having the rump slightly darker rufous, the difference not being sufficient to warrant specific separation. It is probably this bird that Mr. Lawrence refers to (Ann. N. Y. Lyc. viii. p. 130), where he suggests the possibility of a Costa Rica specimen being different from *brunnescens*, and proposes the name *brunnei-cauda* should his surmise prove correct.

+ 82. *DENDROCOLAPTES SANCTI-THOMÆ*, Lafr.

Santiago de Veragua.

+ 83. *DENDRORNIS ERYTHROPYGIA*, Scl.

Santiago de Veragua.

+ 84. *DENDRORNIS LACRYMOSA*, Lawr.

Santiago de Veragua.

I have lately seen a specimen of this fine species in a collection formed by Mr. H. Wickham, near Blewfields, Mosquito coast.

+ 85. *CYMBILANIUS LINEATUS* (Vieill.).

Santa Fé and Santiago de Veragua.

+ 86. *THAMNOPHILUS TRANSANDEANUS*, Scl. (?)*Thamnophilus melanurus*?, Scl. P. Z. S. 1856, p. 142.David (*Bridges*).

Probably the same as the Panama bird, which I consider to belong to this race*.

+ 87. *THAMNOPHILUS NÆVIUS* (Gm.).

Santiago de Veragua.

Both these species have been noticed on the Panama Railway, but not further to the northward.

+ 88. *THAMNOPHILUS DOLIATUS*, L.?; Scl. P. Z. S. 1856, p. 141.David (*Bridges*).+ 89. *THAMNOPHILUS BRIDGESI*, Scl. P. Z. S. 1856, p. 141.David (*Bridges*).+ 90. *DYSITHAMNUS PUNCTICEPS*, Salv. P. Z. S. 1866, p. 72.

Santiago de Veragua.

+ 91. *DYSITHAMNUS SEMICINEREUS*, Scl.

Santa Fé.

Though not yet detected on the Isthmus of Panama, this species doubtless enjoys an uninterrupted range from New Granada to South Mexico; specimens in our collection from several points agree accurately with one another.

+ 92. *MYRMOTHERULA MENETRIESI*, D'Orb.; Scl. Cat. Am. B. p. 180.

Santiago de Veragua.

A single male specimen from the above locality agrees best with Selater's specimen from Ecuador, which he refers to the above species.

* Cf. Scl. & Salv. P. Z. S. 1864, p. 355.

93. MYRMOTHERULA, sp.?

Santa Fé.

Arcé has sent a single specimen of a female of a species of *Myrmotherula*, which I have never been able satisfactorily to determine. It agrees with specimens I obtained in Vera Paz.

+ 94. RAMPHOCÆNUS RUFIVENTRIS, Bp.

Santa Fé.

+ 95. RAMPHOCÆNUS SEMITORQUATUS, Lawr.

Santiago de Veragua.

This species is very closely allied to *R. cinereiventris*, Scater, if really distinct. The most obvious and, indeed, the only point of difference seems to consist in the much less extent of the postocular spot.

+ 96. MYRMECIZA LEMOSTICTA, Salvin, P. Z. S. 1864, p. 582.

Santa Fé.

A single specimen from this locality agrees accurately with our type from Tucuriqui, Costa Rica.

+ 97. CERCOMACRA TYRANNINA, ScL.

Santa Fé.

+ 98. PITHYS BICOLOR, Lawr.

Santa Fé.

+ 99. PHLOGOPSIS MACLEANNANI, Lawr. ; ScL. & Salv. Ex. Orn. t. 9.

Santiago de Veragua.

+ 100. FORMICARIUS RUFPECTUS, Salvin, P. Z. S. 1866, p. 73, pl. viii.

Santiago de Veragua.

In the plate above referred to, the artist has represented this bird on a stone surrounded with water. This is manifestly erroneous, as all members of this genus, and, indeed, of the whole family, frequent the thin undergrowth of the virgin forest. *Formicarius* flies little, but follows the ant-paths, walking and running on the ground amongst the decayed leaves, occasionally mounting a prostrate tree. *F. moniliger*, ScL., has a sharp clear cry.

+ 101. FORMICARIUS ANALIS, D'Orb. & Lafr. ; Salv. P. Z. S. 1866, p. 74.

Santiago de Veragua.

A single immature bird from this locality would, no doubt, in the adult state agree with our Costa Rica specimen mentioned in the above reference. This, as I there observed, differs somewhat from southern specimens ; but my materials are still insufficient to determine whether the differences are constant or not. *F. hoffmanni*, Cab., doubtless also occurs in this portion of Veragua, as it is found both at Panama and in Costa Rica. We thus have three very distinct

species inhabiting this country. *F. analis* is also given by Mr. Lawrence, in his list of Mr. M'Leannan's collections, as being found at Panama.

†102. *GRALLARIA GUATEMALENSIS*, Prev.

Santa Fé.

A single specimen in not quite adult plumage agrees closely with Guatemalan examples; it is, however, rather darker in general colour, the grey of the head, the olivaceous back, the rufous brown of the wings, and the tawny of the under surface being all of a deeper hue. In our specimens of this species some variation is noticeable in intensity of coloration, especially of the under plumage; so that this Veraguan specimen may only show the extreme limit of this difference.

†103. *GRALLARIA PERSPICILLATA*, Lawr.

Santa Fé and Santiago de Veragua.

†104. *PITTASOMA MICHLERI*, Cassin.

Santa Fé.

The presence of these two birds in these collections deprive the Isthmus of Panama of two more of its hitherto-considered-peculiar species, showing their more northern range.

†105. *GRALLARICULA COSTARICENSIS*, Lawr. Ann. N. Y. Lyc. viii.
Cordillera de Tolé.

A single specimen obtained by Arcé agrees well with Mr. Lawrence's description.

†106. *ATTILA SCLATERI*, Lawr.; Scl. & Salv. P. Z. S. 1864, p. 358.
Santa Fé.

This race is also found in Costa Rica, Arcé having sent a specimen from Tucurriqui. It is more constant in coloration than the more northern form, *A. citreopygius*, Bp. (Scl. Cat. p. 195), which frequently exhibits considerable variation of plumage, both in the striation of the head and in the ochraceous tinge of the under surface. *A. sclateri* is distinguishable from *A. citreopygius* by its greener head, hindneck, throat, and chest, and by the paler lemon-coloured uropygium.

†107. *COPURUS LEUCONOTUS*, Lafr.; Scl. & Salv. P. Z. S. 1864, p. 358.

Santa Fé.

This species also ranges northward into Costa Rica, and to Blewfields in the Mosquito territory.

†108. *PLATYRHYNCHUS SUPERCILIARIS*, Lawr. Ibis, 1863, p. 184.

Santa Fé.

Several specimens of both sexes.

- 109. *TODIROSTRUM CINEREUM* (L.); *Scl. P. Z. S.* 1856, p. 141.
Santa Fé; David (*Bridges*).

- + 110. *COLOPTERUS PILARIS*, Cab.; *Scl. Cat. Am. B.* p. 210.
Santa Fé.

The curious formation of the first four primaries, which constitutes the character of this genus, is carried to greater excess in this than in the other species referable to the same genus.

- 111. *SERPOPHAGA CINEREA* (Strickl.); *Scl. Cat. Am. B.* p. 211.
Santa Fé.

No member of this genus has hitherto been noticed north of the Isthmus of Panama. The single specimen sent differs in no way from examples from New Granada and Ecuador, over which countries *S. cinerea* ranges.

- + 112. *MIONECTES OLEAGINEUS*, Licht.; *Scl. Cat. Am. B.* p. 213;
Scl. & Salv. P. Z. S. 1864, p. 358.
Santa Fé.

- + 113. *TYRANNISCUS PARVUS*, Lawr.; *Scl. & Salv. P. Z. S.* 1864,
p. 359.

Santa Fé.

Arcé has also sent specimens of this species from Turialba in Costa Rica.

- + 114. *TYRANNULUS ELATUS* (Spix); *Sclater, Cat. Am. B.* p. 215;
P. Z. S. 1856, p. 141.
David (*Bridges*).

- + 115. *ELAINEA SUBPAGANA*, *Scl. & Salv.*; *Lawr. Ann. N. Y. Lyc.*
viii. p. 177.

Santa Fé; David (*Hicks*).

The type specimens of this species were shot at Dueñas, in the highlands of Guatemala. The bird is, however, much more abundant further to the southward, hardly any collection coming from those districts without containing examples.

- + 116. *ELAINEA CHIRIQUENSIS*, *Lawr. Ann. N. Y. Lyc.* viii. p. 176.
Santa Fé; David (*Hicks*).

A single specimen from this locality corresponds fairly with Mr. Lawrence's description. Its general appearance is that of *E. subpagana*; it is, however, smaller and more obscurely coloured, as the original description shows; the feet, too, are weaker, and the concealed white patch of the crown not so large.

- + 117. *ELAINEA SEMIFLAVA*, *Lawr. Ann. N. Y. Lyc.* viii. p. 177.
David (*Hicks*).

+118. *LEGATUS ALBICOLLIS* (Vieill.); Lawr. Ann. N. Y. Lyc. viii. p. 177.

David (*Hicks*).

+119. *MYIOZETETES COLUMBIANUS*, Cab. & Hein.; Lawr. Ann. N. Y. Lyc. viii. p. 177.

David (*Hicks*).

+120. *MYIODYNASTES NOBILIS*, ScL.; Lawr. Ann. N. Y. Lyc. viii. p. 177.

Santa Fé; David (*Hicks*).

+121. *RHYNCHOCYCLUS BREVIROSTRIS*, Cab.

Santa Fé.

Agrees with Guatemalan examples.

+122. *RHYNCHOCYCLUS FLAVO-OLIVACEUS*, Lawr.; ScL. & Salv. P. Z. S. 1864, p. 359.

Santa Fé.

Agrees with Panama specimens.

+123. *MUSCIVORA MEXICANA*, ScL. Cat. Am. B. p. 225; ScL. & Salv. P. Z. S. 1864, p. 360.

Santa Fé.

This species ranges over the whole of Central America, from Southern Mexico to the Isthmus of Panama.

+124. *MYIOBIUS SULPHUREIPYGIUS*, ScL. Cat. Am. B. p. 226.

Santa Fé.

+125. *MYIOBIUS ERYTHRURUS*, Cab.; ScL. Cat. Am. B. p. 226; Lawr. Ann. N. Y. Lyc. vii. p. 472.

Santa Fé.

Before noticed from the Isthmus of Panama.

+126. *MYIOBIUS NÆVIUS* (Bodd.); ScL. Cat. Am. B. p. 227.

Santa Fé.

A well-known South American species of wide range. It has not hitherto been noticed in so northern a locality.

+127. *MYIARCHUS NIGRICAPILLUS*, Cab. J. f. O. 1861, p. 249.

Santa Fé.

Two specimens rather smaller than a Costa Rican example, but otherwise agreeing. *M. nigriceps*, ScL., of Panama has a narrower rufous border to the rectrices and primaries, and has the dark crown less extensive, which in *M. nigricapillus* includes the nape.

+128. *TYRANNUS MELANCHOLICUS*, Vieill.; ScL. P. Z. S. 1856, p. 141.

David (*Bridges*).

+129. *MILVULUS TYRANNUS* (L.); Sclater, P. Z. S. 1856, p. 141; Lawr. Ann. N. Y. Lyc. viii. p. 177.

Santa Fé: Santiago de Veragua; David (*Bridges; Hicks*).

+130. *TITYRA PERSONATA*, Jard. & Selb.

Psaris mexicana, Less.

Tityra mexicana, Scl. P. Z. S. 1856, p. 141.

David (*Bridges*).

+131. *PACHYRRHAMPHUS CINEREIVENTRIS*, Scl. Cat. Am. B. p. 242, note; Scl. & Salv. P. Z. S. 1864, p. 361.

Santa Fé.

Agrees with Panama specimens.

+132. *LIPAUGUS UNIRUFUS*, Scl.; Scl. & Salv. Ex. Orn. pl. 1, p. 1.

Santiago de Veragua.

+133. *LIPAUGUS HOLERYTHRUS*, Sclater.

Santa Fé.

+134. *LIPAUGUS RUFESCENS*, Scl.; Scl. & Salv. Ex. Orn. pl. 2, p. 5.

Santa Fé.

+135. *PIPRA LEUCOCILLA*, L.

Pipra coracina, Scl. P. Z. S. 1856, p. 29, & Cat. Am. B. p. 249? Cordillera de Tolé.

Specimens of this bird agree with Cayenne skins. The grounds for separating the New Granadan from the Cayenne form appear to be very slight. I think they should be reunited.

+136. *PIPRA CYANEOCAPILLA*, Hahn; Scl. Cat. Am. B. p. 249; Scl. & Salv. P. Z. S. 1864, p. 362.

Santiago de Veragua.

+137. *PIPRA LEUCORRHOA*, Scl. P. Z. S. 1863, p. 63, pl. x.

Santa Fé.

Arcé has also sent specimens of this species from Tucurriqui, in Costa Rica; these all agree with Sclater's types, which came from New Granada (Bogota make).

The species belongs to Cabanis's section *Coropipo*, which includes this bird and its near ally *P. gutturalis* of Cayenne. The collection from Santa Fé also contains females and young males, the former I here describe:—

PIPRA LEUCORRHOA, ♀. *Supra olivaceo-virescens unicolor; sub-tus gula cinerascens, abdomine dorso concolore, medialiter paulo pallidiores.*

- +138. *CHIROXIPHIA LANCEOLATA*, Wagl. ; Scl. & Salv. P. Z. S. 1864, p. 362.

Chiroxiphia melanocephala, Scl. P. Z. S. 1856, p. 141.

Santa Fé ; David (*Bridges*).

The purely Central American species (*C. linearis*, Bp.) terminates its southern range between the Gulf of Nicoya and Chiriqui.

- +139. *CHASMORHYNCHUS TRICARUNCULATUS*, J. & E. Verreaux, R. Z. 1853, p. 193 ; Salvin, Ibis, 1865, p. 90, pl. 3.

Santiago de Veragua ; Cordillera de Tolé.

Adult male specimens having been sent by Arcé, the question broached by Cabanis as to the possibility of the Costa Rican and Veraguan birds being distinct is quite set at rest. These specimens in no way differ from those previously sent by Arcé from Tucuriqui.

- +140. *CEPHALOPTERUS GLABRICOLLIS*, Gould, P. Z. S. 1850, p. 92, pl. xx. ; Cab. J. f. O. 1861, p. 254 ; Selater, P. Z. S. 1859, p. 142.

Cordillera de Tolé ; Cordillera of Chiriqui (*Warszewicz*).

This strange bird appears to be abundant in this locality, and also near Turrialba in Costa Rica. Its probable range hardly extends beyond these points, though it may occur along the northern frontier of Costa Rica, the river San Juan, and the southern shore of the lake of Nicaragua. Judging from the apparently sharp definition of its southern range, I should suppose it a bird that frequents the mountainous region and keeps to forests lying at an elevation of from 2000 to 3000 feet above the sea-level. Arcé has sent home specimens of both sexes. The female has the crest smaller, as is the case in *C. ornatus*, the naked throat-lappet much smaller, and a narrow band of small feathers running down the centre of the bare throat. The head of the young bird very much resembles that of the adult of *Pyroderus*, to which genus *Cephalopterus* is closely allied.

- +141. *MOMOTUS LESSONI*, Less. ; Selater, P. Z. S. 1856, p. 139 ; Lawr. Ann. N. Y. Lyc. viii. p. 177.

Momotus psalurus, Bp. ; Cab. J. f. O. 1861, p. 255.

Cordillera de Tolé ; David (*Bridges* ; *Hicks*).

An immature specimen, having a black margin to the back of the blue circlet of the head and without the chestnut nape, must indubitably be referred to the Central American *Momotus lessoni*. The specimens examined by us, and mentioned in Mr. Selater's and my paper "on the Birds of Panama" (P. Z. S. 1864, p. 362) as *M. lessoni*, properly belong to *M. subrufescens*, Scl., as additional specimens have shown. This last-named race has no black border to the back of the circlet of the head, the nape being slightly chestnut as in *M. brasiliensis*. The colouring, too, of the under plumage is of a clearer rufous than is usually the case in *M. lessoni*, in which race, however, considerable variation is shown in this respect. It is probable that the southern range of the true *M. lessoni* terminates in

the district I am now investigating, and that its place is taken at once as we proceed towards the southern continent by *M. subrufescens*.

† 142. *MOMOTUS MARTII*, Spix.

Santa Fé and Santiago de Veragua.

† 143. *PRIONIRHYNCHUS PLATYRHYNCHUS*, Leadb. ; *Scl. & Salv. P. Z. S.* 1864, p. 362.

Santa Fé.

This species appears to be quite common on the Isthmus of Panama, and thence spreads northward through Veragua.

† 144. *PHAROMACRUS MOCINNO*, La Llave.

Forest of Boqueti (*Bridges*).

Specimens of the Quezal have also been obtained in Costa Rica (see Cabanis, *J. f. Orn.* 1862, p. 175).

† 145. *TROGON AURANTIIVENTRIS*, Gould, *P. Z. S.* 1856, p. 107.

Santa Fé; Cordillera de Tolé; David (*Bridges*).

† 146. *TROGON CALIGATUS*, Gould; *Sclater & Salv. P. Z. S.* 1864, p. 364.

Santa Fé.

† 147. *TROGON ATRICOLLIS*, Vieill. ; *Scl. & Salv. P. Z. S.* 1864, p. 364.

Trogon tenellus, Cab. *J. f. O.* 1862, p. 173.

Santa Fé, Santiago de Veragua, and Cordillera de Tolé.

Brazilian specimens of this species usually have the central rectrices rather more bronzy green. This is the only difference I can detect which at all justifies Cabanis's separation of the Central American race. The difference is very slight, and not constant.

† 148. *TROGON CLATHRATUS*, Salvin, *P. Z. S.* 1866, p. 74.

Santa Fé; Santiago de Veragua; Cordillera de Tolé.

Since I described this fine species Arcé has sent a specimen of the female, of which I now give the following description:—

♀. *Saturate cinereus, alis et cauda nigricantioribus: rectricibus tribus externis albo anguste transfasciatis: abdomine rufescente tincto, ventre imo et crisso coccineis: rostro superiore fusco-nigro, basi et mandibula inferiore flavis.*

† 149. *TROGON MASSENA*, Gould.

Santiago de Veragua; Cordillera de Tolé.

† 150. *GALBULA MELANOGENIA*, *Scl. P. Z. S.* 1856, p. 139.

David (*Bridges*).

+151. *CERYLE AMAZONA*, Lath.

Santiago de Veragua.

+ 152. *CERYLE CABANISI*, Tsch.*Ceryle americana*, Sel. P. Z. S. 1856, p. 139.David (*Bridges*).+153. *EUTOXERES AQUILA*, Bourc. ; Gould, Mon. Troch. i. pl. 3 ;
Lawr. Ann. N. Y. Lyc. vi. p. 139.District of Belen, Veragua (*Merritt*).

In one of Arcé's previous collections from Costa Rica (Tucurriqui) three specimens of this strange form were sent, showing that its Central American range probably extends over the whole of the eastern side of Costa Rica and Veragua. Apparently absent from the Isthmus of Panama, it again, like several other Humming-birds, reappears in New Granada and Ecuador.

+154. *PHAËTHORNIS EMILIÆ*, Bourc. ; Gould, Intr. Troch. p. 44.
Santa Fé.

Arcé has sent quite a number of specimens, both from Costa Rica and Veragua, of a *Phaëthornis* which Mr. Gould and I have compared closely with New Granadan specimens of *P. emiliæ* without detecting any differences. It is somewhat singular that none of these collections contain specimens of *P. longirostris*, a bird which is very common both to the north and south of Costa Rica and Veragua. Should this species be absent altogether from these countries, we have a curious instance of geographical distribution, each of the two species, *P. emiliæ* and *P. longirostris*, having an outlying district detached from what may be considered the metropolis of its range. Mr. Lawrence having recently forwarded to Mr. Gould for inspection the types of the species of *Phaëthornis* he lately described (Ann. N. Y. Lyc. June, 1866) as *P. cassinii*, I am enabled to state that they do not differ, according to Mr. Gould, from *P. longirostris* (*P. cephalus*, Bourc. et Muls.).

+155. *PHAËTHORNIS ADOLPHI*, Bourc. ; Gould, Mon. Troch. i.
pl. 35.

Santiago de Veragua.

+156. *CHALYBURA ISAUURÆ*, Gould, P. Z. S. 1861, p. 199, & Intr.
Troch. p. 72.

Santa Fé ; Santiago de Veragua.

Arcé has sent both sexes of this species ; the female, which has not been hitherto noticed, I now describe :—

♀. *Supra viridescens pilco obscuriore : uropygio et cauda aneo nitentibus : alis fuscis : subtus sordide cinerea, crisso albo ; rectricibus duabus utrinque externis albedo terminatis : rostro superiore fusco, inferiore flavido, apice fusco : pedibus flavis.*

The only other species nearly allied to this is *C. melanorrhœa*,

Salv. P. Z. S. 1864, p. 585 (*C. carmioli*, Lawr. Pr. Ac. Phil. 1865, p. 39), which has the crissum black.

+157. *PHÆOCHROA CUVIERI*, Delatt. et Bourc.; Sci. P. Z. S. 1856, p. 140.

David (*Bridges*).

+158. *OREOPYRA CALOLÆMA*, Salv. P. Z. S. 1864, p. 584.

Cordillera de Tolé.

Several specimens agreeing with the types from Costa Rica. One of these has a few chestnut feathers on either side of the chin, strengthening the view that this is the adult male of *O. castaneiventris*; their presence does not, however, settle the point, as chestnut feathers are not unfrequently seen in this region in immature birds of other species, without reference to the coloration of the mature female.

+159. *OREOPYRA CASTANEIVENTRIS* (Gould).

Trochilus castaneiventris, Gould, P. Z. S. 1850, p. 163.

Adelomyia? castaneiventris, Gould, Mon. Troch. iii. pl. 203.

Oreopyra castaneiventris, Salv. P. Z. S. 1864, p. 585.

Panterpe insignis, ♀, Lawr. Ann. N. Y. Lyc. viii. p. 46.

Cordillera de Tolé; Volcano of Chiriqui (*Warszewicz*).

Arcé has sent two specimens, both marked female; neither of these have so brilliant a crown as the supposed male in Mr. Gould's collection.

+160. *OREOPYRA LEUCASPIS*, Gould, P. Z. S. 1860, p. 312; Mon. Troch. iv. pl. 264.

Volcano of Chiriqui (*Warszewicz*).

I have seen no additional specimens of this fine species.

+161. *LAMPORNIS VERAGUENSIS*, Gould; Schlater, P. Z. S. 1856, p. 140; Lawr. Ann. N. Y. Lyc. viii. p. 177.

David (*Bridges; Hicks*).

+162. *THALURANIA VENUSTA*, Gould, Mon. Troch. ii. pl. 105.

Santa Fé; Santiago de Veragua; Volcano of Chiriqui (*Warszewicz*).

It is hardly possible to distinguish comparatively young birds of this race from the closely allied New Granadan form *T. columbica*. The last named, however, never appears to assume in old individuals nearly the same extent of blue on the back as is seen in *T. venusta*.

+163. *DORIFERA LUDOVICÆ*, Bourc. et Muls.; Gould, Mon. Troch. ii. pl. 88(?).

Cordillera de Tolé.

There seems to be considerable individual variation between members of this species; or I should be inclined to separate, as a distinct race, the bird found in Veragua, a single specimen only of which

has as yet reached me. The shining forehead is considerably darker and of a bluer shade, the bill longer, and the under plumage blacker than in a New Granadan specimen of *D. ludovicæ* before me; the wings, too, are shorter. Should the receipt of additional specimens confirm the constancy of these distinctions, I propose for this race the name of *Dorifera veraguensis*.

+ 164. *HELIODOXA JACULA*, Gould, Mon. Troch. ii. pl. 94.

Heliodoxa henryi, Lawr. Ann. N. Y. Lyc. viii. p. 402.

Santiago de Veragua and Cordillera de Tolé.

A series of specimens of both sexes from Veragua and also from Costa Rica have been sent by Arcé. These I have compared with Mr. Gould's specimens of *H. jacula*; and we both consider them identical with that species. Since then Mr. Lawrence has sent the types of his *Heliodoxa henryi* to Mr. Gould for examination. They prove to be immature birds identical with our specimens; hence this name must be considered synonymous with *H. jacula*. This is by no means an isolated case of New Granadan and Costa Rican specimens being specifically identical, though their range appears to be interrupted at the Isthmus of Panama.

+ 165. *MICROCHERA ALBOCORONATA* (Lawr.); Gould, Mon. Troch. ii. pl. 116.

In a previous collection Arcé sent two specimens of a bird of this genus and closely allied to this species from Tucurriqui, in Costa Rica. Not having good specimens of the true *M. albocoronata* with which to compare them, I left them till I could make a more satisfactory examination. Since then Mr. Lawrence has described a female bird from Angostura, in Costa Rica, under the name of *Panychlera parvirostris*, and afterwards sent the type to Mr. Gould for inspection. Mr. Gould pronounced this bird to be the female of a *Microchera*. Having now a good series of the true *M. albocoronata* I am able to point out the following differences between it and the Costa Rican bird:—The latter has the rich vinous purple of the back decidedly brighter, the white crown seems to extend further over the back of the head, and the black band of the apical third of the outer rectrices is wider and the inner margin not so sharply defined. The under plumage of *M. albocoronata* is decidedly darker, being almost black instead of the same shade as the back. These differences are sufficient to separate the Costa Rican from the Veraguan bird; and for the former the name *Microchera parvirostris* must be taken, though the specific one does not convey the character intended. The range of the two forms corresponds with that of the two *Chalybura* above mentioned.

+ 166. *GOULDIA CONVERSI*, Gould, Mon. Troch. iii. pl. 129.

Santa Fé.

This species has already been noticed by Mr. Lawrence in McLeannan's Panama collections. I have also specimens obtained by Arcé at Tucurriqui.

+ 167. *SELASPHORUS SCINTILLA*, Gould, P. Z. S. 1850, p. 162; Mon. Troch. iii. pl. 138.

Volcano of Chiriqui (*Warszewicz*).

+ 168. *CLAIS GUIMETI*, Bourc. et Muls.; Gould, Mon. Troch. iv. pl. 210.

Santa Fé; Santiago de Veragua.

This species has, I believe, not hitherto been noticed so far north. Arcé also obtained numerous specimens near Chepo, a village situated to the south of the Panama Railway.

+ 169. *FLORISUGA MELLIVORA* (L.).

Santiago de Veragua and Cordillera de Tolé.

+ 170. *HELIOTHRIX BARROTI*, Bourc.

Heliothrix purpureiceps, Gould, Mon. Troch. iv. pl. 216.

Santa Fé.

These specimens agree with others from Panama and Guatemala, which Mr. Gould considers to be of this species.

+ 171. *HELIOMASTER LONGIROSTRIS* (Vieill.); ScL. P. Z. S. 1856, p. 140.

Heliomaster stuartæ, Lawr. Ann. N. Y. Lyc. vii. p. 107, & ibid. p. 291; Gould, Intr. Troch. p. 138; ScLATER & Salv. P. Z. S. 1864, p. 365.

H. sclateri, Cab. & Hein. Mus. Hein. iii. p. 54.

Santa Fé; Cordillera de Tolé.

Veraguan specimens agree with others from New Granada (Bogota make) and from Panama, all doubtless belonging to the race distinguished by Mr. Lawrence as *H. stuartæ*. Mr. Gould, since he wrote his 'Introduction to the Trochilidæ,' has received from Mr. Lawrence a type of that species, and after close examination considers that the New Granadan bird does not differ from the well-known bird of Trinidad; nor can he sustain the distinctions which the Venezuelan bird, *H. sclateri*, Cab. & Hein., is said to possess. In this view I agree, after having compared about forty specimens (Mr. Gould's and our own) from various localities. The Mexican and Guatemalan bird (*H. pallidiceps*, Gould) appears always to have the shining crown of a paler green tint, and is in this respect distinguishable in a slight degree from the more southern bird. Specimens from Costa Rica are referable to *H. longirostris*.

+ 172. *ERYTHRONOTA NIVEIVENTRIS*, Gould, P. Z. S. 1850, p. 164; Mon. Troch. v. pl. 319; ScL. P. Z. S. 1856, p. 140.

Santiago de Veragua; David (*Bridges*); Chiriqui (*Warszewicz*).

This is a scarce species; I have seen a large number of its close ally *E. edwardi*, but have not been able to detect more than two or three specimens of this. The only difference between the two consists in the deeper colouring of the tail of this bird. This character, however, appears quite constant.

- + 173. *AMAZILIA RIEFFERI* (Bourc.); *Sci. P. Z. S.* 1856, p. 140.
David (*Bridges*).

- + 174. *THAUMANTIAS CHIONURUS*, Gould, *P. Z. S.* 1850, p. 162;
Mon. Troch. v. pl. 300.

Eupherusa niveicauda, *Lawr. Ann. N. Y. Lyc.* viii. p. 134.

David; Chiriqui (*Warszewicz*).

The type of the species described by Mr. Lawrence as above was sent to Mr. Gould, who pronounces it to be identical with *T. chionurus*. *Eupherusa cupreiceps*, *Lawr. (Ann. Lyc. N. Y. June 1866)*, on the other hand, is quite distinct, as Mr. Lawrence has shown. Arcé has sent a female of this second species from Tucuriqui.

- + 175. *SAPPHIRONIA CÆRULEIGULARIS*, Gould, *Mon. Troch.* v. pl. 346; *Sci. P. Z. S.* 1856, p. 140.

Santa Fé; David (*Bridges*); Chiriqui (*Warszewicz*).

- + 176. *CHLOROLAMPIS ASSIMILIS*, *Lawr.*

Saucerottia atala, *Sci. P. Z. S.* 1856, p. 140?

Santa Fé; Santiago de Veragua.

The specimens sent agree with others from Panama, which we* have referred to this species.

- + 177. *PIAYA MEHLERI*, *Bp.*

Piaya nigricrissa, *Lawr. Ann. N. Y. Lyc.* viii. p. 177.

David (*Bridges*).

I am unable to distinguish any tangible differences between Panama and Guatemalan examples of this *Piaya*. I believe there is but one species ranging uninterruptedly from Ecuador and New Granada to South Mexico. *P. mexicana* is readily distinguishable by the coloration of its tail.

- + 178. *DIPLOPTERUS NÆVIUS* (L.); *Lawr. Ann. N. Y. Lyc.* viii. p. 177.

David (*Bridges*).

- + 179. *NEOMORPHUS SALVINI*, *Sclater*, *P. Z. S.* 1866, p. 60, pl. v.
Santiago de Veragua; Cordillera de Tolé.

- + 180. *RAMPHASTOS CARINATUS*, *L.*

Ramphastus brevicarinatus, Gould, *Mon. Touc.* ed. 2. t. 3.

Ramphastus approximans, *Cab. Journ. f. Orn.* 1862, p. 333.

Santa Fé.

Veraguan examples agree with others from Panama in having a somewhat wider red band below the yellow throat and breast than is usual in Guatemalan specimens. They belong to the race separated by Gould as *R. brevicarinatus* and by Cabanis as *R. approximans*; but this race is so very closely allied to the more northern bird that I am unwilling to separate them.

* *Sci. & Salv. P. Z. S.* 1864, p. 365.

+181. *PTEROGLOSSUS ERYTHROPYGIUS*, Gould; Lawr. Ann. N. Y. Lyc. viii. p. 178.

David (*Hicks*).

Mr. Lawrence identifies Mr. Hicks's specimens as belonging to this species, which I have never met with, and am strongly inclined to believe to be nothing more than the well-known and wide-ranging species *P. torquatus*.

+182. *SELENDERA SPECTABILIS*, Cassin.

Santa Fé; Santiago de Veragua; Cordillera de Tolé.

This fine species appears to be more common in this district of Veragua than on the Panama Railway, where, I believe, Mr. McLeannan only obtained a single specimen.

+183. *AULACORHAMPHUS CÆRULEOGULARIS*, Gould, P. Z. S. 1853, p. 193; Mon. Ramphastidæ, ed. 2, pl. 51.

Santa Fé; Veragua (*Seemann*).

This species is also found in Costa Rica, whence Arcé has sent specimens. It is also included by Cabanis (Journ. f. Orn. 1862, p. 329) in his list of Hoffmann's collections.

+184. *CAPITO MACULICORONATUS*, Lawr.

Santiago de Veragua.

+185. *CAMPEPHILUS GUATEMALENSIS*, Hartl.

Santiago de Veragua.

+186. *CAMPEPHILUS HÆMATOGASTER*, Tsch. F. P. Av. p. 43, pl. 25.

Megapicus hæmatogaster, Malh. Mon. Pic. i. p. 27, t. 9. f. 1-3; ScL. Cat. p. 332.

Santiago de Veragua.

Two examples agreeing with New Granadan (Bogota) specimens.

+187. *CAMPEPHILUS MALHERBII*, Gray & Mitch. Gen. of B. pl. 108; ScL. Cat. p. 331.

Santa Fé; Cordillera de Tolé.

+188. *CENTURUS TRICOLOR*, Wagl.

Centurus subelegans, ScL. P. Z. S. 1856, p. 143.

Santa Fé; Cordillera de Tolé.

+189. *CHLORONERPES CECILIE*, Malh.; Selater, P. Z. S. 1856, p. 143 (?).

David (*Bridges*).

+190. *CHLORONERPES CABOTI* (Malh.); ScL. Cat. p. 337.

Cordillera de Tolé.

A single male specimen agrees with our specimens from Guatemala, the bill being, however, somewhat larger.

- +191. *PIONUS MENSTRUUS* (L.).
Santa Fé; Santiago de Veragua.
- +192. *CAÏCA HÆMATOTIS*, Scl. & Salv.
Santa Fé.
- +193. *SPIZAËTUS ORNATUS*, Daud.
Cordillera de Tolé.
- +194. *BUTEO GHIESBREGHTII*, DuBus.
Cordillera de Tolé.
- +195. *CRAXIREX UNICINCTUS* (Temm.).
Santa Fé.
- +196. *ASTURINA MAGNIROSTRIS* (Gm.); Lawr. Ann. N. Y. Lyc. viii. p. 178.
David (*Hicks*).
- +197. *FALCO ANATUM*, Bp.
Santiago de Veragua.
- +198. *HYPOTRIORCHIS RUFIGULARIS* (Daud.).
Santa Fé.
- +199. *TINNUNCULUS SPARVERIUS* (L.).
Santa Fé.
- +200. *ACCIPITER TINUS*, Lath.
“*Accipiter collaris*, Scl.,” Lawr. Ann. N. Y. Lyc. vii. p. 462.
Santiago de Veragua.
An immature female in change of plumage belongs, I have little doubt, to this species. The immature stage is quite rufous, as in *A. collaris*, Scl.; and I think it very possible that Mr. Lawrence ought to have referred the specimen from McLeannan’s collections, alluded to *l. c.*, to this species, and not to *A. collaris*.
- + 201. *ICTINIA PLUMBEA* (Vieill.).
Santa Fé.
- + 202. *ELANOÏDES FURCATUS* (Vieill.).
Cordillera de Tolé.
- +203. *LOPHOSTRIX STRICKLANDI*, Scl. & Salv.
Santa Fé.
204. *GLAUCIDIUM*, sp.?
Santa Fé.

†205. *LEPTOPTILA VERREAUXI*, Bp.

Santa Fé.

206. *LEPTOPTILA*, sp. ?

Cordillera de Tolé.

The species of this genus require a thorough revision.

†207. *COLUMBA RUFINA*, Temm.

Cordillera de Tolé.

†208. *CHAMÆPELIA RUFIPENNIS*, Bp.; Lawr. Ann. N. Y. Lyc. 1865, p. 179.David (*Hicks*).†209. *GEOTRYGON CHIRIQUENSIS*, Scl. P. Z. S. 1856, p. 143.David (*Bridges*).†210. *GEOTRYGON VERAGUENSIS*, Lawr. Ann. N. Y. Lyc. June, 1866.Veragua (*Merritt*).

Arcé has sent a specimen of a young Pigeon from Santa Fé, which is just sufficiently feathered to show a dark purple gloss on the back. I have little doubt it belongs to the fine species which Mr. Lawrence has lately described.

†211. *TINAMUS ROBUSTUS*, Scl.

Santiago de Veragua.

†212. *CHAMÆPETES UNICOLOR*, sp. n.

C. niger, viridescens nitens: abdomine et ventre imo paulo dilutioribus, vix nitentibus: plumis pectoris cinereo obscure marginatis: rostro nigerrimo, pedibus rubris: long. tota 24, alæ 11, caudæ 11, tarsi 2·8, rostri a rictu 1·6.

Obs. Affinis *C. goudoti*, Less., sed statura paulo majore, corpore unicolore, et coloribus saturatioribus primo visu dignoscendus.

The genus *Chamæpetes* was founded by Wagler (Isis, 1832, p. 1227) upon *Ortalida goudoti* (Less. Man. d'Orn. ii. p. 217), the characters given being as follows:—"Character *Ortalidæ*, gula et mentum toto-plumosa." *Ortalida* is characterized as having the inner web of the primaries entire, &c. Through Mr. G. R. Gray's kindness I have had an opportunity of examining a specimen of *C. goudoti* in the British Museum, and I find that it has strongly arched primaries, with deeply excised inner webs, such as so clearly characterize some sections of the *Cracidæ*. In addition to this, M. Goudot, as quoted by Lesson, distinctly states that the trachea is without the curious fold found in *Ortalida*. These points, as well

as the character of the coloration, show that it is not with *Ortalida* that *Chamæpetes* must be compared.

Its closest relationship is certainly with *Aburria*, Reich., of which *Penelope aburri*, Less., is the type, and with *P. pipile*, a species forming another section of the same group. All these differ from true *Penelope* in possessing three outer primaries strongly arched, the points of which, for at least $1\frac{1}{2}$ inch of their length, are abruptly reduced to a width of not more than $\frac{1}{8}$ inch. *Aburria* (*P. aburri*, Less.) is distinguished by an appendage to its throat. *Chamæpetes* has the throat quite feathered, while the circle of the eye and the lores are destitute of feathers. *P. pipile*, having a bare throat and different style of coloration, seems equally entitled to subgeneric distinction.

Penelope rufiventris (Tsch. Faun. Per. p. 291, pl. 31) has been placed in the genus *Chamæpetes*, as a synonym of *C. goudoti*. The plate, if trustworthy, shows the style of coloration of the head to be very different. Tschudi also states that it differs from *C. goudoti* in having a fold in the trachea. The only two known species of this form are therefore:—

† (1) CHAMÆPETES GOUDOTI.

Ortalida goudoti, Less. Man. d'Orn. ii. p. 217; Gray, Gen. of B. iii. p. 485.

Chamæpetes goudoti, Wagl. Isis, 1832, p. 1227.

Cauca Valley, New Granada (*Goudot*).

† (2) CHAMÆPETES UNICOLOR.

Veragua (*Arce*).

With reference to the curious formation of the primaries in these birds, I well remember being startled by a strange sound when shooting in one of the ravines in the Volcan de Agua in Guatemala. Not at first perceiving whence it arose, I walked on, when the noise was again repeated. I then set about discovering the cause, and soon found that it was produced by a male *Penelope nigra*, Fraser, which, when flying in a downward direction with outstretched wings, gave forth a kind of crashing, rushing noise, which I likened at the time to the falling of a tree. The outer primaries of *P. nigra*, though very strong, are not cut out like those of the present bird and its allies; and I have little doubt that the latter occasionally produce a strange sound with their wings. Indeed it seems probable that the name by which one of them (*P. aburri*, Less.) is distinguished by the natives of the Cauca Valley is derived from this peculiarity. The name *burri*, *aburri*, *aburrida*, which M. Goudot asserts well represents their cry, in fact expresses the sound produced by the wings. An analogous case at once suggests itself, that of the "drumming" of the Common Snipe (*Gallinago media*, Leach), to which I can add another. A well-known Humming-bird of Mexico and the highlands of Guatemala, *Selasphorus platycercus*, makes a shrill, almost whistling, noise with its wings, which are cut out in a somewhat similar way.

- + 213. *ORTALIDA POLIOCEPHALA*, Wagl.; Sclater & Salv. P. Z. S. 1864, p. 371.

Santiago de Veragua; Cordillera de Tolé.

Agrees with Panama specimens.

- + 214. *ODONTOPHORUS VERAGUENSIS*, Gould, P. Z. S. 1856, p. 107; Scl. P. Z. S. 1856, p. 143.

Panama (*Seemann*); David (*Bridges*).

- + 215. *ODONTOPHORUS MELANOTIS*, Salv. P. Z. S. 1864, p. 586.

Santiago de Veragua.

- + 216. *ODONTOPHORUS LEUCOLEMUS*, sp. n.

O. supra niger, dorso toto minutissime castaneo maculato: primariis fusco-nigris, secundariis in pogonio externo castaneo notatis: tectricibus alarum minoribus macula magna in pogonio interno nigra, interne castaneo circumscripta: subtus regione parotica et pectore toto nigris, hoc maculis celatis albis notato; gula alba: ventre superiore castaneo, ventre imo cum crisso nigris: rostro nigro, pedibus obscure corylinis: long. tota 8, alæ 5, caudæ 2, rostri a rictu 0·9, tarsi 1·6.

Cordillera de Tolé; Veragua.

Arcé has sent a single female specimen of this very distinct species, which has no near allies that I am acquainted with. Its white throat and black breast marked with hidden white spots at once render it easily distinguishable.

- + 217. *ARAMIDES CAYENNENSIS* (Gm.); Scl. P. Z. S. 1856, p. 143.

David (*Bridges*).

- + 218. *EURYPYGA MAJOR*, Hartl.

Santa Fé; Cordillera de Tolé.

- + 219. *PARRA MELANOPYGIA*, Scl.

Santa Fé.

A young bird with the breast white, belonging probably to this species.

- + 220. *HALIPLANA FULIGINOSA*, Gm.

Santiago de Veragua.

9. On some New or Rare Birds' Eggs.

By ALFRED NEWTON, M.A., F.L.S., F.Z.S.

(Plate XV.)

It will perhaps be remembered that at the Meeting of this Society on the 14th March, 1865 (P. Z. S. 1865, p. 256), I exhibited specimens of, and made remarks on, several new or rare birds' eggs,

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intending, as I had done on a former occasion, to contribute a paper respecting them to our 'Proceedings.' To my dismay, however, when about to give instructions to the artist who was to draw the plate illustrating the paper, it was found that one of the most interesting novelties (the egg of *Didunculus strigirostris*) was missing from the care of our excellent Secretary. Thus deprived of my chief ornament, I thought it better to defer the printing of the paper; and this I did the more willingly, because Mr. Selater assured me that the absent specimen was only mislaid, and would certainly be found again in the course of time. The result has proved as he predicted; the lost sheep turned up a few weeks ago; and accordingly I now reproduce the remarks I made nearly two years ago, adding observations on some other specimens which have in the meantime come into my possession.

When in 1861 I first brought some oological specimens before the Society (P. Z. S. 1861, p. 393) I must confess to having taken rather too sanguine a view of the utility of oology as a help to classification. Further experience and the examination of very large series of specimens have almost induced in me a belief which perhaps might be best expressed by parodying the celebrated saying of a celebrated man, and would almost make me define oology as "a science in which size and colour go for nothing at all, and shape and grain for very little." However, notwithstanding Voltaire's epigram, no one doubts there is a science of etymology; and since his time philologists have begun to get a right notion of the value of vowels and consonants. I therefore hope oology may yet keep its rank, and that in time we may come to comprehend the very variable characters which birds' eggs present in their size, colour, shape, and grain.

SWALLOW-TAILED KITE.

Elanoides furcatus (Linnæus).

So much interest has long been attached to the breeding of this bird that, though I had no specimen of its egg to exhibit, I thought myself justified in 1865 in reading some notes with which my friend Mr. H. E. Dresser had furnished me. These, however, have since appeared in print (*Ibis*, 1865, p. 325-327), and I need say no more on the subject, except to remark that the four eggs which are stated to have been obtained for him have not yet reached England.

NUTCRACKER.

Nucifraga caryocatactes (Linnæus). (Pl. XV. fig. 2.)

Thanks to my friends H. H. Pastor Theobald and J. C. H. Fischer of Copenhagen, I have at length the pleasure of exhibiting to the Society the nest and four eggs of the Nutcracker, taken in the same locality as the nest and fully-fledged young bird which I exhibited in June 1862 (P. Z. S. 1862, p. 206), and by the same persons. In 1863 my friends were again disappointed of getting the eggs of this bird, which proved to be a still earlier builder than they had

given it credit for; and on the 9th of April three young ones were found. In 1864 they determined to "be wise in time." They kept two young men on the watch all the winter, and as spring approached careful search was made. At length, on the 23rd of March, after eight days' labour, the nest was found, in the same part of the forest as that of the year before, being indeed only some fifty feet from the same spot. It was, therefore, in all probability built by the same pair of birds. It was on a fir tree, about fifty feet high, and built quite in the same manner as that of the former year. The seeker took the precaution first to climb up a near-extending tree, and then, seeing the Nutcracker on the nest, ascended the nest-tree itself and took the four eggs, which, when sent to Herr Theobald, were blown by him and found to be quite fresh. He writes, "They have, I think, a peculiar character, and I believe that they cannot be easily confounded with others. It is always difficult to give a proper description of a bird's egg; but I am not able to find any likeness between these and the supposed eggs of the bird pictured in Bädcker's plates*. They are smaller than the eggs of *Pica varia*, and larger than those of *Garrulus glandarius*. The ground-colour is a light bluish green, not unlike that of an egg of *Sturnus vulgaris*, which they also resemble in form. Nevertheless they do not deny the type of the *Corvidæ*. They are sprinkled over with very fine spots of leather-yellow [buff] or perhaps olive. Two of them are spotted more distinctly; one is almost spotless."

I need not, I think, add anything to Pastor Theobald's description; but I take this opportunity of giving a figure of the most fully marked specimen (Pl. XV. fig. 2), and also an extract from a letter dated 27th of May, 1865, which I have since received from him, recounting some further successes:—"The long and severe winter [of 1864-65] seems to have retarded the Nutcrackers from laying their eggs at the ordinary time. The two young men we had engaged in Bornholm commenced their work on the 12th of March, but did not succeed in finding a nest (which contained three eggs) before the 10th of April. They waited some days, hoping that a fourth would be added, and took the three eggs on the 15th, when they found them much incubated. When these eggs were sent to us, we heard that another fresh nest was discovered. We awaited the result not without anxiety, when the steamer brought us four eggs taken from that nest on the 30th. They were not at all set on. There is the strongest likeness in all the three sets we have now seen, and therefore I conclude that the Nutcracker's eggs do not vary much. The same is the case respecting the construction of the nest after this year's experience." The writer then proceeds to offer for my acceptance the four eggs of the first nest, a liberal present, the recollection of which will always demand my warmest gratitude. Last March (1866) one nest was found, which the birds deserted after laying a single egg in it.

I need not say with what satisfaction I announce the fulfilment of

* Journ. für Orn. 1856, taf. i. fig. 1, and Eier der Europäischen Vögel, taf. 1. fig. 14, and taf. lxxvi. fig. 4.—A. N.

the hope I formerly expressed, that my good Danish friends would be able to clear up the doubts on this subject; and the satisfaction is so great that I feel I need not take upon me the invidious task of deciding who hitherto has *not* had the veritable egg of *Nucifraga caryocatactes*. I must, however, mention that Herr Fischer has published in the new series of Krøyer's 'Tidsskrift' for 1863 and 1864 two papers, giving an account of the breeding of the Nutcracker in Bornholm (*Cf.* Ibis, 1865, p. 226).

TOOTH-BILLED PIGEON.

Didunculus strigirostris (Jardine). (Pl. XV. fig. 6.)

The extinction of this species, which seems so speedily impending, makes any excuse for dwelling on so great a rarity as a specimen of its egg unnecessary. The specimen figured was entrusted to my care by Mr. Bartlett, our Superintendent, to whom it was delivered by the person who had charge, during the voyage to England, of the living *Didunculus* presented to the Society in 1864 by Dr. Bennett (*P. Z. S.* 1864, p. 158). The specimen (Pl. XV. fig. 6) is of a large size in proportion to that of the bird, measuring 1·78 inch by 1·16 inch, and, notwithstanding that it was laid under very unnatural circumstances, does not appear to me to be abnormally developed. Though it possesses the normal form, it is not of so pure a white colour as is generally seen in the eggs of the *Columbæ*, but has a pale greenish-grey tinge.

HOAZIN.

Opisthocomus cristatus (Linnaeus). (Pl. XV. fig. 7.)

Among the various forms of bird-life which the more cautious systematists regard as "*incertæ sedis*," the Hoazin must be looked upon as one of the most remarkable. The egg of this species is stated by Mons. Des Murs (*Oologie Ornithologique*, pp. 408, 409) to have been first made known to naturalists by Mons. Alcide d'Orbigny; but, so far as I am aware, it has never yet been figured; and the specimen I exhibit is the only one I remember to have seen, though examples should exist, according to the distinguished oologist I have quoted, in the Museums of Paris and Philadelphia. It was sent by an officer of the Royal Artillery to Mr. Whiteley of Woolwich, who has kindly lent it to me. Its dimensions are 1·74 inch by 1·33 inch; and its colouring cannot be better described than in Mons. Des Murs's words:—"Le fond de la coquille est d'un blanc légèrement carné, avec quelques taches de couleur de sang figé, d'autres, en plus grand nombre, de couleur de brique rosâtres, et plusieurs, assez larges, d'une teinte gris-lilas ou grisâtre-violacée."

Its resemblance to the eggs of some of the *Rallidæ* (*Porphyrio* for example) is manifest; but I do not on that account suppose that this very strange form is allied to that family; indeed its osteology, according to MM. Gervais, Lherminier and De Castelnau, in my opinion, entirely precludes such a view.

BUFF-BREASTED SANDPIPER.

Tryngites rufescens (Vieillot). (Pl. XV. fig. 4.)

For a knowledge of the eggs of this occasional visitor to Europe oologists are indebted to the efforts of Mr. R. R. Macfarlane, one of the collectors employed by the Smithsonian Institution of Washington in those explorations of Arctic America which have been so prolific in oological interest. The specimen I possess (Pl. XV. fig. 4) was obtained, 29th June, 1863, by that gentleman on the barren grounds to the east of the Anderson River, and was out of a nest of four eggs, from which the hen bird was shot. I desire to record here my deep acknowledgement of the kindness with which Prof. Henry has placed the describing of this valuable specimen in my power. Its size is 1.52 inch in long diameter by 1.08 inch. In coloration it differs somewhat from the normal appearance of most eggs of the *Scolopacidæ* (though I have seen some Snipes' which resemble it), being of a pale stone-colour, with well-defined moderate-sized and not thickly disposed blotches of hair-brown, beneath which is a series of blotches of two shades of lavender-grey. The accounts which have been published of the habits of this species seem to justify its removal from the genus *Tringa*.

AMERICAN STINT.

Tringa minutilla, Vieillot (*vide* Coues, Proc. Acad. Philad. 1861, p. 191). (Pl. XV. fig. 3.)

The eggs I possess of this species have much the same history as that of the last. They are three, out of four, from a nest whence the hen bird was snared in June 1863, on the Arctic coast east of the Anderson River, and were collected by Mr. Macfarlane. A brief note, in Prof. Baird's handwriting which accompanies the specimens, adds the information that there were "decayed leaves in nest." These eggs have not much resemblance to those of *Tringa minuta* or *T. temmincki*; for though the ground-colour is much the same, the darker markings take the form rather of streaks or dashes than of blotches or spots. They vary much in intensity of tone. In size they seem to correspond almost exactly with those of *T. temmincki*.

GREY PHALAROPE.

Phalaropus fulicarius (Linnæus). (Pl. XV. fig. 1.)

In the "Appendix" to Mr. Baring Gould's 'Iceland' (p. 412) I mentioned that in the summer of 1862 a friend of mine sent me four eggs as those of this bird, which had been taken under his superintendence, and that I believed them to be especially well authenticated. When I was in Iceland in 1858 I discovered and watched for several hours two pairs of Grey Phalaropes on a little lake at Utskála, within a few yards of this gentleman's parsonage house; and though I am sure they did not breed there that year, I was told by several of the inhabitants of the district that they did so sometimes. Accordingly I took my friend and other persons to look at the birds,

bidding them observe the difference between the two species of *Phalarope*, with the view of subsequently obtaining the eggs of this one. It was not until 1862 that any good came of it. In that year, Pastor Sivertsen wrote to me from Utskåla, saying that three nests had at last been found. Of these unfortunately the contents of one disappeared, and those of the second were broken; so that the eggs from the third were all he had to send me. They reached me in a very bad condition, and, but for the skilful manipulation of Mr. Salvin, would have been useless. As it is they are presentable.

In 1866 Pastor Theobald was so good as to send me three eggs of this species with the parent birds caught on the nest, which were brought to him the year before by Herr Zimmer from Egedesminde in North Greenland. It is extremely satisfactory to find that these well-identified eggs closely resemble those I had received from Iceland; and the particulars in which they most resemble one another are the pale ground-colour and infrequency of the markings, which serve to distinguish them at once when laid among a hundred or more eggs of *Phalaropus hyperboreus*. In size the Greenland eggs of *P. fulicarius* are somewhat, though not a great deal, larger than most eggs of *P. hyperboreus*, but are nearly as much smaller than the Icelandic specimens, one of which serves to illustrate this paper (Pl. XV. fig. 1). The largest of the seven I possess measures 1·25 inch by ·9 inch; the smallest 1·17 inch by ·84 inch. I cannot venture to say that the egg of *P. fulicarius* may never closely resemble that of *P. hyperboreus*; but specimens of the former I have here noticed could never for a moment be mistaken for any I have seen of the latter.

YELLOW-SHANKS SANDPIPER.

Totanus flavipes (Gmelin). (Pl. XV. fig. 5.)

I am not aware that the eggs of this species have been anywhere figured or described. I have received two from the Smithsonian Institution. They are marked as having been obtained by Mr. Macfarlane, 25th June, 1863, on the barren grounds at the Fort, Anderson River; and the note mentions that the hen bird was shot very near the nest, which contained four eggs. The specimens sent me measure about 1·57 inch by 1·14 inch, and in colouring greatly resemble some eggs of *Totanus calidris*.

GREAT BLACK-HEADED GULL.

Chroicocephalus ichthyaetus (Pallas).

Specimens of the fine egg of this fine bird recently sent to me by Herr Möschler, who received them from the Lower Volga, correspond very well with the description given of it by Pallas (Zoogr. R.-As. ii. p. 323). On a clean-looking ground of very pale stone-colour or French white, good-sized blotches of dark brown are pretty regularly distributed, patches of lavender-grey being interspersed among and beneath them. My largest specimen is 3·08 inches by 2·11 inches; the smallest 2·91 inches by 2·09 inches. Three ex-

amples are professedly figured by Thienemann in his great work (Fortpfl. der gesamm. Vög. tab. lxxxvii. fig. 1 a-c). These do not resemble the eggs in my possession very much; and of course, in the incomplete state of that work, we have no information concerning them. Bäckker does not seem to have known the egg.

AMERICAN WIGEON.

Mareca americana (Gmelin).

Two eggs of this bird were sent to me in 1863 from the Smithsonian Institution. They were obtained at Fort Yukon, in June 1861, by the late Mr. R. Kennicott, whose recent death in Russian America is so much to be regretted. They are marked "parent shot," and are somewhat smaller and of a good deal deeper colour than eggs of *Mareca penelope* ordinarily or perhaps ever are. The two specimens vary somewhat in dimensions and form, one measuring 2.08 inches by 1.44 inch, the other 2.18 inches by 1.41 inch.

AMERICAN SCAUP.

Fulix affinis (Eyton).

I am indebted to the Smithsonian Institution for seven examples of this bird's eggs:—three, from which the parent was shot, obtained by Mr. Kennicott at Fort Yukon, 24th June, 1861; and four out of a nest of nine eggs obtained 26th June, 1863, and sent with the parent by Mr. J. Lockhart. As might be expected, except in size, they greatly resemble the eggs of *Fulix marila*. The largest of the series, from Mr. Kennicott's nest, measures 2.29 inches by 1.63 inch; the smallest, from Mr. Lockhart's nest, is 2.2 inches by 1.52 inch.

SURF-SCOTER.

Edemia perspicillata (Linnæus).

For this rare egg I am indebted again to the liberality of the Secretary of the Smithsonian Institution. It is marked as being from the collection of Mr. Macfarlane, taken 26th June, 1863, on the Arctic coast, east of Anderson River, and "parent shot." No more particulars. The specimen measures 2.32 inches by 1.55 inch, which is much smaller than any example of *E. nigra* that I have seen, and is less warmly coloured than the eggs of that species. Bäckker professes to figure two specimens of this bird's egg (Eier Europ. Vög. taf. lxi. fig. 9); but, as usual, he does not account for their being in his possession, and it must, I think, be regarded as doubtful whether the originals were authentic.

HOODED MERGANSER.

Mergus cucullatus, Linnæus.

The next egg I have to mention is the result of an interesting discovery made on the River St. Croix in New Brunswick, by Mr

G. A. Boardman; and I owe the possession of three specimens of it to the liberality of my friend Mr. H. E. Dresser, a Fellow of this Society, who has likewise kindly permitted me to bring it before you on this occasion, furnishing me with several extracts from letters written to him by Mr. Boardman. These are to the effect that a nest of this bird, consisting of "about a pailful of down," was found in 1864 in a hollow tree. It contained six eggs. The old bird was caught upon it, and, being thus frightened, did not return to the eggs, which were accordingly taken on the 20th of May; but unluckily the man in descending the tree broke four of them. The following year (1865) a nest, believed to be that of the same hen bird, was found and the eggs taken 15th of June. Three of these are now in my possession. They are of a very pure white colour, spheroidal in shape, and but for the grain, which is decidedly that of a Duck's egg, at first sight look a good deal like Owls'. The shell is remarkably smooth and strong, heavy and hard, the last peculiarity having been particularly noticed by Mr. Boardman when drilling the specimens. The long diameters of the three in my possession are respectively 2.08, 2.11, and 2.06 inches; the short diameter of all is the same, 1.72 inch. Mr. Dresser informs me that an egg of the first nest (upon which the bird was caught) precisely resembles these.

It has been stated that on Prof. Agassiz's expedition to Lake Superior a nest of *Mergus cucullatus* was found containing several eggs, three, at least, of which have been sent by Dr. Brewer to this country. One of them was received by Dr. Frere, and at the dispersal of his collection it came into my possession. This egg differs so entirely from the well-identified specimens obtained by Mr. Boardman that I cannot believe they belong to the same species.

EXPLANATION OF PLATE XV.

- Fig. 1. Egg of Grey Phalarope, p. 165.
 2. " Nutcracker, p. 162.
 3. " American Stint, p. 165.
 4. " Buff-breasted Sandpiper, p. 165.
 5. " Yellow-shanks Sandpiper, p. 166.
 6. " Tooth-billed Pigeon, p. 164.
 7. " Hoazin, p. 164.

10. On the *Nisi* and *Astures* of the Indian Archipelago and of New Holland. By Dr. J. J. KAUP, C.M.Z.S., Director of the Grand-Ducal Museum, Darmstadt*.

Director Schlegel, in his meritorious work, 'Die Valkvogels van Nederl. Indië,' 1866, has enumerated thirteen species of these groups. Of these I possess eleven in all stages of plumage, for

* Communicated by Dr. J. Murie, and translated under his superintendence from the German MS.

which our Museum is indebted to the kindness of the late General von Gagern, Herman von Rosenberg, Mr. Riedel, Mr. Cassalette, and to the Museum of Leyden.

My corrections of synonyms have thus been based upon actual examination, and do not depend upon mere descriptions of other naturalists.

I have long ago given up so-called subgenera, and I have raised all subgenera established by me formerly to the dignity of genera, indicating the section or group by giving it the oldest and most usual name in the plural, according to the plan introduced by the late Prince Charles Lucien Bonaparte.

I give an outline sketch of several heads and of a wing of each of the four Indian genera of the section *Nisi* or *Accipitres* of English ornithologists, and I hope that henceforth the distinctions which I make will be appreciated and not ignored, though the latter is by far the easier.

If we compare the head and the wing of the typical form of the *Nisi*, viz. those of the genus *Tachyspiza*, the thought must occur to each careful ornithologist that this genus possesses more characteristic features than many of the newly created genera of other groups of the class of birds.

The tooth of the upper mandible is round and hangs down low ; it is pressed to the front and separated from the tip of the beak only by a sharp incision, and it overlaps the entire front half of the lower mandible : this alone would justify us in separating *T. soloënsis* from all other species of *Nisi*.

To this characteristic mark of the genus must be added that the wing is longer and more pointed than that of the *Nisi*, and that the length of the point of the wing (77 mm.) is only equal to eleven twenty-sixths of the length of the entire wing (182 mm.).

Add to this that the third primary, and not the fourth, is the longest, and that only the first, second, and third are emarginated distinctly on the inner vane, and the fourth in a scarcely perceptible manner, whilst in others the fourth and fifth are distinctly emarginated ; moreover they have a proportionally short tarsus, and the toes with soles rather wider near their bases.

If we knew its manner of life with the familiarity of a Naumann or a Brehm, we should find that *T. soloënsis* flies better than all other *Nisi*, and that its food, especially when it has young, consists only of insects. We should see, in fact, that *Tachyspiza* represents amongst the *Nisi* the *Nauclerus*, *Hypotriorchis* the Falcones, and *Erythropus* the *Tinnunculi*.

It would, however, be a mistake to place this strongly characterized genus at the head or at the end of the *Nisi*, and to look upon the rest of the *Nisi* seu *Accipitres* as an inseparable whole, because these latter do not possess such a totality of distinguishing marks. If the long point of the wing, with its third primary the longest and the second a trifle shorter than the fifth, is a generic mark of the *Tachyspiza*, the relative proportions of the point of the wing to the entire length of the wing and the relative lengths of the primaries must also be

generic marks of other species; and if the number and shape of the emarginations in *Tachyspiza* are generic, they must be generic also in the others.

In addition to these distinctions, I have taken into account the shape and the markings of the tail; for as yet I have not met with a true *Nisus* having five emarginations on the inner vane of the wings, which at the same time had seven to twenty-four bars on its tail, like the *Uraspiza*, which are confined to New Holland and the Indian archipelago.

In consequence of these conclusions, the Sparrow-Hawks of New Holland and India have been divided by me into the genera *Teraspiza*, *Tachyspiza*, *Erythrospiza*, and *Uraspiza*.

In adopting these more limited genera there arises the great advantage of being able to characterize the species easily and with certainty in a few words, and one is not led astray by trifling analogies to throw together species from different groups. According to my method only those really akin will be thrown together.

Erythrospiza trinotata and *Teraspiza minulla* both have white cross bars on the surface of the dark tail; but it would be an error to place the two together on this account. Nor would it be correct to bring *E. trinotata* with its short toes into proximity with *Accipiter cruentus*, which has also the shortest toes of its genus.

The length of the middle toe or of the toes generally has only a specific value in the *Nisi*, and not a generic one.

If my friend Dr. Schlegel had compared carefully my diagnoses of the genera *Uraspiza* with *Accipiter cruentus*, he would not have considered Gould's *Astur cruentus* identical with his *Nisus cruentus* seu *griseogularis*. Schlegel's *N. cruentus* has the second to the sixth primaries of the outer vane and the first to the fifth of the inner vane emarginated, whilst Gould's *A. cruentus* has the second to the fifth of the outer vane and the first to the fourth of the inner vane emarginated*.

TERASPIZA, Kp.

Beak bent more abruptly than that of *Nisus*, and the concavity behind the hook of the beak deeper. A space round the eyes more naked, as in the noble Falcons. Point of wings very short, and equal to three tenths of the length of the entire wing. Fourth primary the longest; the first to fourth primaries of the inner vane distinctly emarginated; the primaries with the inside always edged. Tail with three bands above and four below.

This genus includes the smallest forms of all the *Nisi*.

* If the interior wide vanes of the primaries are in disorder owing to ill treatment, and the emarginations are not easily recognized, it is sufficient to count the cuts of the outer vane, which are better protected. If the second to the sixth primaries of the outer vane are emarginated, five emarginations of the inner vane, beginning from the first primary, will correspond to these. If it happens that a specimen shows only four instead of five, the wing should be examined with care, and it will be found that a feather has fallen out, or is still very small and young, and is thus hidden underneath the quills of the adjoining feathers.

Fig. 1.

*Teraspiza tinus.*

1. TERASPIZA VIRGATA, Reinw.

Falco virgatus, Reinw. Temm. Pl. Col. 109 (♂).*Accipiter affinis*, Hodgs., Gray, Zool. Misc. p. 81.*A. nisoides*, Blyth, Journ. A. S. B.*Nisus virgatus*, Cuv. Règ. An. p. 334; Schleg. Valkv. t. 12.*N. minutus*, Less. Tr. d'Orn. p. 60.*N. gularis*, Schleg. Fn. Jap. pl. 2, et Mus. d. P.-B. Ast. p. 33.*Nisus (Teraspiza) virgatus*, Kp. Falc. p. 172.

2. TERASPIZA RHODOGASTER, Schl.

Nisus rhodogaster, Schleg. Valkv. t. 12.*N. virgatus rhodogaster*, Schleg. Mus. d. P.-B. Ast. p. 32.Represents *T. virgata* in Celebes.

To these must be added

3. TERASPIZA MINULLA, Daud.,

of the Cape colony, with white bars on the upperside of the tail; and the

4. TERASPIZA TINUS, Lath.,

of South America, which is of the same size, and has no spots on the tail, nor any white upper tail-coverts.

TACHYSPIZA, Kaup.

Beak bent abruptly from the swollen cere; with a round tooth coming low down, and separated from the point of the beak by a sharp incision; seen in profile it overlaps the front half of the lower beak. Point of the wing very long, rather less than secondaries, and equal to eleven twenty-sixths of the length of the entire wing. Third primary the longest; first to third primaries distinctly emarginated on the inner vane; fourth primary indistinctly emarginated;

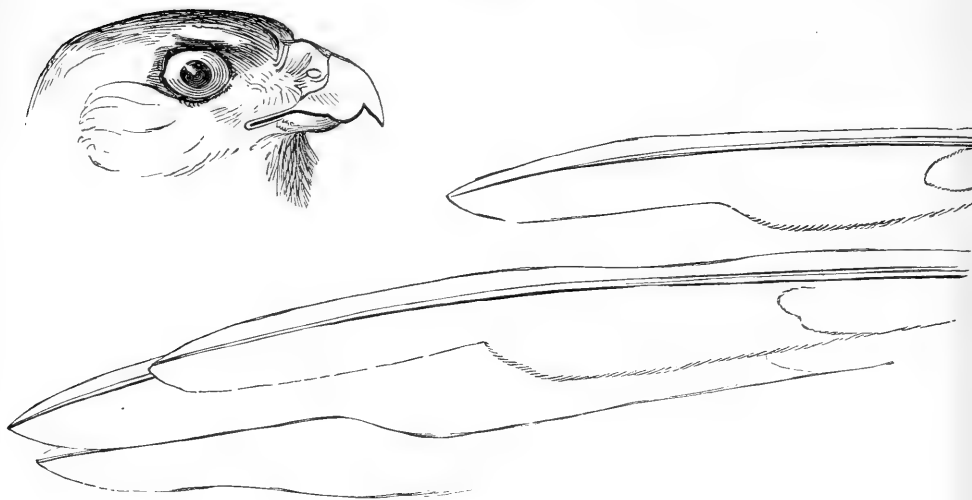
the primaries of old birds without bands and with white spots. Tail with four bands, which grow narrower with age, and disappear almost entirely on the outer and middle feathers. Tarsus and digits slender and short; the latter with rather broader soles.

At present only one species is known, which is found frequently on the continent and in the Indian archipelago, viz.—

TACHYSPIZA SOLOËNSIS.

Falco soloënsis, Linn. Tr. xiii. p. 137.

Fig. 2.



Tachyspiza, Kaup.

ERYTHROSPIZA, Kaup.

Form powerful and compact. Emarginations on the inner vane of the first to fifth primaries. Point of wing equal to from four fifteenths to four thirteenths of the entire length of the wing. Beak straighter than that of *Nisus*. The bars on the long tail frequently disappear with age, and in young birds they are never so numerous as in *Uraspiza*.

The species are found only in Celebes and the Moluccas, and when adult have a uniformly coloured rusty-red under-plumage.

1. ERYTHROSPIZA TRINOTATA, Temm.

Falco trinotatus, Temm. Leyd. Mus.

Nisus trinotatus, Schlegel, Valkv. t. 19.

Astur trinotatus, Bp. Consp. i. p. 33.

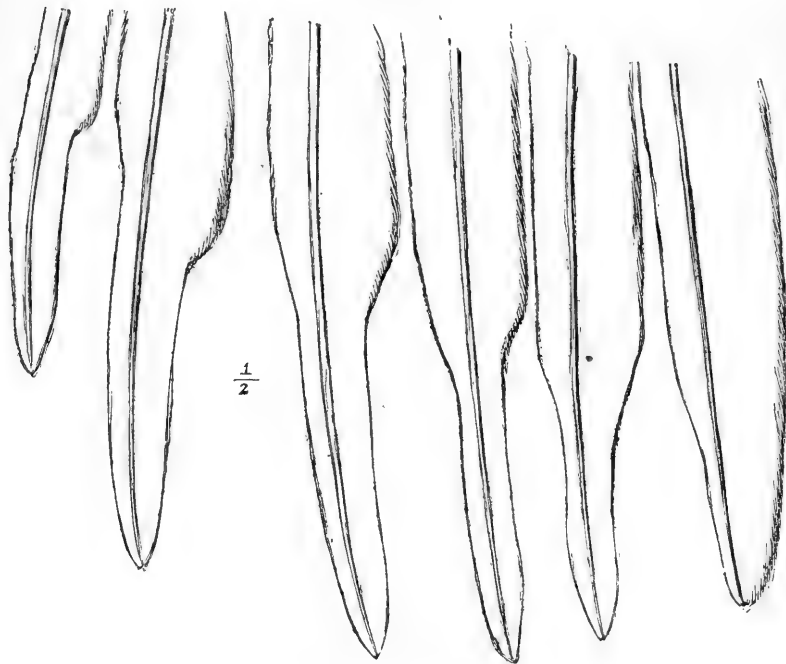
The smallest species. Above bluish grey; throat whitish; below

vinous-reddish. Inner surface of wing for the most part of a brilliant white. On the slate-black tail are three pure-white bands of spots on the inner vanes, which are perceptible at the upper surface. When young, reddish brown, with blackish spots, with elongated stripes on the inferior lighter parts. Wing 155 to 170 mm., tarsus 58 to 62 mm., middle toe 25 to 27 mm. In proportion it has the longest tarsus and the shortest middle toe.

Resembles *Teraspiza minulla* (Daud.), and differs from the following in the colour of its tail.

Hab. Celebes.

Fig. 3.



Erythrospiza griseogularis.

2. ERYTHROSPIZA IOGASTER, Müll.

Falco iogaster, Müll. & Schleg. Verh. Nederl. p. 110.

Epervier océanien (♂), Voy. au Pôle Sud, t. 2. f. 1.

Accipiter hyogaster (a name without a correct meaning), Bp. Consp. p. 33.

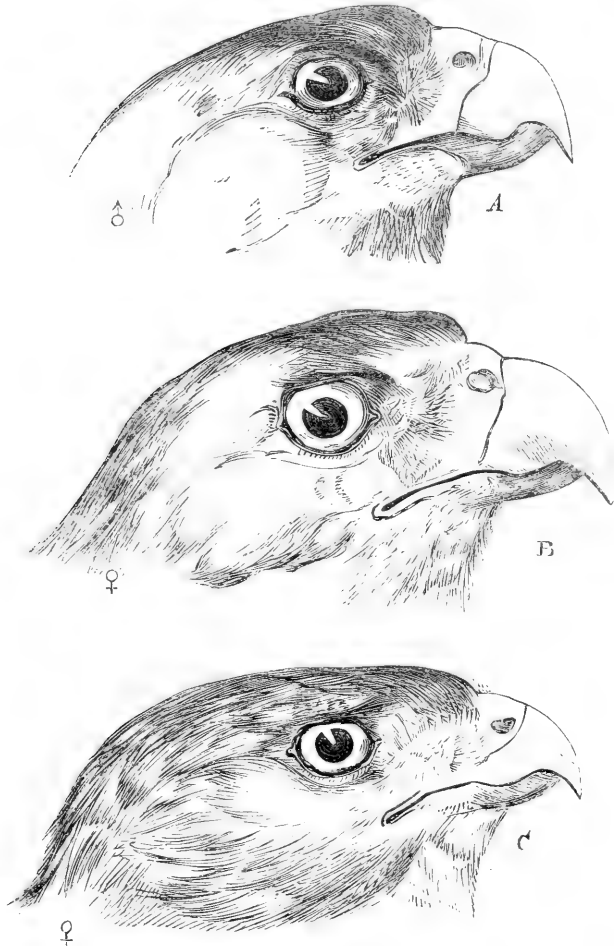
Nisus iogaster, Schleg. Valkv. p. 65, t. 18.

The reddish brown of the lower parts continued in a broad stripe over the grey neck to the lower mandible. Under wing-coverts of a reddish brown. Wings a light ash-grey varied with white on the

inner webs. The lower plumage of the young bird nearly white, with spots on the chest and transverse bars on the sides, which have a rusty yellowish hue. The tail, viewed from below, has about ten cross bars. Point of wing (63 mm.) equal to three tenths of the wing (208 mm.). Tarsus 56 mm., middle toe 31 mm.

Hab. Amboyna and Halmahera.

Fig. 4.



A and B. *Erythrospiza griseogularis*. C. *Uraspiza cruenta*.

3. *ERYTHROSPIZA GRISEOGULARIS*, G. R. Gray.

Astur griseogularis et *A. henicogrammus*, Gr. P. Z. S. 1860, p. 343.

Accipiter æquatorialis, Wall. P. Z. S. 1865, p. 474.

A. muelleri, Wall. P. Z. S. 1865, p. 475.

Nisus cruentus, Schleg. Valkv. 1866, t. 14-16.

This is the largest species and has the highest beak of all the *Nisi*. Schlegel gives nine very fine figures of this species (which is common in the Moluccas), representing all ages of plumage. According to him (t. 2. f. 14) the transverse bars on the lower parts, as well as the neck cross bars, are lost in old age; the lower parts are more or less intensely rusty red; the upper parts ashy grey, more or less dark. My specimen, which has recently moulted, shows eight or nine dark bars on the tail; and when the light is favourable, dark bars can be seen on the breast-feathers.

An old female, of which I give the outline of the head (fig. B, p. 174), has upon it a darker ashy grey; and on the upper part of the back there is a large somewhat obscure and rusty red patch, which mingles with the pale rusty-reddish chest. The lower parts, excepting the grey throat with white spots, are pale rusty-coloured, and have bluish-white transverse bars. On the inner vanes of the tail and of the primaries there are scarcely any traces of bars. On a similar specimen Mr. Gray established his *A. griseogularis*.

At a still greater age the neck-band, as also the breast-markings, disappears as in the male, which Schlegel (*loc. cit.*) figures in t. 2. f. 14. The distinguished ornithologist Wallace established on a specimen of this kind his *A. muelleri*, in honour of a man to whom the Museum of Leyden owes many treasures.

Wallace, who correctly appreciates the difference between *N. cruentus*, Schlegel, and *A. cruentus*, Gould, established his *Accipiter æquatorialis* on a middle-aged bird. Upon a careful examination, traces of bands on the tail will be found.

Amongst all Sparrow-Hawks this is the most powerful, and it has the highest and strongest beak. That of the female is 19 mm. high. Schlegel gives the length of the middle toe as 13''' to 19'''; the first of these figures is clearly an error instead of 15'''. The latter measurement I took from an unusually small male in the nestling-plumage.

Hab. All the Moluccas, where it is very common.

Fig. 5.



URASPIZA.

As regards structure of wings these resemble the *Teraspizæ*, and they, like the latter, have the first to the fourth primaries emarginated; but they have a longer tail, provided with from eight to

twenty-four narrow bands of a blackish colour, which can be perceived even at the greatest age.

These birds are confined to the Indian archipelago and New Holland, and no species has as yet been discovered on the continent.

1. URASPIZA SULAËNSIS, Schleg.

Nisus sulaënsis, Schleg. Valkv. t. 16.

Small; upper surface grey; under surface rusty red, with white underwings and lower tail-coverts. A young bird, above reddish brown, spotted black; primaries of the second order with four blackish-brown bands; below rusty yellow, with blackish-brown shaft-spots. Lower surface of wings rusty yellow, with blackish spots and bands; lower tail-coverts rusty yellow white, with dark shafts. Tail with seven or eight bars; outer tail-feathers with ten bars.

We have an adult received through Dr. Bernstein from the island of Sula-Bessie, and a young one through Herman v. Rosenberg from Ceram.

Wing 165 to 175 mm., tail 125 to 143 mm., tarsus 58 mm., middle toe 33 to 34 mm.

2. URASPIZA TORQUATA, Cuv.

Falco torquatus, Cuv., Temm. Pl. Col. 43 & 93.

Accipiter sylvestris, Wall. P. Z. S. 1863, p. 487.

Nisus torquatus, Schleg. Valkv. t. 17.

Accipiter cruentus, Wall. Birds of Timor (Schleg.).

Rather larger than the preceding species. When old it has a small rusty-red band on the lower parts; underwing nearly white, with traces of bands; the red neck-collar more or less distinct. The young bird has the lower parts lighter, shaft-spots on top with arrow-shaped bands to the rear; tail with about ten bands.

Wing 185 to 250 mm., tail 155 to 187 mm., tarsus 51 to 64 mm., middle digit 28 to 37 mm., according to Schlegel.

Hab. Java; Timor.

3. URASPIZA CIRRHOCEPHALA, Vieill.

Sparvius cirrhocephalus, Vieill. Enc. p. 1268.

Accipiter torquatus, Vig. & Horsf. L. Tr. xv. p. 328.

Nisus (Uraspiza) torquatus, Kp. Falc. p. 181; Gould, Birds of Australia.

The underwing with distinct bands throughout; lower part, a ground of reddish black brown, with innumerable whitish bandlets; tail fifteen to seventeen narrow bands; beak and cere 11 mm. high.

Wing 205 to 240 mm., tail 157 to 170 mm., tarsus 57 to 66 mm., middle digit 33 to 39 mm.

Hab. Common in the whole of New Holland.

4. URASPIZA CRUENTA, Gould.

Astur cruentus, Gould, Birds of Australia.

Nisus (Uraspiza) cruentus, Kp. Falc. p. 181.

Beak and cere 13 to 14 mm. high. The entire inner wing with bands throughout; all the lower parts the same. Tail with from fifteen to seventeen narrow bands.

This is a stronger bird than the preceding, and has a proportionally smaller middle digit.

Wing 252 to 270 mm., tail 185 to 200 mm., tarsus 70 to 72 mm., middle digit 34 to 36 mm.

Hab. Common in New Holland, scarcer in Timor (perhaps only of accidental occurrence).

5. URASPIZA APPROXIMANS, Vig. & Horsf.

Astur approximans, Vig. & Horsf. Linn. Tr. xv. p. 181.

A. radiatus et fasciatus.

A. radiatus, Cuv. Règ. An. p. 332.

Falco radiatus, Temm. Pl. Col. 123.

Nisus (Urospiza) approximans, Kp. Falc. p. 182.

Nisus approximans, Schleg. Valkv. p. 63.

Similar in colouring to the preceding, but the largest of all.

Wing 262 to 306 mm., tail 200 to 230 mm., tarsus 72 to 83 mm., middle digit 36 to 45 mm., beak 15 to 16 mm. high.

This species has the largest number of bands on the tail, viz. from fourteen to nineteen. Schlegel counts from twenty to twenty-four.

Hab. Common in New Holland; more scarce in Timor.

All these species have a reddish neck-collar, more or less distinct, which disappears towards the back of the neck. The old birds, *U. sulaensis* excepted, have the lower parts reddish, with white bands.

The following species, according to Schlegel, deviates more from the usual colouring than does *U. sulaensis*:—

6. URASPIZA ERYTHRAUCHEN, G. R. Gray.

Accipiter erythrauchen, G. R. Gray, P. Z. S. 1860, p. 344.

A. rubricollis, Wall. P. Z. S. 1863, p. 21, pl. iv.

Nisus cirrhocephalus ceramensis, Schleg. M. d. P.-B. Ast. p. 39.

N. erythrauchen, Schleg. Valkv. p. 60, t. 13.

About the size of *N. cirrhocephalus*. Upper part of back fiery reddish brown; sides, belly, and flanks light ash-grey; upper half of inner wing rusty red, with bands. When young of a blackish brown, with rusty-red edges of the wings and rusty-red cross bands on the secondaries. Below rusty yellow, with shaft-stripes on the breast, and arrow-shaped spots on the sides and flanks; lower tail-coverts nearly white; tail with eight or nine moderately wide bands.

Beak and cere 12 mm. high, wing 166 to 214 mm., tail 125 to 168 mm., tarsus 53 to 71 mm., middle digit 31 to 42 mm.

Hab. Ceram, Batjan, Morotai, Halmachera, and Buru.

I have not seen *Acc. poliocephalus*, G. R. Gray (P. Z. S. 1858, p. 170, and P. Z. S. 1859, p. 153), and therefore am not able to place it. A female shot by Mr. Wallace on the Aru Islands has a

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white belly and red cere and feet. The wing is 214 mm. long, and is thus as large as that of *U. erythrauchen*.

As regards *Acc. rufitorques*, Peale, I suspect it to be identical with *A. erythrauchen*, Gray; but I do not know whether the name *rufitorques* is the older one.

Sectio ASTURES.

Of this group only two species have hitherto been found in the Indian archipelago; for the question whether *Leucospiza novæ-hollandiæ* nests there has not yet been settled.

LOPHOSPIZA, Kaup.

These birds resemble *Teraspiza* with respect to the short point of the wings, which is equal to one-fourth the entire length of the wing. The first four primaries on the inner vane emarginated a trifle. Digits clad with three to four little shields before the nails. Middle digit short, as long as the short part of the tarsus, covered with coarse and wide shields in front and behind. Tibial plumes projecting but very little.

1. LOPHOSPIZA TRIVIRGATA, Reinw.

Falco trivirgatus, Reinw. Pl. Col. 303.

Astur indicus (♀), Hodgs. Beng. Sport. Mag. 1838, p. 85.

A. cristatus, G. R. Gray, Ann. Nat. Hist. 1848, p. 371.

A. (Lophospiza) trivirgatus, Kp. Falc. p. 187.

A. trivirgatus, Schleg. Valkv. p. 57, t. 10.

Resembles *Teraspiza virgata*, and has the same habitat. Its white-edged upper tail-coverts or feathers recall *Acc. gabar* and *Acc. monogrammicus*.

Hab. Common on the continent of India and in the archipelago.

2. LOPHOSPIZA GRISEICEPS, Temm.

Falco griseiceps, Temm. MS.

Astur griseiceps, Schleg. Valkv. t. 11; Wall. Ibis, 1864, p. 184, pl. 5.

A. trivirgatus griseiceps, Bp. Consp. p. 31.

Hab. Celebes.

The generic appellation does not accord with this species—a feature which it has in common with many hundred species of other birds.

LEUCOSPIZA, Kaup.

With bent cere, and a strikingly high beak abruptly bent. Middle digit covered entirely with a shield, rather shorter than the more slender tarsus, as far as the latter is covered with a shield. First five primaries indented. When young these birds, like the *Uraspizæ*, whose place they occupy amongst the Astures, have a large number of narrow bands on the tail, which disappear entirely with age. The chest also has bands when young.

LEUCOSPIZA NOVÆ-HOLLANDIÆ, Gmel.

Falco novæ-hollandiæ, Gmel. S. N. i. p. 264.*Astur novæ-hollandiæ*, Cuv. Règ. An. 320; Vig. & Horsf. Linn. Trans. xv. p. 179; Gould, Birds of Austr.; Schleg. Valkv. t. 11.*Falco albus*, Shaw, Gen. Zool. vii. 92; White's Voy. p. 250.*Astur albus*, Sw. Class. of B. ii. p. 215.*Sparvius niveus*, Vieill. N. Dict. d'Hist. Nat. p. 338.*Dædation candidum*, Less. Tr. d'Orn. p. 66.*Falco leucaëtus*, Forst. Descr. Orn. p. 70; Icon. ined. 35.*Astur rayii*, Vig. & Horsf. L. Tr. xv. p. 180.*Falco clarus*, Lath. Ind. Orn. Suppl. p. xiii.*Astur (Leucospiza) novæ-hollandiæ*, Kp. Falc. 197.

This species is also found in New Guinea, but probably only accidentally. There is no doubt that it breeds in the plumage of youth, which has bands. It is also said to prey upon fish.

February 14, 1867.

John Gould, Esq., F.R.S., V.P., in the Chair.

Mr. P. L. Slater read an extract from a letter from Mr. W. T. Blanford, of the Indian Geological Survey, containing a notice of the interesting fact that a species of *Platanista* is common in the river Irrawaddy, probably differing from the species of the Indus and the Ganges.

Mr. P. L. Slater called the attention of the Meeting to several recent additions to the Society's Menagerie, amongst which were:—

1. A Kagu (*Rhinochetus jubatus*), brought to this country in the ship 'Curaçoa,' and acquired by purchase for the Society on the 5th inst. This made up two pairs of this scarce bird now in the Society's Gardens.

2. An additional example of the Mooruk or Bennett's Cassowary (*Casuarius bennetti*), presented by Commodore Sir William Wiseman, Bart., R.N., along with other valuable birds on the 11th inst.

Mr. Slater took this opportunity of also calling attention to the young Cassowary (*Casuarius galeatus*) hatched in the Gardens on the 22nd of June, 1866, which was still in good health and promised to make a fine bird. This was believed to be the only instance of the successful reproduction of this bird that had ever taken place in Europe.

Prof. Newton communicated a notice of a picture which he supposed to represent the Didine Bird (*Didus*, sp.) of the island of

Bourbon, being the same picture as that exhibited by Mr. Tegetmeier at a Meeting of the Society on the 10th of April, 1866*.

This paper will be printed entire in the Society's 'Transactions.'

The following papers were read :—

1. Notice of *Lutronectes whiteleyi*, an Otter from Japan.

By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

Mr. Henry Whiteley, junior, has brought with him from Hakodadi, in Japan, two specimens of a young Otter and their skulls. They appear distinct from the other Otters that are in the British Museum and from all the species I have described in my "Monograph of *Mustelidae*," published in the 'Proceedings of the Society' for 1865. They seem to belong to a peculiar group, which may be called

LUTRONECTES.

The muzzle bald, oblong transverse, with a straight upper and lower edge; the upper edge of the nostril bald. Ears oblong, hairy. Feet rather large; toes strong, webbed, covered with hair above, and bald beneath; toes and palm-pads well developed, those of the palm separated from the toes by a broad bald space; claws strong, acute. Tail conical, covered with hair. Skull elongate; orbit very obscurely defined behind; the flesh-tooth with a large internal lobe about two-thirds of the length of the outer edge.

The toes in this genus are strong, thick, and well webbed, rather larger than in the typical Otters.

The skulls are not quite the normal skulls of the genus *Lutra*, as they have scarcely an indication of any tubercle defining the upper hinder portion of the orbit, and only a very obscure angle on the front of the zygomatic process, defining, or rather separating the lower hinder part of the orbit from the mastoid cavity.

In this respect the skulls are nearly intermediate in form between the skulls of *Hydrogale* and *Barangia*: they have the hinder edge of the orbit above and below rather more defined than in *Hydrogale*, and yet less so than in *Barangia*, where the protuberances that define the orbit behind are much smaller than in *Hydrogale*.

The genus differs from *Hydrogale* in the skin between the pads being bald as in the true Otters (*Lutra*). It agrees with *Hydrogale* and *Lutra* in the muzzle being entirely bald and square between the nostrils; while in *Barangia* the muzzle is entirely covered with hair.

The nose of the skull is short; the nasal aperture very oblique, edged on each side by the narrow intermaxillaries, which are continued up and separate the front half of the nasal from the maxillæ; the infraorbital foramen is very large; the nasal extends back as far as the hinder edge of the maxilla on its sides.

* See P. Z. S. 1866, p. 201.

LUTRONECTES WHITELEYI.

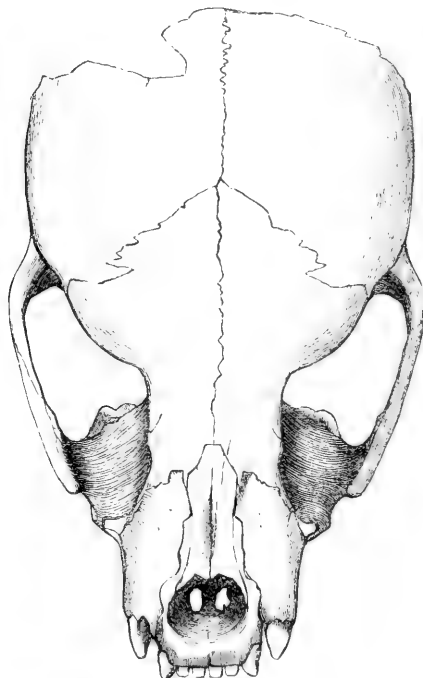
Dark brown ; cheeks, lips, chin, and throat greyish white.

? *Lutra vulgaris*, Temm. Fauna Japonica, 35 ; Schrenck, Reisen in Amurlande, 43.

Hab. Japan.

Like many other Otters, these so closely resemble the Common European Otter that I am not surprised that M. Temminck should have confounded them with that species.

Length of body and head $17\frac{1}{2}$, of tail 10 inches.



Lutronectes whiteleyi.

Skull:—Length about 4 inches (back imperfect) ; width at back of zygomatic arch 2 inches 1 line ; length of palate 1 inch $7\frac{1}{2}$ lines, of tooth-line 1 inch $7\frac{1}{2}$ lines ; width at the upper tubercular grinder 1 inch 5 lines.

The two skulls slightly differ in the size of the teeth and in the width of the palate.

I have great pleasure in naming this species after Mr. Henry Whiteley, junior, of Woolwich, who brought it from Hadodadi in Japan with many other interesting animals, and who has become a martyr to science in the course of his labours as a natural-history

collector. Some ardent "anthropologists" having requested him to procure them some Aino's skulls, he tried to procure them, was informed against by a foreign consul, who did not appreciate science, imprisoned in Japan, and then sent home in confinement. When I first saw him on his return he was almost a living skeleton, in a most pitiable state of bodily and mental prostration. Under good nourishment and nursing he has slowly recovered, and is about to proceed to the Peruvian Andes to continue his labours as a zoological collector.

I may observe that there appear to be two very distinct Otters found in Formosa.

Two imperfect skulls sent by Mr. Swinhoe certainly belong to two very distinct species. The most perfect skull, which wants the cutting-teeth, belongs to the first section of the genus, as defined in my paper above referred to, with moderate-sized tubercular grinders, and a moderate-sized inner lobe to the flesh-tooth.

The second, on the contrary, which only consists of the front portion of the upper jaw, with the teeth in change from the milk to the permanent series, has a very large square tubercular grinder and a very large rounded internal lobe to the flesh-tooth, as in the second section, which I have called *Hydrogale*, in the same monograph.

I propose to indicate this species by the name of *Lutra* (*Hydrogale*) *swinhoei*. It is easily characterized by the small size of the upper cutting-teeth, the series forming only a width of $4\frac{1}{2}$ lines; while the series of most other Indian Otters occupy 6 lines or half an inch, or sometimes rather more.

2. On a New Australian Parrakeet.

By JOHN GOULD, F.R.S. &c.

Mr. Coxen, of Brisbane in Queensland, having forwarded to me a correct drawing of a small species of Parrakeet, new to the Australian avifauna, I hasten to bring it under the notice of the Zoological Society, and to name the bird *Cyclopsitta coxeni*, in honour of the gentleman who has been the first to make us aware of the existence of the species. In size and in some other respects it is nearly allied to the *Cyclopsitta diophthalma* of Mysol, but differs in the absence of scarlet on the crown and the smaller extent of that colour on the cheeks.

CYCLOPSITTA COXENI, Gould.

General plumage green; across the forehead a narrow band of red, which unites through the lores with a large patch of the same hue on the ear-coverts, beneath which is a patch of blue; primaries margined with blue; a patch of red on the tertiaries near the body; tail short and wholly green; bill very stout and of a horn-colour.

Total length $7\frac{1}{2}$ inches, bill $\frac{5}{8}$, wing $3\frac{5}{8}$, tail 2, tarsi $\frac{1}{2}$.

Remark.—In the note accompanying the drawing, Mr. Coxen states that two examples of this bird were procured by Mr. Waller

from a sawyer, who found them in a scrub on the east coast, where he was at work, and where he observed the species moving about in small flocks of from fifteen to twenty in number, and by no means shy.

3. Notes upon some Parrots living in the Society's Menagerie. By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

(Plate XVI.)

In preparing for press a new edition of the List of Vertebrated Animals in the Society's living collection, I have made some notes upon certain species of Parrots now represented in the Society's extensive living series of these birds, which may be worthy of record.

A Maccaw purchased for the Society at Liverpool on the 23rd of August last appears to be quite distinct from the Military Maccaws previously in the collection, differing materially both in its larger size and in the enormous width of the lower mandible. In these birds, therefore, it appears that we have now living side by side in the Parrot-house examples of both the species of "Military Maccaws" figured by Levaillant in his great work on Parrots, the existence of which has been so often denied. That the larger bird, with its enormously crass under mandible, is specifically different from the smaller and more common one can, I think, hardly be denied by those who have seen them both together, although there is but slight difference in the plumage, as far as I can tell from examination of the living birds. The name *militaris* must, I think, be reserved for the smaller of the two species (*L'Ara militaire*, Levaill. Perr. pl. 4), whilst the larger (*Le Grand Ara militaire*, Levaill. pl. 6) must be called *Ara ambigua* (Bechst.), Bechstein's term having been founded upon Levaillant's last-mentioned figure.

The two species may be diagnosed as follows:—

- + *ARA AMBIGUA*: *major*: *rostro majore et mandibula præcipue multo magis crassa*: *pileo obscurius viridi et flavo variegato*: ex Mexico.
- + *ARA MILITARIS*: *minor*: *rostro modico*: *pileo unicolore late viridi*: ex Nov. Granada: rep. Æquat. et Peruvia, inter Andes.

I have no doubt that the smaller is the South American bird, as I have an example of it in my own collection from Bogota. I conjecture, therefore, that the larger one is from Mexico, as Swainson and others have recorded the occurrence of *Ara militaris* in that country.

Another very interesting recent addition to the Society's collection consists of two fine examples of the beautiful Green-tailed Lory of San Cristoval, Salomon Islands (*Lorius chlorocercus*), described by

Mr. Gould in the Society's 'Proceedings' for 1856 (p. 137). The typical specimen of this bird, now in the British Museum, obtained by Macgillivray during the voyage of the 'Herald,' was, I believe, previously unique. The living specimens in question were brought to this country in the ship 'Curagoa,' and acquired by purchase for the Society on the 5th inst. I exhibit a sketch by Mr. Wolf (Pl. XVI.) representing this species.

I have already on more than one occasion spoken of the series of Cockatoos in the Society's Gardens, which is very full and complete*. In my last communication on this subject I proposed to divide the White Cockatoos into two sections, characterized by the form of the crest, which in the one case is pendent, in the other recurved at its extremity. In this it appears that, as I have lately become aware, I had been anticipated by Dr. Schlegel, although I have not yet been able to consult his original article upon this subject†. But in Dr. Schlegel's more recent paper upon the same subject‡, he has fallen into what every one who is acquainted with our living series of *Psittacidae* must allow is a very great error, in stating that *Cacatua ducorspii* and *Cacatua ophthalmica*, as described and figured by me in the articles above referred to, are mere varieties of *C. triton*! Dr. Schlegel is so kind as to add that my descriptions and figures of these birds are "*de nulle utilité pour la science*." To this I have only to reply that I regret to find he has not understood them better. It is true no exact dimensions are stated in my notes; but the birds described were (and still are, I am happy to say) *alive*, and it is not always easy to take exact measurements of living birds. But on reference to my second paper (P. Z. S. 1864, p. 188) it will be found that I have given what I must maintain is an exact and very recognizable diagnosis of *C. ophthalmica*, ending with "*crassitie via minore quam in C. cristata*," which, I consider, is a sufficiently precise account of its size. And in the table above the diagnosis in the same paper I have classed *C. ducorspii* amongst the smaller section of the group, along with *C. sanguinea* and *C. philippinarum*, with which it agrees in size. No naturalist, in fact, after seeing specimens of *C. ophthalmica* and *C. ducorspii*, could regard these two birds as specifically identical. The former is a large species, closely allied to *C. cristata*, as I have already pointed out. The latter is a small species, very closely allied to *C. sanguinea* of Gould, and to be united to that species, if not allowed to stand alone. Neither do I in the least believe that there are any grounds for uniting *C. ophthalmica* to *C. triton*, whatever may be the length of Dr. Schlegel's "series" of specimens of this bird.

The fact is that in this, as in many other cases, Dr. Schlegel is misled by the idea that there are no other species of birds in existence except those represented in the Leyden Museum. In a similar frame of mind he has denied the existence of many other excellent

* See P. Z. S. 1862, p. 141, et 1864, p. 187.

† Jaarb. v. h. Genootschap Natura Artis Magistra v. h. j. 1861.

‡ "Notice sur les Cacatous blancs a houppie jaune," par H. Schlegel (Ned. Tijdschr. v. d. Dierk. 1865, p. 318).

species, until he has obtained examples of them, when their validity is readily acknowledged*.

As regards species of which our excellent Foreign Member has authenticated specimens, every one would wish to hear his views, and will respect them, although he may not agree with them. But it would be certainly more prudent not to condemn in this wholesale manner species with which he is not acquainted autoptically, and described by naturalists in other countries who occasionally have the advantage of examining specimens not yet possessed by the Leyden Museum.

4. A List of Species of Marine Mollusca found in Port Jackson Harbour, New South Wales, and on the adjacent Coasts, with Notes on their Habits, &c. By GEORGE FRENCH ANGAS, F.L.S., C.M.Z.S., &c.—Part I.

[Those species marked with an asterisk (*) have been described from specimens in my own collection.—G. F. A.]

Class CEPHALOPODA.

Fam. OCTOPODIDÆ.

Several species of *Octopus*, including one of very large size (together with species of *Cistopus*, *Pinnoctopus*, *Eledone*, &c.), are occasionally to be met with in Port Jackson. Unfortunately but little attention has hitherto been paid to animals of this class in Australia. A careful examination and description of all the existing species would, however, well repay the researches of a naturalist in that part of the world.

Fam. ARGONAUTIDÆ.

1. ARGONAUTA ARGO.

Argonauta argo, Linn.; Reeve, Conch. Syst. v. 2, pl. 300.

Very large shells of this species of Argonaut are occasionally washed on shore upon the sandy beaches along the coast of New South Wales. It seems to be identical with the *A. argo* of the Mediterranean. Length 10 inches.

2. ARGONAUTA ORYZATA.

Argonauta oryzata, Meusch. Mus. Gev. 252. n. 133.

A. tuberculata, Shaw, Nat. Misc. xxiii. t. 995.

Small examples of *A. oryzata* are now and then found about Port Jackson, and on the beach at Coodgee and Botany Bay. It is in

* E. g. *Dacelo tyro*, G. R. Gray, stated (Musée d. P.-B. *Alcedines*, p. 20) to be = *D. gaudichaudi*! *Tanysiptera nympa* united (*l. c.* p. 43) with *T. dea*! and both subsequently acknowledged to be valid (Ned. Tijdschr. 1865, pp. 250 et 339).

Spencer's Gulf, in South Australia, where this species attains its maximum size, some of the shells measuring from 9 to 11 inches. The largest Port Jackson specimen I have seen does not exceed 5 inches.

Amongst the decapodous Cephalopoda, species of *Loligopsis*, *Onychoteuthis*, *Loligo*, *Sepia*, &c. occur on the coast of New South Wales, but at present they appear to be unidentified.

Fam. AMMONIIDÆ.

3. AMMONIA (LITUUS) LÆVIS.

Lituus lævis, Gray, Cat. Moll. Brit. Mus. (Cephalopoda), pt. i. p. 116.

Spirula lævis, Zool. Voy. Samarang, Moll. pl. 4. f. 2.

The shells of *Lituus* are thrown ashore, after easterly storms, on the sandy beaches outside Port Jackson Heads, especially at Bondi Bay, in company with *Ianthinæ*, *Veilellæ*, and other pelagic creatures. On one occasion I was fortunate enough to meet with the perfect animal enclosing the shell.

Of the pelagic class Pteropoda, the dead shells of several species are cast on shore along the outer beaches, amongst which are those of *Cavolina gibbosa*, Rang, *C. globulosa*, Rang, and *Styliola subulata*, Quoy et Gaim.

Class GASTEROPODA.

Suborder PROBOSCIDIFERA.

Fam. MURICIDÆ.

4. MUREX (PTERONOTUS) ACANTHOPTERUS.

Murex acanthopterus, Lam. Anim. sans Vert. ix. p. 577; Reeve, Conch. Icon. Murex, pl. 16. f. 64.

Of this very rare and elegant species two specimens only were found:—one, an adult example and much beach-worn, at Middle Harbour; the other, a young living specimen, containing the animal, at Watson's Bay, on the reef at low spring tide.

It belongs to the same group of *Murices* as the South Australian *M. triformis*, Reeve. Length 2 inches 3 lines.

5. *MUREX (PTERONOTUS) ANGASI.

Typhis angasi, Crosse, Journal de Conch. 1863, p. 86, pl. 1. f. 2.

This shell, described and figured by M. Crosse, is not a *Typhis*, but a *Murex*, belonging to the same group as *Murex uncinarius*, Lam., from the Cape of Good Hope. It is to be met with under rocks and stones at low water in Watson's Bay, and Middle and North Harbours. Length 10 lines.

6. MUREX (CHICOREUS) PALMIFERUS.

Murex palmiferus, Sowerby, P. Z. S. 1840; Reeve, Conch. Icon. Murex, pl. 4. f. 20.

This species, which is not uncommon in Woolloomooloo Bay and in several localities near Port Jackson Heads, adhering to rocks at very low tides, may be easily recognized by its short compressed fronds, ranging along the varices and the outer lip, so as to form a connected leaf-like frill. Length 2 inches.

Subfam. FUSINÆ.

7. CANTHARUS (TRITONIDEA) ASSIMILIS.

Buccinum assimile, Reeve, Conch. Icon. (*Buccinum*) pl. 12. f. 90.

Under stones at low water, Watson Bay. A pretty little species, transversely ridged, and clouded with purplish brown. Length 7 lines.

8. *CANTHARUS (TRITONIDEA) UNICOLOR.

Tritonidea unicolor, Angas, Proc. Zool. Soc. 1867, p. 110.

A pale fulvous shell, longitudinally ribbed, and transversely ridged throughout with raised striæ. Under stones at very low spring tide at Camp Cove, Port Jackson. Length 6 lines.

9. *TROPHEON HANLEYI.

Trophon hanleyi, Angas, Proc. Zool. Soc. 1867, p. 110.

The whorls of this species are broadly ribbed, sharply nodulous in the middle, and encircled throughout with rough scabrous ridges. It is of a uniform brownish colour, with a white line surmounting the crown of the angular nodules. Under stones at low water. Length 1 inch 2 lines.

10. *TROPHEON PAIVÆ.

Trophon paivæ, Crosse, Journ. de Conch. 1864, p. 278, pl. 11. f. 7.

A broadly ribbed species encircled with scabrous ridges, with the canal somewhat produced and recurved; toothed on the inner edge of the outer lip, and deep purple or yellow within. Under stones, Port Jackson. Length 1 inch.

This species occurs also along the shores of Yorke's Peninsula, South Australia.

Fam. TRITONIDÆ.

11. TRITONIUM AUSTRALE.

Triton australis, Lam. Anim. sans Vert. ix. p. 625.

Murex tritonium-australe, Chemn.

M. nereis (pars), Dillwyn; Reeve, Conch. Icon. Triton, pls. 4, 5. f. 12 a, 12 b.

This noble species is to be met with on the muddy edges of rocks and reefs laid bare at very low spring tides. Farm Cove, Vacluse Bay, and the vicinity of the Heads are its favourite localities. There are two varieties of this species, the one tinged with violet, the other with orange. Length from 4 to 5 inches. A specimen obtained in Middle Harbour measured upwards of 8 inches.

12. TRITONIUM FUSIFORME.

Triton fusiformis, Kiener, Iconog. Coq. viv. p. 36, pl. 5. f. 2.

T. fusiforme is generally distributed, dwelling amongst the rocks in the various bays of Port Jackson. It is a solid, tubercled shell, with an elevated spire, the surface being covered with raised granulated striae, from which the epidermis springs in short curved bristles. Fine large specimens measure $2\frac{1}{4}$ inches in length.

13. TRITONIUM (GUTTURNIUM) EXARATUM.

Triton exaratus, Reeve, Conch. Icon. *Triton*, pl. 13, sp. 50. f. a, b.

This characteristic species is of somewhat rare occurrence. The canal is rather long, and the transverse ridges of the shell stand out boldly, the whorls being peculiarly flat and indented at the sutures. The epidermis forms a long fringe-like frill running along the summits of the varices. Specimens about half the size of the Port Jackson ones are found at Moreton Bay, and a still smaller variety, more or less banded, occurs in Botany Bay. Length 2 inches 3 lines; Botany Bay specimens 13 lines.

14. TRITONIUM (SIMPULUM) OLEARIUM.

Murex olearium, Linn.

M. costatus, Born.

M. parthenopus, Dillw.

Triton succinctus, Lam.

T. lyratum, King, MS. Australian Museum.

This fine species from Port Jackson bears too strong an affinity to the *T. olearium* of Linnæus (which is an inhabitant of the Mediterranean) to allow of its being described as a distinct species. On a careful comparison of specimens from both localities no specific differences present themselves, although the epidermis is more diffuse on those found in Port Jackson. It occurs also at Moreton Bay. Length $4\frac{1}{2}$ inches.

15. TRITONIUM (CABESTANA) SPENGLERI.

Murex spengleri, Chemn.; Reeve, Conch. Icon. pl. 11. f. 36.

Triton spengleri, Lam. Anim. sans Vert. ix. p. 627.

A common species amongst the rocks in Port Jackson, and along the reefs outside the Heads. It is allied to *T. barthelemyi*, Bernardi, and *T. waterhousei*, Ad. & Angas, which occur in South Australia,—also to *T. cutaceum* of the Mediterranean. It ranges from Moreton Bay to Tasmania, and is also found in New Zealand. A very small variety is found in Botany Bay, only an inch long. Length 4 inches.

16. TRITONIUM (CABESTANA) BOLTENIANUM.

Tritonium boltenianum, A. Adams.

A very interesting species, somewhat allied to *T. spengleri*, but smaller, more ponderous and without varices. The young shells are peculiarly inflated, and banded inside with dark purple ridges.

It is very rare, the few specimens known having been obtained on the rocks at Long Bay. Length 2 inches.

17. TRITONIUM (CABESTANA) DOLIARIUM.

Triton doliarius, Lam. Anim. sans Vert. vi. p. 641.

T. africana, A. Ad. (Ichaboe).

A South African species, of which a few examples, evidently conspecific, have been found along the coast of New South Wales. Length 1 inch 6 lines.

18. BURSA (APOLLON) LEUCOSTOMA.

Ranella leucostoma, Lam. Anim. sans Vert. ix. p. 542.

Triton leucostoma, Quoy et Gaim. Voy. de l'Astrolabe; Reeve, Conch. Icon. *Ranella*, pl. 1. f. 4.

This fine large *Ranella*, which has so much the appearance of a *Triton*, seems to be an aberrant form, partaking of the characters of both genera. It is pretty common amongst the crevices of the rocks at low water about Port Jackson, and the coast of New South Wales generally. It is also found in Tasmania, and, according to Dieffenbach, in New Zealand. It varies in colour from dark chocolate with banded varices to a pale reddish fawn-colour, and is covered with a short olive-green epidermis. Length $3\frac{1}{2}$ inches.

Fam. BUCCINIDÆ.

Subfam. NASSINÆ.

19. EBURNA (ZEMIRA) AUSTRALIS.

Eburna australis, Sow. Conch. Ill. f. 5 (not *Cancellaria spirata*, Lam.).

This very interesting shell, which belongs to the subgenus *Zemira* of H. and A. Adams, has been confounded by many authors with the *Cancellaria spirata* of Lam. They are, however, very distinct shells.

Z. australis appears never to have been found anywhere but in Port Jackson, where it is rare and an inhabitant of deep water. My specimens were dredged at a depth of 8 or 10 fathoms, inside the north Head. The outer lip has a small tooth near the fore part, and the columella is smooth and truncated at the base. Length 8 lines.

20. *COMINELLA ADELAIDENSIS.

Buccinum adelaidense, Crosse, Journ. de Conch. 1864, p. 276, pl. 11. f. 6.

This is the only species of *Cominella* I have met with in Port Jackson. It is of a whitish colour, transversely ridged, with the whorls coronately plicate below the sutures. Middle Harbour. Length 1 inch 2 lines.

21. *COMINELLA FILICEA.

Buccinum filiceum, Crosse et Fisch. Journ. de Conch. 1864, p. 346, pl. 3. f. 15, 16.

Under stones at low water. A pretty species, strongly longitudinally ribbed, tessellated and lined with brown. This species also occurs at Yorke's Peninsula, South Australia. Length 1 inch.

22. NASSA (ALECTRION) SUTURALIS, var.

Buccinum suturale, Lam.; Chem. pl. 125. f. 1199, 1200.

Dredged in Port Jackson, near the "Sow and Pigs." This thin, elongated variety, in which the sutural nodules are obsolete, may be distinguished by its smooth whorls, and linear painting flamed and articulated with brown. Length 1 inch 3 lines.

23. NASSA (ALECTRION) JACKSONIANA.

Buccinum jacksonianum, Kien. Mon. Bucc. pl. 19. f. 73.

Dredged in Middle Harbour. The whorls are frequently banded with brown and granulated at the upper part. Length 7 lines.

24. NASSA (NIOTHA) PAUPERATA.

Buccinum pauperatum, Lam. Anim. sans Vert. x. p. 183.

Of this species, so abundant in South Australia and Tasmania, a somewhat thin brownish variety occurs rarely in Port Jackson, in which the granulations upon the longitudinal plicæ are nearly obsolete. Length 7 lines.

25. NASSA (HIMA) RUFOCINCTA.

Nassa rufocincta, A. Ad. P. Z. S. 1851, p. 106.

A pretty species, with an elevated spire and rounded cancellated whorls, belonging to the same group as the British *N. incrassata*, Müll., and *N. compacta*, Ang., from St. Vincent's Gulf, South Australia. Length 7 lines.

26. NASSA (ARCULARIA) MANGELOÏDES.

Nassa mangeloides, Reeve, Conch. Icon. (*Nassa*).

Found on mud-flats at low water. The callus of the inner lip in this species extends over the front of the body-whorl. Length $\frac{1}{2}$ inch.

27. NASSA (ARCULARIA) LABECULA.

Nassa labecula, A. Ad. P. Z. S. 1851, p. 98.

A pretty little species, found on sandy mud at Middle Harbour at low tides; it is stained with yellow and rufous, banded below the sutures with livid purple, and has a blotch of the same colour on the columella-callus. Length 5 lines.

28. *NERITULA (CALLOMPHALA) LUCIDA.

Callomphala lucida, Ad. & Ang. P. Z. S. 1864, p. 35.

From Coodgee Bay, in shell-sand. A white, shining, semipellucid, depressed little shell, with the aperture entire in front, thus wanting the notch of the typical *Neritula*. Length 2 lines.

29. *CYLLENE LACTEA.

Cyllene lactea, Ad. & Ang. P. Z. S. 1863, p. 422.

A milk-white species covered with a thin epidermis, dredged in deep water at Port Stephen. Length 6 lines.

Subfam. PURPURINÆ.

30. PURPURA (POLYTROPA) SUCCINCTA.

Buccinum succinctum, Mart. Univ. Conch. ii. pl. 45.

Purpura rugosa, Lam.

A fine large species, of a yellowish-white colour, very prominently transversely ribbed throughout. Common on rocks at low water generally. Length $2\frac{1}{2}$ inches.

31. *PURPURA (STRAMONITA) NEGLECTA.

Purpura (Stramonita) neglecta, Angas, P. Z. S. 1867, p. 110.

A small ribbed species, with the interstices muricately scaled; purple within. Under stones outside Port Jackson Heads. Length 9 lines.

32. PURPURA (CRONIA) AMYGDALA.

Purpura amygdala, Kiener, Icon. Coq. Viv. pl. 10. f. 26.

Buccinum amygdala, Reeve, Conch. Icon. pl. 8. sp. 60.

The columella and aperture are of an orange cream-colour, and the whorls squamately sculptured and banded with brown fillets. Although frequent at Moreton Bay, this species is rare in Port Jackson, a few examples only having been found. Length 10 lines. Specimens from the north measure $1\frac{1}{2}$ inch.

33. PENTADACTYLUS (SISTRUM) CHAIDEUS.

Purpura chaidea, Duclos, Ann. Scien. Nat. 1832.

P. nassoides, Quoy et Gaim.

A white globular species, somewhat resembling a *Nassa*, and inhabiting New Caledonia, of which I obtained three living specimens amongst the rocks at Nelson's Bay, near Port Jackson. Length 9 lines.

34. PENTADACTYLUS (SISTRUM) TUBERCULATUS.

Purpura tuberculata, De Blainv. Nouv. Ann. du Mus. pl. 9. f. 3.

P. marginalba, De Blainv.

P. granulata, Duclos.

Ricinula tuberculata, Reeve, Conch. Icon. pl. 2. f. 11.

A very common species in Port Jackson, and widely distributed throughout the entire Indo-Pacific province. Easily known by its

rows of large black tubercles on a greyish ground. Length 1 inch 2 lines.

35. *ADAMSIÀ TYPICA*.

Adamsia typica, Dunker, P. Z. S. 1856, p. 357.

Amongst rocks at low water in Port Jackson. Length 1 inch 4 lines.

This genus must be removed from the *Nassinæ*, where it has been placed as a subgenus of *Cominella*, it having a purpuroid operculum. One other species is known (*A. adalaidæ*) from South Australia.

Subfam. RAPANINÆ.

36. *RAPANA (LATIAXIS) NODOSA*.

Latiaxis nodosa, A. Ad. P. Z. S. 1853, p. 98.

An elegant species, squamately sculptured, and nearly white. The aperture sometimes buff, sometimes purple. Watson's Bay and Nelson's Bay. Length 10 lines.

Fam. DACTYLIDÆ.

37. **OLIVELLA PARDALIS*.

Olivella pardalis, Ad. & Ang. P. Z. S. 1863, p. 442, pl. 37. f. 3.

This elegant species was dredged at Watson's Bay, Port Jackson, in 5 fathoms. It may readily be distinguished by three rows of large brown spots encircling the whorls. Length 5 lines.

38. **OLIVELLA LEUCOZONA*.

Olivella leucozona, Ad. & Ang. P. Z. S. 1863, p. 422, pl. 37. f. 23.

Dredged in Port Jackson, in 6 fathoms.

This species must not be confounded with *O. leucozonias*, Gray, from Senegal: the latter is encircled with two narrow white zones; whilst the former has only one, and is moreover of a different style of painting. Length 7 lines.

39. **OLIVELLA NYMPHA*.

Olivella nympha, Ad. & Ang. P. Z. S. 1863, p. 422.

A delicate semiopaque white slender species, with the aperture effuse anteriorly. Dredged at Port Stephen and in Port Jackson, in 5 fathoms. Length 7 lines.

40. *AMALDA MARGINATA*.

Ancillaria marginata, Lam.; Sow. Species Conch. pt. 1. f. 40-43; Reeve, Conch. Icon. pl. 3. f. 8 a, b.

Several specimens of this fine shell were dredged in Port Jackson, near the Heads, and on the "Sow and Pigs" bank. In Tasmania it occurs of a larger size. The Port Jackson examples do not exceed 1 inch 3 lines in length, whilst those from Tasmania are 1 inch 10 lines.

41. AMALDA OBLONGA.

Ancillaria oblonga, Sow. Spec. Conch. p. 7. f. 38, 39; Reeve, Conch. Icon. pl. 8. f. 24 a, b.

A pretty species of a fawn-colour, banded at the sutures with an opaque cream-coloured callosity, which is striped with chestnut; there is also a band of chestnut markings near the lower portion of the last whorl. Dredged near Port Jackson Heads. Length 10 lines.

Fam. VOLUTIDÆ.

42. VOLUTA (SCAPHA) MAGNIFICA.

Voluta magnifica, Chemn. Conch. Cab. xi. p. 8; Reeve, Conch. Icon. *Voluta*, pl. 1. f. 2.

This noble Volute, almost the largest of the genus, seems to attain its maximum growth in Port Jackson. It is now a shell of rare occurrence, and is found half burying itself amongst weed and ooze on sandy and muddy flats beyond tide-mark. Rose Bay, Vaucluse Bay, and Middle Harbour are its favourite localities. It occurs in places along the coast, such as Woollongong, Botany Bay, and Brisbane Water—and extends northwards to Moreton Bay, where the specimens found are tuberculated. Length 12 inches.

43. *VOLUTA (AMORIA) ANGASI.

Voluta angasi, Sowerby, Thes. Conch. *Voluta*, f. 99. sp. 73.

This species (which was formerly confounded with *V. undulata*, Lam.), although plentiful in Tasmania, is rare in Port Jackson. It ranges northwards as far as Richmond River, where its place is supplied by *V. zebra*, Leach. The true *V. undulata* of Lamarek is from Port Lincoln and the Great Australian Bight. Specimens have been found at Middle Harbour and at Cabbage-tree Cove, outside Manly Beach. Length 3 inches. The Tasmanian ones are rather larger, and of a deeper colour.

44. AULICA MARMORATA.

Voluta marmorata, Swainson, Exotic Conch. i. pl. 4.

A rare and elegant shell, of rather light inflated structure, with the whorls sharply tubercled at the upper part and attenuated towards the base. It is of a pale fulvous orange-colour, sparingly painted with waved chestnut lines, descending from the sutures, with two bands formed by a blue clouded shading of the markings. Port tephen and Newcastle, New South Wales. Length $4\frac{1}{2}$ inches.

Fam. MITRIDÆ.

45. MITRA NIGRA.

Mitra nigra, Chemn. (not Quoy) Conch. x. p. 168.

M. melaniana, Lam.

M. carbonaria, Swains.; Reeve, Conch. Icon. *Mitra*, pl. 5. f. 33.

This *Melania*-shaped, smooth, black species is not uncommon under stones at low water, in some parts of Port Jackson. It belongs to the same group as *M. glabra*, which represents it in South Australia and Tasmania. Length 2 inches 8 lines.

46. MITRA SOLIDA.

Mitra solida, Reeve, P. Z. S. 1844; Conch. Icon. *Mitra*, pl. 3. f. 18.

Of this very rare *Mitra*, which is of a fulvous-bay colour, irregularly flaked with white, a single specimen, habitat unknown, was described and figured by Reeve, from the collection of Mr. Norris. A second example, in a living state, was dredged by myself off Middle Head, Port Jackson, in 5 fathoms. It was also obtained in 6 fathoms in Port Jackson, by Mr. MacGillivray, during the voyage of H.M.S. 'Rattlesnake,' and erroneously referred to as *M. sordida* in Prof. Forbes's paper on the "Mollusca" in the Appendix to the account of that voyage. Length 1 inch 6 lines.

47. *MITRA (CANCILLA) STRANGEL.

Cancilla strangei, Angas, P. Z. S. 1867, p. 110.

A pretty little fusiform white shell, with the whorls ridged and cancellated. It somewhat resembles *Mitra isabella* in miniature. Dredged in Middle Harbour. It has also been found at Moreton Bay. Length 7 lines.

Subfam. COLUMBELLINÆ.

48. COLUMBELLA VERSICOLOR.

Columbella versicolor, Sow. P. Z. S. 1832, p. 119; Reeve, Conch. Icon. pl. 11. f. 51 *a*, *b*.

Under stones at low water in Port Jackson. It is also found in New Caledonia and Woodlark Island. Length $\frac{1}{2}$ inch.

49. COLUMBELLA (MITRELLA) SEMICONVEXA.

Buccinum semiconvexum, Lam. Anim. sans Vert. x. p. 171; Reeve, Conch. Icon. pl. 18. f. 95 *a*, *b*.

Common under stones about Watson's Bay. The Port Jackson specimens are smaller and more elongated than those from Tasmania (which are typical), and have not the same flesh-coloured tinge. This is a very variable species; and it is probable that the *C. rosacea* and *C. saccharata* of Reeve are only extreme pink varieties from Tasmania. An orange variety occurs at Lacépède Bay, in South Australia. Length 9 lines.

50. COLUMBELLA (MITRELLA) AUSTRALIS.

Columbella australis, Gaskoin, P. Z. S. 1851, p. 5; Reeve, Conch. Icon. pl. 15. f. 78 *a*, *b*, & 188.

Under stones at low tide, in company with *C. semiconvexa*, from

which it may be known by the contraction of the aperture below and the remarkable frill-like epidermis round the sutures. The apex is papillose in all the specimens I have met with. Length 9 lines.

51. *COLUMBELLA* (*MITRELLA*) *LINCOLNENSIS*.

Columbella lincolnsensis, Reeve, Conch. Icon. pl. 29. f. 184 a, b.

A pretty fusiform species, not unlike *C. corniculata*, Lam., from the Adriatic. Rare, under stones in Port Jackson. The type specimens, as the name imports, are from Port Lincoln in South Australia. Length 6 lines.

52. **COLUMBELLA* (*MITRELLA*) *ALBOMACULATA*.

Columbella albomaculata, Angas, P. Z. S. 1867, p. 111.

A solid fusiform species, mottled with chestnut, and ornamented with clusters of white spots immediately below the sutures. Under stones in Port Jackson. Length 6 lines.

53. *COLUMBELLA* (*MITRELLA*) *PULLA*.

Columbella pulla, Gaskoin, P. Z. S. 1851, p. 6; Reeve, Conch. Icon. pl. 19. f. 106.

A dark-brown species without markings, found under stones in Port Jackson. (Strange, in Cum. Coll.) Length 7 lines.

54. *COLUMBELLA* (*AMYCLA*) *DERMESTOÏDES*.

Columbella dermestoides, Kiener.

C. tessellata, MS. Mus. Cuming; Sow. Thesaurus, pl. 39. f. 123.

This very beautifully tessellated little species is certainly conspecific with the *C. dermestoides* of Kiener, which species, however, is recorded as coming from the West Indies. I have one or two specimens from South Australia, where, as well as in Port Jackson, it is very rare. My specimens were dredged in 5 fathoms of water at Watson's Bay. Length 5 lines.

55. *COLUMBELLA* (*ANACHIS*) *LENTIGINOSA*.

Columbella lentiginosa, Hinds, Moll. Voy. Sulphur.

A very small longitudinally ribbed species, of an olive-brown colour, having a slight tendency to a pale band near the sutures. Under stones in Port Jackson, also Moreton Bay. Length 2 lines.

56. **ÆSOPUS* *FILOSUS*.

Æsopus filusus, Angas, P. Z. S. 1867, p. 111.

An elegant fusiform shell, belonging to the genus *Æsopus* of Gould, with the columella arcuate and smooth, and the whorls closely transversely lirate. The colour is either brown or white. Dredged in Port Jackson. Length 6 lines.

Fam. MARGINELLIDÆ.

57. MARGINELLA (GLABELLA) MUSCARIA.

Marginella muscaria, Lam. Anim. sans Vert. x. p. 441; Reeve, Conch. Icon. pl. 8. f. 29 *a, b*.

This species inhabits deep water in Port Jackson. It may be distinguished by its coating of flesh-coloured enamel, as well as by being the largest species of the genus occurring in that locality. It is found likewise in Tasmania. Length $7\frac{1}{2}$ lines.

58. MARGINELLA ATTENUATA.

Marginella attenuata, Reeve.

A transparent, horny, attenuated species, dredged in Port Jackson. Length $4\frac{1}{2}$ lines.

59. MARGINELLA TRANSLUCIDA.

Marginella translucida, Sow. in Coll. Cuming.

A solid, white, shining species, with an elevated spire. Dredged at Port Stephen. Length 4 lines.

60. MARGINELLA TURBINATA.

Marginella turbinata, Sow. Thes. Conch. *Marginella*, p. 385, pl. 75. f. 70, 71.

Stouter than the preceding, with the spire shorter, and having in some specimens a crenulated plication round the upper part of the whorls. Dredged in Middle Harbour. Length 4 lines.

61. MARGINELLA SIMPLEX.

Marginella simplex, Reeve, Conch. Icon. pl. 22. f. 115.

Tinged with flesh-colour on the back; spire very short. Dredged in Port Jackson. Length $3\frac{1}{2}$ lines.

62. MARGINELLA (CRYPTOSPIRA) OVULUM.

Marginella ovulum, Sow. Thes. Conch. p. 401, pl. 78. f. 188.

White or flesh-colour. The last whorl is produced over the spire. Dredged in Port Jackson and Port Stephen. Length $4\frac{1}{2}$ lines.

Fam. CASSIDIDÆ.

63. CASSIS ACHATINA.

Cassis achatina, Lam. Anim. sans Vert. x. p. 33; Reeve, Conch. Icon. *Cassis*, pl. 10. f. 28 *a, b*.

This very beautifully variegated shell, though rare, is to be met with in several parts of Port Jackson, and also at Woollongong and Port Stephen. The Rev. Mr. Hannah collected some specimens at Algoa Bay, Cape of Good Hope—a remarkable circumstance, as the species is very local in Australia, being confined, as far as we are

aware, to a few spots on the south-east coast. It inhabits deep water. Length $2\frac{1}{2}$ inches.

64. *CASSIS PYRUM*.

Cassis pyrum, Lam. Anim. sans Vert. x. p. 33.

Cassis zeylanica, Lam.; Reeve, Conch. Icon. *Cassis*, pl. 11. f. 29 a, b, c.

This species (to which the *C. paucirugis* of Menke approximates so closely as to render it difficult to separate them) is an inhabitant of rather deep water, like most of the genus, and occurs sparingly in Port Jackson, Port Stephen, and Botany Bay. It is also to be found in Tasmania, and on the west coast of New Zealand, where the examples are beautifully painted with bands of brown wavy spots. Length $2\frac{1}{2}$ inches.

Fam. DOLIIDÆ.

65. *DOLIUM VARIEGATUM*.

Dolium variegatum, Lam. Anim. sans Vert. x. p. 133.

D. kieneri, Phil.; Reeve, Conch. Icon. *Dolium*, pl. 5. f. 7 a.

This fine large *Dolium* is the only species of this somewhat restricted genus which is to be found as far south as Botany Bay and Port Jackson. It is a thin, globose, inflated shell, having the transverse ribs more or less spotted with brown. In Botany Bay, upon the "Seven-mile beach," very large specimens, mostly broken, are washed ashore after easterly gales. Its habitat extends all round North Australia, and westward as far south as King George's Sound. Length 7 inches.

Fam. NATICIDÆ.

66. *NATICA MAROCHIENSIS*.

Natica marochiensis, Lam. Anim. sans Vert. viii. p. 642; Reeve, Conch. Icon. *Natica*, pl. 13. f. 52.

This species, which varies considerably in the pattern of its colouring, though nearly constant in form, seems to be of almost world-wide distribution. The Port Jackson specimens are from Middle Harbour. In the Sandwich Islands, New Caledonia, the Mauritius, and Madagascar, as well as along the north-east coast of Australia, it occurs pretty generally. North Africa and the West Indies are cited by old authors as its habitat. Length of the largest Port Jackson specimen 1 inch.

67. *NATICA (LUNATIA) PLUMBEA*.

Natica plumbea, Lam. Anim. sans Vert. viii. p. 632.

N. sordida, Swains.; Reeve, Conch. Icon. *Natica*, pl. 9. f. 34 a, b.

A fine species, of a turbinated form and dark leaden-grey colour, having the columella tinged with red. It occurs on the sands at Middle Harbour and in Botany and Broken Bays, at low water, burying itself just beneath the surface. Length $1\frac{3}{4}$ inch.

68. NATICA (LUNATIA) MELASTOMA.

Natica melastoma, Swainson, Zool. Illust. pl. 79; Reeve, Conch. Icon. *Natica*, pl. 18. f. 78.

A handsome species, less conical than *N. plumbea*, of a fulvous-ashy tint, with a coloured band below the suture, and having the umbilicus overspread by an orange-red callosity. It inhabits a similar locality to the preceding; and may be distinguished from *N. strangei* by its less conical form and filled up umbilicus. Length $1\frac{1}{2}$ inch.

69. NATICA (LUNATIA) STRANGEI.

Natica strangei, Reeve, Conch. Icon. pl. 18. f. 81.

Like *N. plumbea* in form, bluish-ashy colour, with a red border round the umbilical area, and a paler band of the same colour below the sutures. Rare in Port Jackson. It extends northwards to Cape York. Length 1 inch 2 lines.

70. NATICA (NEVERITA) CHEMNITZII.

Natica chemnitzii, Récluz, Mus. Cuming; Reeve, Conch. Icon. *Natica*, pl. 2. f. 7.

This large species is nearly allied to *N. lamarchiana*, but is more conical, and has the umbilicus more covered by a callosity, which is divided in the middle. It is found on the sandy mud at low water in Middle Harbour and at Botany Bay. Length 2 inches.

71. NATICA (NEVERITA) LAMARCKIANA.

Natica lamarchiana, Récluz, MS. Mus. Cuming; Reeve, Conch. Icon. *Natica*, pl. 2. f. 6.

A globular depressed species, with the umbilicus largely angularly excavated and half covered by a grooved recurved callosity. Rare in Port Jackson. Length of my specimen 1 inch.

72. *AMAUROPSIS MORCHI.

Amauropsis morchi, Adams & Angas, P. Z. S. 1863, p. 423.

A dark-brown horny-looking shell, in aspect something like a small *Vivipara*, with a very acute spire, and the whorls obtusely angled at the sutures. The operculum is thin, horny, and subspiral. Only two examples of this interesting species have been obtained; they were found adhering to the under surface of a large stone, at Watson's Bay, just inside Port Jackson Heads, during an unprecedently low tide. Length 5 lines.

73. NATICINA NITIDA.

Naticina nitida, Reeve, Conch. Icon.

Dredged near Spectacle Island. Several small specimens of this species were dredged at the above locality. It occurs also in South Australia. Length $\frac{1}{2}$ -inch.

74. RUMA UMBILICATA.

Naticina umbilicata, Quoy, Voy. de l'Astrol. ii. p. 224, pl. 66. f. 22, 23.

A few small colourless examples of this species (which in Tasmania and South Australia is handsomely banded with brown) were dredged in Port Jackson. Length of Port Jackson specimens 6 lines; Tasmanian specimens 1 inch.

75. CATINUS ZONALIS.

Sigaretus zonalis, Quoy et Gaim. Voy. de l'Astrol. v. p. 2, pl. 66. f. 1-3.

This species, so common to the westward, is very rarely met with in Port Jackson. Length 10 lines.

Fam. LAMELLARIIDÆ.

76. LAMELLARIA INDICA.

Marsenia indica, Leach.

A thin, transparent, white species, somewhat resembling the British *L. perspicua*, Linn., only four times as large. The animal covers the shell. Found on Coodgee Beach, washed up amongst shell-sand. Length 11 lines.

This shell must not be confounded with *Coriocella nigra* of Quoy.

Fam. SCALIDÆ.

77. SCALA SCALARIS.

Turbo scalaris, Linn.

Scalaria pretiosa, Lam.; Sow. Thes. pl. 32. f. 17.

Of this fine shell (the well-known "Wentle-trap" of the China seas) two or three small-sized specimens have been obtained, washed ashore upon the beaches outside Port Jackson. Length of largest New South Wales specimen $\frac{1}{2}$ inch.

78. SCALA LINEOLATA.

Scalaria lineolata, Kien.; Sow. Thes. pl. 33. f. 45, 46, 48.

An elegant little species, short and stout, having one or more brown bands on the whorls. Dredged in deep water in Port Jackson. It occurs also in the Philippines and Japan. Length 5 lines.

79. SCALA PHILIPPINARUM.

Scalaria philippinarum, Sow. P. Z. S. 1844; Thes. Conch. pl. 32. f. 1-3.

An acuminate white species, with rather distant, thin, oblique varices. Dredged in Port Jackson; found also in Amboyna and the Philippines. Length 10 lines.

80. *SCALA JUKESTANA*.

Scalaria jukesiana, Forbes, Appendix to Voy. of Rattlesnake, p. 383, t. 3. f. 7.

A lanceolately turreted graceful little shell, with numerous thread-like varices, bearing some resemblance to *S. clathratulus* of the seas of Europe. Dredged in Port Jackson. Length 5 lines.

81. *SCALA (OPALIA) AUSTRALIS*.

Scalaria australis, Lam. Anim. sans Vert.; Sow. Thes. Conch. pl. 35. f. 135.

Shell opaque white, many-whorled, and tapering to a sharp point; stoutly variced, those on the last whorl terminating in keel. Found under stones and in crevices of rocks at low tides outside Port Jackson Heads, at Manly Beach, Long Bay, and Wollongong. The animal emits a purple fluid. Length 1 inch 4 lines.

Another species of *Opalia* (*O. granulosa* of Quoy) is found in South Australia.

Fam. PYRAMIDELLIDÆ.

82. **TURBONILLA NITIDA*.

Turbonilla nitida, Angas, P. Z. S. 1867, p. 112.

An elegant shining species, closely and strongly longitudinally ribbed. Dredged in Watson's Bay. Length 5 lines.

83. **ODOSTOMIA LEVIS*.

Odostomia levis, Angas, P. Z. S. 1867, p. 112.

A rather thin milk-white shell, with a strong transverse fold on the columella. Dredged in Watson's Bay. Length $3\frac{1}{2}$ lines.

84. **ODOSTOMIA LACTEA*.

Odostomia lactea, Angas, P. Z. S. 1867, p. 112.

A slender white shining species, with the sutures channelled, and a very prominent slight oblique fold on the columella. Dredged at Watson's Bay. Length $2\frac{1}{2}$ lines.

85. **ODOSTOMIA (PARTHENIA) PASCOEI*.

Odostomia pascoei, Angas, P. Z. S. 1867, p. 112.

Whorls longitudinally plicate, with the last whorl ventricose and the outer lip arcuate. Dredged in Port Jackson. Length 4 lines.

86. **ODOSTOMIA (PARTHENIA) KREFTI*.

Odostomia krefti, Angas, P. Z. S. 1867, p. 112.

A smaller species than the preceding, with similar sculpture, the last whorl narrower, and the outer lip straight. Dredged in Port Jackson. Length 3 lines.

87. **STYLOPTYGMA AURANTIACA*.

Styloptygma aurantiaca, Angas, P. Z. S. 1867, p. 112.

A narrow acuminate rather thin shell, of a pale orange-colour, with the whorls finely transversely striated and the columella fold scarcely developed. Length $2\frac{1}{2}$ lines.

88. *CINGULINA CIRCINATA*.

Cingulina circinata, A. Ad. Ann. & Mag. Nat. Hist. Dec. 1860.

Acuminately pyramidal, with the whorls transversely grooved. Dredged in Port Jackson. Length $3\frac{1}{2}$ lines.

Fam. EULIMIDÆ.

89. **EULIMA PROXIMA*.

Eulima proxima, Sow. Conch. Icon. pl. 6. f. 48.

Dredged in Port Jackson. Length 8 lines.

90. *EULIMA ACICULA*.

Stylifer acicula, Gould, Exped. Shells.

A small shining vitreous shell, of which a few specimens were found in Port Jackson in deep water. Length 4 lines. In Fiji it is found parasitic on the bêche-de-mer.

91. **MUCRONALIA MUCRONATA*.

Eulima mucronata, Sow. Conch. Icon. pl. 6. f. 42.

A remarkable little shell, white and shining, having something of the aspect of a *Eulima*, with the spire terminating in a nipple. Described by Mr. Sowerby from the type specimen in my collection, which is unique. Dredged in Port Jackson. Length 5 lines.

92. **LEIOSTRACA ACUTISSIMA*.

Leiostraca acutissima, Sow. Conch. Icon. pl. 2. f. 10 a, b.

A very slender, white, semitransparent species, dredged in Port Jackson; also unique in my cabinet. Length 4 lines.

Fam. ARCHITECTONICIDÆ.

93. *ARCHITECTONICA REEVEI*.

Solarium reevei, Hanley; Sow. Thes. Conch. *Solarium*, sp. 16, pl. 1. f. 9, 10.

Deep water, in Port Jackson, very rare. A small conoid species, of a pale livid colour, spotted with brown at the sutures. Height 6 lines, breadth 1 inch.

94. *PHILIPPIA LUTEA*.

Solarium luteum, Lam.; Sow. Thes. Conch. *Solarium*, sp. 25, pl. 4. f. 52-54.

Deep water, Port Jackson. This species appears identical with *S. luteum*, Lam., from the Mediterranean. The only difference is that the spots on the sutural ridges are darker in the Australian specimens. Height $3\frac{1}{2}$ lines, breadth 6 lines.

Suborder TOXIFERA.

Fam. TEREBRIDÆ.

95. *ACUS (ABRETIA) BICOLOR.

Acus bicolor, Angas, P. Z. S. 1867, p. 111.

A whitish species, with the whorls more or less longitudinally ribbed, and the lower portion of the last whorl stained with violet chestnut. Dredged in Port Jackson. Length $7\frac{1}{2}$ lines.

96. *ACUS (ABRETIA) ASSIMILIS.

Acus assimilis, Angas, P. Z. S. 1867, p. 111.

In this species the whorls are more rounded, strongly ribbed, and shaded with brown towards the sutures. The last whorl has a white band, and is stained with dark brown below. Dredged in Port Jackson. Length 6 lines.

97. *ACUS (EURYTA) TRILINEATA.

Euryta trilineata, A. Adams & Angas, P. Z. S. 1863, p. 418, pl. 37. f. 13.

An elegant fusiform shell, with the whorls longitudinally plicate and encircled with two or three brown thread-like lines. Dredged in deep water, near Port Jackson Heads. Length 7 lines.

Fam. TURRITIDÆ.

Subfam. TURRITINÆ.

98. *BELA MITRALIS.

Bela mitralis, Ad. & Ang. P. Z. S. 1863, p. 420.

A pale yellow elongated species, ornamented with a band of red spots at the suture of the last whorl. Dredged in Port Jackson. Length 8 lines.

99. DRILLIA (CRASSISPIRA) OWENI.

Pleurotoma oweni, Gray, MSS.; Reeve, Conch. Icon. pl. 9. sp. 70.

An elegant species, of a pale ash-colour, with the whorls plicately nodulated at the upper part and the lower whorl beautifully nodulously cancellated. Dredged in Port Jackson in deep water. Length 1 inch 3 lines.

100. DRILLIA RADULA.

Pleurotoma radula, Hinds, Moll. Voy. Sulphur, pl. 5. f. 9.

Deep water, Port Jackson. Length 1 inch.

101. *DRILLIA VEXILLUM*.

Pleurotoma vexillum, Reeve, P. Z. S. 1845, p. 115; Conch. Icon. pl. 29. f. 264.

A fine species, with the whorls nodulously plicate, broadly banded with white on a chocolate ground. Middle Harbour, Port Jackson. Length 1 inch 2 lines.

102. **DRILLIA METCALFEI*.

Drillia metcalfei, Angas, P. Z. S. 1867, p. 113.

Deep water. Length $7\frac{1}{2}$ lines.

103. **DRILLIA COXI*.

Drillia coxi, Angas, P. Z. S. 1867, p. 113.

An elegant pale fulvous species, with the whorls nodulous and encircled with fine striæ. Dredged in Port Jackson. Length 9 lines.

104. **DRILLIA BERAUDIANA*.

Pleurotoma beraudiana, Crosse, Journ. de Conch. 1863, p. 88, pl. 1. f. 6.

In this species the whorls are strongly nodulous. Dredged in Port Jackson in deep water. Length $7\frac{1}{2}$ lines.

105. **DRILLIA ANGASI*.

Pleurotoma angasi, Crosse, Journ. de Conch. 1863, p. 87, pl. 1. f. 5.

Rather smaller and more slender than the preceding species, with the whorls stoutly plicate. Dredged in Port Jackson. Length 6 lines.

Subfam. CLATHURELLINÆ.

106. **CLATHURELLA RETICOSA*.

Clathurella reticosa, Ad. & Ang. P. Z. S. 1863, p. 420.

A pretty cancellated species. Dredged in Middle Harbour. Length 6 lines.

107. **CLATHURELLA ZONULATA*.

Clathurella zonulata, Angas, P. Z. S. 1867, p. 113.

Brownish, banded with ashy grey. Dredged in Port Jackson. Length 4 lines.

108. *DAPHNELLA CREBRIPPLICATA*.

Pleurotoma crebriplicata, Reeve, Conch. Icon. pl. 34. f. 313.

An elegant fusiform shell, with the whorls finely reticulately cancellated. Dredged in Port Jackson. Length 8 lines.

109. *DAPHNELLA LYMNÆFORMIS*.

P. lymnæformis, Kiener; Reeve, Conch. Icon. pl. 35. f. 325.

Smaller than the preceding; painted with brown lines. Dredged in Middle Harbour. Length 6 lines.

110. *CITHARA COMPTA.

Cithara compta, Ad. & Ang. P. Z. S. 1863, p. 419, pl. 37. f. 5.

Dredged in Port Jackson. Found also in South Australia. Length 6 lines.

111. *MANGELIA PICTA.

Mangelia picta, Ad. & Ang. P. Z. S. 1863, p. 419, pl. 37. f. 7.

Prettily banded with purple and white, on a fulvous ground. Dredged in Port Jackson. Length 6 lines.

112. *MANGELIA LETOURNEUXIANA.

Pleurotoma letourneuxiana, Crosse, Journ. de Conch. 1865, p. 425, pl. 11. f. 7.

An elegant fusiform species, longitudinally plicately ribbed and transversely striated. Dredged in Middle Harbour. Length 6 lines.

Fam. CONIDÆ.

113. CONUS MACULOSUS.

Conus maculosus, Sow.

C. maculatus, Sow. Thes. *Conus*, pl. 13. f. 296.

In the 'Conchologia Iconica' Mr. Reeve figures this species as "var. b" of *C. anemone*, Lam. (see pl. 25. f. 139 a). It is, however, a very distinct species, as a comparison of a number of specimens in various stages of growth tends to prove. *C. maculosus* is a nearly smooth, thin, peculiarly inflated shell, richly mottled with purplish brown, and attains a larger size than *C. anemone*, which is of a true conical form, more solid, finely transversely striated, with an elevated spire, and splashed with rose-brown or orange. *C. anemone*, moreover, is an inhabitant of South Australia, and never occurs in Port Jackson, where *C. maculosus* is to be found under rocks and large stones, at low spring tides, in many situations. At Watson's Bay I have taken as many as ten living specimens from beneath one stone. This species is found in the Philippine Islands, on the authority of the late Mr. Cuming. Length of the largest Port Jackson specimen $2\frac{1}{2}$ inches.

114. CONUS JUKESEI.

Conus jukesii, Reeve; Sow. Thes. *Conus*, pl. 13. f. 297.

A very angular species, peculiarly mottled with bluish grey and olive, first met with by Mr. Jukes during the voyage of H.M.S. 'Fly' on the north coast of Australia. I have obtained several fine living specimens (one of which was perfectly white) in Port Jackson, in company with *C. maculosus*. Its maximum size is 1 inch 4 lines.

115. *CONUS GRAYI*.

Conus grayi, Reeve, P. Z. S. 1843, p. 179; Conch. Icon. pl. 46. f. 258.

A somewhat elongated shell, smooth above, ridged below, and handsomely painted with two rows of large waved blackish spots. This species is of very rare occurrence. Under rocks at Middle Harbour at low spring tide. Length 11 lines.

Suborder ROSTRIFERA.

Fam. CYPRÆIDÆ.

116. *CYPROVULA UMBILICATA*.

Cypræa umbilicata, Sow. in Tank. Cat. 2260.

Cyprovula umbilicata, Gray, P. Z. S. 1849, p. 125.

Several living specimens of this rare shell were dredged in deep water, at a distance of two miles off the coast of New South Wales, a little to the southwards of Wollongong, by Commodore Loring, C.B., when commanding H.M.S. 'Iris.' They are somewhat smaller and paler in colour than the ordinary Tasmanian examples. Length of the New South Wales specimens 3 inches.

117. *CYPRÆA VITELLUS*.

Cypræa vitellus, Linn.; Lister, Conch. pl. 693. f. 40.

This species, so abundant throughout the Indo-Pacific molluscan province, is rarely met with in Port Jackson. The few that have been obtained alive in Woolloomooloo Bay and at Coorunulla beach are rich in colour and moderately large. Length of largest Coorunulla specimen 2 inches 3 lines.

118. *CYPRÆA CAPUT-SERPENTIS*.

Cypræa caput-serpentis, Linn.; Lister, Conch. pls. 701, 702. f. 49, 50.

Like *C. vitellus*, this species, although one of the most abundant within the tropics, is rare in Port Jackson, only three or four specimens having been found at Manly Beach and Long Bay, which may be considered its furthest southern limit. The young shells are ash-coloured, with a dark central band. Length $1\frac{1}{2}$ inch.

119. *CYPRÆA ASELLUS*.

Cypræa asellus, Linn.; Encyc. Méth. pl. 356. f. 5.

Several specimens of this species were dredged in Port Jackson Harbour by the late Fred. Strange. I obtained three examples myself at Long Bay, between Port Jackson and Botany Heads. They are larger and the bands more deeply coloured than those from Ceylon. Length 9 lines.

120. *CYPRÆA CLANDESTINA*.

Cypræa clandestina, Linn.; Wood, Ind. Tes. pl. 3. f. 17.

C. monilaris, Lam.

Outer Manly Beach and Watson's Bay have produced a few specimens of this delicately zigzag-lined species. It is found in crevices of rocks at very low spring tides. At Moreton Bay it is more abundant, being found in company with *C. annulus*, *C. erosa*, *C. caput-serpentis*, and others, in those clusters of oysters called 'ningi-ningi' by the blacks, which are exposed at low tides on the shores of Stradbroke Island. Length 8 lines.

121. CYPRÆA CARNEOLA.

Cypræa carneola, Linn.; Lister, Conch. pl. 664. f. 8.

This species, abundant further to the north, is sometimes met with at Long Bay, between Botany and Port Jackson Heads. Length $1\frac{1}{2}$ inch.

122. CYPRÆA XANTHODON.

Cypræa xanthodon, Gray; Sow. Conch. Illus. f. 18.

A very rare species in Port Jackson, of which I found two living examples at Watson's Bay. Length 14 lines.

123. CYPRÆA ERRONES.

Cypræa erronea, Linn.; Wood, Index Test. pl. 17. f. 39.

Young specimens of this species, so common within the tropics, are found, though rarely, at outer Manly Beach. Length 1 inch.

124. CYPRÆA FELINA.

Cypræa felina, Gmel., Wood, Index Test. pl. 17. f. 26.

A single example of this common Indian *Cypræa* was found by me at Middle Harbour. Length 9 lines.

125. CYPRÆA PIPERATA.

Cypræa piperata, Gray; Sow. Conch. Ill. f. 24.

Rare in Port Jackson. In South Australia this species is abundant. The New South Wales specimens yet obtained are all young, and are spotted in bands somewhat like *C. bicolor* of Gaskoin, which may be only a variety of this species.

126. CYPRÆA MACULA.

Cypræa macula, A. Ad.

Of a greyish colour, freckled with chestnut, with dark spots round the basal margin. It is conspicuously characterized by a large chestnut blotch on the back of the shell. Rare in Port Jackson. Found also in Moreton Bay, and Japan (A. Adams). Length 10 lines. A good species, unlike any other, and *certainly not* a variety of *C. fimbriata*.

127. TRIVIA AUSTRALIS.

Cypræa australis, Lam.; Sow. Conch. Illus. f. 29.

Trivia australis, Gray.

This pretty species of *Trivia* may readily be distinguished by the liver-coloured blotches on the back of the shell. It is found amongst the rocks and under stones at low spring tides. Length 6 lines.

Fam. AMPHIPERASIDÆ.

128. AMPHIPERAS HORDACEA.

Ovulum hordaceum, Lam. Anim. sans Vert. x. p. 471; Reeve, Conch. Icon. pl. 8. f. 37.

A beautiful little elongated species, of a bright orange-colour, transversely striated, with the outer lip dentately serrated. A single specimen only was found, attached to the same branch of *Gorgonia* from which the following species was procured. On comparing it with examples of *A. hordacea* from Borneo it appears more shouldered and compact, with the sculpture stronger and the aperture narrower and more compressed. Until an opportunity offers of examining more specimens, I should hesitate to separate it from *A. hordacea*. Length $3\frac{1}{2}$ lines. Bornean specimens $5\frac{1}{2}$ lines.

129. *VOLVA ANGASI.

Ovulum angasi, A. Adams, MS. in Mus. Cuming; Reeve, Conch. Icon. pl. 10. f. 43 a, b.

Of this fine species, which somewhat resembles *Ovulum subreflexum*, Sow., I obtained two live specimens on a branch of red *Gorgonia* amongst the rocks at Watson's Bay, during an unprecedentedly low spring tide. No other specimens have been found. Length 1 inch 3 lines.

Fam. STROMBIDÆ.

130. STROMBUS (CANARIUM) LUHUANUS.

Strombus luhuanus, Linn. Syst. Nat. (12th edit.) p. 1209; Reeve, Conch. Icon. *Strombus*, pl. 9. f. 19.

This species occurs at the "Bottle and Glass" rocks, Vacluse Bay, on the southern side of Port Jackson, to which spot it appears to be exclusively confined. Following the coast northwards it again makes its appearance in great numbers at Moreton Bay, and is widely extended thence over the whole of the Indo-Pacific molluscan province. The Port Jackson specimens are smaller and lighter in colour than those from the tropics. Length 2 inches 6 lines.

131. STROMBUS (CANARIUM) FLORIDUS.

Strombus floridus, Lam. Anim. sans Vert. ix. p. 707.

S. mutabilis, Swainson.

This little *Strombus*, so variable in form and markings, is found in company with *S. luhuanus*, at the same locality in Port Jackson. It is not at all common there, and displays the same paleness of colour. It is one of the most abundant species of the tropics, and ranges from East Africa to Tahiti. Length 1 inch 2 lines.

Fam. APORRHAIIDÆ.

132. PELICARIA SCUTULATA.

Buccinum scutulatum, Martyn, Univ. Conch. t. 55.

Struthiolaria oblita, Sow.

The remarkable genus *Struthiolaria* has its headquarters in New Zealand. Of the allied genus *Pellicaria* of Gray, *P. scutulata* (the only species yet described) is found on the Australian coast. It lives on the sand in moderately deep water, and has been dredged at Watson's Bay, inside Port Jackson Heads, and at Middle Harbour. On the beach at Port Aiken fine adult specimens are occasionally washed ashore after a south-east gale. Length 2 inches.

Fam. CANCELLARIIDÆ.

133. CANCELLARIA GRANOSA.

Cancellaria granosa, Sow. Conch. Illus. *Cancellaria*, no. 15. f. 16, 17.

This fine species is nearly allied to *C. undulata*, Sow., from Port Elliott, South Australia. It is found in deep water, in Middle Harbour, Port Jackson. Dead specimens are occasionally washed ashore at Edwards's Bay, but it is rarely met with in good condition. The *C. australis*, Sow., and *C. lævigata*, Sow. (described from shells in the late G. Humphrey's collection that were *stated* to have come from New South Wales), I have never met with. Length 1 inch 7 lines.

Fam. CERITHIIDÆ.

134. BITTIUM GRANARIUM.

Cerithium granarium, Kiener, Icon. Coq. Viv. p. 72, pl. 19. f. 3.
Bittium lacertinum, Gould.

Common under stones at low water in Port Jackson. Length 8 lines.

135. LAMPANIA AUSTRALIS.

Cerithium australe, Quoy, Voy. de l'Astrolabe, pl. 55. f. 7.

Abundant in Port Jackson, on mud, and amongst rocks at low water. Length $1\frac{1}{2}$ inch.

136. POTAMIDES EBENINUM.

Cerithium ebeninum, Brug. Dict. no. 26.

Strombus aculeatus, Gmel.

This fine species occurs in great numbers on the mud-flats in Woomooloo Bay, and other similar localities in Port Jackson, Botany Bay, and Brisbane Water. Length 4 inches.

Fam. CERITHIOPSIDÆ.

137. TRIPHORIS NIGROFUSCUS.

Triphoris nigro-fuscus, A. Ad. P. Z. S. 1851, p. 278.

Under stones at low water, Port Jackson. Length 4 lines.

138. *TRIPHORIS LABIATUS*.

Triphoris labiatus, A. Ad. P. Z. S. 1851, p. 279.

Under stones, low water, Port Jackson. Length 3 lines.

Fam. LITTORINIDÆ.

139. *LITTORINA MAURITIANA*.

Phasianella mauritiana, Lam. Anim. sans Vert. ix. p. 244.

Littorina unifasciata, Gray.

? *L. levis*, Phil.

Very abundant on rocks between tide-marks, and creeping up far above high-water mark, all along the coast of New South Wales. This species extends from New South Wales to Swan River. Length 10 lines.

140. *TECTARIUS PYRAMIDALIS*.

Littorina pyramidalis, Quoy, Voy. de l'Astr. pl. 33. f. 12-15.

Equally common, and occurring in similar places, with *L. mauritiana*.

141. *RISELLA LUTEA*.

Trochus luteus, Quoy et Gaim. Voy. de l'Astr. p. 271, pl. 62. f. 8-11.

T. cicatrosus, Jonas, 1843, in Phil. Abbild. *Trochus*, pl. 2. f. 2.

This species, the most conical of the genus, is common on the rocks outside Port Jackson, and along the coast to Kiama and Jervis Bay. Length 10 lines.

142. *RISELLA PLANA*.

Trochus planus, Quoy et Gaim. Voy. de l'Astr. p. 274, pl. 62. f. 13, 14.

Very abundant on rocks between tide-marks. Found also in South Australia. A depressed species, 5 lines in height, with the diameter of the base 1 inch.

143. *RISELLA NANA*.

Trochus nanus, Lam. Anim. sans Vert. Gen. *Trochus*, no. 67.

Littorina australis, Gray, Beechey's Voy. Zool. p. 141.

This species, which may be distinguished by the black bands in the interior of the aperture, is found occasionally in Port Jackson, in company with *R. plana*. In Tasmania it is abundant. Height 5 lines, diameter of base 7 lines.

144. **FOSSARINA PATULA*.

Fossarina patula, Adams & Angas, P. Z. S. 1863, p. 424, pl. 37. f. 9, 10.

Two specimens only of this interesting form were obtained, during PROC. ZOOL. SOC.—1867, No. XIV.

an unusually low tide, adhering to the under surface of a stone at Watson's Bay. Length 3 lines.

Fam. PLANAXIDÆ.

145. *PLANAXIS* (NINEA) MOLLIS.

Planaxis mollis, Sow. Genera, ii, *Planaxis*, f. 2.

A smooth white shell, covered with a brownish-yellow epidermis. Not uncommon amongst the rocks at low water at Coodgee Bay, and along the coast to Wollongong. Length 9 lines.

146. **ALABA PHASIANELLA*.

Alaba phasianella, Angas, P. Z. S. 1867, p. 113.

A beautiful semitransparent little species, somewhat resembling *A. pulchra* of A. Ad., but much more elongated, with the whorls flamed at the sutures, and irregularly dotted and line-painted with brown. Found amongst sea-weed in Port Jackson. Length 3 lines.

Fam. RISSOIDÆ.

147. **RISSOINA VARIEGATA*.

Rissoina variegata, Angas, P. Z. S. 1867, p. 113.

This species is white, either banded with livid purple or ornamented with zigzag chestnut markings. Port Jackson, deep water. Length 4 lines.

148. **RISSOINA TURRICULA*.

Rissoina turricula, Angas, P. Z. S. 1867, p. 114.

Strongly plicate, with the whorls angulate at the sutures and the last whorl ribbed at the base. Port Jackson, deep water. Length $2\frac{1}{2}$ lines.

149. **RISSOINA CINCTA*.

Rissoina cincta, Angas, P. Z. S. 1867, p. 114.

A pretty little elongate species, narrowly zoned with brown. Port Jackson, deep water. Length $2\frac{1}{4}$ lines.

150. **RISSOINA SMITHI*.

Rissoina smithi, Angas, P. Z. S. 1867, p. 114.

Strongly plicate, with the plicæ curved and banded with pale brown below the sutures. Port Jackson, deep water. Length 3 lines.

Fam. TURRITELLIDÆ.

151. *TURRITELLA* (HAUSTATOR) SINUATA.

Turritella sinuata, Reeve, Conch. Icon. pl. 11. f. 62.

A pretty little species, distinguished by its dotted painting and the deep sinus of the outer lip. Dredged in Middle Harbour and Watson's Bay. Length $8\frac{1}{2}$ lines.

Fam. VERMETIDÆ.

152. THYLACODES DECUSSATUS.

V. decussatus, Gmel.

A grotesquely twisted tubular shell, longitudinally squamately ridged, adhering by the under surface of the spire to blocks of sandstone and rocks at low water. Length 2 or 3 inches, diameter of tube 6 lines.

153. BIVONIA QUOYI.

Bivonia quoyi, A. Ad.

Spirally tubular, smooth, agglomerate, and not attached to stones. Dredged in Port Jackson. Length 2 inches, diameter of tube 3 lines.

Fam. CALYPTRIDÆ.

154. TROCHITA (HALIOTIDEA) CALYPTRÆFORMIS.

Trochus calypttræformis, Lam. Anim. sans Vert. vii. p. 627.*Calypttræa lamarcki*, Desh.*Crepidula tomentosa*, Quoy et Gaim.

Attached to stones at low water in Port Jackson. Breadth 9 lines.

155. GALERUS PELLUCIDUS.

Trochita pellucida, Reeve, Conch. Icon. pl. 1. f. 2.

A small, white, semitransparent species, not unlike the European *G. chinensis*, or "Chinaman's hat." Adhering to dead shells in deep water in Port Jackson. Breadth 4 lines.

156. CRYPTA (CREPIATELLA) ACULEATA.

Crypta aculeata, Lam. Anim. sans Vert. vii. p. 642.*Patella aculeata*, Gmel.

Covered on the outside with rows of prickly scales, dark inside. Found attached to rocks at low water in Port Jackson. Length 1 inch.

157. CRYPTA (IANACHUS) UNGUIFORMIS.

Crepidula unguiformis, Lam.; Brod. Trans. Zool. Soc. i. p. 204, pl. xxix. f. 4.

Adhering to dead shells. Whitish, smooth, flat, and very variable in form. This species is almost worldwide. Length 1 inch 3 lines.

Fam. CAPULIDÆ.

158. COCHLOLEPAS ANTIQUATA.

Patella antiquata, Linn.*Pileopsis mitrula*, Lam.*? Hipponyx foliacea*, Quoy, Voy. de l'Astrol. pl. 72. f. 41-45.

Shell flatly conical, with a foliaceous epidermis. Under rocks and stones in Port Jackson. Breadth 7 lines.

159. COCHLOLEPAS SUBRUFa.

Hipponyx subrufa, Sow. P. Z. S. 1835, p. 5.

Elevately and obliquely conical, transversely crenulately ridged, tinged with rufous. Height $\frac{1}{2}$ inch.

160. *CAPULUS VIOLACEUS.

Capulus violaceus, Angas, P. Z. S. 1857, p. 114.

Shell compressed laterally, and violet within. Long Bay, outside Port Jackson Heads.

Fam. VANIKORIDÆ.

161. VANIKORO DESHAYESIANA.

Vanikoro deshayesiana, Récluz.

A fine species, allied to *V. plicata*, but without the longitudinal plaits of that species. Watson's Bay, very rare. Length $7\frac{1}{2}$ lines.

162. VANIKORO GRANULATA.

Vanikoro granulata, Récluz.

The alternate ridges in this species are nodosely granulated. Port Jackson, under stones at low tide: very rare. Length 5 lines.

163. VANIKORO QUOYANA.

Vanikoro quoyana, A. Ad. P. Z. S. 1853, p. 175.

Scarcely umbilicated, with the whorls nodulous and deeply cancellated. Under stones, Watson's Bay, very rare. Length $4\frac{1}{2}$ lines.

164. *VANIKORO RECLUZIANA.

Vanikoro recluziana, Ad. & Ang. P. Z. S. 1863, p. 424.

Under stones, low water, Camp Cove, very rare. The whorls are finely lirate, with the margin of the umbilicus strongly angulate. Length 5 lines.

Order SCUTIBRANCHIATA.

Fam. NERITIDÆ.

165. NERITA (THELIOSTYLA) ATRATA.

Nerita atrata, Chemn. Conch. v. pl. 190. f. 1954, 1955.

N. punctulata, Quoy et Gaim.

Very common on rocks between tide-marks. This jet-black species, with the columella and interior white, is generally distributed throughout extra-tropical Australia, Tasmania, and New Zealand. Length 1 inch.

Fam. TROCHIDÆ.

Subfam. EUTROPHINÆ.

166. EUTROPIA VENTRICOSA.

Phasianella ventricosa, Quoy et Gaim. Voy. de l'Astr. pl. 59. f. 8, 9.

Articulated throughout with brown on a flesh-coloured ground, and clouded with olive more or less below the sutures. This species is found on the beach occasionally at Middle Harbour and about Wollongong. Length 1 inch.

167. *EUTROPIA SANGUINEA*.

Phasianella sanguinea, Reeve, Conch. Icon. pl. 3. f. 3.

The examples of this shell found in Port Jackson are much smaller than those from South Australia and Swan River. On examination of a number of specimens, this species seems to pass into the preceding one. Length 1 inch.

168. *EUTROPIA (TRICOLIA) KOCHII*.

Phasianella kochii, Phil., Krauss, Moll. Südaf. p. 104, pl. 6. f. 4.

This richly coloured little species is from deep water in Port Jackson. It is also met with in South Africa and the Falkland Islands. Length 6 lines.

169. **EUTROPIA (TRICOLIA) ROSEA*.

Eutropia (Tricolia) rosea, Angas, P. Z. S. 1867, p. 114.

A very minute species, somewhat elongated, of a uniform roseate colour. From shell-sand, Coodgee Bay. Length $1\frac{1}{2}$ line.

170. **EUTROPIA (TRICOLIA) VIRGO*.

Eutropia (Tricolia) virgo, Angas, P. Z. S. 1867, p. 115.

Equally minute with *E. rosea*, having the whorls ventricose, flamed with white at the sutures, and finely painted with pink undulating lines. From shell-sand at Coodgee Bay. Length $1\frac{1}{2}$ line.

Subfam. TURBININÆ.

171. *LUNELLA UNDULATA*.

Turbo undulatus, Chemn. Conch. Cab. x. pl. 169. f. 1640, 1641.

Amongst rocks about Port Jackson Heads, Broken Bay, Wollongong, &c. This species ranges all along the southern coasts of Australia and Tasmania. Height 1 inch 6 lines.

172. *NINELLA STRAMINEA*.

Helix stramineus, Martyn, Univ. Conch. t. 71.

Turbo torquatus, Gmel. Syst. Nat. 3597.

T. lamellosus, Brod. Zool. Journ. v. p. 331.

This large species is common amongst the rocks at low water about Port Jackson Heads. It is also abundant on many parts of the coast of New South Wales, the animal being used as an article of food by the aborigines. The operculum of *Ninella* is remarkable for having two marginal raised spiral ribs externally. Height 2 inches.

Subfam. ASTRALIINÆ.

173. UVANILLA TENTORIIFORMIS.

Trochus tentoriiformis, Jonas, Zeitschr. für Mal. 1845, p. 66.

T. urvillei, Philippi, Küster, Conch. Cab. p. 215, pl. 32. f. 4.

An interesting conical species, with a concave, beautifully imbricately sculptured base. The operculum is tinged with blue and pink, and makes a pretty shirt-stud when set in gold. The adult shells are very conical, and the young much flattened, in which state they are the *T. urvillei* of Philippi. Found amongst the rocks at low water in various parts of Port Jackson. Height $1\frac{1}{2}$ inch.

Subfam. LIOTIINÆ.

174. *LIOTIA ANGASI.

Liotia angasi, Crosse, Journ. de Conch. 1864, p. 343, pl. 13. f. 4.

This nodulously cancellated little species was dredged in Port Jackson. It also occurs in St. Vincent's Gulf, South Australia. Height 1 line.

175. *ADEORBIS ANGASI.

Adeorbis angasi, A. Ad. P. Z. S. 1863, p. 424, pl. 37. f. 11, 12.

This, one of the largest species of the genus, is unique in my cabinet. It was found at high-water mark in Coodgee Bay, outside Port Jackson Heads. Long. 3 lines, lat. $2\frac{1}{2}$ lines.

Subfam. TROCHINÆ.

176. CLANCULUS MAUGERI.

Trochus maugeri, Gray in Wood, Ind. Test. Sup. pl. 5. f. 27.

This fine large *Clanculus* is more conical than most species of this genus, and is of a peculiar livid greyish-pink colour. It is found at Cabbage-Tree Cove, Outer Manly, and outside the North Head of Port Jackson. Height 1 inch.

177. CLANCULUS CLANGULOÏDES.

Trochus clanguloïdes, Gray in Wood, Ind. Test. Sup. pl. 6. f. 39.

Frequent under stones at low water at Watson's Bay. This pretty species may be distinguished from the two following by its green colour, painted with maroon flames, by the rose-pink spots upon the base, and by its more conical spire. Height 6 lines.

178. CLANCULUS OMALOMPHALUS.

Clanculus omalomphalus, A. Ad. P. Z. S. 1851, p. 162.

Under stones at low water, in company with *C. clanguloïdes*. It may be known by having the lower whorl sharply keeled. White or pale rose, with alternate blotches of brown or dark rose-colour. Height 5 lines.

179. CLANCULUS GIBBOSUS.

Clanculus gibbosus, A. Ad. P. Z. S. 1851, p. 162.

Under stones in Port Jackson; less abundant than either of the two former species. In this species the whorls are rounded, not keeled, and the spire is more depressed. Height 4 lines. It is also found in South Australia.

180. EUCHELUS BACCATUS.

Monodonta baccata, Menke, Moll. Nov. Holl. p. 14. no. 51.

Adhering to the under surface of stones at low water near Port Jackson Heads. It occurs also in South Australia. Length $\frac{1}{2}$ inch.

181. *EUCHELUS SCABRIUSCULUS.

Euchelus scabriusculus, A. Ad. & Ang. MS. in Coll. Cum.

A very small species, differing from *E. baccatus* in its cancellated sculpture and being umbilicated. Under stones in Port Jackson. Length 2 lines.

182. THALOTIA ZEBRIDES.

Thalotia zebrides, A. Ad. P. Z. S. 1851, p. 173.

Common amongst the rocks in various parts of Port Jackson. The whorls are granulately ridged, and painted with dusky flames below the sutures. Length 11 lines.

183. EUTROCHUS SCITULUS.

Ziziphinus scitulus, A. Ad. P. Z. S. 1854, p. 38; Reeve, Conch. Icon. *Ziziphinus*, pl. 6. f. 44.

This shell differs from a true *Ziziphinus* in being deeply umbilicated. It is found at Watson's Bay, Rose Bay, and in North Harbour under stones at low water. Height 8 lines.

184. *CANTHIRIDUS TIBERIANUS.

Trochus tiberianus, Crosse, Journ. de Conch. 1863, p. 381, pl. 13. f. 2.

This beautiful little species is of a pearly yellowish olive-colour, painted with white flames. It is found on sea-weed at low water amongst the rocks at Coodge Bay. Height $2\frac{1}{2}$ lines.

185. ELENCHUS BADIUS.

Trochus badius, Wood, Ind. Test. Supp. pl. 6. f. 46.

Middle Harbour, Port Jackson, in deep water. Of an olive colour, red towards the apex, with the interior of a brilliant iridescent green. Length 1 inch 3 lines.

186. ELENCHUS APICINUS.

Monodonta apicina, Menke, Moll. Nov. Holl. p. 15.

This lovely species may be easily recognized by the fine pencilling of the whorls, which becomes stronger below, and forms a striped

border of white and brown round the lip, and by the exquisite cerulean-blue colour of the pearly interior. Port Jackson, deep water, rare. It is also found at Aldinga Bay, in St. Vincent's Gulf, South Australia. Length 1 inch.

187. *ELENCHUS LEUCOSTIGMA*.

Trochus leucostigma, Menke, Moll. Nov. Holl.

A smaller but handsomely variegated species, mottled with red, white, and olive. The interior of a pearly greenish-blue colour. Deep water, in Port Jackson. Length 8 lines.

188. *BANKIVIA VARIANS*.

Bankivia varians, Beck.

B. purpurascens, Beck.

Dredged in Middle Harbour, on a sandy bottom at 3-4 fathoms. This species is abundant on all the shores of extra-tropical Australia. It varies in colour, from white to purple, rose, grey, amber, or black, and is either plain or banded with black or white bands, the coloured interstices being sometimes painted with longitudinal wavy lines. Length 7 lines.

189. **LEIOPYRGA PICTURATA*.

Leiopyrga picturata, H. & A. Ad. Ann. & Mag. Nat. Hist. Jan. 1863, p. 19.

Dredged in Middle Harbour, Port Jackson. *Leiopyrga* has somewhat the aspect of an umbilicated *Bankivia*, with rounded whorls. It is variously marked and banded with irregular pink lines. Length 6 lines. This species also occurs in South Australia.

190. *TROCHOCOCHLEA TÆNIATA*.

Trochus tæniatus, Quoy et Gaim. Voy. de l'Astrol. p. 249, pl. 63. f. 15-17.

A fine species, common in Port Jackson, broadly painted with zig-zag wavy longitudinal bands of a deep-purple or black colour, on a greenish-yellow ground. Length $1\frac{1}{2}$ inch.

191. *TROCHOCOCHLEA PORCATA*.

Labio porcata, A. Ad. P. Z. S. 1851, p. 179.

The whorls are strongly carinated, and ornamented with narrow rose-coloured stripes longitudinally. It is equally common with the foregoing species. Length 11 lines.

192. *TROCHOCOCHLEA MULTICARINATA*.

Trochus multicarinatus, Lam. Anim. sans Vert. t. 7. p. 36. no. 15; Quoy, Voy. de l'Astrol. pl. 63. f. 26, 27.

A bold species, strongly concentrically ribbed, and reticulately painted with flowing black lines on a greenish-grey ground. Jervis Bay, and on rocks outside Port Jackson Heads. Length 1 inch 3 lines.

193. *TROCHOCICLEA CONCAMERATA*.

Monodonta concamerata, Gray, Wood's Index Test. Supp. pl. 6. f. 35.

Faintly ridged, and painted with irregular wavy longitudinal lines of yellow on a black ground. *L. striolatus* of Quoy, from Tasmania and South Australia, is much more depressed and has a tessellated style of painting, although regarded as a synonym by Mr. Hanley in his edition of Wood's 'Index.' Same locality as the preceding species. Length 1 inch 4 lines.

194. *MINOLIA VITILIGINEA*.

Trochus vitiligineus, Menke, Moll. Nov. Holl. p. 18.

This species, which is prettily clouded with rose-colour and olive, was dredged in Middle Harbour. It occurs also in South Australia. Height $3\frac{1}{2}$ lines.

195. *MINOLIA ANGULATA*.

Margarita angulata, A. Ad. P. Z. S. 1851, p. 190.

A small flattened species, with the upper portion of the whorls angulated and the umbilicus large and perspective. Dredged in Port Jackson in 5 fathoms. Height 2 lines.

196. *MONILEA CORRUGATA*.

Monilea corrugata, Koch.

Outer Manly Beach and Cabbage-Tree Bay. Height 9 lines.

197. **GIBBULA COXI*.

Gibbula coxi, Angas, P. Z. S. 1867, p. 115.

This species may be recognized by the biangular character of the whorls and its small deep umbilicus. Dredged in Port Jackson. Its nearest ally is *Gibbula preissiana*, Phil., from South Australia. Height $3\frac{1}{2}$ lines.

198. *GIBBULA SULCOSA*.

Gibbula sulcosa, A. Ad. P. Z. S. 1851, p. 186.

Middle Harbour and Coodge Bay. Height 4 lines.

199. *GIBBULA STRANGEI*.

Gibbula strangei, A. Ad.

Under rocks and stones at low water, Port Jackson. Height $3\frac{1}{2}$ lines.

200. **GIBBULA PICTURATA*.

Gibbula picturata, Ad. & Ang. P. Z. S. 1864, p. 36.

A small richly painted species, varying considerably in colour and markings. Found attached to masses of sea-weed amongst the rocks at Coodge Bay. Height 3 lines.

Subfam. STOMATELLINÆ.

201. STOMATELLA IMBRICATA.

Stomatella imbricata, Lam. Enc. Méth. pl. 450. f. 2.

Attached to the under surface of large stones at low water in most parts of Port Jackson. Found also in South Australia. Length 1 inch 2 lines.

202. GENA STRIGOSA.

Gena strigosa, A. Ad. P. Z. S. 1850, p. 37.

Under stones at low water. This pretty species is striated and brilliantly nacreous within, whilst the back is finely striated throughout, and variegated with every variety of pattern and colour. It must not be confounded with *G. lutea*, Linn. (*G. auricula*, Lam.), which is smooth and more elongated, and has the spire lateral and rather prominent. Length 10 lines.

Fam. HALIOTIDÆ.

203. HALIOTIS NÆVOSA.

Haliotis nœvosa, Martyn, Univ. Conch. v. t. 11. f. 63.

On rocks at low tide on various parts of the coast. Length 6 inches.

204. HALIOTIS COCCO-RADIATA.

Haliotis cocco-radiata, Reeve, P. Z. S. 1846, p. 55.

A pretty species, variously mottled with red, green, and liver-colour. It is commonly found attached to the under surface of stones at Watson's Bay and other parts of Port Jackson. It also occurs in South Australia. Length 2 inches.

Fam. FISSURELLIDÆ.

205. LUCAPINA (GLYPHIS) INCEI.

Fissurella incei, Reeve, Conch. Icon. pl. 10. f. 69.

F. indusica, Reeve.

? *F. lineata*, Sow. Conch. Illus. f. 68.

A fine large cancellated species, more or less rayed with olive bands. On rocks and under stones at low water. This species bears a considerable resemblance to the British *F. reticulata*, although of a much larger size. Length 1 inch 9 lines.

206. *FISSURELLIDÆA CONCATENATA.

Fissurella concatenata, Crosse & Fisch. Journ. de Conch. 1864, p. 348, pl. 3. f. 4-6.

A rare and beautiful species, the surface of which is white and covered with a sort of fine malleated network, resembling the indentations upon a thimble. My specimens are from Kiama and Botany Bay. The type specimen, from which MM. Crosse and Fischer's description is taken, I dredged at Port Adelaide. Length 9 lines.

207. FISSURELLIDÆA SCUTELLA.

Fissurellidæa scutella, Gray, B. M.; Sow. Conch. Ill. f. 34.*F. trapezina*, Sow. P. Z. S. 1834; Conch. Ill. f. 34; Thes. Conch. pl. 9. f. 207.

Botany Bay. Found also at the Cape of Good Hope. Length 10 lines.

208. FISSURELLIDÆA NIGRITA.

Fissurellidæa nigrata, Sow. P. Z. S. 1834, p. 127; Thes. Conch. pl. 8. f. 196.

Found also in Tasmania and South Australia. Length 10 lines.

209. EMARGINULA (HEMITOMA) RUGOSA.

Emarginula rugosa, Quoy et Gaim. Voy. de l'Astrolabe.*E. aspera*, Gould, Exped. Shells. p. 12; Sow. Thes. Conch. pl. 13. figs. 92, 93, 95, 96-102.

This shell varies considerably, and has been described under various names by different authors. It is not uncommon on rocks and under stones in Port Jackson; it is also found in South Australia and Tasmania. Length 11 lines.

210. EMARGINULA (CLYPIDINA) STELLATA.

Emarginula stellata, A. Ad. P. Z. S. 1851, p. 87; Sow. Thes. Conch. pl. 13. f. 103.

Less common than the preceding. Watson's Bay and Coodgee Beach. Length 10 lines.

211. EMARGINULA DILECTA.

Emarginula dilecta, A. Adams, P. Z. S. 1851, p. 85; Sow. Thes. Conch. *Emarginula*, pl. 10. f. 5.

Coodgee and Middle Harbour. Length 7 lines. A pretty, white, cancellated species, with the anterior margin moderately fissured.

212. SCUTUS ELONGATUS.

Parmophorus elongatus, Lam.*P. lævis*, Blain.*Scutus angustatus*, A. Ad. in Thes. Conch. Fissurellidæ, pls. 13 & 14. figs. 1, 2, 10, 21.This species is very common amongst the rocks at low water in some of the bays in Port Jackson, and at various localities along the coast. The animal is very large and black. Length of shell $3\frac{1}{4}$ inches.

213. TUGALIA OSSEA.

Tugalia ossea, Gould, Exped. Shells; Sow. Thes. Conch. Fissurellidæ, pl. 14. f. 18.Under stones at low water near Port Jackson Heads, rare. Length $9\frac{1}{2}$ lines.

Fam. DENTALIIDÆ.

214. ANTALIS ERECTA.

Dentalium erectum, Sow. Thes. Conch. pl. 13. f. 55.

Dredged near the "Sow and Pigs" bank, Port Jackson. Length of my specimen 1 inch.

Fam. TECTURIDÆ.

215. TECTURA JACKSONIENSIS.

Patella jacksoniensis, Reeve, Conch. Icon. pl. 39. f. 127 a, b.

On rocks at low tide. Length 9 lines.

216. *TECTURA SCABRILIRATA.

Acmæa scabrilirata, Angas, P. Z. S. 1865, p. 154.

Under stones amongst the rocks at low tides. Found also in Port Phillip and South Australia. Length 6 lines.

217. TECTURA STELLARIS.

Patelloïda stellaris, Quoy et Gaim. Voy. de l'Astr. pl. 71. f. 1-4.

An elegant species, with bold ribs projecting outwards from the margin, so as to give it a stelliform appearance. Under stones at very low spring tides at Kiama and outside Port Jackson Heads. Sometimes found in the stomachs of Bream caught along the coast. Length 1 inch.

218. *TECTURA SUBUNDULATA.

Acmæa subundulata, Angas, P. Z. S. 1865, p. 155.

Attached to stones at low water. Found also in Port Phillip and South Australia. Length 8 lines.

219. TECTURA SEPTIFORMIS.

Patelloïda septiformis, Quoy et Gaim. Voy. de l'Astrol. pl. 71. f. 43, 44.

On rocks between tide-marks at Kiama, and near Newcastle, New South Wales. Length 10 lines.

Fam. GADINIIDÆ.

220. GADINIA PENTIGONIOSTOMA.

Gadina pentagoniostoma, Sow. Conch. Ill.

A depressedly conical white shell, strongly radiately ridged, and polished inside. Coodgee Bay. Length 9 lines.

221. *GADINIA CONICA.

Gadina conica, Angas, P. Z. S. 1867, p. 115.

A small and very conical species, from shell-sand, Coodgee Bay. Length 4 lines.

Fam. PATELLIDÆ.

222. PATELLA TRAMOSERICA.

Patella tramoserica, Mart. Univ. Conch. i. pl. 16.

This fine species is abundant everywhere, adhering to the rocks between tide-marks. It varies considerably in colour and markings, typical specimens being characterized by a golden-yellow tinge, more or less articulated with black and scarlet. Length 2 inches.

223. PATELLA COSTATA.

Patella costata, Sowerby, Voy. of Beagle.

A boldly ribbed conical shell, with a pectinated margin, edged with black. On rocks at Coodgee and Wollongong. Length $1\frac{1}{4}$ inch.

224. PATELLA ACULEATA.

Patella aculeata, Reeve, Conch. Icon. pl. 32. f. 90.

Strongly nodulously ribbed, of a pale colour, both within and without. Occasionally met with on the rocks outside the Heads. Length $1\frac{1}{2}$ inch.

225. PATELLA SQUAMIFERA.

Patella squamifera, Reeve, Conch. Icon. pl. 32. f. 94 a, b.

A small squamately ribbed depressed species, of rare occurrence. Rocks near Wollongong and Bondi Bay. Length 10 lines.

226. PATELLA PENTAGONA.

Patella pentagona, Born, Mus. Test. Vindob.

P. stellaformis, Reeve in Conch. Syst.; Conch. Icon. pl. 20. f. 48 a, b, c.

A single example of this species was found on the rocks near Port Jackson Heads. Length 8 lines.

Fam. CHITONIDÆ.

227. LOPHYRUS AUSTRALIS.

Chiton australis, Sow. Mag. Nat. Hist. 1840; Conch. Ill. f. 46.

Common under stones in Port Jackson. Of a dark olive-colour. This is the largest species found in New South Wales. Length 3 inches.

228. LOPHYRUS CONCENTRICUS.

Chiton concentricus, Reeve, Conch. Icon. pl. 16. f. 95.

A very beautiful longitudinally ridged species, with the terminal valves concentrically grooved; mottled with green and straw-colour, the second valve sometimes blood-colour or scarlet. Under stones at Watson's Bay, at very low tide. Length $1\frac{1}{2}$ inch.

229. *LOPHYRUS GLAUCUS*.*Chiton glaucus*, Gray.*C. quoyi*, Desh. Anim. sans Vert. vii. p. 509.*C. viridis*, Quoy.

Very variable in colour. The green variety is *C. quoyi* of Desh. Rare in Port Jackson. Length 1 inch.

230. *LOPHYRUS MURICATUS*.*Chiton muricatus*, A. Ad. P. Z. S. 1852, p. 91.*C. carnosus*, Carp. MS. Coll. Cuming.*C. limans*, Carp. MS. Coll. Cuming.

A very charming species, of rare occurrence in Port Jackson, having the outer edge of the valves armed with short muricated spines. It somewhat resembles *L. concentricus*, but has the anterior terminal valve longitudinally radiate, and varies in colour from dull green to orange and buff. Length 1 inch.

231. *LOPHYRUS JUGOSUS*.*Chiton jugosus*, Gould, Exped. Shells, p. 3.

A prettily mottled species, with the terminal valves smooth, of which a few examples have been found at very low tides near Camp Cove. Length $9\frac{1}{2}$ lines.

232. **LOPHYRUS SMARAGDINUS*.*Lophyrus smaragdinus*, Angas, P. Z. S. 1867, p. 115.

Of a pale bluish-green colour, sometimes white-mottled, and nearly smooth; faintly striated under the lens. Port Jackson. Length 6 lines.

233. *LEPIDOPLEURUS PROTEUS*.*Chiton proteus*, Reeve, Conch. Icon. pl. 18. f. 111.*C. fruticosus*, Gould, Exp. Shells, p. 4.

Common under stones. The colours vary, some specimens being curiously mottled with white or pale orange on an olive ground. Length $1\frac{1}{2}$ inch.

234. *LEPIDOPLEURUS LONGICYMBA*.*Chiton longicymba*, De Blainv.; Sow. Conch. Illus. f. 67.

This pretty species is abundant under stones, especially at Watson's Bay. Its variations in colour are many: one variety has a broad white stripe along the back, another is pale straw-colour, and a third is spotted with black on a reddish ground. Length 1 inch.

235. *LEPIDOPLEURUS USTULATUS*.*Chiton ustulatus*, Reeve, Conch. Icon. pl. 17. f. 102.

Of a dull brown colour. Watson's Bay, under stones. Length 1 inch 4 lines.

236. *LEPIDOPLEURUS ANTIQUUS*.

Chiton antiquus, Reeve, Conch. Icon. pl. 25. f. 169.

C. apparatus, Carp.

C. elenensis, Sow.

A highly sculptured species, with two broad divaricating ridges on each side of the valves. Port Jackson, rare. Length 10 lines.

237. **TONICIA CARPENTERI*.

Tonicia carpenteri, Angas, P. Z. S. 1867, p. 116.

A pretty, ovate species, concentrically subimbricately sculptured, with alternate pale and dark spots at the hinder edges of the valves, and the umbo nearly terminal. Port Jackson, very rare. Length 9 lines.

238. *LEPTOCHITON VERSICOLOR*.

Leptochiton versicolor, A. Ad. P. Z. S. 1852, p. 92, pl. 16. f. 5.

A nearly smooth species, delicately shagreened under the lens, of very rare occurrence. Found near the Heads of Botany Bay. It is variegated with maroon and olive. Length 1 inch.

239. *ONITHOCHITON INCEI*.

Chiton incei, Reeve, Conch. Icon. sp. 94.

A beautiful species, with the valves longitudinally crenated, and clouded more or less with olive, green, and rosy flesh-colour. Occurs under stones at Watson's Bay, at very low tides. Length $1\frac{1}{2}$ inch.

240. **ONITHOCHITON RUGULOSUS*.

Onithochiton regulosus, Angas, P. Z. S. 1867, p. 115.

A nodulously sculptured species, having the valves bordered with green, and ornamented with concentric wavy bands of yellowish olive. Port Jackson, very rare. Length 8 lines.

241. *CHITON PICEUS*.

Chiton piceus, Gmel. Syst. Nat. p. 3204.

? *C. magellanicus*, Lam.

? *C. incanus*, Gould, Exped. Shells.

This very common species is freely distributed on most parts of the coast of New South Wales. Dwelling in cavities on the upper surfaces of rocks exposed to the full action of the waves, the valves are generally more or less worn and destitute of character. A dark stripe runs along the centre of the umbones, and the mantle is covered with alternate bands of black and white calcareous spicula. Length $2\frac{1}{2}$ inches.

242. *CHÆTOPLEURA RUGOSA*.

Chatoppleura rugosa, Gray; Sow. Conch. Ill. f. 49.

This species is but rarely met with in Port Jackson. The mantle is covered with straggling horny bristles, and the valves corrugately sculptured. Length 10 lines.

243. *LORICA CIMOLIA*.

Chiton cimolius, Reeve, Conch. Icon. pl. 21. f. 141.

C. volvox, Reeve, Conch. Icon. pl. 6. f. 31.

This fine species may at once be recognized by the fissure of its posterior margin. The valves are longitudinally sculptured, and the mantle squamous. It is to be met with occasionally under rocks and stones, at very low tide, about Watson's Bay and Middle Harbour. Length $2\frac{1}{2}$ inches. This *Lorica* is also found at Port Lincoln, in South Australia.

244. *PLAXIPHORA PETHOLATA*.

Chiton petholatus, Sow. Conch. Illust. f. 65, 66.

This *Chiton*, though common in South Australia, is but seldom met with in Port Jackson, and then not in good condition. The valves are rugosely sculptured at the sides, and the mantle is beset with bifurcated bristles proceeding from a double series of pores. Length $2\frac{1}{4}$ inches.

245. **ACANTHOCHITES COSTATUS*.

Acanthochites costatus, H. Ad. & Ang. P. Z. S. 1864, p. 194.

Only three or four specimens of this species were taken, at Watson's Bay, during an unusually low tide. Length 8 lines.

246. *ACANTHOCHITES SCUTIGER*.

Acanthochites scutiger, Adams & Reeve, Voy. Samarang; Reeve, Conch. Icon. pl. 27. f. 178.

Under stones at Watson's Bay. This little species may be recognized by the tufts of silvery bristles surrounding the pores of the mantle. Length $\frac{1}{2}$ inch.

247. **ACANTHOCHITES CARINATUS*.

Acanthochites carinatus, H. Ad. & Ang. P. Z. S. 1864, p. 194.

A single specimen only of this fine new species was found, in Port Jackson. The plates are whitish and finely granulated, and ridged along their summits with black. Length 1 inch 3 lines.

248. **MICROPLAX GRAYI*.

Microplax grayi, H. Ad. & Ang. P. Z. S. 1864, p. 194.

A single example of this new genus was procured, adhering to the under surface of a stone dredged in Watson's Bay. It is figured in 'Proc. Zool. Soc.' 1865, pl. 11. f. 16, 17. Length 6 lines.

249. *CRYPTOPLAX STRIATUS*.

Chitonellus striatus, Lam. Anim. sans Vert. vol. . p. 317.

Chiton striatus, Sow. Conch. Illus. f. 62.

? *C. oculatus*, Quoy et Gaim. Voy. de l'Astr. iii. p. 410, pl. 72. f. 37, 38.

Not uncommon under stones and in crevices of rocks, at low water, in various parts of Port Jackson. Length 3 inches.

On comparing the specimens in the Cumingian Collection (now in the British Museum) of *C. gunni*, Reeve, and *C. rostratus*, Reeve, I can detect no characters which appear to separate them specifically from *C. striatus*, Lam., and I am inclined to regard them all as varieties of that species. Specimens in my own cabinet from Port Jackson, Port Adelaide, Port Lincoln, and Tasmania seem all to belong to the same species, displaying but slight variations in the angularity and breadth of the valves.

Order TECTIBRANCHIATA.

Fam. ACTÆONIDÆ.

250. BUCCINULUS AFFINIS.

Buccinulus affinis, A. Ad.

This pretty species, more slender and elongated than *B. solidulus*, is very finely tessellately painted with brown or black on a white ground, having sometimes one or two white bands. Dredged in Port Jackson. It also occurs in Japan. Length 9 lines.

251. MYONIA CONCINNA.

Monoptygma concinna, A. Ad. in Thes. Conch.

An elongated white shell, spirally grooved throughout. Dredged in Port Jackson. Length $\frac{1}{2}$ inch.

252. *LEUCOTINA ESTHER.

Leucotina esther, Angas, P. Z. S. 1867, p. 116.

A small grey species, with rounded whorls finely striately grooved. Dredged in Port Jackson. Length $2\frac{1}{4}$ lines.

Fam. APLUSTRIDÆ.

253. HYDATINA PHYSIS.

Bulla physis, Linn., Mart. t. 21. f. 196, 197.

Hydatina filosa, Schum.

This fine shell may be readily distinguished by the narrow zebra-like bands encircling its entire outer surface. It occurs in muddy bays, especially at Vacluse Bay, Port Jackson, and at Botany Bay. At Moreton Bay it attains the length of two inches. The largest Port Jackson specimen measures 1 inch 5 lines.

254. BULLINA LINEATA.

Bulla lineata, Wood, Index Test. Sup. pl. 3; Sow. Thes. Conch. pl. 120. f. 2.

B. lauta, Pease.

? *B. scabra*, Chemn.

No one can fail to detect this pretty species, banded with two
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lines of rose-colour, and painted with wavy longitudinal stripes of the same hue. It forms a beautiful object in the water, when crawling about on the sandy bottoms of the rock-pools left by the receding tide, the expanded membranaceous foot of the animal being bordered with azure-blue. On examination I found it had a small, horny, linear, transverse operculum like the *Actæonidæ*, and ought therefore probably to be included in that family. Rock-pools at Coodgee Bay and Middle Harbour, at low spring tides. Length 8 lines.

Fam. CYLICHNIDÆ.

255. CYLICHNA ARACHIS.

Bulla arachis, Quoy, Voy. de l'Astr.; Sow. Thes. Conch. p. 590. f. 133, 134.

A solid, cylindrical, white shell, covered with a rust-coloured epidermis. Dredged in Port Jackson. This species is found also at Wollongong and Port Stephen, in sandy mud. Length 8 lines.

256. TORNATINA FUSIFORMIS.

Tornatina fusiformis, A. Ad. Thes. Conch. p. 570, pl. 121. f. 37.

A little, white, shining species, dredged at Port Stephen and Port Jackson, in 4 fathoms. Length 3 lines.

Fam. BULLIDÆ.

257. BULLA OBLONGA.

Bulla oblonga, A. Adams, Thes. Conch. p. 577, pl. 123. f. 74.

This large and somewhat elongated species is common on muddy bottoms in all the bays along the coast of New South Wales. It ranges westward to Port Phillip, South Australia, and Swan River; and, according to Cuming, is found in the Philippines and South-Sea Islands. Length 2 inches 4 lines. This shell has hitherto been confounded by some authors with *B. australis* of Quoy & Gaim., which is found in Tahiti.

258. BULLA PUNCTULATA.

Bulla punctulata, A. Adams, Thes. Conch. p. 577, pl. 123. f. 77.

Clouded with clusters of black and white punctated spots on a light-brown ground. Found in deep water, in sandy mud. Rare in Port Jackson. It is found also in New Caledonia. Length 1 inch 4 lines.

259. BULLA SOLIDA.

Bulla solida, Gmel. (not Bruguière) MS. in Coll. Cuming.

A prettily painted species, peculiarly marked with large angular blotches of rose liver-colour on a greyish-white ground. Middle Harbour, Port Jackson. Length 1 inch.

260. *BULLA MAGDELUS*.*Bulla magdelus*, Lister.*B. ovulum*, Gould (MS. in Coll. Cuming).

A brown-clouded species, rather solid, and more swollen than *B. punctulata*. Middle Harbour and Long Bay. Length 1 inch 1 line.

261. *HAMINIA BREVIS*.*Bulla brevis*, Quoy et Gaim. Voy. de l'Astrol. pl. 26. f. 36, 37.

Dredged in Middle Harbour; and Port Stephen, New South Wales. Length 8 lines.

262. *AKERA SOLUTA*.*Bulla soluta*, Chem., Mart. Hist. Conch. x. t. 46. f. 1359-1361.*B. tenuis*, A. Adams; Sow. Thes. Conch. pl. 121. f. 45.

Found in sandy mud, Botany Bay. It is also found in the Philippines; Zanzibar; and Spencer's Gulf, South Australia; also in Torres Straits. It varies greatly in size. Length of Botany Bay specimens 10 lines, Spencer's Gulf specimens 1 inch 5 lines, Zanzibar specimens 1 inch 9 lines.

Fam. *PHILINIDÆ*.263. **PHILINE ANGASI*.*Bulla angasi*, Crosse, Journ. de Conch. 1865, pl. 2. f. 8.

Generally distributed along the Australian coasts. Common on mud-banks. Nearly allied to *Bulla coreanica* of A. Ad., from the Korean archipelago. Length 1 inch 4 lines.

The gizzard of this species resembles in form that of the British *B. quadripartita*.

264. **CHELIDONURA ADAMSI*.*Chelidonura adamsi*, Angas, P. Z. S. 1867, p. 116.

The shell is small, flat, thin, and patulous, with the outer lip produced posteriorly, and is concealed in the thickness of the mantle.

The animal of *C. adamsi* is extremely beautiful. It is of a velvet-black, having the mantle and the two long projecting tails bordered with lines of cobalt-blue and gold. On the back is a small white crescent-shaped spot. Found in a rock-pool at low water, at the "Bottle and Glass," Vacluse Bay, Port Jackson. Length of animal 2 inches.

The only other species of the genus as yet described is the *C. hirundinina* of Quoy, from the Mauritius, the animal of which is of fine blue and emerald-green colours.

Fam. *APLYSIIDÆ*.265. *DOLABELLA SCAPULA*.*Dolabella scapula*, Martyn.

D. rumphii, Cuvier, Ann. du Muséum, v. p. 437, pl. 29. f. 1 ; Rang, Hist. Nat. des Aplysiens, pl. 1.

D. callosa, Lam. Anim. sans Vert. prem. edit. f. 62.

This common species is widely distributed throughout the Indian and Pacific Oceans. The animal is of a blackish olive-colour, from 7 to 10 inches long, and emits a purple fluid when molested ; the shell internal, flattened, triangular, callous at the apex, and covered with a brown horny epidermis. Height 2 inches, breadth 1 inch 9 lines. Found on sandy mud at low water, especially in the bays of Paramatta River.

266. APLYSIA TIGRINA.

Aplysia tigrina, Rang, Hist. Nat. des Aplysiens, pl. 11.

Animal olive, mottled with black. Shell internal, thin, horn-colour, oblong, produced, and curved at the apex. Length 1 inch 3 lines, breadth 10 lines. Middle Harbour and Coodgee Bay.

267. SYPHONOTA KERAUDRENI.

Aplysia keraudreni, Rang, Hist. Nat. des Aplysiens, pl. 13.

A fine, large species ; the animal clouded with olive and grey. Shell yellowish brown, faintly concentrically striated, rather flat, oval, and triangular at the apex. Length 2 inches, breadth 1½ inch. Port Jackson.

I have the shells of three other species of *Aplysiidæ* from Port Jackson, none of which appear to have been described ; but not knowing the animals, I hesitate to publish them.

Subfam. OPERCULATINÆ.

268. OPERCULATUM INDICUM.

Umbrella indica, Lam., Chemn. Conch. v. p. 10, pl. 169. f. 1645, 1646.

This species, which ranges throughout the Indo-Pacific province, occurring in the Philippines, Mauritius, and other places, is to be met with at very low spring tides amongst the rocks at Cabbage-tree Cove, outside the North Head of Port Jackson, also at Botany Bay. The animal is very large, and of a greenish-yellow colour, having the shell external. Length of a specimen taken in Botany Bay 4 inches.

Order NUDIBRANCHIATA.

The following species of Naked-gilled Gasteropoda have already been found in Port Jackson and its vicinity :—

Fam. DORIDIDÆ.

269. **DORIS VARIABILIS*, Angas, Journ. de Conch. 1864, p. 44, pl. 4. f. 1.

270. **DORIS DENISONI*, Angas, Journ. de Conch. 1864, p. 45, pl. 4. f. 2.

271. **DORIS CHRYSODERMA*, Angas, ib. p. 46, pl. 4. f. 3.

272. **DORIS ARBUTUS*, Angas, ib. p. 47, pl. 4. f. 4.

273. **DORIS PANTHERINA*, Angas, ib. p. 47, pl. 4. f. 5.

274. **DORIS NODULOSA*, Angas, ib. p. 48, pl. 4. f. 6.

275. **DORIS CARNEOLA*, Angas, ib. p. 48, pl. 4. f. 7.

276. **ACTINODORIS AUSTRALIS*, Angas, ib. p. 49, pl. 4. f. 8.

277. **ANGASIELLA EDWARDSII*, Angas, ib. p. 49, pl. 4. f. 9.

Fam. GONIODORIDIDÆ.

278. *GONIODORIS ATROMARGINATA*.

Doris atromarginata, Cuvier, Ann. Mus. i. 4. p. 473, pl. 2. f. 6.

279. **GONIODORIS BENNETTI*, Angas, Journ. de Conch. 1864, p. 51, pl. 4. f. 10.

280. **GONIODORIS LORINGI*, Angas, ib. p. 52, pl. 4. f. 11.

281. **GONIODORIS FESTIVA*, Angas, ib. p. 53, pl. 4. f. 12.

282. **GONIODORIS DAPHNE*, Angas, ib. p. 54, pl. 5. f. 3.

283. **GONIODORIS CROSSEI*, Angas, ib. p. 54, pl. 5. f. 1.

284. **GONIODORIS SPLENDIDA*, Angas, ib. p. 55, pl. 5. f. 2.

285. **GONIODORIS VERRUCOSA*, Crosse, Journ. de Conch. 1864, p. 56, pl. 5. f. 4.

286. **GONIODORIS ERINACEUS*, Crosse, ib. p. 57, pl. 5. f. 3.

Fam. POLYCERIDÆ.

287. **POLYCERA COOKI*, Angas, Journ. de Conch. 1864, p. 58, pl. 5. f. 6.

288. **PLOCAMOPHORUS IMPERIALIS*, Angas, ib. p. 59, pl. 5. f. 7.

Fam. TRIOPIDÆ.

289. **TRIOPA YATESI*, Angas, ib. p. 60, pl. 5. f. 8.

Fam. DENDRONOTIDÆ.

290. **BORNELLA HERMANNI*, Angas, ib. p. 61, pl. 6. f. 1.

Fam. MELIBÆIDÆ.

291. **MELIBÆA AUSTRALIS*, Angas, ib. p. 62, pl. 6. f. 2.

Fam. PROCTONOTIDÆ.

292. **JANUS SANGUINEUS*, Angas, Journ. de Conch. 1864, p. 63, pl. 6. f. 5.

Fam. ÆOLIDIDÆ.

293. **ÆOLIS FOULISI*, Angas, ib. p. 64, pl. 6. f. 3.
 294. **ÆOLIS MACLEAYI*, Angas, ib. p. 65, pl. 6. f. 4.
 295. **FLABELLINA IANTHINA*, Angas, ib. p. 66, pl. 6. f. 6.
 296. **FLABELLINA ORNATA*, Angas, ib. p. 67, pl. 6. f. 7.
 297. **FLABELLINA NEWCOMBI*, Angas, ib. p. 68, pl. 6. f. 8.

Fam. ELYSIIDÆ.

298. **ELYSIA COODGEENSIS*, Angas, ib. p. 69, pl. 6. f. 9.

Fam. GLAUCINÆ.

299. *GLAUCUS*, sp. ?

Dark blue. Washed ashore on the outer beaches, along with *Veilellæ*, on which it feeds.

Subclass HETEROPODA.

Fam. IANTHINIDÆ.

300. *IANTHINA VIOLACEA*.

Helix violacea, Bolten, Virg. p. 93. n. 953 (1798).

Ianthina casta, Reeve, Conch. Icon. pl. 1. f. 4.

I. depressa, Reeve, Conch. Icon. pl. 3. f. 14.

Pelagic. Washed ashore on the outer beaches. Deep violet below the periphery. Height 1 inch.

301. *IANTHINA IANTHINA*.

Helix ianthina, Linn.

Ianthina fragilis, Lam.

I. communis, Lam.

I. bicolor, Menke.

I. penicephala, Péron.

I. striulata, Carp.

Pelagic. Washed ashore at Manly Beach, Bondi, and Kiama. Deep violet below, with a white band round the columella. Height 8 lines.

This and the foregoing species seem to be worldwide in the warmer regions of the three great oceans.

302. *IANTHINA DECOLLATA*.

Ianthina decollata, Carp. Cat. Reigen Coll. in Brit. Mus. p. 187.

Pelagic. An elegant species, with globular whorls and a produced

spire; the columella is prolonged at the lower part, and the entire shell is of a peculiar rosy-violet hue. Found on the sands after storms, at Bondi &c. Height 1 inch.

303. *IANTHINA (IODINA) EXIGUA.*

Ianthina exigua, Lam. Anim. sans Vert. vi. p. 206.

I. bifida, Nuttall, Jay's Cat. p. 295.

I. capreolata, Mont. Journ. de Conch. 1860, pl. 2. f. 4.

Pelagic, worldwide. Varying greatly in size; height of largest New South Wales specimens 8 lines.

This species may be known by its sculpture, of densely set lamellar striæ, and by the very deep notch in the outer lip, which gives it a bifid structure.

Macgillivrayia spinigera and *Cheletropis huxleyi* are often washed ashore on Coodgee Beach. They are now ascertained to be only the pelagic fry of certain Gasteropods.

Subclass PULMONIFERA.

Fam. ELLOBIIDÆ.

304. *CASSIDULA ZONATA.*

Cassidula zonata, H. & A. Ad. P. Z. S. 1854, p. 32.

This species is found amongst the mangrove swamps and samphire marshes at Cook's River, Botany Bay. Length $\frac{1}{2}$ inch.

Subfam. MELAMPINÆ.

305. *OPHICARDILUS AUSTRALIS.*

Auricula australis, Quoy et Gaim. Voy. de l'Astrol. ii. pl. 13. f. 34-38.

Melampus ovatus, Gray.

This species is common on samphire swamps about Shoalhaven and Cook's River. It is dark olive with pale bands. Length 7 lines.

306. *OPHICARDELUS SULCATUS.*

Laimodonta sulcata, H. & A. Ad. P. Z. S. 1854, p. 34.

Very like the preceding, excepting that the spire is transversely sulcately ridged. Length 7 lines.

307. *OPHICARDELUS QUOYI.*

Laimodonta quoyi, H. & A. Ad. P. Z. S. 1854, p. 34.

Port Jackson. Shorter and stouter than the preceding species; of a uniform brown colour, without bands. Length 5 lines.

308. *MARINULA XANTHOSTOMA.*

Marinula xanthostoma, H. & A. Ad. P. Z. S. 1854, p. 35.

This pretty little species may be recognized by the three project-

ing plaits on the inner lip, of which the uppermost one is the largest. It is of a pale lilac colour, when denuded of its brown epidermis. Found at Shoalhaven and in Port Jackson. Length 4 lines.

Fam. AMPHIBOLIDÆ.

309. AMPULLARINA QUOYANA.

Ampullarina quoyana, Desh.

Banded and painted with zigzag brown lines. Found at Rushent-ter's Bay, and in mangrove and samphire swamps at Cook's River and Shoalhaven, &c. Length 8 lines.

310. AMPULLARINA FRAGILIS.

Ampullacera fragilis, Quoy et Gaim. Voy. de l'Astr.

Banks of Paramatta River. In this species the whorls are rounder and more depressed; the shell is thinner, and painted with one broad brown band, or several narrow thread-like lines. Length 5 lines.

Fam. SIPHONARIIDÆ.

311. SIPHONARIA SCABRA.

Siphonaria scabra, Reeve, Conch. Icon. pl. 1. f. 2.

Allied to *S. diemenensis*, Quoy, but with the purple linear painting running further up into the interior. Common in Port Jackson. Length 1 inch.

312. SIPHONARIA DENTICULATA.

Siphonaria denticulata, Quoy et Gaim. Voy. de l'Astr. ii. p. 340, pl. 25. f. 19, 20.

A fine species, distinguishable by the livid-brown colouring of the interior and the white spots round the inner margin. Common on rocks and jetty-piles in Port Jackson. Length 1 inch 4 lines.

313. SIPHONARIA FUNICULATA.

Siphonaria funiculata, Reeve, Conch. Icon. pl. 2. f. 6 *a*, *b*.

A conical species, ribbed with white, denticulated and stained in the interior with brown. It varies considerably in colour. Found also in Tasmania. Length 9 lines.

314. SIPHONARIA BIFURCATA.

Siphonaria bifurcata, Reeve, Conch. Icon. pl. 5. f. 22.

Depressedly conical, with broad, distant ribs, the interstices of which are ridged and stained with black. Interior white, irregularly marked with brown round the edge. Length 1 inch.

315. SIPHONARIA COCHLEARIFORMIS.

Siphonaria cochleariformis, Reeve, Conch. Icon. pl. 6. f. 28.

A flattened pale-coloured species, with a broad projecting sinus. On jetty-piles, Watson's Bay. Length 1 inch.

316. SIPHONARIA ATRA.

Siphonaria atra, Quoy et Gaim. Voy. de l'Astrol. vol. ii. p. 337, pl. 25. f. 41, 42.

Painted inside with broad black stripes. Found also in Japan and the Pacific Islands. Length 1 inch.

5. Notes on *Zoanthinæ*, with the Descriptions of some New Genera. By Dr. J. E. GRAY, F.R.S.

M. Milne-Edwards, in his 'Coralliaires' (vol. i. p. 226), divides the *Actinidæ* into two groups:—one in which the covering of the body remains soft and does not form a polyperoid; and, secondly, the *Zoanthinæ*, in which the integument of the body thickens and is strengthened with sclerotes, so as to form a coriaceous polyperoid. But in the larger character of the family (at p. 298) he adds that they are aggregate polypes, which multiply by basal buds formed of the tegumental tissues; and he confines the family to the genera *Zoanthus* and *Palythoa*,—the first arising from root-like stolons, and the other from a broad laminal expansion.

There can be no doubt that the group so defined is very natural; but there are several genera of *Actinidæ* that have considerable relation to *Zoanthus*, not mentioned by Milne-Edwards, which do not come under either of these characters: that is to say, there are some which have the outer skin thick and strengthened with imbedded sand or calcareous particles, which are not aggregate and do not increase by basal buds, arising from neither root-like fibres nor an expanded base, but which are free; on the other hand, there are other genera which do not arise from basal buds, some of which have a thick cartilaginous skin not strengthened by sand or calcareous concretions, and others which have a thin membranaceous skin.

All these genera have only a single or double row of very short tentacles, which are placed round the edge of the oral disk far from the mouth, which when the oral disk is contracted are completely hidden.

I think that these animals should form a family distinct from *Actinidæ*, which may be called *Zoanthidæ*.

The zoanthoid polypes, in Lesueur, Dana, and Milne-Edwards's 'Coralliaires,' are divided into groups, according to the form of the base from which they arise,—some, as the *Zoanthi*, having cylindrical stolons, and others, as the *Palythoa*, an expanded foliaceous base; the latter are again divided according to whether the polypes are entirely or partially separate, or confluent nearly to the mouth of the cells,—all, no doubt, very good characters for the separation of the species into groups.

They separate themselves into two very natural groups, according to the structure of the external surfaces of the polypes.

In many, which may be called *Zoanthi malacodermi*, or soft-

skinned *Zoanthi*, or *Zoanthinæ*, the surface of the polype is smooth, soft, and fleshy.

Duchassaing and Michellot, in their 'Essay on the Corals of the West Indies,' have established some additional genera.

The base expanded, laminar.

1. MAMMILLIFERA, Lesueur.

Mammillifera, Duchassaing & Michellot, Mém. Coral. des Antilles, 51.

The base slender, subcylindrical, creeping.

2. ZOANTHUS, Cuvier, 179; M.-Edw. Coral. 299.

Zoantha, Lamk.

1. ZOANTHUS SOCIATUS, Ellis, Zooph.

2. ZOANTHUS ALDERI, Gosse, Brit. Sea Anem. 305, t. 9. f. 8, t. 12. f. 5.

Hab. Coast of Britain.

See other species (Duchassaing & Michellot, Mém. Coral. des Antilles, 1860, p. 49; Dana, Zoophytes, 423).

3. PALYTHOA.

The polypes close together, arising from a net-like anastomosing linear base.

PALYTHOA BERTHOLETI.

Solitary, rarely irregularly aggregate.

4. ISAURUS, Gray, Spic. Zool. 8, 1825.

Isaure, Savigny.

Isaurus, Duchassaing & Michellot, Mém. Coral. des Antilles, 1860, p. 51, t. 8. f. 10.

ISAURUS TUBERCULATUS, Gray, Spic. Zool. 8, t. 6. f. 3, 1825.

Hab. —.

B.M.

This genus and species was described and figured in 1825 from a specimen in the British Museum.

5. ? ORINIA, Duchassaing & Michellot, Mém. Coral. des Antilles, 54.
Separate.

6. PALES.

Body cylindrical; isolated, solitary, clustered, or sometimes proliferous, but each specimen having a separate base; outer skin smooth, thin, olive-brown, slightly concentrically wrinkled; the tentacles numerous. The internal laminæ numerous, slender, only

slightly elevated, straight and parallel above, with a thickened edge and sinuous below.

PALES CLIFTONI. (Fig. 1, p. 236.)

Hab. Western Australia (*Mr. Clifton*).

The bodies are from $\frac{1}{3}$ to $\frac{1}{2}$ inch in diameter; but they vary greatly in length, some being as much as 2 inches long; but the general length seems to be about an inch,—that is to say, of the specimens in spirits; when alive they are probably longer. They are found attached to shells, both isolated and in clusters, and the larger ones are attached to the base of each other, forming a somewhat stellate cluster, as if they were free floating in the sea.

In others (the *Zoanthi sabuliferi*, or *Palythæina*) the outer surface of the polypes is hard, crustaceous, and thickened with imbedded grains of sand.

This group may be divided into sections by the habit of the animal, some being attached to marine bodies, and others living free.

I. Coral free, unattached.

1. SPHENOPUS, Steenstrup, Overs. Dansk. Vidensk. Selskabs. Forhandl. 1856, p. 37.

Sabella, sp., Schröter, Gmelin.

The type of this genus is an animal that was long ago figured as a *Sabella* by Schröter, and named from Schröter's figure *Sabella marsupialis* by Gmelin. Professor Steenstrup has found the original specimens in spirits, which were collected by Johns, the Moravian missionary, in Tranquebar, and has described them and their anatomy, under the name of *Sphenopus marsupialis*, in the 'Proceedings of the Danish Academy' for 1856. But I am not aware that any other specimen had been collected, until those which were sent to the Liverpool Museum. M. Milne-Edwards evidently has not seen them; for he places the genus *Stenopus* with the free-bodied, soft-skinned *Actinæ*, giving a very short account of the animal, evidently extracted from Steenstrup's paper, and without even mentioning the habitat.

The body is free, rather variable in shape, but more or less like a small flask; the upper part is cylindrical, truncated when contracted, with a central opening; the hinder part is more or less compressed and half ovate, the hinder portion in some specimens being truncated or rounded, and in others more or less produced, with a blunt rounded end. The outer surface is hard, formed of agglutinated sand closely imbedded in a thick cartilaginous case. The upper truncated part of the case has some indistinct lines, which are often scarcely to be distinguished, radiating towards the central aperture; in one of the specimens there are three round sunken pits on each side of the neck of the body, just under the swollen edge of the truncated upper end. In some of the other specimens there are slightly

impressed longitudinal lines on the neck, where these pits are placed in the specimen above described.

The inner coat of the body is membranaceous, with sixteen membranaceous folds, which extend to the base of the body; the lower part of the cavity is filled with vermicular cylindrical ovaries.

The mouth of the outer case, which is much contracted in spirits, is furnished with a single series of short tentacles. The laminæ of the stomach have a cartilaginous edge; they extend to the base of the cavity.

The details of the anatomy are given in Professor Steenstrup's paper, and he shows the darting stinging threads in the skin (fig. 8).

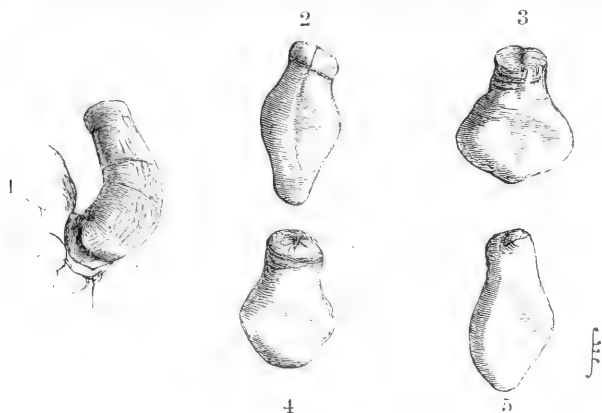


Fig. 1. *Pales cliffoni*.

2, 3, 4, 5. *Sphenopus marsupialis*.

SPHENOPUS MARSUPIALIS. (Figs. 2, 3, 4, 5.)

Sabella (die beutelförmige *Sabelle*), Schröter, Einleit. Conch. ii. p. 591. no. 19, t. 6. f. 21.

Sabella marsupialis, Gmelin, S. N. 3751.

Sphenopus marsupialis, Steenstrup, Oversigt Kgl. Dansk. Vidensk. Selsk. 1856, p. 37, t. 1. f. 1-8; M.-Edwards & Haime, Coral. i. 287.

Hab. Tranquebar (*Johns*).

The specimens here figured were collected at Pulo Faya, in the China Seas, by Capt. Perry of the ship 'Richard Cobden,' who has kindly presented specimens to the British Museum and to the Free Museum at Liverpool.

Var. bursiformis. The body variable in shape (figs. 2-5), more or less produced and compressed behind.

Hab. Massachusetts Bay, U. S. America.

B.M.

2. SIDISIA, Gray, P. Z. S. 1858, p. 582.

Coral free, cylindrical, simple, or developing lateral basal buds, giving it a more or less branched form.

SIDISIA BARLEEI, Gray, P. Z. S. 1858, p. 532, t. 10. f. 6.

Zoanthus couchii, var., Holdsworth, P. Z. S. 1858, p. 560.

Zoanthus couchii, var. *liber*, Gosse, Brit. S. Anem. 297, t. 9. f. 9.

Hab. Orkney, Brasse Island (*Mr. Barlee*).

II. Coral attached; cells arising from a foliaceous expanded base.

3. EPIZOANTHUS.

The base expanded, foliaceous (parasitic on shells); the cells cylindrical, simple, separate from each other from the base; tentacles numerous.

EPIZOANTHUS PAPILLOSUS.

Spongia suberea (part.), Johnston, Mag. N. H. vii. 494. f. 60.

Dysidea? papillosa, Johnston, Brit. Sponges, 109. f. 18, t. 16. f. 6, 7; Gray, P. Z. S. 1858, p. 531.

Zoanthus couchii (part.), Holdsworth, P. Z. S. 1858, p. 557, t. 10. f. 3.

Zoanthus couchii, var. *diffusa*, Gosse, Brit. Sea Anem. 298, t. 9. f. 10.

Hab. Coast of England; Coast of Massachusetts, U. S. B.M.

Dr. Johnston, though he described this animal as a sponge, very justly observed that it was "nearly allied to the *Alcyonium ocellatum* of Solander (Zoophytes, 180, t. 1. f. 6), whatever that may be."

This species is found entirely covering some shells which are inhabited by *Paguri*, or Hermit Crabs, on the coast of Massachusetts, in North America. Specimens were collected in forty-fathom water by Capt. Mortimer of the ship 'America,' and by him presented to the British Museum and the Free Museum at Liverpool.

It appears to envelope more than one species of shell, as the form of some is much more elongated and turreted than others. But the shells are entirely destroyed, probably absorbed by the Hermit Crab to make room for the enlargement of its body; for when the coral mass is cut through, the cavity, which has all the forms of the whorls of a spiral shell, seems only to be covered with the basis of the coral, strengthened by the sandy particles that are imbedded in it.

The coral covers the shell with a smooth coat, only leaving the mouth of the shell free for the emission of the crab. This coat is scattered with distinct radiating cylindrical bodies, thickened and rounded near the upper margin; the apex when expanded is flat, with close radiating white lines, and a central circular aperture.

One of these bodies is generally placed on the apex of the spire of the shell, and another on the front end of the aperture and the back of the shell; and the sides of the spire are furnished with from three to eight or nine similar bodies, which diverge from each other. The under surface of the body (that is to say, the part of it that is trailed along the ground as the animal walks) is smooth and free from any of these cylindrical bodies of the *Actinia*. The bodies differ in length, according to their age and the position they occupy on the surface of the shell, and they always diverge from each other;

and those on the lip and the edge of the shell are generally the largest, as they are in a position where they can obtain the most nourishment. They are gradually developed from the surface of the coral that covers the shell. They first appear as a small circular spot, which enlarges and gradually raises itself above the surface of the surrounding coral until it forms a cylindrical body, which is generally considerably higher than it is broad. The adult or well-developed body sometimes breaks off from the base, leaving a circular concave scar, with pores round its circumference, which is the basis of the ovaries of the animal.

4. GEMMARIA, Duchass. & Michel. Mém. Coral. des Antilles, 55.

Mammillifera, sp.

Palythoa, sp., Milne-Edw. Coral. i. 303.

Base expanded; polypes not soldered together.

Duchassaing and Michellot describe several species of this genus; to these add

GEMMARIA? SULCATA.

Zoanthus sulcatus, Gosse, Brit. Sea Anem. 303, t. 9. f. 7, t. 12. f. 2.

Hab. Devonshire.

Tentacles twenty-two, in two rows; upper half of polypes naked.

5. PALYTHOA, Lamx. Hist. Polyp. 361; Duchassaing & Michellot, Mém. Coral. des Antilles, 53, 1860.

Palythoa A A & A A A, Milne-Edw. Coral. 304.

Cavolina, sp., Schweiger.

Corticifera, Lesueur.

Mammillifera, Ehr., Blainv.

The polypes soldered side by side.

1. PALYTHOA MAMMILLOSA, Lamx.

L. stellata, Lamx.

Aleyonium mammilloso, Solander, Zooph. t. 1. f. 4, 5.

2. PALYTHOA AXINELLÆ, O. Schmidt, Sponges of the Adriatic, p. 61, t. 6. f. 1, 2.

Polype short, broad, on an expanded base, white when dry.

Hab. Adriatic. Parasitic on *Axinella cinnamomea* and *A. verrucosa*, O. Schmidt (Sponges of the Adriatic, pp. 61, 62). Esper called the latter sponge *Spongia verrucosa*, from the presence of this polype.

Professor Oscar Schmidt described a species of *Axinella* which has circular eight-rayed stars scattered on the surface and sunk in the substance of the sponge, under the name of *Axinella polypoides* (p. 62, t. 8. f. 5). He calls these stars *oscules*; but they are very unlike the oscule of any other sponge, and I think they may be parasitic *actinoid* polypes. Mr. Bowerbank, in his 'British Sponges' (t. 20. f. 307), figures a very similar body, which he describes as

a portion of the dermal surface of an undescribed sponge from the East Indies, having numerous depressed porous areas furnished with stomata, like protective organs. Mr. Tyler, F.L.S., has kindly shown me some specimens of the sponge mounted, as a transparent and as an opaque object; and they are very like a parasitic actinioid polype; but the rays are strengthened with spicules on the surface, and on the tips with some prominent ones (which form a pencil), unlike any *Actinia* I have seen, and so they are perhaps sponges. If so, they ought to form a genus, which may be called *Astrostoma*.

III. *The coral attached; the cells arising from a slender subcylindrical base.*

6. CAROLIA.

The base slender, subcylindrical, creeping; the cell cylindrical, separate, and far apart from the base.

CAROLIA COUCHII.

Zoanthus couchii, Johnston; Couch, Cornish Fauna, iii. 73, t. 15. f. 3; Johnston, Brit. Zoophytes, 202, t. 35. f. 9 (cop. Couch); Holdsworth, P. Z. S. 1858, p. 557, t. 10. f. 4-7 (not fig. 3).

Zoanthus couchii, var. *linearis*, Gosse, Brit. Sea Anem. 298, t. 10. f. 5.

Hab. Cornwall.

IV. *Polypes forming a network, sunk in sponges; the buds arising the upper or cephalic edge.*

7. BERGIA, Duchass. & Michellot, Coral. des Antilles, 54, 1860.

Alcyonium, sp., Lamk.

BERGIA SERPENS.

Alcyonium serpens, Lamk.

Bergia catenularis, Duch. & Michel. 54, t. 8. f. 12.

Hab. West Indies.

B.M.

V. *Polypes attached, solitary, with a rather expanded base.*

8. TRIGA.

The coral subcylindrical, solitary, attached, with a rather expanded base; outer coat coriaceous, sandy, concentrically wrinkled.

TRIGA PHILIPPINENSIS.

B.M.

Coral subcylindrical, clavate, rather narrowed near the base, concentrically wrinkled; end convex, obscurely radiately striated.

Hab. Philippines, attached to small pebbles (*Cuning*).

The coral varies from an inch to an inch and a half in length.

The genera *Iluanthos* of Forbes (Ann. of Nat. Hist. v. 1840, p. 184, t. 3. f. 1) and *Peachia*, Gosse (Trans. Linn. Soc. xxi. 267), may

belong to this family, and form a section of it which has a soft thin skin.

The genus *Edwardsia*, Quatrefages (Ann. des Sci. Nat. xviii. 65, 1842), and *Solanthus* of Gosse (Ann. Nat. Hist. xii. 1853, p. 157), may also belong to this tribe, and form a section characterized by the middle portion of the skin of the body being thickened, so as to form an imperfect tubular polyperoid, into which the soft anterior and posterior portion of the body are retracted for protection.

The *Edwardsia vestita* of Forbes (Ann. Nat. Hist. viii. 244. t. viii. 1842, and xii. 42, 1843) is most probably a *Cerianthus*, which forms a tube of agglutinated sand, like many Annelides, for the base of its body.

February 28, 1867.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

The Secretary called the attention of the Meeting to several recent additions to the Society's Menagerie, amongst which were—

1. A male example of the wild Swine of *Formosa* (*Sus taivanus*, Swinhoe), received by the ship 'Island Queen,' January 17th, having been obtained for Mr. Swinhoe by Mr. Gregory, H.M. Vice-Consul at Tamsuy, and forwarded to the Society by Mr. Swinhoe.

This animal was stated by Mr. Selater to be very nearly allied to, if not identical with, *Sus leucomystax* of Japan, of which the Society had previously possessed a female specimen, and was apparently very different from the curious red pig of the savages of Formosa, of which Mr. Swinhoe had sent three examples to the Society on the 25th of October, 1866, in the 'Maitland,' and which had been spoken of as *Sus taivanus* in a former communication on the subject (P. Z. S. 1866, p. 419).

2. A pair of Saiga Antelopes (*Saiga tatarica*, Pallas), received on deposit in November 1866, and recently purchased, as being apparently likely to do well in the Society's Menagerie. A drawing by Mr. Wolf was exhibited (Plate XVII.) showing the peculiar sheep-like appearance of this singular Antelope.

Mr. W. H. Flower exhibited a skull of the newly described Tapir of Panama (*Elasmognathus bairdi*, Gill, Pr. Acad. Sc. Phil. 1866, p. 183), belonging to the collection of the Royal College of Surgeons, and pointed out the characters which distinguish it from *Tapirus americanus* and *T. malayensis*, the most prominent of which was the complete osseous septum between the nasal apertures. Mr. Flower did not propose to give any further description of this animal at present, as it was understood that Professor Gill was preparing a complete account of it. The skull had been obtained by a collector at one of the stations of the Panama Railway.

In relation to the same subject, Mr. P. L. Selater read the following extract from a letter received by him from Capt. John M. Dow, F.Z.S., dated New York, January 17th, 1867:—

“The new Tapir from the Isthmus of Panama (*Tapirus bairdi*) appears to be the only species inhabiting that region of country. Not having seen an example of *T. americanus* I am unable to say whether it is, or is not, distinct in external appearance from *T. bairdi*. The young specimens of the latter I have seen were all marked on the back with light spots, and were covered with reddish-brown hair, which becomes darker, coarser, and uniform in colour in adult specimens.

“Thus far all examples of *T. bairdi* have exclusively been found on the Atlantic side of the isthmus, and north of the Chagres River. Their favourite haunts appear to be in the hills lying at the back of Sion Hill and the adjoining stations of the Panama Railway. It is only during the rainy season that they seem to seek the lowlands, for it is only in that season they are captured. They are not hunted by the natives; and it is only when they occasionally stray out into the open space of the railway that the young are sometimes captured alive, and the old ones shot.”

The Secretary read the following extracts from a letter, addressed by Dr. F. Mueller, of Melbourne, C.M.Z.S., to the ‘Australasian,’ on the 15th of December last, giving further particulars as to the Cassowary of Australia:—

“For the intelligence of the existence of an Australian true Cassowary, and for the means of defining preliminarily its specific characters, I am indebted to G. Randall Johnson, Esq., who in September last, while on a visit to Rockingham Bay, shot in the Gowrie Creek scrub the only specimen of this remarkable bird as yet obtained, and whose name I wish it should bear; and I cannot do better than to give in the first instance publicity to the lucid remarks transmitted to me by that gentleman:—

“‘The Cassowaries for some time past have been known to exist in the country about Rockingham Bay, but from their extreme shyness and caution have up to this time managed to escape every attempt to catch or kill them.

“‘The specimen shot is a male bird, and closely resembles the Helmeted Cassowary, but is of smaller size, its greatest height when standing in a natural position being not more than $4\frac{1}{2}$ feet. The head and neck are almost entirely bare of feathers, and the skin of different shades of blue and red. On the top of the head is a horny substance of dirty light-brown colour; the beak is black, the irides of rich light brown; the skin from the beak along the top of the head, and extending 5 inches down the back of the neck, marine-blue; below this, still following the back of the neck down to the point at which the feathers become thick, a length of 5 inches, the skin is of a cinnabar-red tint, the underside of the head and throat, from the beak downward, being of ultramarine, and the small trian-

gular portion immediately adjoining the feathers of indigo-blue, and fluted or puffed, as it were, in ridges. At the bottom of the throat are two pendent caruncles of a bright red colour, very similar to those of the common turkey-cock, and 4 inches in length.

“The wings are very small, and contain six quills resembling those of the porcupine, the third pair from the upperside being 12 inches long, the pair immediately adjoining 11 inches, the next pair 6 inches, and the lowest of all 2 inches and curved.

“The leg, from the knee-joint downwards, measured 12 inches, and is very stout and powerful, whilst two of the toes of each foot are 5 inches, and the centre one 7 inches long. The inside toe is armed with a long sharp and strong nail, with which, no doubt, a serious wound might be inflicted. The feathers are of a deep black colour, and similar in shape to those of the Emu; at a distance they present the appearance of coarse hairs rather than of feathers.

“On the upper part of the breast the bone appears to be flattened, and the skin is bare of feathers, and very thick and horny.

“The bird seems to confine itself almost entirely to the more open parts of the scrubs, and seldom ventures far out on the plains. During the months of July, August, and September its food consists chiefly of an egg-shaped blue-skinned berry, the fruit of a large tree. This, together with herbage, probably forms its diet, at least for that portion of the year; but at present its habits have been so little observed that hardly anything is known concerning them.”

“From these notes, and a sketch simultaneously received, it is obvious that the *Casuarus johnsonii* must rank as a separate species. The size of the bird may be the same as that of the Indian *Casuarus galeatus*; the former, however, has the neck coloured with two shades of blue, and wants the broad squalid-violet vitta; and while in the Indian Cassowary the black hairy plumage commences immediately below the oblique violet band, and covers the lower portion of the neck quite along the scarlet posterior caruncle, the Australian bird shows an indigo-blue line descending in a cuneate-deltoid form to the thorax, quite as deep as the two cervical anterior appendages. The short lower curved quill is not noticed by any writer on the *Casuarus galeatus*, so far as I am aware, and seems, therefore, not to exist in that species. The caruncular appendages towards the sternum are given as pink in D’Orbigny’s ‘Dictionnaire Universel d’Histoire Naturelle,’ while Mr. Johnson describes them as bright red in the Australian species.”

In referring to this letter Mr. Selater called attention to the communication he had made on the same subject to the Meeting on December 13, 1866 (see P. Z. S. 1866, p. 557), and remarked that the bird was, no doubt, the *Casuarus australis*, Gould.

The following papers were read:—

1. On the Cause of Death of the Sea-Bear (*Otaria hookeri*) lately living in the Society's Gardens. By JAMES MURIE, M.D., Prosector to the Society.

The loss which the Society's Collection has recently sustained in the death of the Sea-Bear, a species of *Otaria*, is one which cannot readily be repaired.

The animal was attractive in a threefold manner,—its rarity in the live state in this country, its curious mode of progression in the water and on the land (differing much in this respect from its allied neighbours the true Seals), and, not the least attractive point, if only in a pecuniary sense to the Society, its remarkable intelligence and docility serving at all times to gather round it a crowd of interested visitors.

The anatomy of this *Otaria* I shall treat of at length in a separate communication, and in this confine myself alone to the symptoms of illness and the morbid appearances disclosed, as an answer to the very general question put to me, "What did the Sea-Bear die of?"

Adolphe Lecomte, its keeper, reported to me that on Friday the 8th of February he first noticed the animal's appearing to him dull, out of sorts, and careless of food. On the day following (Saturday) it exhibited decided symptoms of illness, besides continued want of appetite. It lay on the straw in the little railed enclosure in front of the outhouse, and, as he said, had swelling of the abdomen and breathed unnaturally.

I myself saw the creature for the first time after the commencement of symptoms of illness on the Sunday morning. The symptoms then were as follows:—It lay on its right side, breathing at regular intervals, taking each time a long inspiration, and which seemed mainly abdominal; the body and flippers felt unusually cold; the eyes were watery and languid, the pupils contracted; there was no swelling of the abdomen, and there no tenderness on pressure, but pressure at the posterior part of the thorax elicited manifestations of uneasiness. Over this last region there was dulness on percussion; and auscultation revealed indistinct crepitation. Altogether there existed no very evident symptoms of great pain.

There was thus a difficulty in exactly determining the nature of the illness, and consequently the proper treatment. Some castor-oil was given along with a fish, and afterwards a clyster, as Lecomte believed the animal to be constipated. A mat having been laid over the creature and the trelliswork well protected from the cold wind with straw, the next day the body and the flippers had become warmer; the breathing, however, was shorter and more oppressed. During the night there had been a slight evacuation. On Tuesday morning there passed along with other alvine matter a piece of canvas rolled tightly together in a cord-like manner, and in this was contained a bent fish-hook, which I now exhibit.

The symptoms were somewhat relieved, and there were hopes of amendment; but towards night the animal became worse, and died on the 14th inst.

The body was opened a few hours after death, when it was found that the stomach and intestines, especially the upper or duodenal and jejunal parts of the latter, were intensely congested, and bore all the aspect of acute inflammatory action. The piece of canvas evidently had caused a stoppage in the alimentary canal; and the secondary effects of this had been an enormous amount of secretion of bile, the gall-bladder being excessively distended with it, the vessels and ducts of the liver everywhere containing an unusual abundance of biliary fluid, of which also traces existed in the duodenum and stomach. No other foreign bodies were found in the intestinal tract. The lungs were very much congested, but all the other organs presented the appearance of health.

Thus it would seem that the Sea-Bear had in some unknown manner obtained and swallowed the foreign bodies already spoken of, which produced a stoppage in the alimentary canal, and by their irritation brought on a bilious, or, as it is sometimes called, gastric fever, under which the poor creature succumbed.

On consideration, the symptoms bore out the post mortem examination. The reason of the chest or pneumonic symptoms may be best explained by the fact of the foreign body's lodgment in the first part of the intestines, which in this animal are protected by the posterior ribs; and the unusual dulness on both sides of the inferior (or posterior) part of the thorax was due to the lobes of the liver occupying both the right and left hypochondriac regions.

Tenderness of the abdomen was thus absent. The cutaneous coldness, no doubt, was produced by the biliousness. The laboured respiration occurred from the long congestion.

In the present instance it may be said that a lesson ought to have been received from the circumstance that on a former occasion multitudes of fish-hooks were discovered in a Seal that had died in the Gardens. It may be answered that great care has always been taken on this score, every fish given to the Sea-Bear having been gutted. How the canvas and hook came to be swallowed is involved in mystery.

2. Note on the "Hwang-Yang," or Yellow Sheep of Mongolia. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

The "Yellow Sheep," of which Dr. Lockhart has sent two skulls to the British Museum*, has been described by Pallas under the name

"Feb. 16, 1867.

* "MY DEAR SIR,—The horns I took to the Museum yesterday I brought with me from Peking. The animal to which they belong is called *Hwang-Yang*, the Yellow or Imperial Sheep. It is brought into Peking from Mongolia in large numbers in a frozen state, and sold for food. The flesh is much esteemed for its fine flavour and tenderness, and is eagerly purchased both by natives and foreigners.

"The European gentlemen in Peking used to go into Mongolia on shooting-expeditions, for the purpose of hunting the *Hwang-Yang*. The animal, however, is very wary, and generally keeps a long way out of range, so that the hunters are not very successful. It is considered a great feat to kill one of them.

"Yours very truly,

"W. LOCKHART."

Fig. 1.

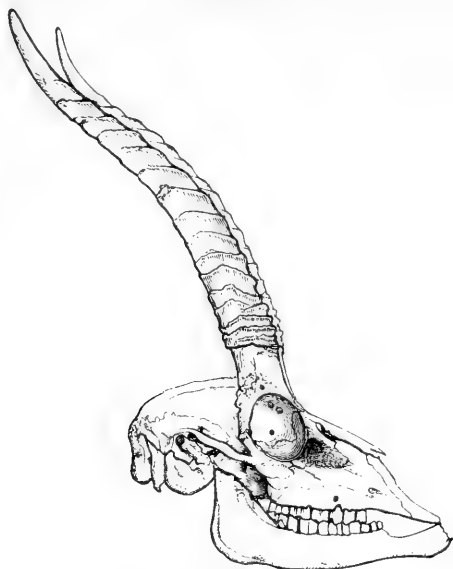
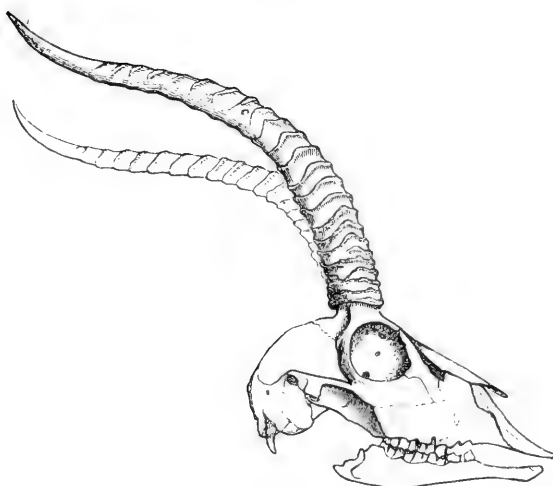
Horns of *Procapra gutturosa*.

Fig. 2.

Horns of *Procapra picticauda*.

of *Antelope gutturosa* (Spic. Zool. vii. 14, t. 2, 3. f. 14-17). The horns are like those of *Gazella dorcas*, but rather longer and with more numerous and closer rings.

The "Yellow Sheep of Mongolia" (*Procapra gutturosa*) is known from the nearly allied "Goa" of Tibet (*Procapra picticauda* of Hodgson) by its larger size and the shortness and thickness of the horns, which have their tips turned upwards. The two species agree in the length, softness, and colour of the fur, and in having a distinct white rump-spot. The horns of the Goa are much more slender, compressed, and longer than those of the Yellow Sheep, and have the tips bent rather forwards. The length of the horn, along the curves, of the adult Yellow Sheep is $9\frac{1}{2}$ inches, of the Goa $11\frac{1}{2}$ inches. The latter has about twenty-four or twenty-five, and the former only twenty rings. There are also several differences in the skulls. The aperture of the front blood-vessels at the base of the horn in *P. gutturosa* is very much larger than that in *P. picticauda*. Pallas describes the horns of *P. gutturosa* as "*lutescenti-opaca*;" but in the two specimens in the British Museum they are of a dark blackish horn-colour, in this respect very different from those of the "Goa."

March 14, 1867.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

The Secretary read the following extract from a letter addressed to him by Mr. J. H. Thomson, of New Bedford, Massachusetts:—

"I notice in the 'Proceedings' (1865, pp. 390 &c.) some account of 'Deformity of the Lower Jaw of the Sperm-Whale,' by Dr. J. Murie. Such deformed jaws are by no means uncommon; there are at this time some four or five specimens of such in the collection of our High School and the Natural-History Society of this place, and I have seen quite a number besides. As to the cause of this deformity, whalers generally attribute it to the fighting-propensities of the young 'Bull' Whales. I have never seen a specimen except from male Whales. The difference of teeth mentioned on page 396, 'Proceedings' (1865), is not in accordance with my observations. The lower jaws are very frequently brought home in whalers, to use up as bone for manufacturers and for ornaments &c.; you can find them lying about in a great many places in this vicinity. I have myself seen Sperm-Whale jaws with the sides of the same jaw differing by one or two teeth—that is, one or two more on one side than the other. The male Sperm-Whales in the rutting-season are very jealous of each other; the old 'bulls' at that time fight and drive off the young males from the 'school' or herd. Their mode of fighting is with their jaws mostly, so much so that you can approach a Whale directly behind to fasten or harpoon

them. They use their 'flukes,' or caudal fins, much less than the Right or Whalebone Whales. They will often lock their jaws, and turn on their sides and twist about. As to this being the cause of deformity, of course it is only opinion, but the general opinion. Such deformed Whales are generally fat; but this is accounted for by the fact that they are generally 'lone,' or single Whales, and their food, which is the Squid or Cuttlefish, can be nearly as easily captured by the deformed jaw as by the other. The Sperm-Whale will often in his 'flurry,' or death struggle, vomit up large pieces of Squid. Our place being eminently a whaling city, portions of the skeleton of the Sperm-Whale, such as jaws, skulls, &c., are often brought home in our whale-ships. Should any of these be of use to you, I will endeavour to send you such as you may require, or any other specimens of natural history which may be of service to your honourable Society.

"I notice also a paper in the 'Proceedings' (1864, p. 170) on the Bonnet of the Right or Whalebone Whale. Such appendage or bonnet is an invariable portion of the Right Whale from the North-west Coast and Arctic Sea; it is a development of the cuticle, similar to the nails of Mammalia, or the hoofs of the Ruminants."

The following papers were read:—

1. On the Skull of *Indris diadema*.

By ST. GEORGE MIVART, F.Z.S. &c.

(Plate XVIII.)

INDRIS DIADEMA.

Propithecus diadema, Bennett, Proc. Zool. Soc. 1832, p. 20.

Macromerus typicus, A. Smith, South African Journal, 2nd. ser.

ii. p. 49 (1833).

Lemur diadema, De Blainville, Ostéographie, Primates, Lemur, pp. 23 & 37, pl. 8 (skull), pl. 11 (immature dentition).

Habrocebus diadema, Wagner, Schreber, Suppl. i. (1840), p. 260; v. p. 141.

Propithecus diadema, Lesson, Species des Mammifères (1840), p. 219; Van der Hoeven, Tijdschr. v. Nat. Gesch. xi. p. 44 (1844); Isid. Geoff. St.-Hilaire, Catalogue des Primates, p. 68 (1851); Dählbom, Studia Zool. p. 203; J. E. Gray, Proc. Zool. Soc. 1863, p. 133; St. George Mivart, Proc. Zool. Soc. 1864, p. 638, and 1866, p. 167.

In March 1866 I had the honour of laying before the Society a description of a skin, a skull, and some other parts of the skeleton of the Woolly Lemur (*L. laniger* of Linnæus). At the end of that paper I gave the distinctive characters of that form and those of the Indri, adding such ones of *P. diadema* of Bennett as I had been able to gather from the scanty materials then accessible.

I am now enabled to complete that memoir, through the remarkable kindness and liberality of Professor Peters of Berlin, who has not only transmitted to me for examination a perfect and nearly adult skull of the *Propithecus diadema* of Bennett, but has expressly

authorized me to communicate the results of my examination to the Zoological Society.

Before proceeding to do so, however, I am desirous of correcting an error of nomenclature in my previous communication. The Woolly Lemur is there described under the generic name *Microrhynchus*, which I had adopted because it was the original one proposed by M. Jourdan in 1834. Professor Peters, however, has been kind enough to call my attention to the fact that this generic term was at the time of its proposal by M. Jourdan already appropriated, it having been employed in the group Coleoptera as long ago as the year 1823.

Under these circumstances I think the generic name *Avahis* should have been adopted (as was done by M. Isid. Geoff. St.-Hilaire*), as that term was proposed in 1835†; the other generic designations (*Habrocebus* of Wagner‡ and *Semnocebus* of Lesson§) having both appeared in works which have each on their titlepage the date 1840. This question, however, is of little importance, if, as I now believe, both terms must be abandoned. The examination of the skull sent by Dr. Peters has convinced me that sufficient grounds do not exist for the generic separation of the three forms|| of *Indrisinae*, all of which I shall therefore henceforth designate by the oldest¶ and very generally received generic name *Indris*,—the three being respectively *I. brevicaudatus*, *I. diadema* (instead of *Propithecus*), and *I. laniger* (instead of *Microrhynchus* or *Avahis*).

The subject of the present communication is, as is well known, as yet a rare animal. Mounted skins, indeed, exist in the British Museum, but no extracted skulls or other bones of the species are preserved in the osteological collections either of that institution or of the College of Surgeons. No adult skull or complete dentition has hitherto been figured; but the immature condition has been represented by De Blainville**.

I find, as I strongly suspected††, that the cranium of this species does closely resemble the crania of the other *Indrisinae*; and, to avoid repetition, it may be understood to correspond completely with

* Catalogue des Primates, p. 68.

† Is. Geoff. St.-Hilaire, 'Leçons de Mammalogie,' published by M. Gervais, p. 23 (1835).

‡ Schreber, Suppl. i. p. 257.

§ Species des Mammifères, p. 209.

|| This union has already been proposed by M. Vinso, who has described a fourth form, under the name *Indris albus*; but as scarcely any osteological characters are given, I can only allude to it in the present communication. It may be remarked, however, that if, as is asserted, the tail is somewhat longer than that of the common Indri, it so far tends to justify the union of *I. brevicaudatus* in one genus with the other *Indrisinae* (see Ann. des Sc. Nat. xix. p. 253; and Revue et Mag. de Zoologie, 1862, p. 494). The muzzle is said to be shorter than in *I. brevicaudatus*; but the form of the skull and the dentition appear to be as in that species.

¶ Proposed by Geoff. St.-Hilaire, 'Mém. sur les *Makis*' (1796), where, however, it is without the final s, which appears in 'Tabl. des Quadrum.' (1812). Illiger's term *Lichanotus* was proposed in 1811.

** Ostéographie, Primates, Lemurs, pls. 8 & 9.

†† P. Z. S. 1866, p. 165.

the description before given of the dentition and skull of *I. laniger*, except where the contrary is stated.

Of the two incisors in each præmaxilla, the anterior one is *very considerably* larger than the posterior one.

The upper canine is not yet in place in the skull transmitted by Dr. Peters; but from the mounted specimens in the British Museum it has already been determined to decidedly exceed the incisors in length.

The vertical prominence on the internal surface of the tooth is (unlike that of the canine of *I. laniger*, and more like that of *I. brevicaudatus*) very much nearer to the anterior margin of the tooth than to its posterior edge.

The anterior upper premolar is quite like that of *I. laniger*, and has the anterior process more developed than is the case in the corresponding tooth of *I. brevicaudatus*.

Fig. 1.



Inside of left dental series. Scale, nat. size.

The posterior upper premolar differs from the anterior one just as in *I. laniger*, and the internal cingulum is very marked indeed. It also, of course, more resembles the second than it does the third premolar of any Lemuroid*.

The first upper molar, as in *I. laniger*, is the largest grinding-tooth in the upper jaw. The difference in size, however, between it and the posterior premolar is not quite so great as that between the second and third upper molars.

It may be said to have seven cusps, as, beside the four principal ones, there are three developed from the external cingulum and placed as in *I. laniger*. The posterior one of these three, however, is (as in *I. brevicaudatus*) much smaller relatively than in the Woolly Lemur, and much smaller than the two anterior ones; also the small cusp, which in *I. laniger* exists between the two large anterior ones, is here wanting.

In other respects this tooth agrees with its homologue in the Woolly Lemur, and has a similar slightly marked ridge running from the postero-external cusp to the antero-internal one†.

The second upper molar quite resembles the corresponding tooth

* Dr. Peters, in his very interesting memoir on the Aye-Aye (in the 'Abhandlungen der Königl. Akad. der Wissenschaften zu Berlin,' 1865), in a note (p. 87), observes that it is not always the homologues of the most anterior premolars of one genus which are the first to disappear in another in which the number is less. He refers, as examples, to the *Phyllostomata* and *Rhinolophi*.

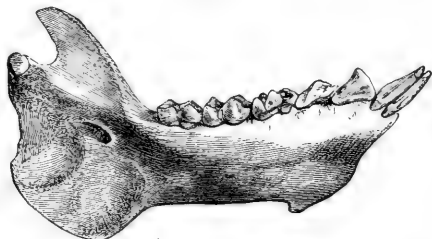
† In the immature dentition of *Indris diadema*, which is represented by De Blainville in his 'Ostéographie, Primates, Lemur' (pl. 11), the first upper molar is represented with the posterior cusp of the external cingulum quite rudimentary. There is also an indication of the oblique ridge extending between the postero-external and the antero-internal principal cusps.

in *I. laniger*, the third cusp of the external cingulum being more developed than in the first upper molar.

The third upper molar is relatively smaller than in either of the other genera of *Indrisinæ*. It has indeed two anterior cusps, one external, and the other internal; but these are much smaller than are the principal cusps of the more anterior molars. Behind these the posterior part of the tooth has a slightly irregular surface and margin, but is without any distinct cusps.

The inferior incisors and canines are quite like those of *I. laniger*, except that the inner surface of each canine has a wider groove than even in *I. brevicaudatus*, owing to the greater development of the lateral external prolongation of the basal cingulum.

Fig. 2.



Inside of left half of mandible. Scale, nat. size.

The anterior lower premolar is very much like that of *I. laniger*, but is more vertically and less antero-posteriorly extended than even in *I. brevicaudatus*.

The posterior lower premolar is quite like that of *I. laniger*, except that the median longitudinal ridge does not extend upwards as far as the external margin of the tooth does, though it does so rather more than in the short-tailed form.

The first lower molar is distinctly quinquecuspidate, the two processes of the antero-external cusp of *I. laniger* being here distinct cusps. In other respects it quite resembles its homologue in that species. The same is the case, at least sometimes, in *I. brevicaudatus*. This tooth has a great resemblance to the lower molars of many insectivora, the three anterior cusps together forming a triangular prism with one angle turned outwards; while the postero-internal angle of the prism is connected by a ridge with the molar's postero-external cusp.

The second molar resembles the first, except that there are but four cusps (the most anterior of the three internal ones of the first molar aborting), that the antero-internal cusp is more vertically extended, and the antero-external one less so, and finally that (as in *I. laniger*) the anterior half of the tooth is not narrower transversely than is its posterior half.

The third and last lower molar is like that of *I. brevicaudatus*, and has its supplemental fifth (posterior) cusp rather more developed than it is in *I. laniger*.

	inch.
Length of the anterior upper incisor	·16
Breadth " "	·13
Length of the posterior upper incisor	·10
Breadth " "	·10
Interspace between the two median incisors	·10
Antero-posterior diameter of anterior upper premolar at its base*	·19
Extreme antero-posterior diameter of anterior upper premolar..	·25
Vertical extent of anterior upper premolar	·19
Breadth from within outwards	·12
Antero-posterior diameter of posterior upper premolar at its base	·20
Extreme antero-posterior diameter of posterior upper premolar.	·22
Vertical extent of posterior upper premolar	·15
Breadth from within outwards	·15
Antero-posterior diameter of first upper molar at its base	·22
Extreme antero-posterior diameter of first upper molar	·29
Vertical extent of first upper molar	·14
Breadth from within outwards	·22
Antero-posterior diameter of second upper molar at its base ..	·21
Extreme antero-posterior diameter of second upper molar	·27
Vertical extent of second upper molar	·13
Breadth from within outwards	·22
Antero-posterior diameter of third upper molar	·17
Vertical extent of third upper molar	·09
Breadth from within outwards	·16
Length of inferior incisor	·30
Transverse diameter of inferior incisor	·05
Antero-posterior diameter of inferior incisor	·09
Length of inferior canine	·31
Transverse diameter of inferior canine	·09
Antero-posterior diameter of inferior canine	·13
Antero-posterior diameter of anterior lower premolar at its base	·16
Extreme antero-posterior diameter of anterior lower premolar..	·23
Vertical extent of anterior lower premolar	·22
Breadth from within outwards	·10
Antero-posterior diameter of posterior lower premolar at its base	·17
Extreme antero-posterior diameter of posterior lower premolar..	·25
Vertical extent of posterior lower premolar	·15
Breadth from within outwards	·11
Antero-posterior diameter of first lower molar at its base	·22
Extreme antero-posterior diameter of first lower molar	·27
Vertical extent of first lower molar	·16
Breadth from within outwards	·17
Antero-posterior diameter of second lower molar	·25
Vertical extent of second lower molar	·15
Breadth from within outwards	·16
Antero-posterior diameter of third lower molar	·25
Vertical extent of third lower molar	·11
Breadth from within outwards	·16

* The dimensions of the upper canine cannot be given, it not being yet in place.

Fig. 3.



Front view of skull. Scale, nat. size.

The skull.—De Blainville remarks* of the skull of this species, of which he had only a very immature specimen,—“Tout ce que je puis en dire, c’est qu’elle a la plus grande ressemblance avec une de pareil âge environ, provenant de l’*Indri* ordinaire; seulement le museau est notablement plus court, l’espace inter-orbitaire un peu plus large, et l’os incisif plus développé.”

The facial part is indeed very decidedly shorter than in *I. brevicaudatus*, though it is longer than in *I. laniger*; and the antero-posterior extent of the anterior opening of the orbit falls short of the length of the muzzle in front of it, though by no means so decidedly so as in the former species.

As in *I. laniger*, the skull, when viewed from above, is seen to be broadest between the outer margins of the orbits; while the greatest width of the cranium proper is in a transverse line passing just behind the posterior ends of the zygomatic arches.

The mastoidal region, as in the other *Indrisinæ*, is not inflated, but the prominence just above the aperture of the external auditory meatus, which is so marked in *I. laniger*, is represented by only a very slight enlargement in the species now described.

The skull is not concave externally, either between the orbits or elsewhere on its roof; but there is a flattening in the former situation, which may become a concavity with age, as this region in *I. brevicaudatus* thus alters with time. The same may be said with regard to the development of temporal ridges, which are not indicated in the skull examined.

There is no interparietal.

The nasals are rather strongly convex, and become slightly narrower transversely towards their upper ends. They are shut out from the lachrymals by a tolerably broad process of the maxilla,

* *Loc. cit.* p. 23.

the fronto-maxillary suture being a little anterior to their posterior termination.

As in the other *Indrisinæ*, there is no malar foramen, and the lachrymal opening is very near the margin of the orbit.

The floor of this latter part (the orbit) is not so large relatively as in *I. laniger*; but, as in that species, it is placed lower down than in *I. brevicaudatus*, so as to be but little above the alveolar margin of the upper jaw.

The malar is wide and extends back very nearly to the glenoid surface; but its lower part does not offer a vertically ridged and grooved space for the attachment of the *masseter* (though such may very probably be developed with age), neither is there any process given off from its posterior border above the zygomatic process of the squamosal.

The glenoid surface and the post-glenoid process and foramen are all as in the other *Indrisinæ*.

There are two small suborbital foramina; and the posterior palatine foramina are also small, and are intermediate, as to their development, between the conditions presented by *I. laniger* and *I. brevicaudatus* respectively; for the foramen behind the last molar and the two in front of the posterior margin of the palate are all of moderate size.

The anterior palatine foramina are rather large, and the palate is much as in *I. brevicaudatus*, except that its posterior border is scarcely at all thickened. The most anterior point of its posterior border is in a line with the anterior margin of the last molar. There is a small but distinct paroccipital process, and much smaller than that of the last-named species; but in the union of the foramen rotundum with the sphenoidal fissure, the conspicuous Vidian foramen, and the other points before mentioned* in describing *I. laniger*, *I. diadema* agrees with both the other species of *Indrisinæ*. I am unable to say, however, whether there is or is not a *crista galli*.

A very large and conspicuous stylo-mastoid foramen opens immediately behind and beneath the aperture of the meatus auditorius externus.

In the form of the mandible, *I. diadema* presents an interesting intermediate condition between *I. brevicaudatus* and *I. laniger*, the posterior part of the articular surface of the condyle being much flattened, but not vertically grooved, and the digastric fossa and ridge above the mylohyoid foramen being more marked than in the former species, but not so much so as in the latter one. The bending downwards of the angle of the mandible is also intermediate.

Dimensions.

	inch.
Length from anterior end of the præmaxilla to anterior margin of the foramen magnum	2.35
Length from anterior end of præmaxilla to most anterior point of orbital margin	0.65

* P. Z. S. 1866, p. 162.

	inch.
Length between vertical planes traversing the most anterior and most posterior points of orbital margin	0·46
Length from orbital margin to posterior end of skull	1·66
Extreme width between outer margins of orbits....	1·81
Extreme width behind posterior roots of zygomata..	1·49
Width between nearest points of orbits	0·61
Length of palate	1·20
Breadth of palate between first premolars	0·45
Breadth of palate at its posterior end	0·63
Length of nasals	0·65
Breadth of nasals	0·34
Length of lower alveolar margin from front of first premolar to behind last molar	1·15
Length of symphysis	0·80
Height of condyle above alveolar margin	0·43
Height of coronoid process above alveolar margin ..	0·70

Of the rest of the skeleton of *I. diadema* I am entirely ignorant ; but I have no doubt that when examined it will show an agreement with the skeletons of the two other species, similar to that which exists between their crania and dentition.

As I have before observed, I feel convinced that sufficient grounds do not exist for the generic separation of the species now described, the Woolly Lemur, and the Short-tailed Indri. The dental characters are all but identical ; and as regards the crania the main distinctions are those of the size of the entire skull, the proportional length of the muzzle, and the development of the orbit—characters which in other genera of Primates vary considerably amongst species of the same genus, especially when such genus contains species of very different dimensions.

The tail is short indeed in *I. brevicaudatus*, as compared with the same part in either of the two other species ; but length of tail varies much in *Macacus* and *Cynocephalus*, especially if, as I believe should be the case, *M. inuus* be included in the former genus.

The posterior incisors in *I. diadema* are decidedly larger than the anterior pair, while the reverse is the case in *I. laniger* ; but, as before observed*, *I. brevicaudatus* appears to be subject to some variation as to the relative size of the two pairs of upper incisors.

The shortness of the upper canine in *I. laniger* distinguishes it (as far as my observations have gone, and judging from De Blainville's figure) from the two other *Indrisinæ* ; but Prof. Van der Hoeven's figure† and that of Prof. Vrolik‡ leave it doubtful whether this is not merely a sexual peculiarity.

In other points given in my former paper as characters distinguishing *I. laniger* from *I. brevicaudatus*, we have seen that *I. diadema* presents an intermediate condition ; and the characters offered

* P. Z. S. 1866, note in p. 154.

† *Loc. cit.* pl. 1. fig. 6.

‡ Todd's 'Cyclopædia,' iv. p. 215. fig. 136.

by the three forms (which I consider together constitute but a single genus) may perhaps be expressed as follows:—

INDRISINÆ. INDRIS.

$$I. \frac{2-2}{2}. \quad C. \frac{1-1}{1-1}. \quad P.M. \frac{2-2}{2-2}. \quad M. \frac{3-3}{3-3} = \frac{16}{14} = 30.$$

Characters.—Ears short; muzzle moderate, or rather or very short; hind legs much longer than the fore limbs; index very short, much shorter than the fifth digit; pollex short and placed far back; hallux very long and covered with hair; tail long, or very short and rudimentary; internal condyle of the humerus perforated; carpus destitute of an os intermedium; tarsus short; first upper molar with four principal cusps, and from two to four supplementary ones; last upper molar with only two well-developed cusps; each lower incisor with its outer surface longitudinally grooved; posterior lower premolar much antero-posteriorly extended; first lower molar with five more or less distinct cusps; last lower molar quinquedens; a paramastoid process; no malar foramen; lachrymal foramen very near the margin of the orbit; a process depending from zygoma in front of, and external to, the glenoid surface; a glenoid foramen; anterior palatine foramina very large; mandibular symphysis very long; condyle rounded, but very little transversely extended; articular surface prolonged somewhat down the back of ascending ramus; digastric fossa more or less deep.

Hab. Madagascar exclusively.

INDRIS BREVICAUDATUS.

Characters.—Ears exerted; muzzle moderately long; tail short; posterior pair of upper incisors not much larger, sometimes decidedly smaller, than anterior pair; upper canine longer than first premolar; skull not concave between the orbits; antero-posterior extent of the anterior opening of the orbit less than the length of the muzzle in front of that opening; no protuberance above the external auditory meatus; no process of the malar projecting over the anterior end of the zygomatic process of the squamosal; floor of orbit considerably above the upper alveolar margin; a large palatine foramen behind the third molar; palate with its posterior margin thickened; mandibular symphysis much less than three times the length of the lower incisors; fossa for digastric not very deep; posterior part of articular surface of condyle not grooved, nor always much flattened; angle very much bent downwards, making the inferior margin of the mandible exceedingly concave.

Hab. Madagascar, but not St. Mary's Island.

INDRIS DIADEMA.

Characters.—Ears short, in the fur; muzzle rather short; tail long; posterior pair of upper incisors much smaller than the anterior pair; upper canine larger than first premolar; last upper molar very small; skull not concave between the orbits; antero-posterior

extent of the orbit about equal to the length of the muzzle in front of that opening; a very slight protuberance above the external auditory meatus; no process of the malar projecting above the anterior end of the zygomatic process of the squamosal; floor of orbit not much above the upper alveolar margin; all posterior palatine foramina moderate; mandibular symphysis not much less than three times the length of the lower incisors; fossa for digastric very deep; posterior part of articular surface of condyle very much flattened; angle much bent downwards, making inferior margin of mandible decidedly concave.

Hab. Madagascar.

INDRIS LANIGER.

Characters.—Ears very small and hidden in the fur; muzzle very short indeed; fur woolly: supinator ridge of humerus very large; posterior pair of upper incisors considerably larger than the anterior pair; upper canine (sometimes at least) scarcely exceeding first premolar in vertical extent; skull strongly concave between the orbits; antero-posterior extent of the anterior opening of the orbit exceeding the length of the muzzle in front of that opening; a marked protuberance above the external auditory meatus; an obtuse process projecting from the malar over the anterior end of the zygomatic process of the squamosal; floor of orbit very little above the upper alveolar margin; no large palatine foramen behind the last molar; palate with its posterior margin not thickened; anterior palatine foramina very large; mandibular symphysis nearly three times the length of the lower incisors; fossa for digastric very deep indeed; a vertical groove on posterior part of articular surface of condyle; inferior margin of mandible only slightly concave.

Hab. Madagascar and St. Mary's Island.

EXPLANATION OF PLATE XVIII.

- Fig. 1. Upper surface of the skull of *Indris diadema*.
 2. Under surface of the same.
 3. Side view of the same.
 4. Side view of the outside of the mandible of *I. diadema*.
 5. Grinding-surface of the right dental series of the same.

(All the figures are of the natural size.)

2. Supplementary Note on *Potamogale velox*.

By Prof. ALLMAN, F.R.S., Corr. Memb. Zool. Soc.

Mr. St. George Mivart having recently expressed a wish to inspect the skull of the *Potamogale velox*, described by me at a former Meeting of the Society*, I had much pleasure in placing it at his disposal. Shortly afterwards I received from him a note reminding me of the discrepancy between the number of teeth in the dental

* Trans. Zool. Soc. vi. pt. 1, June 1863.

formula of this animal as given by Prof. J. V. Barboza du Bocage* and that in the formula given by myself, the Lisbon zoologist describing ten teeth on each side in both jaws, while in my specimen only nine were apparent on each side. Mr. Mivart, however, thought that he saw indications of a tooth still confined within the mandible at the extreme posterior end of each ramus, while a small, apparently fractured, surface in the corresponding part of the maxilla appeared to afford evidence of a portion of the upper alveolar margin with its tooth having been here carried away.

I have now the satisfaction of being able to confirm in great part the suspicion of Mr. Mivart. In the case of the mandible, it was easy enough to set the question at rest. On removing a portion of the side of the mandible, where the missing tooth was supposed to be concealed, a small cavity was exposed, in which, with some care, a minute calcareous point, the commencing calcification of the dental papilla, still enveloped in the remains of its capsule, was detected.

There can thus be no doubt of the presence of a rudimental tooth on each side in the mandible of my specimen, behind the most posterior of those previously described by me.

Of the existence of a corresponding tooth in the maxilla, no such direct evidence can be adduced. There is certainly a very small rough surface at the most posterior end of the alveolar margin at each side, and I agree with Mr. Mivart in thinking it probable that a portion of this margin has been here broken off; the missing fragment, however, must have been extremely small, and the tooth which it contained must have been in at least as rudimental a state as that of the mandible.

Had I become acquainted with Prof. Du Bocage's determination of the dental characters of *Potamogale* before my own communication had been printed, I should perhaps have made a search in the same direction for the missing teeth; but as it was, my specimen gave me no reason to suspect that it did not offer an exposition of the complete series, though it is now plain that it had not yet developed its last molars.

The facts now stated render necessary a correction of the formula which I had already given as that of the teeth of *Potamogale*, and which must henceforth be regarded as applying to the dentition of this genus before the adult state had been attained in the development of the last molars. In the corrected formula the incisors and premolars must remain as before, but to the true molars one must now be added. The dental formula, as amended for the adult, will accordingly stand as follows:—

$$I. \frac{3-3}{3-3}. \quad C. \frac{0-0}{0-0}. \quad P. \frac{3-3}{3-3}. \quad M. \frac{4-4}{4-4} = 40.$$

PS. Since the above note was communicated to the Society, I have been enabled, through the kindness of M. Jules Verreaux, of

* Noticia acerca los Caracteres e Afinidades Naturaes de un novo Genero de Mammiferos Insectivoros. Lisboa, 1865.

the Jardin des Plantes, Paris, to examine a skull of *Potamogale* in which the entire series of teeth has been developed. It is that of a specimen brought from the Gaboon by M. Aubry Le Compte, the stuffed skin of which now forms part of the French Colonial Collection in the International Exhibition, Paris.

In this skull the last molars have made their appearance, so that there are ten teeth on each side in both upper and lower jaws. The most posterior molar of the mandible entirely resembles that in front of it, except in its crown being on a slightly lower level. In the maxilla the posterior molar is considerably narrower from before backwards than the tooth which immediately precedes it, but in other respects it resembles it.

By an error overlooked in correcting the proof of my former paper on *Potamogale velox*, the first, second, and third true molars of the lower jaw are stated to be equal in height to the *second* premolar; it ought to have been written the *third* premolar.

3. Notes on the Skulls of the Cats (*Felidæ*).

By DR. J. E. GRAY, F.R.S., V.P.Z.S., &c.

Having had occasion, while revising the nomenclature of the specimens of *Felidæ* in the British Museum Collection, to examine a large series of the skulls of the family, I herewith submit the result of that examination.

The examination confirms the separation of several of the genera that have been proposed, and shows the distinctness of some species which it has been suggested should be united.

The British Museum Collection contains the skulls of a large number of species of *Felidæ*—the largest series of skulls of that group, I believe, that has ever been brought together—nearly twice as many as are figured in M. de Blainville's 'Ostéographie,' which embraces figures of all the species contained in the French collections, in Paris and elsewhere. Of most of the species there are several examples, and almost all of them are obtained from the skins of the specimens in the collection: therefore there can be no doubt of the accuracy of their determination; and should any doubt arise it can be solved by the examination of the skin from which the skull was obtained. I have referred to the work in which the best figures of the skull of each species is to be found, and I have added figures of some of the more interesting forms, which, I believe, are now published for the first time.

The form of the flesh-tooth of the Hunting-Leopard (*Gueparda*) at once separates it from all the other Cats as distinctly as its long slender legs and round face. The flesh-tooth of the upper jaw, instead of being stout and having a more or less large but always distinctly marked prominence with a conical crown on the front of the inner edge, as is common to the skulls of all the Cats and Lynxes, in the *Gueparda*, on the contrary, is thin, compressed longitudi-

nally, and has only a very slightly raised scarcely visible keeled ridge on that part. This process is represented as rather more prominent in M. de Blainville's figure of the skull (*Ostéographie, Felis*, t. 9) than it is in the specimens in the British Museum.

The peculiarity in the formation of the skull, which separates the Lynxes from the Cats, is not very striking; but as it is common to the skulls of all the species of Lynxes, both from the eastern and western hemispheres, it shows how important it is to observe even slight differences.

In the *Felidæ* generally the upper processes of the intermaxillæ and the front edge of the frontal bone on each side are provided with a more or less elongated conical process, which separates a part of the nasal from the maxilla; and in the Lynxes these processes are very slender and so much elongated that those of the intermaxilla and the frontals nearly or quite unite, and entirely separate the nasals from the upper front edge of the maxillæ. This is not altogether peculiar to the Lynxes, the same structure being found in a Cat which has been called *F. marmorata*; and the processes of the intermaxillary, often very long, reach up one-third the length of the side margin of the nasal in some of the larger Leopards. But the lateral processes of the frontal not being so long as in the Lynxes and *F. marmorata*, the two processes do not unite and separate the nasal bones from the maxillæ as is found in all the species of the genus *Lyncus*.

The skulls of the species of true Cats are so similar and uniform in their structure that they present very few tangible characters for the separation of the species into groups. In looking at a small series of skulls it is easy to perceive that some are remarkable for having a broad rather lengthened nose and moderate-sized orbits, and others a narrow, short nose, pinched up behind, and above with a more or less distinct concavity on the sides in front of the orbits, and the orbits generally large. The former structure is confined to the skulls of the larger species, as the Lion, Tiger, Leopard, Ounce; and the second is more marked in the small kinds. If a larger series of skulls is examined, the two forms gradually pass into each other, and it is found that the intermediate gradation of form occurs in the skulls of some of the species that are intermediate in size between the two extremes; while some of the skulls of the middle-sized species retain the characters of the larger broad-nosed species.

In some species, while the skulls of the adult animals are similar to those of the larger broad-nosed group, the skulls of the younger or half-grown specimens have the sides of the nose more or less concave and narrower behind, like those of the second group.

The skull of a Chinese Leopard, presented by Dr. Lockhart, from Pekin, presents one of those anomalies in dentition which now and then occur in most families of Mammalia. It has a small subcylindrical short tubercular grinder behind the flesh-tooth on one side of the lower jaw, and none on the other, thus having on one side the formula of dentition that is peculiar to the genus *Canis*. But

no one could make a mistake as to what it was, as the teeth are all those of the Cats (*Felidæ*).

The skulls of species of *Felis* which have the same system of colouring are not always alike: thus the skulls of *Felis uncia*, *F. marmorata*, and *F. macrocelis*, of *Felis viverrina*, *F. bengalensis*, and *F. nepalensis*, and of *F. pardina* and *F. macroura* are very different in form and structure. On the other hand, the skulls of the Lion, the Tiger, the Leopard, and the Jaguar are nearly similar in form and teeth, and chiefly to be distinguished by their size and other slight characters.

Keyserling and Blasius have pointed out the differences in the skulls of the Wild Cat and the Lynx of Europe. The characters mentioned are common to most of the species of the genera *Felis* and *Lynx*; but *Felis marmorata* has a skull like that of the Lynxes; and the *Chaus* group, which have the pencilled ears of the Lynxes, but not their long legs, have a skull like that of the Domestic Cat.

The *Felis macrocelis* has very long, rather compressed canine teeth in the upper and lower jaws. Its skull presents the nearest approach to those of the fossil Cats with very long sharp-edged canines, such as *Felis cultridens* of England, Germany, France, and Italy, *F. megatherion* and *F. smilodon* of Brazil. The latter has exceedingly long sword-like canines in the upper jaw. These animals form the genera *Machairodus* and *Agnotherium* of Kaup (see Blainville, *Ostéographie, Felis*, t. 17 & 20).

In most *Felidæ* the orbits are furnished with an imperfect bony ring; in *F. viverrina*, *F. subrugosa*, *F. planiceps*, and some other spotted Cats these orbits are complete even at an early age.

The Domestic Cat has nocturnal eyes, with an elongated erect pupil, and this has been generally given as the character of the entire genus; but the Lion, Tiger, Leopard, and some of the other larger species have a round pupil, and do not, under any circumstances, ever contract their eyes into an erect linear shape; so they may be called diurnal eyes.

The Domestic Cat, and the species of the genus that are known to have nocturnal eyes with linear erect pupils when contracted, have a very large eyeball and large orbits in the skull, while the eyeball and orbit of the skulls of the Lion and other Cats, which are known to have diurnal eyes, have a moderate-sized eyeball and orbit to the skulls.

Observing that the Cats, which are well known to have vertical pupils, have large eyeballs and orbits in the skulls, I have taken it for granted that all Cats which have large orbits in the skull have vertical pupils. This is important, as we can observe the size of the orbit in museums, while the form of the pupil can only be observed in the living animal. The animals which have nocturnal eyes, generally have short small faces to the skulls; but the *Felis viverrina*, which certainly has nocturnal eyes, has a rather elongated nose to the skull.

As regards the form of the pupil in the *Felidæ* there is a great

want of information. Years ago I remarked that, contrary to the general belief, the pupils of the larger species, such as the Lion, the Tiger, the Leopard, the Jaguar and some other species, had a round pupil, and I therefore separated them from the true Cats, which had linear erect pupils; but the number of species that belonged to each group was left for further verification. Very few zoologists have noted the form of the pupils in the species they have described. Sometimes two observations on the same species do not coincide: thus Burmeister describes the pupils of the eyes of *F. jaguarondi* and *F. eyra* as round; but Berlandier represents the pupil of the latter (*F. eyra*) as linear and vertical. Then Mr. Hodgson has figured the eye of *F. macrocelis* as circular; but Mr. Bartlett says that in the example living in the Society's Gardens it is oblong erect.

Mr. Bryan Hodgson had prepared by native artists a series of drawings of Nepalese animals from life, with the intention of publishing a 'Fauna of Nepal.' These drawings he presented to the British Museum along with his large collection of specimens; and I find that the eyes of the Leopard, the Ounce, the Tortoise-shell Tiger (*F. macrocelis*), and the Murma Cat (*F. murmensis*) are represented with round pupils. The Viverrine Cat of the Tarai (*F. viverriceps*, Hodgs.), the small Nepal Cat (*F. nepalensis* and *F. pardochrous*, Hodgs.), the *F. nigripictus*, the Chaus (*Chaus lybicus*), and the Lynx of Thibet (*L. isabellina*, Blyth) are all represented with linear erect pupils.

Mr. Bartlett, in reply to my inquiries, kindly observes, "A great difficulty exists in determining the form of the pupils in the eyes of many of the Cats, as in some lights and conditions they are all round. It depends upon the light and other causes that you find them sometimes oblong; but from a careful and oft-repeated observation of the following list, I feel safe in saying that in the Ocelot, Puma, Jaguar, Leopard, Tiger, Lion, and Cheetah they are round, and in the Caracal, Clouded Tiger, Chaus, and Serval are oval.

"There are no others on your list that I can speak of with certainty."

"P.S. In my former list I told you the Ocelot had a round pupil. I have this day had the animal in the sunlight, and I must say the pupil of the Ocelot is oblong when exposed to the bright sunlight."

Section 1. Normal Cats.—*The flesh-tooth of the upper jaw with a well-marked prominent internal lobe on the front part of its inner side. The legs moderate.*

Tribe I. True Cats—FELINÆ.

The head oblong; face slightly produced. Legs moderate, nearly of equal length. The skull oblong; intermaxillæ and frontal bones with short processes, which extend between the ends of the nasal bones and the maxillæ. The front upper false grinder small (rarely deciduous and wanting).

A. Diurnal Cats.—*The eyes diurnal, with a round pupil. The orbits of the skull moderate-sized, compared with the size of the skull; face of the skull elongate, high, broad, flattened above.*

* *Forehead of skull suddenly elevated above the line of the face.*

1. UNCIA.

Skull broad; face broad, short, flat above; forehead suddenly raised; crown convex in front and on the sides, concave behind; nasal bones broad, short, not reaching so far back as the upper edge of the maxillæ; upper processes of the intermaxillæ rather elongate, extending about one-third up the sides of the nasals; orbits moderate, incomplete behind; canines conical, moderate; zygomatic arch very strong and high.

This genus is at once known from the Lion, Tiger, Leopard, and Tortoise-shell Tiger by the shortness and breadth of the face, and the sudden elevation of the forehead. "Pupil round."—*Hodgson.*

UNCIA IRBIS. (Fig. 1.)

Felis uncia, Schreb.

F. pardus, Pallas.

F. panthera, Erxl.

F. irbis, Ehr.

F. tulliana, Valenc.

F. uncioides, Hodgson.

Hab. Tibet (? Smyrna, *Val.*).

Skull imperfect behind, nearly to the occiput. Length $6\frac{1}{2}$ inches, width $4\frac{1}{4}$ inches.

Fig. 1.



Uncia irbis.

** *Nose on the same plane as the forehead.*

2. LEO.

Head, neck, sides of body, and legs maned. Tail elongate, tufted at the end. Pupil round. Skull: nose on the same plane as the forehead; nasals flat, nearly as long as maxillæ. The orbits of the skull moderate, incomplete behind.

LEO NOBILIS.

Felis leo, Linn.

Leo africanus et *L. persicus*, Swains.

L. gambianus, Gray.

L. goorgrattensis, Gmel. &c.

Blainv. Ostéogr. *Felis*, t. 5 & 9.

Hab. Asia; Africa.

Skull: length $14\frac{1}{2}$ inches, width $9\frac{5}{8}$ inches.

3. TIGRIS.

Cheeks with spreading whiskers. Tail elongate, tapering at the end. Pupil round. Skull: nose on same plane as the forehead; orbits of the skull moderate, incomplete behind. Nasals very large, reaching beyond the back edge of the maxillæ. Internal nostrils broad. Palate truncated behind.

TIGRIS REGALIS.

Felis tigris, Linn.

Blainv. Ostéogr. *Felis*, t. 7.

Hab. Asia.

Skull: length 14 inches, width $10\frac{1}{8}$ inches.

4. LEOPARDUS.

Hair of head and neck uniform. Tail elongate (rarely shorter than the body). Pupil round. Orbits of the skull moderate, incomplete behind. Nose on same plane as the forehead. The upper process of the intermaxilla very narrow, and much produced up the side of the maxilla, often one-third the length of the nasal.

† *Large rose-spotted Leopards.*

1. LEOPARDUS PARDUS.

Felis leopardus, *F. varia*, et *F. uncia*, Schreb.

F. pardus, Linn.

F. panthera, Erxl.

F. chalybeata, Herm.

F. minor, Ehr.

F. antiquorum, Fischer.

F. pccilura, Valenc.

F. paleopardus, Fitz.

Blainv. Ostéogr. *Felis*, t. 8; Temm. Monogr. t. 9. f. 1, 2.

Var. Black.—*F. melas*, Péron. *F. fusca*, Meyer.

Hab. Southern Asia; North, South, and West Africa.

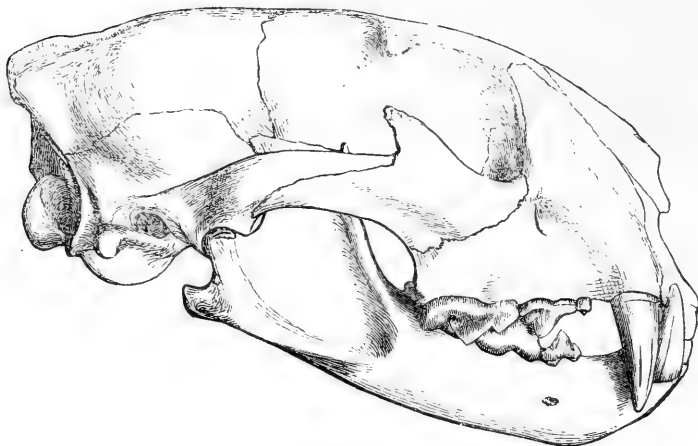
Pupil round.—*Bartlett*; *Gray*.

Very variable in the size and number of the spots. Skull: nasal elongate, back edge on a line with back edge of maxilla; internal nostril rather narrow. Length $9\frac{1}{4}$ inches, width $5\frac{5}{8}$ inches.

2. *LEOPARDUS JAPONENSIS*, Gray, P. Z. S. 1862, p. 262, t. 33.

Hab. Japan.

Fig. 2.



Leopardus chinensis.

3. *LEOPARDUS CHINENSIS*. (Fig. 2.)

Skull (in British Museum) very like that of a Leopard, but shorter; and the nose, instead of being nearly flat, is regularly arched before the orbits.

Hab. Pekin, mountain-forests of the west.

Skull: length $6\frac{7}{8}$ inches, width $4\frac{5}{8}$ inches. Nasal wide, flat; apex produced rather behind the back edge of the maxilla. Processes of the intermaxilla very slender, short; forehead broad, convex.

This may be the skull of *L. brachyurus*. There are two or three skulls of Leopards in the Museum received from Utrecht without habitats, that rather resemble the Pekin specimen, which was presented to us by Dr. Lockhart.

4. *LEOPARDUS ONCA*.

Felis onca, Linn.

F. panthera, Schreb.; Cuvier, Oss. Foss. t. 34. f. 3, 4.

Jaguar, Buffon.

Var. Black.—*Felis nigra*, Erxl.

Var. *Leopardus hernandezi*, Gray, P. Z. S. 1857, p. 278, t. 18; Blainv. Ostéogr. *Felis*, t. 3.

Hab. South America.

Pupil round.—*Bartlett*.

Skull: nasals broad, their hinder end and the back edge of maxillæ nearly on a line; forehead convex; nose broad, flat above; orbit with a prominence in the middle of the front or nasal edge. Length 9 inches, width 6 inches.

Var. Black.—Skull: length $9\frac{1}{2}$ inches, width $6\frac{3}{4}$ inches. Brazil.

†† Large one-coloured Cats.

5. LEOPARDUS AURATUS.

Felis aurata, Temm.

F. chrysothrix, Temm.

F. moormensis et *F. murmensis*, Hodgson.

Junior. *F. temminckii*, Vigors.

Hab. Himalaya, Sumatra; Borneo.

Pupil round.—*Hodgson*.

6. LEOPARDUS CONCOLOR.

Felis concolor, Linn.

F. discolor, Schreb.

F. puma, Shaw.

F. fulva, Brisson.

Puma, Penn.

Blainv. Ostéogr. *Felis*, t. 6; Baird, Mam. N. A. t. 71 (skull).

Var. Black.

Hab. North and South America.

Pupil round.—*Bartlett*.

Skull: length $7\frac{7}{8}$ inches, width $5\frac{3}{8}$ inches.

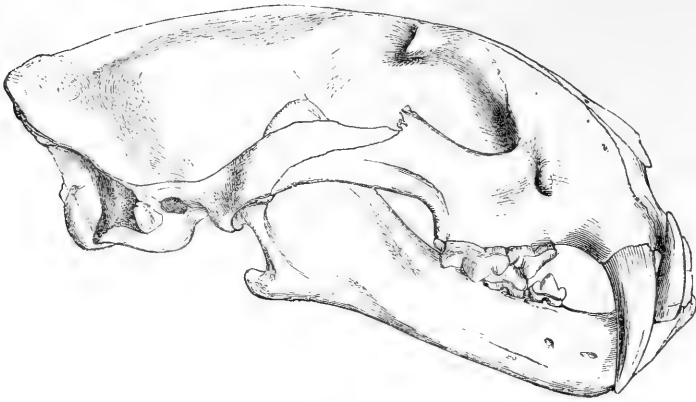
Nasals rather narrow, with a central sunken line rather behind the back end of maxillæ; cheeks in front of the orbits rather concave; the upper part of the intermaxilla much produced up the side of the nasal for one-third the length of that bone.

5. NEOFELIS.

Skull elongate; face broad, rather produced, on the same plane as the forehead. Nasal large, elongate. Orbit moderate, very incomplete behind. Lower jaw truncated and high in front. Canine teeth, upper and lower, very long, conical, with a sharp cutting hinder edge; the front upper and lower false grinders distinct, early deciduous. The front lateral process of the frontal bone rather elongate. The hinder entrance to the nostrils very narrow, elongate; sides parallel; front edges rounded. Pupil round (*Hodgson*), oblong erect (*Bartlett*).

This skull most nearly resembles that of the celebrated fossil *Felis smilodon* (Blainv. Ostéogr. *Felis*, t. 20), with a very much elongated upper canine.

Fig. 3.



Neofelis macrocelis.

1. NEOFELIS MACROCELIS. (Fig. 3.)

Felis macrocelis, Temm.

F. diardii, Desmoul.

F. macroceloides, Hodgson.

F. nebulosa, H. Smith.

Hab. Himalaya (*Hodgson*); Malacca (*Temm.*); Siam.

Pupil oval.—*Bartlett*.

Skull: length $7\frac{3}{4}$ inches, width $4\frac{3}{4}$ inches.

Var. Smaller. Skull: length 5 inches, width $3\frac{1}{2}$ inches (adult).

Hab. Siam.

2. NEOFELIS BRACHYURUS.

Leopaadus brachyurus, Swinhoe, P. Z. S. 1862, p. 352, t. 43.

Hab. Formosa (*Swinhoe*).

B. Nocturnal Cats.—*The pupil of the eye oblong or linear erect when contracted; the eyeball large. The orbits of the skull large for the size of the face. The nose of the skull generally short, compressed above behind, with a more or less marked concavity in front of the orbits.*

In some genera and species the orbits of the eyeballs are much larger, compared with the size of the face and skull, than in others.

* *Skull short and high.*

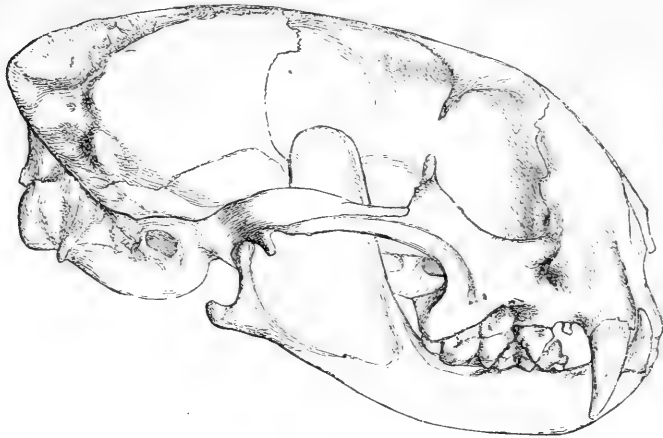
6. PARDALINA.

Face round. Eyes moderate; pupil —? Skull short, high; face short; forehead arched in front; brain-case swollen, short; orbits moderate, incomplete behind. First upper false grinder small.

Canines conical, moderate. Hinder aperture to the nose truncated in front.

This genus differs from *Leopardus* in having a much shorter-faced skull.

Fig. 4.



Pardalina warwickii.

PARDALINA WARWICKII. (Fig. 4.)

Felis himalayanus, Warwick.

F. viverrina, var., Blyth.

Leopardus himalayanus, Gray, List Mam. B. M. p. 44.

Hab. Himalaya (*Warwick*). Probably from South America?

Skull, adult, from Mr. Warwick. Length $4\frac{1}{4}$, breadth $3\frac{1}{16}$, height $2\frac{1}{4}$ inches.

/ 7. CATOLYNX.

Head round. Ears rounded. Pupil oblong erect. Tail very long, cylindrical. Skull ovate; face short, rather broad; nose slightly flattened on the sides; forehead arched; the nasal bones moderate, elongate, separated from the maxillæ by the long slender processes of the intermaxillæ and frontal bones. First upper false grinder small, distinct. Orbits large, subcircular, complete or nearly complete behind. Internal nostril narrow, arched in front.

This genus is peculiar for having the same form of the nose-bones as the Lynxes.

1. CATOLYNX MARMORATUS.

Felis marmoratus, Martin.

F. diardii, Jardine.

F. ogilbii, Hodgson.

F. longicaudata, Blainv. Ostéogr. Felis, t. 9 (skull).

Hab. India; Borneo.

2. CATOLYNX CHARLTONI.

Felis charltoni, Gray, P. Z. S. 1856, p. 396.

Hab. Nepal; Darjeeling (*Charlton*).

The spotting of this species is rather different from that of *F. marmoratus*; they may be only local varieties.

The separation of the nasals from the maxillaries is uniform in all the six specimens of this skull in the British Museum Collection.

** *Skull elongate; face and brain-case elongate.*

8. VIVERRICEPS.

Head rather elongate. Ears rounded, not pencilled. Eyes nocturnal; pupil erect, linear. Fur spotted. Tail moderate, tapering. Skull elongate; face produced, narrow above, concave on the sides in front of the orbits; orbits rather large, complete behind; nasal bones elongate, very narrow above. Canines conical, moderate.

Asia.

† *Skull elongate; nose long.*

1. VIVERRICEPS BENNETTII. (Fig. 5.)

Felis viverrina, Bennett, P. Z. S. 1833, p. 68.

F. viverriceps, Hodgson.

F. bengalensis, B. Hamilton.

F. himalayana, Jardine.

F. celidogaster, Gray, List of Hodgson's Collection, B. M. (not Temm.).

Hab. East Indies.

Pupil linear erect.—*Hodgson*.

Skull: length 5 inches 5 lines, width 3 inches 8 lines.

Fig. 5.



Viverriceps bennettii.

†† *Skull*: nose shorter, concave on sides.

2. *VIVERRICEPS PLANICEPS*. (Fig. 6.)

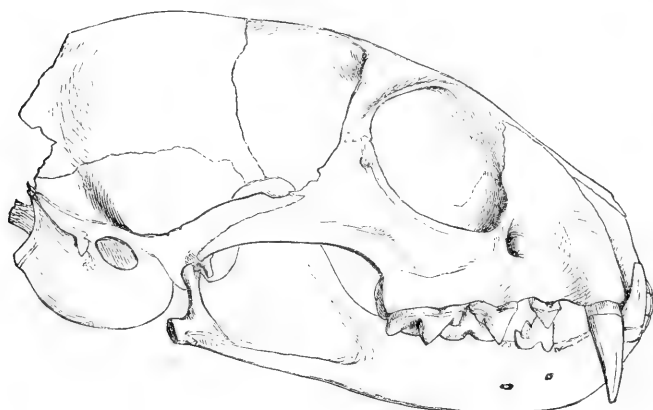
Felis planiceps, Vigors & Horsfield, Zool. Journ. vii. t. 2; Blainv. Ostéogr. Felis, t. 9.

F. diardii, Crawford.

Hab. Malacca; Sumatra; Borneo.

Skull elongate; crown flat, rhombic; face rather produced, broad; the orbits moderate, complete behind. Length of adult $3\frac{3}{4}$ inches, width 2 inches 5 lines. Very like that of *F. viverrina*.

Fig. 6.



Viverriceps planiceps.

3. *VIVERRICEPS ELLIOTI*.

Leopardus ellioti, Gray, Ann. & Mag. N. II. x. p. 260.

F. bengalensis, var., Blyth?

Hab. Madras.

Skull elongate; crown flat, rhombic; face concave in front of the orbits; orbits moderately complete behind.

The skull very like that of *F. rubiginosa*, but larger, 3 inches 10 lines long and 2 inches 7 lines wide.

4. *VIVERRICEPS RUBIGINOSA*.

Felis rubiginosa, I. Geoffr. Voy. Bélanger, t. .

Hab. India; Madras.

Skull 2 inches 10 lines long, 2 inches wide at the back of the zygomatic arch; crown flat, rhombic.

9. *PAJEROS*.

Head elongate. Ears rounded. Pupil round?? Skull elongate and swollen behind; face short, broad; orbits moderate, incomplete

behind. The front upper false grinder very early deciduous, always wanting in the half-grown skull.

The skull of the *Pajeros* is like that of the Common Cat; but the orbits are small, as in the other diurnal Cats, and the face broader, and the brain-case is rather more produced behind; but it differs from that of the Leopards and Cats in the upper front false grinders being very early deciduous, as in the Lynxes.

In the four skulls in the Museum the holes for these teeth are only to be observed in the skull of a very young animal; in the other three older skulls the holes even are obliterated.

PAJEROS PAMPANUS.

Felis pajeros, Desm. Mamm. p. 231.

Hab. South America; The Pampas.

Skull elongated; face short, broad, slightly concave in front of the orbits; nasal broad below, suddenly narrowed above; orbits moderate, incomplete behind; brain-case rather swollen; forehead slightly convex, rhombic. Length 4 inches 2 lines, width 2 inches 4 lines.

The skull differs from that of the common *Felis domestica* in the orbits being smaller and the brain-case larger.

*** *Skull ovate; face short; brain-case moderate.*

10. FELIS.

Tail cylindrical, elongate, sometimes shorter than the body. Ears oblong, rounded at the tip, without any pencilling. Pupil erect, linear. Skull moderate; face short, conical; nose moderate, narrow above behind, concave in front of the orbits; brain-case oblong, broad; front upper false grinders distinct, small; orbits large, or very large, incomplete.

† *Moderate-sized large-headed Cats, with lines of spots on the sides.* Pardalis.

Face of skull elongate.

Pupil round, oblong, erect in sunlight.—*Bartlett.*

1. FELIS PARDALIS, Linn.; Baird, Mam. N. A. p. 87, t. 72 (skull).

? *F. armillata*, F. Cuvier.

? *F. griffithsii*, H. Smith.

Hab. America, tropical or subtropical.

Skull, adult: length $5\frac{1}{8}$, width $3\frac{1}{2}$ inches.

2. FELIS GRISEA.

Leopardus griseus, Gray, Ann. & Mag. N. H. x. p. 260, 1842.

Hab. Guatemala.

Skull, adult: length $5\frac{1}{2}$, width $3\frac{3}{5}$ inches. Nose rather concave on the sides before orbits.

3. FELIS MELANURA, Ball, P. Z. S. 1844, p. 128!

Hab. America.Skull, adult: length $5\frac{1}{2}$, width $3\frac{1}{2}$ inches.

The skulls of these three species are very similar, only differing a little in size; perhaps they are only local varieties of the same species.

4. FELIS PICTA.

Leopardus pictus, Gray, Ann. & Mag. N. H. x. p. 260, 1842.*Hab.* Central America.Skull: length $5\frac{1}{2}$, width $3\frac{1}{2}$ inches.

The skull of *F. pardalis* and the typical specimens of *F. grisea* and *F. melanura* are very similar in shape, size, and structure. The nasal bones vary in shape; in some skulls they are short, broad, and gradually attenuated; in others the nasal bones are longer, very broad in front, and then suddenly narrowed at about half their length; but the different skulls vary in this respect, and the two forms gradually pass into each other.

The skull of an adult *F. pardalis* is 5 inches long and $3\frac{1}{2}$ inches wide, of the typical *F. grisea* $5\frac{1}{6}$ inches long and $3\frac{1}{4}$ inches wide; the nose rather concave on the sides behind. In the typical *F. melanura* the length of the adult skull is $5\frac{1}{2}$ inches, width 3 inches 7 lines; intermaxillæ elongated; orbits moderate, incomplete behind; face broad, rather produced.

†† *Smaller, small-headed, spotted American Cats.* Margay.

5. FELIS MACROURA, Pr. Max. Abhild. t. .

F. wiedii, Schinz.Var. *Leopardus tigrinoides*, Gray, Cat. Mamm.*Hab.* Brazil.

Skull, adult: 4 inches long, 2 inches 2 lines wide. The nasals narrow, with the outer edges curved inwards.

Length about $3\frac{1}{2}$ (imperfect behind), width $2\frac{1}{2}$ inches.

6. FELIS MITIS (*chati*), F. Cuv. Mamm. Lithogr. t. .*F. chati*, Griffith.*Jaguar*, Buffon, H. Nat. ix. t. 18.*F. onca*, Schreb. from Buffon.*Hab.* Paraguay.

7. FELIS TIGRINA, Schreb. t. 100.

F. margay, Griffith.*F. guigna*, Molina.*Margay*, Buffon.*Hab.* South America.

Skull as in *F. macroura*; the nasals rather wider, and the orbits not quite so large, compared with the size of the skull. Length about $3\frac{1}{2}$ (rather imperfect behind), width $2\frac{1}{2}$ inches.

See also—

8. *FELIS GEOFFROYII*, D'Orb. Voy. Amér. Mérid. t. 13 (skull).
Hab. South America.

9. *FELIS COLOCOLLA*, Molina; F. Cuv. Mamm. Lith. t. .
Hab. South America; Chili (*Molina*); Surinam (*H. Smith*).

††† *Smaller one-coloured American Cats.*

10. *FELIS JAGUARONDI*, Lacép.

F. mexicana, Desm.

F. calomithi, Baird, Mam. N. A. t. 74. f. 2 (skull, adult).

Hab. South America.

Skull, B.M.

Pupil round.—*Burmeister*.

Nose much higher and forehead flatter than the skulls in the British Museum.

11. *FELIS EYRA*, Desm.

F. unicolor, Trail, Baird, Mam. N. A. t. 73. f. 2 (skull, young).

Hab. Tropical America.

Skull, B.M.

Pupil round.—*Burmeister*.

Pupil linear and vertical.—*Berlandier*.

†††† *Moderate-sized, African, spotted Cats.* Skull: face rather produced; cheeks without the cheek-streaks. Serval.

12. *FELIS SERVAL*, Schreb.

F. capensis, Forst.

F. galeopardus, Desm.

Serval, Buffon.

Chaus servalina, Gerrard, Blainv. Ostéogr. Felis, t. 16.

Hab. South and West Africa.

Length of skull 5 inches, width $3\frac{1}{4}$ inches. Nasals large.

Pupil oblong, erect.—*Bartlett*.

13. *FELIS RUTILA*, Waterhouse, P. Z. S. 1842, p. 130.

Hab. Sierra Leone.

Skull oblong; orbits incomplete behind. Length $4\frac{3}{4}$, width $3\frac{1}{8}$ inches. Very like that of *F. serval*, but smaller.

See also—

14. *FELIS NEGLECTA*, Gray, Ann. & Mag. N. H. 1838, i. p. 27.

F. servalina, Ogilby.

Hab. Gambia.

15. *FELIS CELIDOGASTER*, Temm. Monag. i. p. 140; Esquiss. Zool. p. 87 (not Gray).

F. chalybeata, H. Smith (not good).

Hab. Guinea (*Mus. Leyden*).

16. *FELIS SENEGALENSIS*, Lesson; Guérin, Mag. Zool. Mamm. t. .*Hab.* Senegal.Very like *F. viverrina* from India. Can it be the same?++++ Clouded or marbled Old World Cats. Orbits of skull
very large.17. *FELIS CAFFRA*, Desm.? *F. nigripes*, Burchell; Blainv. Ostéogr. t. 6.*Hab.* South Africa.Skull 4 inches 5 lines long, 3 inches 2 lines wide. Orbits sub-
quadrangular, $1\frac{1}{8}$ inch high, incomplete behind.Var. Hybrid with *F. domestica*.18. *FELIS INCONSPICUA*.*Leopardus inconspicuus*, Gray, 1844.*Felis torquata* (*Chat de Nepaul*), F. Cuvier, Mamm. Lithogr. ii. t.? *F. bengalensis*, Desm. from F. Cuvier?*Hab.* India (domesticated, or perhaps a hybrid).

Skull: length 3 inches 2 lines, width 2 inches 1 line.

Face moderate, broad, rather concave in front of orbits; orbits
large, rather oblong, incomplete behind; forehead slightly convex,
rhombic. Like skull of *Chaus libycus*, but smaller, and the forehead
not so convex.

++++ Small-sized spotted Asiatic Cats.

19. *FELIS MINUTA*, part., Temm.*F. undata*, part., Fischer.*F. sumatrana*, Horsfield, Z. Java, t. .*Hab.* Sumatra.

B.M.

Fig. 7.

*Felis pardochrous.*

20. *FELIS PARDOCHROA*, Hodgson, P. Z. S. 1856, p. 396. (Fig. 7.)
F. nepalensis, Hodgson, Icon.
Hab. Nepal.
Pupil linear, erect.—*Hodgson*.
21. *FELIS CHINENSIS*, Gray, Mag. N. H. 1837!
F. bengalensis, var., Blyth, P. Z. S. 1863, p. 184.
Hab. China.
22. *FELIS JERDONII*, Blyth, P. Z. S. 1863, p. 185 (not described).
Hab. India.
23. *FELIS JAVANENSIS*, Horsfield, Zool. Java, t. ?
F. diardii, Griffith.
F. minuta, var., Temm.
F. undata, var., Fischer.
Hab. Java.
24. *FELIS NEPALENSIS*, Vigors & Horsfield, Zool. Journ. iv. p. 382.
Hab. India.
Perhaps a hybrid or domesticated.
25. *FELIS MANICULATA*, Rüppell.
F. rüppelli, Schinz.
Hab. Tunis; Tangiers; Sennaar; Cordofan.
Var. Pale whitish.—*Felis pulchella*, Gray, Mag. N. H. 1837.
Skull $3\frac{1}{2}$ inches long, $2\frac{1}{2}$ inches wide. Face short, broad; orbits large, rather oblong, nearly complete behind.
26. *FELIS CATUS*, Linn.
Chat sauvage, Buffon, H. N. vi. t. 1; Blasius, W. E. p. 163. f. 102, 103 (skull); Blainv. Ostéogr. t. 10 (skull).
Hab. Europe.
Tail very thick.
Skull: length $3\frac{3}{4}$, width $2\frac{3}{4}$ inches. Orbits nearly complete, 1 inch in diameter.
27. *FELIS DOMESTICA*, Brisson; Blasius, Fauna, W. E. p. 167. f. 104, 105 (skull).
F. syriaca, Aldrov.
Hab. Syria?, and has been introduced as a domestic animal in most countries.
The normal colour seems to be that of the Tabby Cat, grey with black dorsal streaks and subconcentric bands on sides and thighs; sometimes all black from melanism, or grey, blue, yellow, or white, or these colours more or less mixed. When black, white, and yellow, it is called Tortoise-shell or Spanish Cat. The fur varies greatly in length; it is very short, close, and almost erect from the skin in the Rabbit Cats; it is very long, silky, and fluffy in the Angora (or

Angola) Cat. The tail is usually long. It is very short or almost entirely wanting in the Isle of Man Cats, or the Japan Cats of Kæmpfer. The ears are generally erect; but they are sometimes pendulous in the Chinese Cats.

Mr. Hodgson thinks the Domestic Cat (*Felis domestica*) is derived from *F. nepalensis* (Journ. Asiat. Soc. Bengal, i. p. 341). Pennant (Hist. Quad. i. p. 293) says the Indian Wild Cat breeds with the Domestic English one. The Domestic Cats in India breed with *F. chaus* and *F. rubiginosa*, Elliot, with *F. ornata*, Scott, and with *F. viverrina*, Kelaart, in Ceylon. They breed with *F. caffra*, Layard, at the Cape (see Blyth, P. Z. S. 1863, p. 184).

Skull not observed.

28. FELIS MANUL, Pallas.

F. nigripictus, Hodgson.

Hab. Tibet.

Pupil linear, erect.—*Hodgson.*

29. FELIS MEGALOTIS, Müller.

Hab. Timor. Not seen by me.

11. CHAUS.

Tail shorter than the body, reaching to the hocks. Ears pencilled at the tip. Pupil oblong, erect. Skull: orbits very large, incomplete behind; nasal bones narrow, close on the maxilla; front upper false grinder distinct; upper tubercular grinder small, transverse; the lobe on the inner side of the upper flesh-tooth moderate.

Forehead of skull convex; face short.

1. CHAUS LIBYCUS.

Felis libyca, Olivier.

F. chaus, Gûldenst.

F. catolynx, Pallas.

F. affinis, Gray.

F. dongolensis, Hemp.

F. jacquemontii, I. Geoff. Voy. Jacquemont, t. 3. f. 1, 2 (skull).

F. katas, Pearson.

F. rüppellii, Brandt.

F. marginata, Loche, Rev. Zool. 1858.

Lyncus erythrotis, Hodgson.

Chaus jacquemontii, Gerrard.

? *F. caligata*, Bruce; I. Geoff. Voy. Jacquemont, t. 3. f. 2 (skull).

Hab. Africa and Asia.

2. CHAUS ORNATUS.

Felis ornata, Gray, Illust. Ind. Zool. t. .

? *F. huttonii*, Blyth, MS.

Hab. India (*Capt. Boys*).

B.M.

Legs long and slender. Skull, adult, imperfect behind. Animal very different from *Felis torquata*, F. Cuvier. The skull sent from the Salt-range by Mr. Oldham and marked *F. huttonii*, Blyth. Length 3 inches 10 lines, width 2 inches 7 lines. Orbits moderate, incomplete behind, 1 inch in diameter; crown convex, shelving on the sides; face rather short, broad; nasal very long, slender.

The orbits are much larger than in a skull of *F. himalayana*, of a larger size.

Tribe II. Lynxes—LYNCINA.

Head short, subglobular. Legs elongate, the hinder ones longest. Tail short, or very short. Ears pencilled at the tip. Pupils of eyes oblong. The face of the skull short; the lateral processes of the intermaxillæ and the frontal bones elongate, nearly reaching each other, and separating the nasals from the maxillæ. The orbits incomplete, large; the lobes on the inner side of the upper flesh-tooth moderate-sized.

12. LYNCUS.

Tail very short. Limbs elongate.

* *Pads of feet overgrown with hair. Animal large. Lynx.*

1. LYNCUS BOREALIS.

Felis lynx, Blainv. Ostéog. Felis, t. 3 (skull); Blasius, Faun. W. E. p. 173. f. 106 (skull).

Hab. Northern Europe and Asia.

2. LYNCUS LUPULINUS.

Felis lupulina, Thunb.

Hab. Northern Europe; Sweden.

3. LYNCUS CANADENSIS.

Felis canadensis, Geoffr.

Hab. North America.

** *Soles of feet nakedish. Animal small. Cervaria.*

4. LYNCUS PARDINUS.

Felis pardina, Temm.

Hab. Southern Europe and Turkey.

5. LYNCUS ISABELLINUS.

Felis isabellina, Blyth.

F. lynx, Hodgson.

Hab. Tibet.

Pupil linear, erect.—Hodgson.

6. LYNCUS FASCIATUS.

Felis fasciata, Harlan.

Hab. North America, western part.

7. *LYNCUS RUFUS*.*Felis rufa*, Gldenst. Voy. de la Venus, t. 9. f. 2-4 (skull).*Hab.* North America.8. *LYNCUS MACULATUS*.*Felis maculata*, Vigors & Horsfield; Baird, Mam. N. A. t. 75 (skull of adult and young).*Hab.* North America: Mexico; California.13. *CARACAL*.

Tail cylindrical, reaching to the hocks. Limbs more equal. Pads of feet bald. Pupil oblong. The skull is that of the Lynx; but the processes of the frontals and intermaxillæ are not quite so much produced, and they do not entirely separate the nasals from the maxillæ. The front upper false grinder is absent. The orbits are rather large, and incomplete behind. The lobe on the inner side of the upper flesh-tooth small.

CARACAL MELANOTIS.*Felis caracal*, Schreb.; Blainv. Ostéogr. *Felis*, t. 10; Van der Hoeven, Zool. t. 19. f. 2 (skull).*Hab.* Southern Asia and Africa; Persia and Arabia.

Section 2. Abnormal or Dog-like Cats.—*The flesh-tooth of the upper jaw compressed, without any lobe, and only with a very slightly marked keel on the front part of the inner side. The legs elongate, slender.*

Tribe III. Hunting-Leopards—*GUEPARDINA*.

Head short, subglobular; face very short. Neck slightly maned. Legs elongate, slender, subequal. Tail elongate. Ears rounded. Pupil round? Skull: face very short, convex; the processes of the frontals and intermaxillæ very short, not separating the nasals from the maxillæ; the flesh-tooth of the upper jaw compressed, without any lobe, but with only a very slightly marked keel on the front part of the inner side; the front upper false grinder distinct, small; orbits incomplete, moderate.

14. *GUEPARDA*, Gray.*Cynælurus*, Wagner.*GUEPARDA GUTTATA*.*Felis guttata*, Herm.; Blainv. Ostéogr. *Felis*, t. 4 (skeleton), t. 9 (skull).*F. jubata*, Schreb.*F. venatica*, A. Smith.*F. fearonis*, A. Smith.*Cynælurus sæmmeringii*, Rüppell.*Hab.* Africa and Asia: Persia.

4. List of Birds collected on the Blewfields River, Mosquito Coast, by Mr. Henry Wickham. By P. L. SCLATER, F.R.S., and OSBERT SALVIN, M.A., F.Z.S.

Mr. Henry Wickham, who has lately left England to collect objects of natural history in the little explored territory of Mosquitia, has kindly requested his correspondents in this country to submit his bird-skins to our determination. We have had great pleasure in undertaking this task, the more so as we have as yet seen no collections from this part of Central America.

The nearest point of the ornithology of which we have as yet any published account is the vicinity of Greytown, Nicaragua, where Mr. H. E. Holland obtained the small series described by Mr. Lawrence in the 'Annals of the Lyceum of New York' in 1865*.

Mr. Wickham's present collection embraces thirty-nine species. We have thought it advisable to give a complete list of these (although the greater part are well-known Central American species, and none are new to science) in order to furnish further data for limiting the geographical range of the species. The district is one of considerable interest, as it is somewhere here that the remarkable change must take place for the fauna of Guatemala to pass into that of Costa Rica. We must await further additions before we draw any conclusions from Mr. Wickham's series; but we may point out as of interest the occurrence in it of several southern forms, such as *Cotyle uropygialis*, *Dendroornis lacrymosa*, *Copurus leuconotus*, *Myiozetetes granadensis*, *Myiarchus nigricapillus*, *Prionorhynchus platyrhynchus*, and *Porzana albigularis*, not hitherto recorded so far north.

Mr. Wickham's present collection contains the following species, all collected during his voyage up the Blewfields River:—

Fam. TURDIDÆ.

- † 1. *GALEOSOPTES CAROLINENSIS* (Linn.).

Fam. HIRUNDINIDÆ.

2. *COTYLE UROPYGIALIS*, Lawrence.

Agreeing with specimens from Panama and Ecuador.

Fam. TANAGRIDÆ.

3. *PYRANGA ÆSTIVA* (Gm.).
4. *RAMPHOCÆLUS PASSERINII*, Bp.
5. *RAMPHOCÆLUS SANGUINOLENTUS* (Less.).

Fam. FRINGILLIDÆ.

6. *SPERMOPHILA CORVINA*, ScL.

* Ann. Lyc. N. H. N. Y. viii. p. 179.

Fam. ICTERIDÆ.

7. OSTINOPS MONTEZUMÆ (Less.).
8. ICTERUS BALTIMORENSIS (L.).
9. ICTERUS PROSTHEMELAS (Strickl.).
10. ICTERUS MESOMELAS (Wagl.).
11. CASSIDIX ORYZIVORA (Gm.).

Fam. DENDROCOLAPTIDÆ.

- + 12. DENDRORNIS LACRYMOSA, Lawr. ; Sclater & Salv. P. Z. S. 1864, p. 355.

Fam. TYRANNIDÆ.

- + 13. COPURUS LEUCONOTUS, Lafr.
- + 14. MYIOZETETES GRANADENSIS, Lawrence, Ibis, 1862. p. 11.

The *Myiozetetæ*, allied to *M. cayennensis*, may be divided as follows :—

a. Species with a clearly defined white superciliary stripe.

a'. Species with the primaries externally narrowly bordered with rufous, and with the basal half of the inner webs of both primaries and secondaries broadly margined with pale rufous. 1. *M. guianensis*.

b'. Species without rufous edgings to primaries, embracing four local forms, which require further examination.

2. <i>M. texensis</i> .+
3. <i>M. columbianus</i> .
4. <i>M. cayennensis</i> .
5. <i>M. similis</i> .

b. Species without white superciliary stripe 6. *M. granadensis*.

The synonymy of these *Myiozetetæ* is correctly given in Sclater's 'American Catalogue' (p. 219). Mr. Wickham's skins of *M. granadensis* agree with examples from Panama in Sclater's collection.

- + 15. MYIARCHUS NIGRICAPILLUS, Cab.
- + 16. TYRANNUS SATRAPA (Cab. et Heine).

Fam. COTINGIDÆ.

- + 17. LIPAUGUS UNIRUFUS, Scl. & Salv.
- + 18. LIPAUGUS HOLERYTHRUS, Scl. & Salv.

Fam. MOMOTIDÆ.

- + 19. PRIONORHYNCHUS PLATYRHYNCHUS, Leadb.

Fam. ALCEDINIDÆ.

- + 20. CERYLE AMAZONIA (Lath.).

21. *CERYLE CABANISI*, Tsch.

— 22. *CERYLE TORQUATA* (L.).

Fam. CUCULIDÆ.

23. *CROTOPHAGA SULCIROSTRIS*, Sw.

24. *PIAYA MEHLERI* (Bp.).

Fam. RAMPHASTIDÆ.

— 25. *RAMPHASTOS PISCIVORUS*, L.

Fam. PICIDÆ.

— 26. *CENTURUS PUCHERANI* (Malh.).

Fam. PSITTACIDÆ.

— 27. *CONURUS ASTEC*, Souancé.

Fam. ACCIPITRES.

— 28. *URUBITINGA ZONURA*, Shaw.

— 29. *URUBITINGA ANTHRACINA*, Nitzsch.

— 30. *ACCIPITER FUSCUS*.

Fam. STRIGIDÆ.

— 31. *SYRNIUM PERSPICILLATUM*, Lath.

Fam. COLUMBIDÆ.

— 32. *COLUMBA NIGRIROSTRIS*, Scl.

Fam. ARDEIDÆ.

33. *ARDEA VIRESCENS*, L.

34. *ARDEA CANDIDISSIMA*, Gm.

35. *ARDEA CÆRULEA*, L.

— 36. *TIGRISOMA CABANISI*, Heine, J. f. O. 1859, p. 407.

Fam. SCOLOPACIDÆ.

37. *GALLINAGO WILSONI*, Temm.

Fam. RALLIDÆ.

38. *ARAMIDES CAYENNENSIS* (Gm.).

— 39. *PORZANA ALBIGULARIS*, Lawr.

5. On the Fishes of the Neilgherry Hills and Rivers around their Bases. By Surgeon FRANCIS DAY, F.Z.S., F.L.S.

During the period Sir William Denison, K.C.B., F.Z.S., was Governor of Madras, the absence from the waters of the Neilgherry Hills of all but an insignificant species of fish, *Paradanio neilgherriensis*, sp. nov., attracted attention. It was universally considered desirable that fish should be introduced into the Ootacamund Lake, which is $1\frac{1}{2}$ mile in length and 7600 feet above the level of the sea, as well as into the Pykara River, which is only about 1500 feet lower down. The presence of the finny tribes, it was surmised, would be very acceptable in this magnificent sanitarium, both as affording sport for anglers and food for convalescents and the general public.

To carry out this design, I was instructed early in 1866 to convey Trout-ova in ice overland from England to Madras. This experiment having failed from various causes, more especially the high temperature of the water on the hills, some substitute appeared necessary; and as on examination I found the fauna to be almost entirely tropical, I suggested and obtained leave to remain four months longer for the purpose of attempting the introduction of fishes from the plains. Unfortunately about one month before the allotted time had expired, when the best mode of carriage had been discovered, after the species unadapted for transit had been ascertained, and others successfully introduced, my services were required for temporary regimental duty at Kurnool, and there was no one available to complete the experiment.

It appears advisable to record what has been accomplished, or at some future date naturalists visiting these hills may be at a loss to explain the presence of Eels, Ophiocephalidæ, and other fishes of the plains at the summit of such an elevated plateau, and erroneous deductions as to their geographical distribution might be the consequence.

An account of this experiment, or the obstacles which had to be surmounted, upon endeavours at first unsuccessful but finally overcome, would be too long for recording here. So I will merely observe that most of the Siluroids died of cold whilst being carried up the ghawts, as the water in the earthen chatties in which they were being conveyed became cooled by evaporation or the direct action of the cold cutting winds which at night time sweep those mountainous roads; the *Cyprinidæ* and *Ophiocephalidæ* when large knocked themselves about so much during their transit that they either perished whilst "*en route*," or a few days after reaching their destination; that finally a stock-pond had to be instituted halfway, where the fish could rest before being carried into Ootacamund, whilst only the young of the various species were taken, and that several varieties appear to have been successfully introduced. It is to be regretted that the experiment was not completed, to do which two dozen more of each of the four following species ought to

be placed in the Ootacamund Lake and the Pykara River:—the *Ophiocephalus marulius*, *O. striatus*, *Labeobarbus tor*, and *Puntius carnaticus*, all of which breed in the Bowany River, at the foot of the Neilgherries, on the Coimbatore side. The period to obtain the young fish is during the months of September and October.

Whilst employed as stated I took the opportunity of investigating and collecting all the indigenous varieties on the plateau, slopes, and rivers flowing around the bases of these hills, except upon their western side. During the course of my researches I obtained thirty-six species, many of which appear to be new.

The almost complete absence of Acanthopterygians was very remarkable; for, with the exception of the Eel-like *Mastacembelidæ* and the *Ophiocephalidæ*, whose title to rank as such might almost be open to dispute, none were captured; even the *Gobiidæ*, so universally distributed throughout India, seemed to be absent. On the other hand, some species hitherto only recorded from Northern Bengal and the Deccan obtained a place in my collection.

The fishes mentioned in this paper may be divided into:—those of the upper plateau of the hills, from 5000 to 7000 feet elevation, where only one species, *Paradanio neilgherriensis*, sp. nov., exists; secondly, those on the lower slopes, from 2000 to 4000 feet above the level of the sea. From the rapids on the slopes of the Neilgherries one small Roach (*Nemacheilus guentheri*, sp. nov.), a little Carp (*Puntius grayi*, sp. nov.), and what is commonly and erroneously called “a Trout” (*Barilius rugosus*, sp. nov.), were taken. Besides these species in the Seegoor River, which is not rapid, but nearly 3000 feet above the sea, and takes a long winding course into the rivers of the plains, the *Ophiocephalus guchua*, Buch. Ham., the *Nemacheilus semiarmatus*, sp. nov., the *Garra gotyla*, Gray, the *G. jerdoni*, sp. nov., the *Puntius carnaticus*, Jerdon, and the *Paradanio aurolineatus*, Day, were found to be indigenous. The Bowany River, flowing along the base of the hills at an elevation of only 1000 feet above the sea, contained most of the foregoing species, as well as twenty-seven others. For stocking the waters of the hills those fish which were found to inhabit the highest levels were preferred.

The following is a list of the species obtained, and specimens of which I still possess:—

OPHIOCEPHALUS MARULIUS, Buch. Ham.

Poo verarl (Tam.). The flower of the Verarls.

B. v. D. 51. P. 16. V. 1/6. A. 35. C. 13. L. 1. 60.
L. tr. $\frac{6-7}{13-14}$.

The coloration of this species, when captured in the Bowany, agreed with Colonel Sykes's ‘Fishes of the Dukhun,’ pl. 60. f. 3. The young were greenish, with about five stripes passing backwards on the sides, and a yellowish ocellus on the posterior part of the dorsal fin. A few of these were placed in the Ootacamund Lake.

OPHIOCEPHALUS STRIATUS, Bloch.*Curroopoo verarl* (Tam.). The Black Verarl.B. v. D. 42. P. 16. V. 6. A. 24. C. 13. L. 1. 56. L. tr. $\frac{5-6}{10-8}$.

Both this and the last species commenced breeding in June, when the south-west monsoon began. Large specimens are difficult to convey long distances alive, because they knock themselves about, and cause such injuries that, if they reach their destination, they generally die in a few days. Some young ones were placed in the Ootacamund Lake.

OPHIOCEPHALUS GACHUA, Buch. Ham.*Korava* (Tam.).B. v. D. 32. P. 15. V. 6. A. 16. C. 9. L. 1. 41. L. tr. $\frac{4}{7}$.

This fish is exceedingly common in the Bowany, where it is frequently captured up to one foot in length.

The very young has generally a light edging to its dorsal fin, but no red colour is apparent except in the pectoral; an ocellus is invariably present in the posterior portion of the dorsal fin. The adult has its dorsal, caudal, and pectoral fins margined with bright orange, most developed in the males.

At first difficulty was experienced in conveying these fish alive up the ghawts; but finally it was found that when one-fourth (or a little less) of the chatty was first filled with mud and then water added the difficulty vanished.

The following incidents will show how exceedingly tenacious of life these fish are:—At Culhatty, on July 19th, 1866, a Cooly accidentally turned one out of a tin can of water; this took place at 6 P.M., when the temperature of the air was 69°; the occurrence remained undiscovered until 8.45 P.M., or nearly three hours subsequently, when the fish was found on the gravel-path outside the house. It was quite well, had suffered no injury, and some days later was placed in the Ootacamund Lake. A few days subsequently a still more interesting circumstance occurred with one of these fish:—On July 27th, 1866, I was riding from Mettapolliam to Wellington, and on passing the Kullaar Bridge at 4.45 P.M. obtained a young one of this species. Having nothing else in which to place him, I moistened my pocket-handkerchief, within which I rolled him up, being careful to leave the head exposed. An hour subsequently I took him out of my coat-pocket and put him into a small stream of water by the side of the road; he gave three gasps, was then as well as ever, and was again consigned to the pocket. At 6.45 P.M. the dipping was repeated, and at 8.45 P.M., on my arrival at Wellington, he was quite well. The succeeding morning he was put into the Coonoor stock-pond, and on August 2nd removed, along with fourteen others, into the Ootacamund Lake. The vitality must be great in a fish which, as in this instance, bore an ascent of nearly 5000 feet, carried in a wet pocket-handkerchief

only moistened twice by the way, especially as the time consumed was four hours.

Nearly one hundred of this species were placed in the Ootacamund Lake, and eighteen in the Pykara River.

MASTACEMBELUS ARMATUS, Lacép.

Allaree (Tam.).

B. vi. D. 37|74. P. 23. A. 3|79. C. 15.

Not uncommon, but does not bear transporting well.

Numbers of young of this species were captured in the Bowany during July and August.

WALLAGO ATTU, Bloch.

Wahlah (Tam.).

B. xix. D. 1/4. P. $\frac{1}{14}$. V. 9. A. 92. C. 17.

This fish is very common in the Bowany, where it attains a large size, but does not extend its limits so high as Seegoor. In conveying this species up the ghawts they generally died: some few reached Coonoor alive; but all succumbed after they had been there a few days.

WALLAGO MALABARICUS, Cuv. & Val.

Chota wahlah (Tam.). The small Wahlah.

B. xv. D. 4. P. $\frac{1}{13}$. V. 9. A. 73. C. 17. Vert. $\frac{11}{39}$.

Length of specimens up to 9 inches.

This species is numerous in the same localities as the last. Both deposit their ova during the south-west monsoon, and by the end of July young fish are common.

HEMIBAGRUS PUNCTATUS, Jerdon.

Psetta kultetee (Tam.).

B. xi. D. $\frac{1}{2}$ |0. P. $\frac{1}{7}$. V. 6. A. 11. C. 17.

Length of specimens up to 11 inches.

Length of head $\frac{2}{9}$, of pectoral $\frac{1}{6}$, of caudal $\frac{2}{9}$, of base of first dorsal $\frac{1}{6}$, of base of adipose dorsal $\frac{1}{10}$, of base of anal $\frac{1}{10}$ of the total length. Height of head $\frac{1}{11}$, of body $\frac{1}{9}$, of first dorsal $\frac{2}{11}$, of anal $\frac{1}{11}$ of the total length.

Eyes transversely oval; horizontal diameter $\frac{1}{8}$, vertical diameter $\frac{1}{8}$ of the length of the head; two horizontal diameters apart, $1\frac{1}{2}$ from end of snout.

Gape of mouth wide, being equal transversely to nearly half the length of the head. Jaws of equal length. Summit of head depressed, both it, the opercles, and shoulder-bones being furrowed. Occipital process very narrow, and only extending about one-third of the distance to the basal bone of the first dorsal, which is narrow. A flat lance-shaped groove on the summit of the head, between the

orbits, reaching anteriorly nearly as far as the intermaxillaries, and posteriorly almost to the base of the occipital process. Nasal cirri reach to opposite the posterior margin of the orbit; the maxillary to slightly behind the origin of the ventral fin; the external mandibular pair reach the base of the pectoral fin, whilst the internal are one-third shorter.

Teeth villiform, and in numerous rows in both intermaxillaries and lower jaw; on the vomer and palate they are of the same description, and arranged in an uninterrupted and slightly crescentic band.

Fins. The first dorsal arises opposite to the posterior third of the pectoral, the ventral below the posterior extremity of the first dorsal. The anal commences rather nearer to the origin of the ventral than to the base of the caudal. The adipose dorsal begins opposite the middle of the anal. Dorsal spine weak, with about eight very slight serrations posteriorly in its upper third and terminating in a soft prolongation; its rays longer than the spine. The pectoral spine longer and stronger than the dorsal, flattened, rugose externally, with about eighteen strong serrations internally. Adipose dorsal thin and rounded. Anal slightly rounded. Caudal deeply lunated, the upper lobe the longest.

Lateral line passes from the upper portion of the opercle direct to the centre of the caudal.

Colours. Summit of head and back of a dark greyish olive, becoming yellowish from a little below the lateral line; abdomen nearly white; about ten rather small and rounded black spots along the lateral line; both dorsals dusky, with darker margins; caudal olive; ventral and anal yellowish white; pectoral yellowish, tipped with olive; eyes olive, with a yellowish margin.

Not uncommon in the Bowany, where they are captured up to 18 inches in length, and are considered good eating.

HYPSELOBAGRUS CAVASIUS, Buch. Ham.

Vella kulletee, Tam. The White Bagrus.

B. vi. D. $\frac{1}{2}$ | 0. P. 1/6. V. 6. A. 11. C. 16.

Grows to 18 inches in length.

GLYPTOSTERNUM LONAH, Sykes.

Kul kulletee, Tam. Stone Kulletee.

B. viii. D. 1/6. P. 1/10. V. 7. A. 3 8. C. 15.

Length of specimens to 4 inches.

Not uncommon in the Bowany, where it gets under stones in the fords.

NEMACHEILUS GUENTHERI, nov. sp.

B. iii. D. $\frac{2}{7}$. P. 11. V. 8. A. $\frac{2}{5}$. C. 19.

Length of specimens up to 4 inches.

Length of head $\frac{2}{11}$, of pectoral $\frac{2}{11}$, of base of dorsal $\frac{1}{8}$, of base of anal $\frac{1}{16}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{1}{9}$, of body $\frac{1}{7}$, of dorsal $\frac{1}{7}$, of anal $\frac{1}{7}$ of the total length.

Eyes not covered by skin; diameter $\frac{2}{7}$ of length of head; 1 diameter apart, $1\frac{1}{2}$ from end of snout.

Body elongated, anteriorly fusiform, in the posterior portion laterally compressed; abdominal profile nearly straight.

Mouth rather below, lower jaw shortest; the cleft of the mouth extending halfway to below the anterior end of the orbit. Lips fleshy. Two pairs of cirri on snout, not united at their bases. One pair of fleshy maxillary cirri. All these cirri short, not reaching so far as the orbit. Nostrils midway between the snout and the orbit, the anterior tubular.

Fins. Dorsal arises slightly anteriorly to the origin of the ventrals, and is situated about the centre of the entire length of the fish. Anal commences midway between the middle of the pectoral and the end of the caudal. Dorsal nearly square. Anal slightly pointed. Caudal with sharp lobes.

Scales over the whole of the body, none on the head.

Lateral line becomes indistinct in the last portion of the body.

Colours. Generally of a deep olive-brown, with three rows of round, oval, or irregularly shaped flesh-coloured spots running along the whole of the body of the fish, the superior row (along the back) and inferior (along the abdomen) being much larger than the middle series; a black bar at the base of the caudal fin; all the fins reddish, stained with orange in their external halves; two rows of fine black dots along the dorsal fin, and one across the anal; two indistinct blackish bands across either lobe of the caudal, which has also a slightly black edge.

This very pretty little Loach I have named after Dr. A. Günther.

NEMACHEILUS SEMIARMATUS, nov. sp.

B. iii. D. $\frac{3}{6}$. P. 12. V. 7. A. $\frac{2}{5}$. C. 18.

Length of specimens up to 4 inches.

Length of head $\frac{2}{11}$, of base of dorsal $\frac{1}{8}$, of base of anal $\frac{1}{16}$, of pectoral $\frac{2}{11}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{1}{9}$, of body $\frac{1}{7}$, of dorsal fin $\frac{1}{7}$, of anal $\frac{1}{7}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, $1\frac{1}{2}$ diameter from end of snout, 1 diameter apart.

Body elongated, fusiform anteriorly, compressed laterally, posterior to the ventral fin. Profile from snout to origin of dorsal fin convex; abdominal profile almost straight.

Lower jaw shortest; lips fleshy; opening of mouth rather inferior, and extending one-third of the distance to the anterior margin of the orbit. Two pairs of cirri on snout; the external extend as far as the orbit, whilst the internal pair are only half that length. The maxillary pair of cirri extend as far as the posterior third of the orbit. Nostrils one-third of the distance from anterior extremity of orbit to the snout; the anterior tubular. A cartilaginous and rudimentary

spine exists opposite the anterior inferior extremity of the orbit ; it is present in both males and females.

Fins. Not scaled at their bases. The dorsal arises slightly anterior to the origin of the ventral, the anterior extremity of its base being nearly the same distance from the snout as its posterior extremity is from the posterior extremity of the caudal fin. Pectoral rather large and pointed. Ventrals subhorizontal, reaching as far as the anus, which is a short distance anterior to the origin of the anal fin ; this last is short. Caudal lobed in its last half.

Scales apparent over the whole of the body, but not very distinct ; none on the head.

Lateral line passes direct from opposite the eye to the centre of the caudal fin.

Colours. Light brown, with numerous irregular-shaped spots and bars proceeding from the back towards the lateral line ; head brownish, with a dark line from the snout through the orbit ; dorsal fin with about three rows of dark spots ; caudal irregularly barred ; a dark line runs down the centre of the back.

Hab. Bowany and Seegoor Rivers, as well as the Billicul Lake. A few were placed in the ponds in the Government Gardens at Ootacamund.

NEMACHEILUS DENISONI, nov. sp.

B. iii. D. 2/7. P. 11. V. 8. A. 2/4. C. 19.

Length of head $\frac{2}{3}$, of pectoral $\frac{2}{9}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{2}{13}$, of body $\frac{2}{13}$ of the total length.

Back broader and more flattened than in the last two species. The two pairs of cirri on the snout, as well as the maxillary pair, are all short.

Dorsal fin commences slightly in advance of the ventral, and is situated in the centre of the total length.

Colours. Of a rich light reddish-brown colour, having twelve yellowish-olive bars passing across the back, and continued vertically down either side of the body to the abdomen ; before the dorsal fin they irregularly coalesce across the back ; summit of head dotted and marbled with black points ; dorsal fin with three rows of fine black dots ; caudal irregularly dotted in bands ; some dull spots on anal and ventral fins ; pectoral with a darkish external edge.

Hab. Bowany River.

I have named this species after Sir William Denison, K.C.B., under whose auspices the Indian fish-experiment was commenced ; and during whose governorship, had he continued in Madras, it would most assuredly have been successfully completed.

Whilst engaged upon this experiment I communicated with Mr. Assistant Apothecary Everard, stationed at Trichoor, my wish to obtain some more specimens of my *Platacanthus agensis* (P. Z. S. 1865, p. 296), and he was good enough to forward me twelve. Being taken during the breeding-season, their colours were much more vivid than in the specimen which I described. I found two distinct sorts, the markings of both being identical ; but in the one the pectoral

spine was present, in the other it was absent. In dissecting seven of these, four males and three females, the spine was present in the former, absent in the latter. I am the more disposed to consider this a sexual peculiarity, from having obtained a second Loach, in which the same sexual difference exists. In this latter species, which I shall describe at a future date, out of about forty specimens, I only found the adult males thus armed.

In these fresh specimens of the *Platacanthus agrensis* all have about fifteen marks or blotches along the lateral line, with rows of irregular longitudinal pencillings above it, and a superior row of blotches crossing the back. Caudal more emarginate than lobed, with three or four bars upon it, and a jet-black spot at its base having a light ring around it. A number of small black spots on the side beneath the pectoral fin.

GARRA GOTYLA (Gray).

B. iii. D. 2/8. P. 1/3. V. 9. A. 2/5. C. 20. L. l. 33-34. L. tr. 4/3.

Length of specimens from 2 to $5\frac{4}{10}$ inches.

At least twenty or thirty were captured at each haul of a small drag-net, in a stream at the foot of the Neilgherries. On July 20th one large female was found full of ova; but this was not the rule, the breeding-season being apparently completed. There were many young ones, and the transverse fissure was apparent across the snout, even in the smallest specimens.

Hab. Common in the Bowany and most of the streams around the base of the hills, but rarer in the Seegoor River.

GARRA JERDONI, sp. nov.

B. iii. D. 2/8. P. 15. V. 10. A. 2/5. C. 20. L. l. 36. L. tr. 5/4. Vert. $\frac{16}{15}$.

Length of specimens from 2 to $4\frac{5}{10}$ inches.

Length of head $\frac{2}{1\frac{2}{3}}$, of pectoral $\frac{2}{1\frac{2}{3}}$, of base of dorsal $\frac{1}{5}$, of base of anal $\frac{1}{1\frac{2}{5}}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{1}{5}$, of body $\frac{2}{9}$, of dorsal $\frac{2}{1\frac{2}{3}}$, of anal $\frac{1}{8}$ of the total length.

Eyes nearer to the posterior than they are to the anterior extremity of the head; diameter $\frac{1}{4}$ of length of head, 2 diameters from end of snout, $2\frac{1}{2}$ diameters apart.

The profile ascends in an almost regular curve from above the snout, which is thick and prominent, to the anterior extremity of the dorsal fin, whence it sinks to the base of the caudal. The abdominal profile is not so convex as that of the back. Sides moderately compressed.

Mouth below. Snout broad, becoming rather pointed anteriorly (not rounded as in the *Garra malabarica*, P. Z. S. 1865, p. 297), and covered with mucus-pores, which remain persistent in the adult. The gape of the mouth equals the length of the base of the anal fin. The two lips are united and moderately thick. Behind the lower lip is a round suctorial disk, the diameter of which is one-

half more than that of the orbit. One short pair of cirri exist on the snout; a second pair at the angles of the maxillæ. Nostrils close to the anterior superior angle of the orbit, the posterior round and patent, the anterior tubular. Interorbital space rather convex from side to side; no furrow exists between it and the snout.

Teeth. Pharyngeal teeth small, curved, sharp, in three rows, 5, 4, 2/2, 4, 5.

Fins. The anterior extremity of the dorsal is the same distance from the snout as its posterior extremity is from the base of the caudal; it is slightly in advance of the ventrals, and higher anteriorly than it is posteriorly. Anal in the posterior fourth of the body. Caudal lobed, with a broad and scaly base.

Lateral line nearly straight, from the centre of the orbit to the centre of the caudal fin.

Colours. Olive-green, gradually fading into dirty olive on the abdomen; a black spot sometimes exists on the scale behind the upper piece of the opercle.

This and the last species rapidly die when removed from streams; however, some were placed alive in the Ootacamund Lake. This species is said to grow to 10 inches in length, and is much esteemed for eating.

Hab. Very common in the Seegoor River; rare in the Bowany.

LABEO KONTIUS (Jerdon).

Curumunnee candee, Tam.

B. iii. D. $\frac{4}{12}$. P. 15. V. 10. A. $\frac{3}{5}$. L. l. 38. L. tr. $\frac{9}{5}$.

Length of specimen $21\frac{1}{2}$ inches.

Length of head $\frac{1}{7}$, of pectoral a little above $\frac{1}{7}$, of base of dorsal rather above $\frac{2}{11}$, of base of anal $\frac{1}{15}$, of caudal nearly $\frac{2}{3}$ of the total length. Height of head $\frac{2}{17}$, of body $\frac{1}{4}$, of dorsal above $\frac{1}{3}$, of anal $\frac{1}{6}$ of the total length.

Eyes nearly circular; diameter nearly $\frac{1}{5}$ of length of head, 3 diameters apart, $2\frac{1}{2}$ diameters from end of snout.

Profile rather more convex along the abdominal than the dorsal aspect; in the latter it rises considerably to the commencement of the dorsal fin, beyond which it sinks.

Gape of mouth wide, arched, almost triangular, with the apex above. Muzzle blunt and truncated. Cleft of mouth short, not extending quite half the distance to the anterior margin of the orbit. Lower jaw shortest, almost angular. Lips fleshy, continued from the upper to the lower jaws, and covered with mucus-pores. Snout tuberculated, and a fleshy prolongation from it is extended laterally. Upper surface of head smooth. Opercle high and narrow, its width not being quite equal to half its height. Nostrils slightly in advance of anterior superior angle of the orbit. Cheeks fleshy. No cirri were observed in this specimen, neither did Dr. Jerdon perceive any in his; but probably they were present, but minute. The specimen being now stuffed, they cannot be detected.

Fins. Dorsal commences over the ventrals, and nearer to the snout
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than it does to the base of the caudal. Anal begins midway between the base of the pectoral and the posterior extremity of the caudal. Dorsal fin highest anteriorly, the last ray divided at its base and prolonged; upper margin of fin concave; the first two undivided rays minute, the second scarcely more than one-third of the length of the third ray, which last is weak. Anal longest anteriorly; first undivided ray very minute, second one-third the length of the third, all very weak. Caudal deeply lunated, lobes extended and pointed.

Scales moderate in size.

Lateral line in single tubes, passing nearly directly from opposite the centre of the orbit to the centre of the caudal fin.

Teeth. Pharyngeal teeth small, placed close together, plough-shaped, and hardly pointed, 5, 4, 2 $\frac{1}{2}$, 4, 5.

Colours. Greenish brown along the back, fading to dirty silvery white on the abdomen; fins reddish, the posterior and external margins of each stained darker; a golden gloss over the opercles; eyes golden.

This species is said to grow to a large size.

Hab. Bowany River, from which I only obtained this one specimen.

LABEO (? *BANGANA*) *DUSSUMIERI*, Cuv. & Val.

B. iii. D. 3/8. P. 15. V. 9. A. 3/5. L. l. 36. L. tr. 7/4.

Length of specimens up to 7 inches.

Pharyngeal teeth as in the last species, 5, 4, 1 $\frac{1}{2}$, 4, 5.

I have placed this, according to Dr. Bleeker's identification, as a *Labeo*, but, whilst doing so, cannot avoid stating that it seems questionable whether Buchanan Hamilton's genus *Bangana*, which has no lateral lobes to the snout, can be identified with the genus *Labeo*. Both are extensively diffused in India. Some of this species were placed in the Ootacamund Lake.

LABEOBARBUS *TOR*, Buch. Ham.

Poomeen candee, Tam.

B. iii. D. 3/9. P. 18. V. 9. A. 2/5. C. 18. L. l. 23-27. L. tr. 4/2.

Length of specimens from 3 to 7 inches.

Pharyngeal teeth 5, 3, 2 $\frac{1}{2}$, 3, 5, crooked and pointed.

This species, which is said to grow to a large size in the higher regions of Bengal, is moderately common in the Bowany, where young ones are easily obtained in August and September. I had intended introducing it into the waters of the hills, to which it would seem well adapted.

PUNTIUS (*BARBODES*) *GRACILIS*, Jerdon.

Coatee candee, Tamil.

B. iii. D. 4/9. P. 17. V. 9. A. $\frac{2-3}{5}$. C. 19. L. l. 40. L. tr. 7/4.

Length of head $\frac{1}{5}$, of pectoral $\frac{1}{5}$, of caudal $\frac{1}{5}$, of base of dorsal $\frac{1}{7}$,

of base of anal $\frac{1}{15}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{2}{7}$, of dorsal fin nearly $\frac{1}{7}$, of ventral $\frac{1}{6}$, of anal nearly $\frac{1}{6}$ of the total length.

Eyes transversely oval, $\frac{2}{7}$ of length of head, $1\frac{1}{4}$ diameter apart, $1\frac{1}{4}$ from end of snout.

Dorsal profile more convex than the abdominal, and ascending in a regular curve from the snout to the commencement of the dorsal fin, whence it gradually sinks.

Snout rather pointed; cleft of mouth extending scarcely half the distance to below the anterior margin of the orbit; lower jaw slightly the shortest. Nasal cirri extend to the anterior third of the orbit; the maxillary cirri to the posterior margin of the orbit. Præorbital rather elongated, with its apex anterior, and curved rather towards the median line. Nostrils generic.

Fins. Dorsal arises immediately over the ventrals; base slightly scaled. First two undivided rays small; third not quite half so long as the fourth, which is bony, strong, broad, laterally compressed, smooth, and nearly as high as the first soft ray; last ray hardly more than one-third the length of the first. Pectoral pointed, and reaching as far as the base of the ventral. Anal entirely posterior to the dorsal, arising midway between the base of the pectoral and the termination of the caudal; its undivided rays articulated and weak, when three exist the first is very minute. Caudal deeply forked in its posterior two-thirds.

Scales largest in the anterior half of the body.

Lateral line in single tubes; commencing near the upper end of the opercle, it bends gently downwards, and opposite the centre of the pectoral it passes direct to the centre of the caudal.

Pharyngeal teeth crooked, pointed, 4, 3, 2/2, 3, 4.

Colours. Cheeks golden; body generally silvery green superiorly, becoming silvery white below the lateral line, the base of each scale being the darkest. After death a darkish line appears along the centre of every scale.

Hab. Bowany River.

A few of this species were placed in the Ootacamund Lake. It is said to attain to a large size.

PUNTIUS (BARBODES) DUBIUS, sp. nov.

B. iii. D. 4/9. P. 17. V. 9. A. 3/5. L. l. 42. L. tr. 9/6.

Length of head nearly $\frac{1}{5}$, of pectoral $\frac{1}{6}$, of caudal a little above $\frac{1}{4}$, of base of dorsal $\frac{1}{6}$, of base of anal $\frac{1}{16}$ of the total length. Height of head $\frac{2}{15}$, of body nearly $\frac{1}{4}$, of dorsal $\frac{1}{5}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{6}$ of the total length.

Eyes transversely oval; diameter $\frac{2}{7}$ of length of head, $1\frac{1}{3}$ diameter apart, and the same distance from end of snout.

Appearances the same as in the last species, from which it may be only a sexual difference. Its cirri are much shorter, its two pairs being of the same length, and only equal to half the diameter of the orbit. The third dorsal spine extends two-thirds the length of the fourth. Snout more elevated, and scales smaller.

Hab. Bowany River.

PUNTIVS (BARBODES) CARNATICUS.

? *Barbus carnaticus*, Jerdon, Madras Journ. No. 35. p. 311.

Pooree candee, or *Saal candee*, Tam.

B. iii. D. 4/8. P. 15. V. 9. A. $\frac{2-3}{5}$. C. 19. L. l. 32. L. tr. 6/3.

Length of specimens up to $22\frac{1}{2}$ inches.

Length of head $\frac{2}{11}$, of pectoral $\frac{2}{13}$, of base of dorsal $\frac{1}{8}$, of base of anal $\frac{1}{13}$, of caudal $\frac{1}{6}$ of the total length. Height of head nearly $\frac{1}{7}$, of body rather more than $\frac{1}{4}$, of dorsal $\frac{1}{7}$, of anal $\frac{1}{8}$ of the total length.

Eyes. Transverse diameter $\frac{1}{4}$ of length of head, $2\frac{1}{4}$ transverse diameters apart, $1\frac{1}{4}$ from end of snout.

Dorsal profile rather more convex than that of the abdomen.

Cleft of mouth extending nearly to beneath the anterior margin of the orbit. Nostrils generic. Præorbital irregularly pentagonal, the anterior margin the longest, the anterior superior the shortest. In adults the summit of the head very rugose, and a slight depression extends across the snout just anterior to the nostrils. Nasal pair of cirri thin, reaching as far as anterior margin of the orbit; maxillary thicker, but slightly shorter.

Fins. The dorsal, nearly square, commences midway between snout and base of the caudal, and is situated in the posterior half of the body; first entire dorsal ray minute, the second longer, the third only two-fifths of the length of the fourth, which last is broad, nearly as long as the first soft ray, strong, entire, and has a short soft articulated termination; the last soft ray is divided at its root. Caudal deeply forked, lobes pointed.

Scales very large, nearly quadrangular, and in the adults having very roughened margins; some scales exist over the bases of the dorsal, anal, and caudal fins.

Lateral line first curves gently downwards for five scales, and then proceeds direct to centre of caudal fin.

Teeth. Pharyngeal teeth pointed and slighted crooked at their extremities, 5, 3, $2\frac{1}{2}$, 3, 5.

Colours. Brownish green along the back, silvery white on the abdomen; cheeks glossed with gold; dorsal fin dark grey; pectorals, ventrals, and anal whitish, with a dash of pink; caudal greyish; eyes golden.

Hab. Bowany and Seegoor Rivers.

This is the only large species of *Puntius* existing as an indigenous species at so high an elevation as 2900 feet; the small *Puntius grayi*, spec. nov., was also found at about the same height above the sea. At Billicul, about 5700 feet elevation, I found it existing; it had been introduced there some years previously; and the first fish I obtained was taken on a night-line, and nearly $4\frac{1}{2}$ lb. weight. In the Bowany it has been taken 25 lb. weight. Their conveyance alive during the hot months is difficult, but during the cold weather exceedingly easy. Upwards of two dozen were placed in the Ootacamund Lake, where, however, more are necessary; and no doubt they would succeed in the Pykara River.

PUNTIVS (BARBODES) GRAYI, sp. nov.

B. iii. D. 3/6. P. 15. V. 8. A. 2/5. C 15. L. l. 20. L. tr. 4/2.

Length of specimens up to $2\frac{1}{2}$ inches.

Length of head $\frac{2}{3}$, of pectoral $\frac{1}{2}$, of base of dorsal $\frac{1}{7}$, of base of anal $\frac{1}{4}$, of caudal $\frac{1}{4}$ of the total length. Height of head $\frac{1}{7}$, of body $\frac{1}{3}$, of dorsal $\frac{2}{9}$, of anal $\frac{1}{7}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head, nearly 1 diameter apart, $\frac{3}{4}$ of a diameter from end of snout.

Profile of dorsal aspect considerably more convex than that of the abdomen, there being a very considerable rise from the snout to the anterior extremity of the dorsal fin, whilst from its posterior end there is a rapid fall.

Cleft of mouth extends to under the anterior margin of the orbit. Nasal cirri short; the maxillary pair slender and equal in length to the diameter of the orbit. Præorbital longer than high, irregularly pentagonal and directed forwards.

Fins. Dorsal commences midway between the snout and the base of the caudal fin; the anal midway between the posterior extremity of the orbit and the end of the caudal, which last fin is deeply emarginate in its posterior two-thirds. Unbranched dorsal rays thin and articulated.

Scales large; some extended over the bases of the dorsal, anal, and caudal fins.

Lateral line in single tubes; it passes nearly direct from the posterior superior margin of the opercle to the centre of the caudal fin.

Pharyngeal teeth in three rows, curved, sharp, 5, 3, 2/2, 3, 5.

Colours. Olive-green superiorly, with a dash of crimson, and becoming of a dirty reddish white on the abdomen. A broad black band commences from under the whole extent of the base of the dorsal fin, and passes downwards to just below the lateral line; a second band begins four scales beyond the posterior extremity of the base of the dorsal, and passes down to one scale below the lateral line; there is also a slight blackish band, often indistinct, at the base of the caudal fin. Dorsal, caudal, and anal pinkish; the posterior extremity of the first black, whilst the anal is also margined with black having an external white edge. In some specimens taken from a high level (about 3000 feet) in a rapid stream the ground-colour was of a brilliant crimson; in a few young specimens the caudal had the outer third of its caudal crimson edged with black.

Hab. The Bowany and Kullaar Rivers, at the foot of the Neilgherries, and other streams on the lower slopes up to 3000 feet elevation.

I have named this pretty little Carp after Dr. J. E. Gray, F.R.S.

PUNTIVS FILAMENTOSUS, Cuv. & Val.

Sawaal candee, Tam. The Red-tailed Carp.

B. iii. D. 3/8. P. 17. V. 9. A. 2/5. C. 15. L. l. 20. L. tr. 5/4.

Common in the Bowany.

This species of *Puntius* is easily conveyed alive from place to place; six specimens were placed alive in the Ootacamund Lake.

PUNTIUS ARULIUS, Jerdon.

B. iii. D. 3/8. P. 15. V. 8. A. 2/5. C. 18. L. 1. 23. L. tr. 5/2.

Length of specimens up to 2 inches.

Length of head $\frac{1}{2}$, of pectoral $\frac{1}{2}$, of base of dorsal $\frac{1}{8}$, of base of anal $\frac{1}{3}$, of caudal $\frac{1}{8}$ of the total length. Height of head $\frac{1}{2}$, of body $\frac{1}{4}$, of dorsal fin $\frac{1}{5}$, of anal $\frac{1}{4}$ of the total length.

Eyes. Diameter nearly $\frac{1}{2}$ of length of head, $\frac{1}{4}$ of a diameter apart, $\frac{1}{2}$ a diameter from end of snout.

Profile of dorsal and ventral aspects about equally convex, the greatest depth of the body being opposite the commencement of the dorsal fin.

Cleft of mouth extending nearly to under the anterior margin of the orbit. Nostrils generic. Præorbital pentagonal. No cirri.

Fins. The dorsal commences midway between the snout and the base of the caudal, and opposite the posterior third of the pectoral. Anal arises midway between the centre of the orbit and the extremity of the caudal, which last is deeply emarginate in its posterior three-fourths.

Scales large, and extended over the bases of the dorsal, anal, and caudal fins.

Lateral line in single tubes, first curving downwards to opposite the posterior end of the pectoral, whence it proceeds direct to the centre of the caudal.

Teeth. Pharyngeal teeth in three rows, crooked at their extremities and sharp, 5, 3, 2/2, 3, 5.

Colours. Olive-green on the back, becoming silvery white dashed with green on the abdomen. A black band of about two scales in width passes from under the commencement of the dorsal fin, as low as the lateral line; a second from just below the posterior extremity of the dorsal to the base of the anal fin; and a third across the base of the caudal. Dorsal, caudal, and anal pinkish; the first with a black bar along its summit, whilst the caudal has also a slightly black termination.

Hab. Bowany River.

AMBLYPHARYNGODON JERDONI, Day.

B. iii. D. 3/7. P. 15. V. 9. A. 3/5. C. 19. L. 1. 60. L. tr. 10/6.

Length of specimens up to $3\frac{3}{10}$ inches.

Differs slightly from the Malabar species in having a minute first undivided ray in the dorsal fin, and in the latter being rather lower posteriorly.

The colours also are not so bright, being more of a bluish green along the back, whilst the lateral stripe is more of a steel-colour.

Hab. Bowany River.

BARILIUS RUGOSUS, sp. nov.

Aart candee, Tam. River-Carp.

B. iii. D. 3/8. P. 15. V. 10. A. 3/14. C. 18. L. 1. 40. L. tr. 8/3.

Length of specimens from $\frac{4}{10}$ of an inch to $4\frac{3}{10}$ inches.

Length of head nearly $\frac{1}{4}$, of pectoral $\frac{1}{6}$, of base of dorsal $\frac{1}{6}$, of base of anal $\frac{1}{6}$, of caudal a little above $\frac{1}{6}$ of the total length. Height of head $\frac{1}{7}$, of body $\frac{1}{4}$, of dorsal fin $\frac{1}{6}$, of anal $\frac{1}{8}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, $1\frac{1}{4}$ diameter apart, 1 diameter from end of snout.

Profile more convex on the ventral than on the dorsal aspect.

Cleft of mouth large, directed forwards and slightly upwards, extending posteriorly to beneath the middle of the orbit. The lower jaw is received at its termination into a slight emargination formed by the junction of the intermaxillaries. The anterior surface of the snout, and the sides of the intermaxillaries and of the lower jaw, covered with large glands; some also exist along the inferior surface of the lower jaw. Nostrils at anterior superior angle of the orbit, nearer to it than to the end of the snout, and divided from one another by a membranous valve; the posterior broad and patent, the anterior semitubular.

Fins. Dorsal commences midway between snout and middle of caudal fin, and opposite the anterior third of the ventral, extending posteriorly to above the third anal ray. Caudal moderately emarginate, lower lobe slightly the longest. Anterior extremities of dorsal and anal fins the highest; the former with a slightly convex, the latter with a convex and concave margin.

Scales moderately large, with from two to three raised lines on each. The base of the dorsal scaleless, of the anal slightly scaled. Two long free scales at the base of the ventral. Base of caudal scaled.

Lateral line in single tubes on each scale; it passes downwards nearly to the abdominal profile, along which it runs parallel.

Teeth. Pharyngeal teeth in three rows, curved, slightly hooked, and pointed at their extremities, 5, 4, $2\frac{1}{2}$, 4, 5.

Colours. Head purplish silvery, generally of a shade of grey glossed with purple, becoming silvery white along the abdomen. About fifteen vertical greyish silvery bands pass from the grey of the back to nearly as low as the lateral line; in the old males they are more in the form of large oval spots. Fins greyish, the anterior extremity of the dorsal and anal tipped with white. In a very few young the body was marked with black bands in the form of the letter W.

The old males differ so much from the young and the females as at first to appear like different species; in the latter the scales are quite smooth, and but few glands around the jaws. Some of the males, on the contrary, when full-grown, have from one to three rough spots on each scale in the posterior half of the body, the lateral line is indistinctly apparent, the caudal fin is comparatively short, and its lower lobe considerably the longest.

This species differs from the *Barilius bakeri*, being of a more slender shape, whilst the jaws are surrounded by large glands, and, instead of a few distinct oval or round spots along the lateral line, it has fifteen distinct stripes.

Fishes of this genus are invariably called Trout by Europeans.

Hab. The Bowany and Seegoor Rivers, and the rapid streams along the lower slopes of the Neilgherries.

BARILIUS (PACHYSTOMUS) COCOA, Buch. Ham.

B. iii. D. $\frac{2}{7}$. P. 13. V. 9. A. $\frac{2}{7}$. C. 18. L. 1. 42. L. tr. $\frac{9}{3}$.

Length of specimens to 5 inches.

The existence of a short pair of nasal, and a second pair of maxillary cirri about equally long was very apparent. Having captured an identical fish at Kurnool, I have but little doubt that it is Buchanan Hamilton's fish, with which it exactly agrees.

Hab. Bowany River, where, however, it is not common.

PARADANIO AUROLINEATUS, Day.

Poarah kunjoo candee, Tam.

B. iii. D. $\frac{3}{11-12}$. P. 14. V. 7. A. $\frac{3}{15-16}$. C. 19. L. 1. 35. L. tr. $\frac{7}{2}$.

Length of specimens to $4\frac{5}{10}$ inches.

The coloration differs slightly from the Malabar species, in that here there are some irregular vertical yellow lines on the fore part of the body, and the blue between the yellow lines and the opercular spot is less distinct. The lower half of the dorsal fin is also darker.

Hab. Billicul, where it was imported and breeds; also the Bowany and Seegoor Rivers. Some were placed in the Ootacamund Lake. It grows to about 6 inches in length.

PARADANIO NEILGHERRIENSIS, sp. nov.

Cowlie, Tam.

B. iii. D. $\frac{2}{9-10}$. P. 15. V. 10. A. $\frac{2}{10}$. C. 20. L. 1. 35. L. tr. $\frac{12}{20}$. Vert. $\frac{12}{20}$.

Length of specimens up to $3\frac{1}{2}$ inches.

Length of head $\frac{2}{9}$, of pectoral $\frac{1}{6}$, of base of dorsal $\frac{1}{8}$, of base of anal $\frac{1}{8}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{2}{13}$, of body $\frac{1}{4}$, of dorsal $\frac{1}{8}$, of anal $\frac{1}{8}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head, $1\frac{1}{4}$ diameter apart, $\frac{2}{3}$ of a diameter from end of snout.

Profile more convex on the ventral than it is on the dorsal aspect. Body compressed.

Cleft of mouth extending to under the anterior margin of the orbit, with the lower jaw directed rather upwards, and having a slight knob at its termination, so that when the mouth is closed it forms the anterior end of the fish. Nostrils at anterior superior angle of the orbit, nearer to it than to the end of the snout, and divided from each other by a membranous valve.

Fins. The dorsal commences midway between the snout and the middle of the caudal fin, and opposite the posterior third of the ventral, extending to above the fourth anal ray. Caudal emarginate in its posterior fourth. Anterior ends of dorsal and anal fins the highest.

Scales of medium size; none over the bases of dorsal or anal fins, but a few over the caudal.

Lateral line commencing from the upper posterior margin of the

opercle, bends directly downwards to opposite the posterior extremity of the pectoral fin, it then follows the curve of the abdomen to its termination; it consists of single tubes.

Teeth. Pharyngeal teeth crooked and pointed, 5, 4, $2\frac{1}{2}$, 4, 5.

Colours. Back greenish, sides silvery, with a purplish tinge along the abdomen, and a badly marked broad steel-blue stripe extending from behind the eye to the caudal fin; it is bounded superiorly and inferiorly by a narrow bright yellow band. Fins yellowish, with fine black dots, the external portions of dorsal and anal the highest. The colours vary in different places.

Hab. Ootacamund Lake, Pykara, Avelanche, and Kaity streams. This is the only indigenous fish of the hills.

With short dorsal fin, and an elongated ray in ventral fin.

PARADANIO ELEGANS, spec. nov.

B. iii. D. $1\frac{1}{3}$. P. 11. V. 8. A. $2\frac{1}{23}$. C. 19. L. 1. 52. L. tr. $8\frac{1}{2}$.

Length of specimens up to $3\frac{1}{2}$ inches.

Length of head $\frac{1}{5}$, of pectoral $\frac{1}{4}$, of base of dorsal $\frac{1}{18}$, of base of anal $\frac{1}{4}$, of caudal nearly $\frac{1}{4}$ of the total length. Height of head $\frac{1}{9}$, of body $\frac{2}{7}$, of dorsal $\frac{1}{8}$, of anal $\frac{2}{13}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head, $\frac{3}{4}$ of a diameter from end of snout, $1\frac{1}{4}$ apart.

Profile of dorsal aspect rises slightly to the base of the dorsal fin; along the abdominal surface there is a regular curve from the symphysis of the lower jaw to the end of the anal fin. Body strongly compressed.

Cleft of mouth deep, oblique, and reaching to nearly under the anterior margin of the orbit. Snout short. Upper jaw slightly compressed; lower jaw the longest; both covered by thin lips. Nostrils generic.

Fins. Dorsal commences over the middle of the anal. Ventral with an elongated ray extending backwards as far as the middle of the anal, which last fin is highest anteriorly. Caudal lobed, the inferior lobe both largest and longest.

Scales with two or three diverging striæ. Base of dorsal not scaled, of anal scaled.

Lateral line in single tubes; it first curves round the base of the pectoral fin, and just beyond the ventral attains within two scales of the abdominal profile, which it follows as far as the posterior extremity of the anal, and then curves upwards to the centre of the caudal.

Teeth. Pharyngeal teeth crooked at their extremity and pointed, 5, 4, $1\frac{1}{1}$, 4, 5.

Colours. Greenish, with a silvery band extending from opposite the upper margin of the opercle to the upper portion of the caudal fin. Abdomen silvery. Several irregular yellow bars pass downwards from the back to the abdomen. Cheeks silvery. Fins diaphanous. Eyes golden.

Hab. Bowany River.

RASBORA NEILGHERRIENSIS, spec. nov.*Ovaree candee, Tam.*

B. iii. D. 2/7. P. 13. V. 8. A. 2/5. C. 18. L. 1. 34. L. tr. 6/3.

Length of specimens to $5\frac{1}{2}$ inches.

Length of head $\frac{2}{11}$, of pectoral $\frac{1}{8}$, of base of dorsal $\frac{1}{12}$, of base of anal $\frac{1}{15}$, of caudal $\frac{1}{11}$ of the total length. Height of head $\frac{1}{9}$, of body $\frac{1}{5}$, of dorsal $\frac{1}{8}$, of anal $\frac{1}{9}$ of the total length.

Eyes. Diameter $\frac{1}{5}$ of length of head, $1\frac{1}{2}$ diameter apart, 1 diameter from end of snout.

Profile more convex on the ventral than on the dorsal aspect, which last is almost straight.

Cleft of mouth extending to beneath the anterior margin of the orbit; it is directed upwards, and there is a slight knob below the anterior extremity of the lower jaw. Nostrils at anterior superior angle of the orbit, nearer to it than to the end of the snout; the posterior broad and patent, divided by a valve from the anterior, which has elevated margins. Præorbital irregularly pentagonal, its anterior margin the longest, its anterior superior very short.

Fins. Dorsal commences midway between the snout and centre of the caudal fin, and over the middle of the ventral, extending backwards to opposite its posterior extremity. Caudal broad, slightly lobed in its posterior fourth, in adults the lowest lobe being the longest. Anterior extremities of dorsal and anal the highest.

Scales moderately large; none on the base of either the dorsal or anal, some on the caudal.

Lateral line consists of single tubes; it makes a very gentle curve downwards, from the posterior superior angle of opercle to above the ventral fin, whence it runs parallel with the abdominal profile.

Teeth. Pharyngeal teeth crooked, pointed, 5, 3, 2/2, 3, 5.

Colours. Back dull greenish brown, fading to white glossed with purple on the abdomen. Opercles silvery. A darkish silvery line runs along the opercles and side of the body, having a broad silvery band below it. Fins yellowish grey; base of caudal dark grey. Eyes bluish green.

This species is said to grow to eight inches in length, and takes either a fly or a worm. In the Billicul Lake (to which place it was imported) it breeds very readily.

Hab. Bowany and Seegoor Rivers, also the Billicul Lake.

RASBORA WOOLAREE, spec. nov.*Woolaree candee, Tam.*

B. iii. D. 2/7. P. 13. V. 8. A. 2/5. C. 18. L. 1. 30. L. tr. 5/2.

Length of specimens up to 3 inches.

Length of head $\frac{1}{4}$, of pectoral $\frac{1}{6}$, of base of dorsal $\frac{1}{10}$, of base of anal $\frac{1}{15}$, of caudal $\frac{1}{4}$ of the total length. Height of head $\frac{2}{15}$, of body $\frac{1}{4}$, of dorsal $\frac{1}{6}$, of anal $\frac{2}{5}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head, $1\frac{1}{6}$ diameter apart, $\frac{3}{4}$ of a diameter from end of snout.

Profile more convex on the ventral than on the dorsal aspect, which last is nearly straight.

Cleft of mouth extending to under the anterior margin of the orbit; upper jaw broad; the lower jaw with a well-marked knob at its anterior extremity, and which is received into a rather deep emargination in the centre of the upper jaw, where, when the mouth is closed, it forms part of the upper profile. Upper surface of head nearly flat. Nostrils generic. Præorbital irregularly pentagonal, pointing downwards and backwards, its posterior margin the longest, its posterior inferior margin the shortest.

Fins. Dorsal commences midway between the snout and the centre of the caudal fin, and over the middle of the ventral, extending backwards to over its posterior extremity. Caudal broad and deeply lunated in its posterior half. First divided rays of dorsal and anal the highest.

Scales moderately large, some on base of both anal and caudal fins.

Lateral line consists of single tubes; it makes a rather concave curve downwards from the posterior superior angle of the opercle to opposite the end of the pectoral fin, whence it passes parallel with the abdomen to the lower third of the caudal fin.

Teeth. Pharyngeal teeth sharp, curved, 5, 3, 2/2, 3, 5.

Colours. Olive-green superiorly, becoming lighter on the abdomen, with a purplish gloss. A leaden-blue stripe passes from the eye to the centre of the caudal fin; it has a dull yellow edging above. Fins orange.

Said never to exceed four inches in length. It is common in the Bowany River.

This species of *Rasbora* differs materially from the *R. neilgherriensis* in its comparatively longer head, its larger eye, its mouth, its præorbital, its lateral line, and the shape of the caudal fin.

Fishes of this genus are avoided as food by the natives of some portions of the Madras Presidency whilst cholera is present, as they are considered to predispose the eater to attacks of this scourge.

Genus ESOMUS.

I have in this place introduced a fish of this genus, of which I have been favoured with many specimens captured by Mr. Assistant Apothecary Everard at Trichoor, near Cochin. It is exceedingly interesting, because Valenciennes's specimen was obtained from a hot spring in Ceylon, and Dr. McClelland's from a hot spring in Bengal. Although not captured near the Neilgherries, I shall describe it in this place with reference to the next species.

ESOMUS MALABARICUS, sp. nov.

B. iii. D. 2/7. P. 12. V. 9. A. 2/5. C. 19. L. l. 32. L. tr. 7.

Length of specimens up to 3 inches.

Length of head $\frac{1}{11}$, of pectoral $\frac{2}{7}$, of base of dorsal $\frac{1}{12}$, of base of anal $\frac{1}{12}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{1}{8}$, of body $\frac{1}{4}$, of dorsal $\frac{1}{6}$, of anal $\frac{1}{6}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, $1\frac{1}{2}$ diameter apart, 1 diameter from end of snout.

Profile from snout to anterior margin of dorsal fin almost straight, then sinking along its base it again becomes straight. Abdominal profile more convex. Body compressed.

Cleft of mouth short, oblique, not extending halfway to the orbit; the anterior surface of the lower jaw, when the mouth is closed, forms part of the upper profile. Snout rather depressed. Lower lip rather fleshy, not covering the tip of the lower jaw. The superior pair of cirri reach as far as the middle of the orbit; the inferior pair extend from the angle of the mouth to beyond the base of the ventral fin. Præorbital triangular, apex below.

Fins. Dorsal short, placed opposite the anal, and commencing midway between the anterior margin of the orbit and posterior extremity of the caudal fin. Pectoral large, falcated, reaching to the commencement of the ventral, which is short. Caudal deeply lunated.

Teeth. Pharyngeal teeth slightly crooked and pointed, 5/5, in a single row.

Scales of moderate size.

Lateral line absent.

Colours. Greyish silvery above, becoming silvery white below the middle of the body, along which runs a silvery stripe, which has a narrow yellow edge superiorly. In one specimen the silver stripe was edged superiorly by a broad black band.

Hab. Trichoor in Malabar.

Subgenus NURIA.

Differs from *Esomus* in the presence of a lateral line strongly curved.

ESOMUS (NURIA) MADERASPATENSIS, sp. nov.

B. iii. D. 2/7. P. 12. V. 9. A. 3/5. L. l. 32. L. tr. 5/2.

Length of specimens up to 3 inches.

Length of head $\frac{2}{11}$, of pectoral $\frac{1}{5}$, of caudal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{7}$, of body $\frac{1}{4}$, of dorsal $\frac{1}{7}$, of anal $\frac{1}{7}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, 1 diameter apart, $\frac{3}{4}$ of a diameter from end of snout.

Cleft of mouth short, oblique, not extending above one-third of the distance to below the orbit, and gape three times as wide as the cleft is deep. Two pairs of cirri, as in the last species.

Fins. Dorsal short, its anterior half in advance of the origin of the anal. Pectoral does not extend so far as the ventral; neither does the latter reach the anal. Caudal deeply lunated.

Teeth. Pharyngeal teeth in one row, straight and sharp, 5/5.

Colours. Silvery white, with a silvery line extending along the centre of either side. Fins diaphanous.

Hab. Bowany River. It is also exceedingly common at Madras.

CHELA ARGENTEA, sp. nov.

Wellachee candee, Tam. The White Carp.

B. iii. D. 3/7. P. 15. V. 8. A. 3/14. C. 19. L. 1. 40-45.
L. tr. 7/2.

Length of specimens to $5\frac{2}{3}$ inches.

Length of head nearly $\frac{1}{5}$, of pectoral a little above $\frac{1}{5}$, of base of dorsal $\frac{1}{3}$, of base of anal above $\frac{1}{4}$, of caudal a little more than $\frac{1}{5}$ of the total length. Height of head $\frac{1}{10}$, of body above $\frac{1}{5}$, of dorsal fin nearly $\frac{1}{9}$, of anal nearly $\frac{1}{9}$ of the total length.

Eyes. Orbits circular, their upper margin close to the profile. Diameter not quite $\frac{1}{3}$ of length of head, 1 diameter apart posteriorly, $\frac{3}{4}$ anteriorly, and the same distance from the end of the snout.

Profile rises to over the centre of the pectoral fin, whence it proceeds direct to the base of the caudal. Its abdominal profile is more convex than its dorsal. Abdomen sharp, cutting anteriorly; body and head compressed laterally.

Cleft of mouth extending to beneath the anterior third of the orbit; the lower jaw is directed obliquely upwards, so that its anterior extremity is nearly level with the dorsal profile. The lower jaw has a knob at its symphysis, which is received into an emargination formed by the intermaxillary bones. Nostrils generic. Præorbital nearly oval, its superior and inferior margins being twice the length of its anterior and posterior ones.

Fins. Dorsal situated in the posterior third of the distance between the snout and the base of the caudal fin, and over the commencement of the anal. Pectoral commencing under the posterior extremity of the opercle, extends to rather beyond the base of the ventral, which does not quite reach so far as the anal. Dorsal and anal both highest anteriorly, with their external margins slightly concave, their first undivided rays minute. Pectoral and ventral pointed, the outer ray of the first strong and undivided. Caudal deeply lobed.

Scales moderately large, and with six or eight well-marked lines radiating from their bases towards their circumferences. A few scales exist along the anterior portion of the base of the anal and caudal fins.

Lateral line consisting of a single tube in each scale; commencing on a level with the upper margin of the opercle, it bends downwards for about twelve scales, when it reaches above the base of the ventral fin, from here it follows the curve of the abdomen to opposite the lower third of the base of the caudal, when it suddenly ascends to attain its centre.

Teeth. Pharyngeal teeth curved, pointed at their extremities, and in three rows, 5, 3, 2/2, 3, 5.

Colours. Brilliant silvery, with a brownish-green back, divided from the abdomen by a broad green band, which extends from behind the upper part of the orbit to the centre of the caudal fin. Fins yellowish; external portions of dorsal and caudal stained with dark, due to numerous minute black spots. Outer margin of anal also darkish.

Grows to about 8 inches in length, and is very numerous in the Bowany.

Hab. The Bowany River.

NOTOPTERUS PALLASII, Cuv. & Val.

Ambutan wahlah, Tam. The Barber's Wahlah.

B. vi. D. 9. P. 17. A. 108. V. 4. C. 13. L. 1. 225.

Length of specimens from $4\frac{1}{2}$ to 10 inches.

Twenty-eight serrations along the anterior margin of the chest and abdomen.

Its native name is derived from the form of the body being similar to the knives which barbers employ for shaving.

BELONE CANCELATA, Buch. Ham.

Coco meen, Tam. "Long-nosed Fish."

B. x. D. 2/15. P. 11. A. 2/15. C. 15.

Very common in the Bowany River. It is reputed to be very destructive to young fish.

MURÆNA MACULATA, Buch. Ham.

Vellangoo, Tam.

Common in the Bowany. Upwards of a dozen and a half were placed in the Ootacamund Lake.

6. Description of a New Australian Bird pertaining to the genus *Malurus*. By JOHN GOULD, F.R.S.

MALURUS CALLAINUS. Turquoise Malurus.

Male in full nuptial dress:—

Entire crown of the head, mantle, and upper tail-coverts light turquoise-blue; ear-coverts similar in colour, but of a conspicuously lighter hue; throat rich cobalt-blue; entire abdomen and under tail-coverts rich verditer-blue; the turquoise-coloured feathers of the crown are separated from those of the mantle by a band of jet-black, while the mantle is again separated from the upper tail-coverts by a conspicuous patch of the same colour; a lunate band of deep black also separates the cobalt-blue of the throat from the verditer-blue of the under surface; tail-feathers dull green, each slightly tipped with greyish white; wings brown, each feather tinged with greyish-green on its outer web; under surface of the shoulder buff; bill and legs brownish black.

Total length $4\frac{1}{2}$ inches, bill $\frac{1}{2}$, wing $\frac{7}{8}$, tail $2\frac{3}{8}$, tarsi $\frac{7}{8}$.

Hab. South Australia.

Remark.—This very beautiful bird is closely allied to *Malurus melanotus* and *M. splendens*; but on comparison the distinctive characters of each become very apparent.

For this new species and many other fine objects I am indebted to Mr. S. White, of Adelaide, South Australia, who procured them in the interior of that country.

7. Descriptions of New Species of Shells collected by Geoffrey Nevill, Esq., at Mauritius. By HENRY ADAMS, F.L.S.

(Plate XIX.)

VOLVARIA (VOLVARINA) PUSILLA, H. Ad. (Pl. XIX. fig. 1.)

V. testa fusiformi, pallida; spira elevata, apice obtusiuscula; anfr. 5, convexiusculis, ultimo antice attenuato, postice paulum ascendente; columella quadruplicata; apertura angusta; labro incrassato, intus dentato.

Long. 5, diam. $2\frac{1}{2}$ mill.

Hab. Port Louis Harbour, Mauritius.

This small species of the genus *Volvaria* has much the appearance of *V. neglecta*, Sow.; but the outer lip is strongly denticulated, while that of *V. neglecta* is smooth.

MACROCHLAMYS MINIMA, H. Ad. (Pl. XIX. fig. 2.)

M. testa subperforata, depressa, discoidea, tenui, vix striatula, pellucida, nitida; spira planiuscula, sutura profunda; anfr. 4, convexis, ultimo non descendente, basi convexo; apertura vix obliqua, lunari; perist. simplici, acuto, margine columellari superne reflexiusculo.

Diam. $1\frac{1}{3}$, alt. $\frac{1}{2}$ mill.

Hab. Near Port Louis, Mauritius.

Although this species is so minute, it appears to be adult, and is therefore deserving of record.

MACROCHLAMYS PERLUCIDA, H. Ad. (Pl. XIX. fig. 3.)

M. testa anguste umbilicata, depressa, tenui, lævigata, pellucida, nitida; spira brevissime conoidea, sutura marginata; anfr. $5\frac{1}{2}$, convexiusculis, arcte convolutis, ultimo vix descendente, peripheria rotundato, basi medio impresso; apertura obliqua, lunari; perist. simplici, recto, margine columellari superne reflexiusculo.

Diam. 6, alt. 4 mill.

Hab. Peter Botte, Grand Bassin, Trou-aux-Cerfs, Mauritius.

"The animal of this species presents a very pretty appearance, the mantle being of a bright-yellow colour spotted with black, and the foot bright yellow, while the tentacles are entirely black."—G. Nevill.

STYLODONTA (EREPTA) RUFOCINCTA, H. Ad. (Pl. XIX. fig. 4.)

S. testa vix perforata, conoideo-lenticulari, solidula, superne confertim arcuato-striata, pallide rufa, fascia rufa supra carinam alteraque suturali ornata; spira parum elevata, apice obtusa,

sutura leviter impressa; anfr. 6, planiusculis, lente accrescentibus, ultimo antice breviter descendente, periphæria angulato, basi modice convexo, sublævigato, leviter concentricè striato, albido; apertura obliqua, rotundato-lunari; perist. simplici, marginibus callo crasso junctis, columellari declivi, incrassato, supra perforationem reflexo.

Diam. maj. 13, min. 12, alt. $7\frac{1}{2}$ mill.

Hab. On sandhills near the sea-shore, Coromandel, Mauritius.

STYLODONTA (EREPTA) NEVILLI, H. Ad. (Pl. XIX. fig. 5.)

S. testa subperforata, depresso-conica, oblique costulis undulatis granulosis remotiusculis munita, pallide fulva; spira breviter conoidea, apice obtusa, sutura impressa; anfr. 8, convexis, lente accrescentibus, ultimo non descendente, ad peripheriam subangulato, subtus convexo; apertura obliqua, lunato-rotundato; perist. acuto, intus labiato, marginibus callo tenui junctis, columellari incrassato, reflexiusculo.

Diam. maj. 12, min. 10, alt. 7 mill.

Hab. The Pouce Mountain, Mauritius.

This species has characters in common with both *S. suffulta*, Bens., and *S. setiliris*, Bens., but is larger and less globose than the former, and is without the prominent columellar tooth of the latter; while from the latter it also differs in being larger, less umbilicated, and in the absence of the undulate lines of hairs. I have much pleasure in naming it after Mr. Geoffrey Nevill, a very enterprising young naturalist, to whom I am indebted for the opportunity of describing this and the other species included in this paper.

PUPA (PAGODELLA) VENTRICOSA, H. Ad. (Pl. XIX. fig. 6.)

P. testa profunde rimata, ovata, tenuiuscula, oblique striatula, pallide fusca; spira convexo-conica, sutura impressa; anfr. 5, convexiusculis, ultimo ventricosus, basi rotundato; apertura semiovali, plica parietali compressa, intrante, et dente prope insertionem marginis dextri munita; perist. simplici, vix expansiusculo, marginibus callo junctis, dextro subsinuato, columellari superne dilatato.

Long. $2\frac{1}{2}$, diam. $1\frac{3}{4}$ mill.

Hab. The Moka Ravines, Mauritius.

This singular little species I cannot satisfactorily refer to any of the present subgenera of the genus *Pupa*, and I therefore propose a new subgenus for it under the name of *Pagodella*, which may be characterized as follows:—

Subgenus PAGODELLA, H. Ad.

Testa rimata, ovata, opaca; anfr. convexi; apertura semiovalis, plicis parietalibus 2; perist. tenue, rectum, vix expansiusculum, marginibus callo junctis.

GIBBUS (GIBBULINA) NEVILLI, H. Ad. (Pl. XIX. fig. 7.)

G. testa rimata, cylindræa, solidiuscula, oblique sinuato-costata,

albida; spira cylindrica, apice obtusa, sutura mediocri; anfr. 9, planiusculis, ultimo non ascendente, basi angulato; apertura parum obliqua, rhombéo-ovali, dente parietali compresso, intrante, et plica columellari obsoleta munita; perist. breviter expanso, margine dextro intus labiato, columellari patente.

Long. 24, diam. 6 mill.; ap. $6\frac{1}{2}$ mill. longa, 4 lata.

Hab. The Pouce Mountain, Mauritius.

"The foot of the animal in this species is orange; the mantle is also orange, slightly mottled with black anteriorly, more densely so posteriorly; and the tentacles are black."—*G. Nevill*.

I have named this species in honour of Mr. William Nevill, the father of Mr. Geoffrey Nevill, a gentleman well known as a mineralogist.

GIBBUS (GONIDOMUS) NEWTONI, H. Ad. (Pl. XIX. fig. 8.)

G. testa profunde arcuato-rimata, elongato-ovata, oblique costata, pallido-lutea; spira convexo-conica, sutura impressa; anfr. 8, convexiusculis, ultimo antice ascendente, basi compresso; apertura verticali, truncato-oblonga; perist. breviter expanso, marginibus callo junctis, dextro intus incrassato, columellari patente.

Long. 24, diam. 11 mill.; ap. 7 mill. longa, 6 lata.

Hab. Trou-aux-Cerfs, Mauritius.

"This species was first found by Mr. Caldwell at Trou-au-Cerf, and I have since found it alive at the same place. The animal has the foot of a greyish flesh-colour, the mantle light brownish grey closely veined with longitudinal dark brown lines, and the tentacles of a dull purple."—*G. Nevill*.

ENNEA (GULELLA) MODESTA, H. Ad. (Pl. XIX. fig. 9.)

E. testa profunde perforata, ovato-oblonga, tenuiuscula, conferte et minute costulata, nitida, pellucida, corneo-hyalina; spira ventrosa, sursum tumida, apice convexo-conica, sutura impressa; anfr. 11, convexis, ultimo ascendente, basi rotundato; apertura verticali, ovali, plica compressa oblique descendente prope insertionem marginis dextri munita; perist. expanso, subsoluto, margine dextro sinuato, intus tuberculifero.

Long. 5, diam. supra medium $2\frac{1}{2}$ mill.; ap. $1\frac{1}{2}$ mill. longa, 1 mill. lata.

Hab. Mauritius.

This species has hitherto been confounded with *E. clavulata*, Lam., but appears to be distinct. Among many specimens that came under the notice of Mr. G. Nevill there was not one of an intermediate form.

CYCLOSTOMUS (TROPIDOPHORA) MAURITIANUS, H. Ad. (Pl. XIX. fig. 10.)

C. testa anguste umbilicata, ovato-conica, tenuiuscula, pallide fulva, strigis fulvis ornata; spira conica, apice acutiuscula; anfr. 5, convexis, bicarinatis, inter carinas undique costis irre-

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gularibus subdistantibus munitis; apertura vix obliqua, subcirculari; perist. simplici, marginibus approximatis, callo tenui junctis, margine dextro recto, columellari mediocriter expanso.
Diam. maj. 14, min. 12, alt. 17 mill.

Hab. The Pouce Mountain, Mauritius.

CYCLOSTOMUS SCABER, H. Ad. (Pl. XIX. fig. 11.)

C. testa profunde umbilicata, globoso-turbinata, tenuiuscula, spiraliter costulis subdistantibus et longitudinaliter striis elevatis decussata, basi costulis spiralibus propioribus, in umbilico remotioribus, pallide carnea, fascia rufa angusta infra peripheriam ornata; spira turbinata, apice obtusiuscula; anfr. 5, convexis, ultimo rotundato; apertura verticali, circulari; perist. simplici, recto, continuo, superne subangulato, breviter adnato.
Diam. maj. 12, min. 10, alt. 11 mill.

Hab. The Pouce Mountain, Mauritius.

OMPHALOTROPIS COSTELLATA, H. Ad. (Pl. XIX. fig. 12.)

O. testa umbilicata, ovato-conica, tenuiuscula, spiraliter costulis filiformibus subdistantibus, circa umbilicum remotioribus, superne fere obsoletis munita, pallide carnea, versus apicem rubida, strigis fulguratis rufis picta; spira conica, apice acutiuscula, sutura profunda; anfr. 7, convexiusculis, ultimo rotundato, in umbilico liris æqualibus munito; apertura subverticali, ovali; perist. recto, acuto, marginibus callo tenui junctis, columellari subincrassato, expansiusculo.

Long. 10, diam. 7 mill.; ap. 6 mill. longa.

Hab. The Pouce Mountain, Mauritius.

OMPHALOTROPIS PICTURATA, H. Ad. (Pl. XIX. fig. 13.)

O. testa perforata, ovato-conica, oblique confertim striatula, corneo-rufa, maculis et strigis albis notata; spira conica, apice acuminata, sutura submarginata et crenulata; anfr. 6, convexiusculis, ultimo rotundato; apertura subverticali, oblongo-ovata; perist. simplici, margine dextro recto, columellari vix expansiusculo.

Long. 6, diam. 3 mill.; ap. 2 mill. longa.

Hab. The Pouce Mountain, Mauritius.

"The animal in this species has the tentacles yellow, tipped with dark brown; the foot almost white; the mantle a kind of grey (varying), with its sides dark brown, and the same colour between the tentacles."—*G. Nevill.*

CASSIDULA PARVA, H. Ad. (Pl. XIX. fig. 14.)

C. testa subperforata, ovato-conica, solidula, spiraliter confertim costulata (prope suturam costulis majoribus), longitudinaliter minute striata, sordide alba; spira conica, apice mucronata; anfr. 6, convexiusculis, ultimo basi attenuato, antice crista obtusa munito; apertura subobliqua, ovali; plica parietali 1, compressa, subtransversa, nodulo supero obsoleto; plica colu-

mellari paulo minore, illi parallela; perist. simplici, margine dextro vix expansiusculo, intus medio unidentato, columellari calloso, dilatato.

Long. 4, diam. $2\frac{1}{2}$ mill.; ap. 2 mill. longa.

Hab. Port Louis Harbour, Mauritius.

PLECOTREMA EXIGUA, H. Ad. (Pl. XIX. fig. 15.)

P. testa profunde rimata, ovato-conica, solida, spiraliter valde sulcata, longitudinaliter striata, pallide fulva; spira conoidea, apice mucronata; anfr. 8, planiusculis, infra suturam sulco profundo et lato exaratis, ultimo basi attenuato, pone aperturam valde cristato; apertura subobliqua, angusta; plicis parietalibus 2, superiore tuberculiformi, altera bipartita; plica columellari compressa, subhorizontali; perist. simplici, marginibus callo crasso junctis, dextro intus incrassato, tridentato, dente superiore minuto, columellari dilatato, patente.

Long. 6, diam. $3\frac{1}{2}$ mill.; ap. 2 mill. longa.

Hab. Trou d'Eaux Douces, Mauritius.

8. Descriptions of New Species of Shells.

By HENRY ADAMS, F.L.S.

(Plate XIX.)

NANINA (? ROTULA) CONULUS, H. Ad. (Pl. XIX. figs. 16, 16a.)

N. testa imperforata, trochiformi, tenui, oblique striata, superne liris spiralibus obsoletissimis signata, rubello-cornea, ad carinam et ad suturas pallidiore; spira conoidea, apice obtusiuscula, sutura distincta; anfr. 6, convexiusculis, ultimo non descendente, carinato, basi convexo; apertura subobliqua, tetragono-lunari; perist. recto, acuto, marginibus convergentibus, columellari verticali, superne breviter reflexo.

Diam. maj. 11, min. 10, alt. 12 mill.

Hab. Newera Ellia, Ceylon (Coll. F. Layard).

This species, which is closely allied to *N. concavospira*, Pfr., was obtained by Mr. Frederick Layard from Newera Ellia, Ceylon, at an elevation of 6500 feet above the level of the sea. I have referred it with doubt to the subgenus *Rotula*, the animal of the typical species, *N. detecta*, not being known. In the figure given of the animal, in this case, the truncature of the foot is distinctly shown; while the animals of certain Indian species, considered by Mr. W. T. Blanford to belong to the same subgenus, are without such truncature, the mucus-pore being above the flattened posterior extremity.

BULIMULUS (ENA) PUSILLUS, H. Ad. (Pl. XIX. fig. 17.)

B. testa sinistrorsa, rimato-perforata, cylindrico-turrita, tenui, inæqualiter striata, vix nitidula, olivaceo-fusca; spira elongata, sursum parum attenuata, apice obtusiuscula, sutura distincta;

anfr. 7, convexiusculis, ultimo $\frac{1}{3}$ longitudinis vix æquante, basi rotundato; apertura verticali, semiovali; perist. recto, margine columellari subverticali, superne dilatato, patente.

Long. 5, diam. 2 mill.

Hab. Matelle, Ceylon (*Coll. F. Layard*).

This small species was collected by Mr. Frederick Layard at Matelle, Ceylon, and is peculiar from being, at least so far as I know, the only sinistral land-shell that has yet been met with in the island.

APICALIA SCITULA, II. Ad. (Pl. XIX. fig. 18.)

A. testa subulata, solidiuscula, subpellucida, politissima, alba, fascia suturali subdiaphana ornata; spira attenuata, sutura indistincta; anfr. 12, apicalibus 3 stilinis, deinde planiusculis, ultimo rotundato; apertura subovali; labio incrassato, tenui, calloso; labro valde sinuato, vix incrassato.

Long. 10, diam. $3\frac{1}{2}$ mill.; ap. 3 mill. longa.

Hab. Borneo (*Coll. H. Adams*).

COLINA PYGMEÆ, II. Ad. (Pl. XIX. fig. 19.)

C. testa pupiformi, tenuiuscula, flavida, strigis fulvis nonnullis ornata; spira medio inflata, sursum convexo-turrita, apice obtusiuscula; anfr. 7, convexiusculis, longitudinaliter nodosoplicatis et transverse leviter striatis; plicis longitudinalibus in anfractu ultimo fere obsoletis, striis transversis, ad suturas moniliformibus, et fusco lineatis; anfractu ultimo $\frac{2}{3}$ longitudinis æquante, contracto, et in medio subangulato; apertura semiovali, canali brevi recurvo; columella obliqua, arcuata, oblique striata, vix callosa; labro valde expanso, extrorsum incrassato.

Long. 10, diam. 3 mill.

Hab. Borneo (*Coll. H. Adams*).

This species is another interesting addition to the small genus *Colina*. The species I lately described as *C. gracilis* I find has been since described by Mr. G. B. Sowerby under the name of *C. coarctata*.

Genus PARMELLA, H. Ad.

Testa haliotideæ, tenuissima, epidermide cornea, extra testam producta; spira plana, vertice laterali; anfr. paucis, ultimo maximo; apertura ampla.

This peculiar form is probably closely allied to *Parmacella*; but the shell of the latter is shown in Cuvier's figure of the typical species (*P. olivieri*) to have a posterior, terminal and rather prominent apex. It is also somewhat similar to the South American genus *Peltella*, Beck (*Gæotis*, Shuttl.), but differs in being more depressed, and in the horny polished epidermis with which it is furnished extending widely beyond the posterior part of the margin.

PARMELLA PLANATA, II. Ad. (Pl. XIX. fig. 20.)

P. testa depressissima, haliotidiformi, tenuissima, epidermide

luteo-fulva cornea politissima induta, extra marginem postice late expansa, strigis incrementi subplicata; spira minutissima, plana, sutura distincta, vertice laterali, ad $\frac{1}{4}$ diametri maximi posito; anfr. 3, rapide accrescentibus, ultimo maximo, horizontaliter compresso, periphæria rotundato; apertura subhorizontali, ovato-lunari, spira intus conspicua.

Diam. maj. 15, min. 10 mill., epidermide exclusa.

Hab. Fiji Islands (*Coll. H. Adams*).

BULIMUS (MESEMBRINUS) GEALEI, H. Ad. (Pl. XIX. fig. 21.)

B. testa subperforata, oblongo-ovata, tenui, oblique striata, striis spiralibus rugosis decussata, nitida, straminea, fasciis fuscis interruptis plerumque ornata; spira conica, acutiuscula, sutura submarginata; anfr. 6, planiusculis, ultimo spiram subæquante, basi rotundato; apertura parum obliqua, ovali-oblonga; perist. simplici, recto, margine columellari superne appresso-reflexo, perforationem fere claudente, basali arcuato.

Long. 29, diam. 14 mill.

Hab. Mexico. Collected by Mr. Boucard.

9. Descriptions of New Species of Shells from Japan.

By ARTHUR ADAMS, F.L.S. &c.

(Plate XIX.)

1. AGADINA GOULDI, A. Ad. (Pl. XIX. fig. 22.)

A. testa vix umbilicata, helicoidea, subinflata, tenui, pellucida; anfr. $3\frac{1}{2}$, rapide accrescentibus; apertura obliqua, cucullata.

Diam. $1\frac{1}{2}$ mill.

Hab. Kino-Osima, in shell-sand.

This species is much smaller than *A. cucullata* of Gould, which he states is a quarter of an inch in diameter.

2. AGADINA STIMPSONI, A. Ad. (Pl. XIX. fig. 23.)

A. testa profunde umbilicata, planorboidea, depressa, tenui, albida; anfr. $3\frac{1}{2}$, lente accrescentibus; apertura obliqua, campanulata.

Operculum tenuissimum, corneum, extus concavum, multispirale.

Diam. 1 mill.

Hab. Kino-Osima, in shell-sand.

This is much more depressed and planorbular than the former, and the umbilicus is deeper and more open.

MANGELIA SPLENDIDA, A. Ad. (Pl. XIX. fig. 24.)

M. testa elongato-fusiformi, solidula, subpellucida, nitida, longitudinaliter plicata plicis obtusis inæqualibus, spiraliter lineata lineis elevatis subdistantibus, postice prominentibus et validioribus munita; albida, maculis fasciisque interruptis ferrugineis ornata; spira turrita, apice submamillato, sutura im-

pressa; anfr. 11, convexiusculis; apertura subovali, $\frac{1}{3}$ totius longitudinis; columella rotundata, callo tenui induta; labro acuto, sinuato, extus valde varicoso, intus lævigato; canali lato, brevi.

Long. 24, diam. 9 mill.

Hab. Gotto Islands, Japan.

The largest and most beautiful species of the genus.

Genus IOLEA, A. Ad.

Testa tenuis, turbinato-turrita, umbilicata, seu rimata; anfractibus sculptis, convexis, transversim liratis; apertura ovata; plica parietali obsoleta aut celata.

I established this little group under the name of *Iole* in the 'Annals' for 1860, founding my diagnosis on a single specimen. Since then, however, I have succeeded in obtaining both *I. scitula* and another species, *I. amabilis*, in greater abundance; and I find that on breaking some examples the parietal plica exists, but is entirely concealed. In *I. amabilis* it is conspicuous externally. The description and natural position of the genus, however, I still consider correct. I have altered the termination of the word *Iole*, as there is a genus of birds under that name. The group differs from *Oscilla* in being thin and turbinate, with the axis more or less perforated, and with the parietal fold either obsolete or entirely concealed.

1. IOLEA SCITULA, A. Ad. Annals, 1860.

Hab. Mino-Sima; Seto-Uchi; Akasi; Mososeki; Gotto.

2. IOLEA SCULPTILIS, A. Ad.

Menestho sculptilis, A. Ad. Annals, 1861.

Hab. Mino-Sima; Yobuko.

In the young shells the axis is rimately umbilicated.

3. IOLEA AMABILIS, A. Ad.

I. testa turbinato-turrita, rimata, alba, tenui, subdiaphana; anfractibus 6, convexis, transversim liratis, liris acutis, angustis, elevatis, distantibus, interstitiis longitudinaliter valde striatis, suturis canaliculatis; apertura acuminato-ovata, antice producta et effusa; labio libero, arcuato; plica parietali postica, parva, inconspicua.

Long. 3, diam. $1\frac{1}{2}$ mill.

Hab. O-Sima; Tanabe; Gotto, 48 fathoms.

A thin, semipellucid, exquisitely sculptured species, with channelled sutures.

Genus OSCILLA, A. Ad.

Testa solida, ovata seu pyramidato-turrita, imperforata; anfractibus transversim valde liratis; apertura ovata aut subquadrata; plica parietali valida, transversa, mediana.

1. OSCILLA LIRATA, A. Ad.

Odostomia (Evalea) lirata, A. Ad. Annals, 1860.*Hab.* Sado ; O-Sima ; Seto-Uchi ; Tsu-Sima.

2. OSCILLA SULCATA, A. Ad.

Odostomia (Evalea) sulcata, A. Ad. Annals, 1860.*Hab.* Tsu-Sima ; Mososeki.

3. OSCILLA CINGULATA, A. Ad.

Monoptygma cingulata, A. Ad. Annals, 1861.*Hab.* Takano-Sima.

4. OSCILLA ANNULATA, A. Ad.

Obeliscus annulatus, A. Ad. ; Sow. Thes. Mon. Obeliscus, pl. 171.

f. 26.

Hab. Mososeki ; Yobuko.

5. OSCILLA CIRCINATA, A. Ad.

O. testa elongato-ovata, rimata, tenuiuscula, alba, semiopaca; anfractibus normalibus 5, planis, cingulis transversis angustis elevatis regularibus ornatis, interstitiis longitudinaliter concinne striatis; apertura oblonga; plica parietali valida, acuta, mediana, transversa; labro margine crenulato, intus sulcato.

Hab. O-Sima ; Takano-Sima.

A very pretty semipellucid species, delicate in texture and neatly sculptured.

Genus AMAURELLA, A. Ad.

Testa parva, ovata, imperforata, alba, nitida, apice submamillato; apertura acuminato-ovata; labio arcuato, simplici, subincrassato.

This little group of Japanese Mollusca will include a remarkable shell I described as *Macrocheilus japonicus*, but which appears to have greater affinities with *Amaura*. I now add diagnoses to two other shells, which seem to belong to the same type of form.

1. AMAURELLA GLABRATA, A. Ad.

A. testa ovata, imperforata, solidiuscula, alba, semiopaca, lævi, nitida; anfractibus 3, planiusculis, ultimo elongato, amplo; apertura oblonga, antice producta, subacuminata; labio simplici, arcuato, subincrassato.

Hab. Takano-Sima.

2. AMAURELLA SEMISTRIATA, A. Ad.

A. testa ovata, imperforata, solidula, semiopaca, alba, nitida,

vertice submamillato; anfractibus $4\frac{1}{2}$, *planiusculis, longitudinaliter oblique strigillatis, anfractu ultimo magno, superne glabrato, inferne transversim striato, striis subdistantibus, conspicuis; apertura acuminato-ovata; labio arcuato, incrassato, antice subplanato.*

Hab. Kino-O-Sima.

Genus PUTILLA, A. Ad.

Testa turbinato-conoidalis, rimata, solida; apertura subquadrato-orbiculari; labio rectiusculo, incrassato, antice subeffuso, vix dilatato.

Founded on a little, solid, robust, subpellucid shell, which will neither be affiliated to *Eulina* nor any other recognized form.

PUTILLA LUCIDA, A. Ad. (Pl. XIX. fig. 25.)

P. testa candida, lævi, glabra, sublucida, rimato-umbilicata, solida; anfractibus quatuor, convexis; apertura ut supra.

Hab. Gotto Islands: 54 fathoms.

FOSSARINA PICTA, A. Ad. (Pl. XIX. fig. 26.)

F. testa turbinata, depressa, late umbilicata; spira parva; anfractibus 4, convexis, spiraliter liratis, liris simplicibus, æqualibus; lutescente, maculis irregularibus atro-purpureis variegata; anfractu ultimo magno, ad peripheriam rotundato; apertura orbiculata, patula; labio arcuato, acuto; labro postice dilatato, ascendente.

Diam. 3, alt. $2\frac{1}{2}$ mill.

Hab. Tanabe; Kino-O-Sima: on the shore.

A species very similar in form to the type, *F. patula*, Ad. & Ang., from Port Jackson; but the liræ are equal and simple, the aperture is nearly circular, and the outline of the shell is more orbicular. It is marked with irregular purple-black radiating blotches, and the umbilical region is generally pale yellow.

AMATHINA NOBILIS, A. Ad. (Pl. XIX. fig. 27.)

A. testa capuliformi, solida, candida; apice mediano, dextrorsum inclinato, involuto, acuto; extus valde bicarinata; apertura subcirculari, ampla, margine posteriore dilatato.

Diam. maj. 25, min. 22, alt. 17 mill.

Hab. Cape Notoro, Island of Saghalien.

I found this very remarkable shell cast up on the shore after a gale, in company with *Pilidium commodum*, Middendorff, *Velutina coriacea*, Pallas, and many other fine molluscos exuviae. There are now three species of this group—*A. tricarinata*, Chem., *A. bicarinata*, Pease, and *A. nobilis*.

MACROCHISMA SINENSIS, A. Ad. (Pl. XIX. fig. 28.)

Animal very large and elongated, bearing the shell in a sloping

direction, obliquely upwards, on the fore part of the body. The tentacles are filiform and very long; and the eyes, large, black, and conspicuous, are on slight swellings at their outer bases. The front edge of the mantle is extended, and gives the appearance of a large veil over the head. The mantle is not developed, nor does it cover the shell as in some members of the *Fissurellidæ*, and neither the mantle-margin nor anal tube is fringed. The edge of the mantle is furnished with short papillæ, four on each side and two behind, which are recurved over the edge of the shell. The anal tube is elongate and cylindrical, and is directed backwards and a little upwards through the foramen in the shell. The foot, large and fleshy, is produced behind, and tapers to a point; it is ovate in outline, and the sides are simple and not furnished with cirri or papillæ, as is the case with some other genera of the family.

In progression the form of the foot varies considerably, sometimes being greatly dilated at the sides, and at others extended in front and contracted and pointed behind.

Hab. Tabu-Sima, Japan: dredged from 25 fathoms of water.

There are about a dozen species of this group already described, but the animal has not hitherto been figured. The tentacles are red; the eyes black, with a light areola; the body is light brown, lineated with darker brown.

Genus CÆLOPOMA, A. Ad.

Operculum elatum, conicum, concavum, corneum, lamina spirali cornea instructum. Testa subdiscoidea, late umbilicata; peristomate simplici, superne subangulato.

CÆLOPOMA JAPONICUM, A. Ad. (Pl. XIX. figs. 29, 29 a.)

C. testa turbinato-depressa, striata, castanea; spira vix elata, sutura profunda; anfractibus $4\frac{1}{2}$, convexis, cylindræis, ultimo antice subdilato, descendente; umbilico lato, profundo; apertura perobliqua, vix circulari, peristomate recto, superne subangulato.

Diam. maj. 14, min. 11, alt. $6\frac{1}{2}$ mill.

Hab. Tsu-Sima. On dead leaves among stones in shady woods and rocky places.

In this form of *Cyclophoridae* the peritreme is similar to that of *Myxostoma* or *Cyclotus*, being nearly simple and continuous, and without the peculiar notch of *Pterocyclos*. The operculum, on the other hand, is very similar in form to that of *Pterocyclos*, being elevated, conical, and hollow; but whereas in *Pterocyclos* the spiral lamina is calcareous, and stands out horizontally from the margin of the whorls, in *Cælopoma* it is horny and closely imbricate.

While the animal is on the move, the operculum, which is carried close to the body, is received into the cavity of the wide umbilicus, and the foot tapers into a point beyond. This is the same mollusk I described in the 'Annals' for 1861 as a species of *Pterocyclos*.

The following is a list of the species of *Cyclophoridae* found by me in Japan, with two exceptions:—

CYCLOTUS CAMPANULATUS, Martens.

Hab. Yokohama (*Martens*).

CYCLOTUS FORTUNEI, Pfr.

Hab. Tsu-Sima.

CÆLOPOMA JAPONICUM, A. Ad.

Hab. Tsu-Sima.

CYCLOPHORUS HERKLOTSI, Martens.

Hab. Tsu-Sima.

CYCLOPHORUS HALOPHILA, Bens., ? = *musiva*, Gould.

Hab. O-Sima.

JAPONIA BARBATA, Gould.

Hab. Tago.

JAPONIA CITHARELLA, Gould.

Hab. Sado.

ALYCÆUS JAPONICUS, Martens.

Hab. Tsu-Sima.

ALYCÆUS SPIRACELLUM, Ad. & Rve.

Hab. Tsu-Sima.

PUPINOPSIS RUFA, Pfr.

Hab. Japan (*Cuming*).

PUPINOPSIS MINDORENSIS, Ad. & Rve. = *japonica*, Mart.

Hab. Tsu-Sima.

DIPLOMMATINA EXIGUA, A. Ad.

Hab. Tsu-Sima.

TEREBRATULA DAVIDSONI, A. Ad. (Pl. XIX. fig. 30.)

T. testa ovato-globosa, lævi, albida, laminis incrementi distinctis, irregularibus, ad basin validioribus; margine ventrali circulari; rostro producto, recurvato; foramine parvo, perfecto; deltidio parvo, concavo; apophysi simplici, $\frac{1}{3}$ longitudinis testæ superante.

Long. 18, lat. 14, alt. 11 mill.

Hab. Satanomosaki, Japan: 55 fathoms.

This is the fourth recent species of *Terebratula* (as restricted) known. It most resembles *T. uva*, from the Gulf of Tehuantepec, but differs from it in its more solid structure and more globose form, and in the foramen being smaller and entire.

DESCRIPTION OF PLATE XIX.

- Fig. 1. *Volvaria* (*Volvarina*) *pusilla*, p. 303.
 2. *Macrochlamys minima*, p. 303.
 3. — *perlucida*, p. 303.
 4. *Stylodonta* (*Erepta*) *rufocincta*, p. 303.
 5. — (*Erepta*) *nevillei*, p. 304.
 6. *Pupa* (*Pagodella*) *ventricosa*, p. 304.
 7. *Gibbus* (*Gibbulina*) *nevillei*, p. 304.
 8. — (*Gonidomus*) *newtoni*, p. 305.
 9. *Ennea* (*Gulella*) *modesta*, p. 305.
 10. *Cyclostomus* (*Tropidophora*) *mauritanus*, p. 305.
 11. — *scaber*, 306.
 12. *Omphalotropis costellata*, p. 306.
 13. — *picturata*, p. 306.
 14. *Cassidula parva*, p. 306.

- Fig. 15. *Plecotrema exigua*, p. 307.
 16, 16a. *Nanina* (? *Rotula*) *conulus*, p. 307.
 17. *Bulimulus* (*Ena*) *pusillus*, p. 307.
 18. *Apicalia scitula*, p. 308.
 19. *Colina pygmaea*, p. 308.
 20. *Parmella planata*, p. 308.
 21. *Bulimus* (*Mesembrinus*) *gealei*, p. 309.
 22. *Agadina gouldi*, p. 309.
 23. — *stimpsoni*, p. 309.
 24. *Mangelia splendida*, p. 309.
 25. *Putilla lucida*, p. 312.
 26. *Fossarina picta*, p. 312.
 27. *Amathina nobilis*, p. 312.
 28. *Macrochisma sinensis*, p. 312.
 29, 29a. *Celopoma japonicum*, p. 313.
 30. *Terebratula davidsoni*, p. 314.

March 28, 1867.

George Busk, Esq., F.R.S., V.P., in the Chair.

The Secretary called attention to two fine specimens of *Boidæ* lately added to the Society's collection of living Reptiles, namely:—

1. A specimen of the Carpet-Snake of Australia (*Morelia variegata*, Gray), received from Queensland, purchased of a dealer.

2. A specimen of the Peruvian Boa (*Boa eques*, Eyd. et Soul.), from Guayaquil, presented to the Society by Prof. William Nation, of Lima, Peru, C.M.Z.S.

Mr. Sclater also called attention to the specimen of *Larus fuscus*, Licht. (*Clupeilarus fuscus*, Bp. Consp. ii. p. 221), living in the Society's Gardens, having been purchased, when in immature plumage, in 1859, out of a vessel coming from Mogador, and pointed out how very distinct, when seen alive and in full plumage, this bird was from its near allies *Larus fuscus* and *Larus argentatus*. The three species might be diagnosed as follows:—

L. argentatus. Major; pedibus pallide carneis: chlamyde cinerea.

L. fuscus. Medius: pedibus læte flavis: chlamyde nigricantincinerea.

L. fuscus. Minor: pedibus pallide flavis: chlamyde nigricante.

In his recently published 'Musée des Pays-Bas' (*Lari*, p. 15),

Prof. Schlegel had united the two latter species together, which he would hardly have done if he had seen the living birds.

The following papers were read :—

1. Notes on the Mammals and Birds of Cape York, with Description of Two New Rodents of the Genus *Hapalotis*. By GERARD KREFFT, F.L.S.; C.M.Z.S.

Some months ago I purchased for the Australian Museum a few Mammals and Birds collected at Cape York, among which were several specimens of a very large *Hapalotis*, for which I propose the name of

HAPALOTIS CAUDIMACULATA*.

Fur harsh and coarse, reddish brown upon the back, and grey on the sides, beneath white. The hair appears stiff and shiny, and consists of some which is grey at the base, white or yellowish white on the upper part, generally tipped with brown, and of much longer and stiffer brown hairs, the tips of which are almost black. Thin silvery hairs cover the feet; and an elongate patch of a darker hue commences at the elbow, runs tapering along the outside of the arm, and stops at the base of the third toe. A similar band is indicated on the hind feet, extending from a little above the heel to the base of the third toe; the marks are caused by the white hair being tipped with brown. The nails are large, very broad at the base, and not very sharp, the animal frequenting rocks more than trees. The first toe is very short, and has a broad blunt round nail. There is a black elongate mark above and below the eye, and on each corner the skin appears destitute of a hairy covering. The whiskers are black, strong, and very long, reaching far beyond the ear, which is of moderate size, flesh-colour, and covered with short hair. The tail is quite nude, and the scales on it, which are large and coarse, do not overlap each other. Various individuals differ in the coloration of the caudal appendage; but in all of them is the apical portion white, but sometimes more or less spotted with black, and the basal part black, and occasionally spotted with white; though generally the tail is about half black and half white, yet there is one specimen in which the black colour covers only one-third of the whole. The measurements of one of the dry skins are as follows :—

	inches.
From tip of nose to base of tail	28
Tail	13½
Face to base of ear	3
Ear	1
Fore leg to elbow	3
Tarsus and toes	2½

* A subsequent communication from Mr. Krefft points out that this may be the same as Dr. Gray's *Mus macropus* (P. Z. S. 1866, p. 221).—P. L. S.

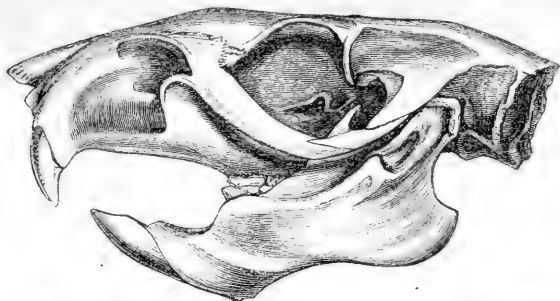


Fig. 1.

Fig. 2.



Fig. 3.

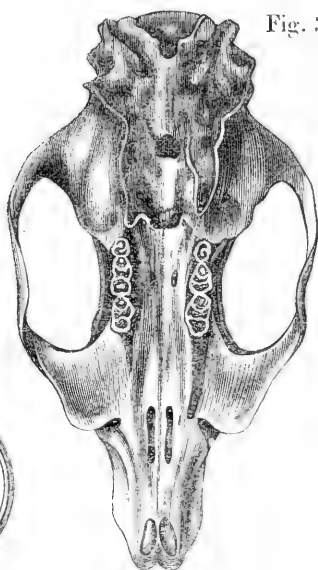


Fig. 4.

Fig. 5.

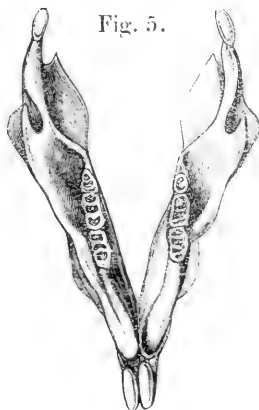


Fig. 6.



Fig. 7.



Figs. 1, 2, 3. Skull of *Hapalotis caudimaculata*.

4. Incisor of ditto, n. s.

5. Lower jaw of ditto from above

6. Right upper molar series magnified.

7. Lower ditto.

The skull of this Rat differs considerably from that of all other species of *Hapalotis* with which I am acquainted. In the small species the brain-cavity is dome-shaped, the parietals expand towards behind, and the occiput is rounded off; the frontals almost form a triangle, and are consequently very narrow between the zygomatic arches. The present large species differs considerably, as will be seen from the accompanying sketches by Miss Harriet Scott's pencil.

The skull (figs. 1, 2, 3, p. 317) is elongate, not very broad, and narrows considerably towards the occiput; the frontals are depressed and smallest in the middle; the parietals, also narrow and depressed, form an oblong square, as long again as broad. The teeth (figs. 4-7, p. 317) (as usual, $I, \frac{2}{2}, M, \frac{3-3}{3-3} = 16$ in number) are of moderate size, the upper incisor forming more than the half of a circle. The molars are much worn in the specimen before me; the first tooth has three, the second two, and the last one fold. In the lower jaw these worn-down tubercles or folds are four, three, and two respectively.

Another, smaller Rat in the collection is probably a young individual. The tail is similarly spotted, the whiskers are long and black, but the fur appears softer and longer. I had no opportunity of examining the skull.

HAPALOTIS PERSONATA, sp. nov.

This is also a coarse-haired Rat, similar in colour to the previous species, but distinguished by a black mark from the side of the nose to the eye, which is surrounded by it. The fur beneath is sandy white; and on the sides each hair is mottled with light-brown patches (sometimes in the middle, and occasionally at the tip), giving the fur rather a dirty appearance. The tail is about $6\frac{1}{2}$ inches long (the body 9 inches), covered with coarse irregular scales, between which a few stiff hairs are visible. The skull resembles that of *Mus hirsutus*. In the upper jaw the first tooth has three tubercles of almost equal size, the second also three (the inner one very small), and the third two (the inner less than half the size of the outer one). The teeth of the lower jaw have four, three, and two tubercles.

A Bat probably referable to the genus *Petalia*, but not so large as *Scotophilus morio*, was found in the collection; and the Australian Museum is in possession of another specimen from Rockhampton. This Bat is tailless, has a pointed muzzle, and is provided with teeth resembling those of the genus *Pteropus*.

I also obtained a single skin of a *Perameles* from the same locality, which differs from *P. nasuta* and *P. obesula*. It has the harsh bristly fur of the latter, is, however, of a much lighter hue, and beneath quite white. It is larger than *P. obesula*, but not so large as *P. nasuta*. The dentition is very perfect and not much worn; but all the skulls of *P. obesula* or *P. nasuta* at my disposal have the teeth so much ground down that comparison is impossible. I consider this species identical with *P. doreyana* of Quoy and Gaim.

The collection of birds contains nothing remarkable, except a *Pitta* not hitherto recorded from Australia—*P. mackloti*, Temm. I may also observe that the northern *Pitta strepitans* is not only a much smaller bird than the southern one, but differs considerably in the markings, and the shape of the bill and feet. The blue spot on the shoulder is comparatively larger, the colour of the head lighter brown, and, whilst the *P. strepitans* of New South Wales has from three to four white spots on the primaries, the northern bird has only two. I wish to draw the attention of ornithologists to these facts, as I have seen only a single specimen of *P. strepitans* from Cape York.

2. Notes on the Birds of Chili. By P. L. SCLATER, M.A.,
Ph.D., F.R.S., Secretary to the Society.

Messrs. Philippi and Landbeck, of the Museum of Santiago in Chili, have been kind enough to supply me with typical specimens of a certain number of the new species of Chilian birds recently described by them in Wiegmann's 'Archiv für Naturgeschichte,' along with other specimens of birds from that country. It has been of the greatest interest to me to examine these specimens, and to compare them with examples in my own collection and that of Mr. Salvin; and I beg leave to communicate to the Society the following notes on them.

The most recent summary of Chilian ornithology is that given by Dr. Hartlaub in 'Naumannia' for 1853. Dr. Hartlaub has there enumerated the principal sources of our knowledge of the avifauna of this country. As more recent authorities to be consulted on this subject I may add:—

(1) Mr. Cassin's article on the Birds obtained during the U. S. Naval Astronomical Expedition to the Southern Hemisphere, under the command of Lieut. Gilliss, published in the second volume of the Report of that Expedition*. Washington, 1855.

(2) Herr v. Pelzeln's volume on the Birds of the Novara Expedition. Wien, 1865.

(3) Dr. Philippi and Herr Landbeck's numerous articles in Wiegmann's 'Archiv für Naturgeschichte'†.

* In relation to this, consult my remarks, P. Z. S. 1856, p. 18.

† The following are the titles of these articles, and the names of the new species of birds described in them:—

(1) "Ueber einige Vögel Chile's, von Dr. R. A. Philippi," Wieg. Arch. 1855, p. 9. (*Phenicopterus andinus*, sp. nov., *Ardea cocoi*, *Xanthornus cayennensis*, *Circus macropus*.)

(2) "Ueber einige Chilenische Vögel und Fische, von Dr. R. A. Philippi," Wieg. Arch. 1857, p. 262. (*Rallus salinasi*, sp. nov., *Upucerthia atacamensis*, sp. nov., *Totanus chilensis*, sp. nov., *Culicivora fernandeziana*, sp. nov.)

(3) "*Pteroptochus albifrons*, sp. nov., von Ludwig Landbeck," Wieg. Arch. 1857, p. 273.

The nomenclature used in this paper, unless the contrary is stated, is that of my 'Catalogue of American Birds.'

My friend Mr. Osbert Salvin has gone through the whole of the Columbæ, Grallæ, and Anseres referred to in these notes, along with me, and has brought his series of specimens for comparison. The results arrived at under these heads are, therefore, as much his conclusions as my own.

Fam. TURDIDÆ.

- I have only seen two species of this family undoubtedly from Chili—namely, *Turdus falklandicus* (from Chiloe, teste Darwin, Voy. Beagle, Birds, p. 59; and Valdivia, Hartl. Naum. 1853, p. 212) and *Mimus thenca*. *Turdus fuscater*, Lafr. & D'Orb., is stated by Gay (Hist. de Chile, Zool. i. p. 331) to be one of the "commonest birds in Chili," but Gay's authority is utterly unreliable. Lieut. Gilliss (U. S. Naval Astr. Exp. ii. p. 184) also states it to be "extremely common," but does not say in what locality. Burmeister met with this bird in the neighbourhood of Mendoza; but that is on the other side of the Andes.

(4) "Kurze Beschreibung einer neuen Chilenischen Ralle, von Dr. R. A. Philippi," Wiegmann. Arch. 1858, p. 83. (*Rallus uliginosus*.)

(5) "Beschreibung neuer Wirbelthiere aus Chile, von Dr. R. A. Philippi," Wiegmann. Arch. 1858, p. 303. (*Graculus elegans*.)

(6) "Ueber zwei vermuthlich neue Chilenische Enten und über *Fringilla barbata*, Mol., von Dr. R. A. Philippi," Wiegmann. Arch. 1860, p. 24. (*Anas ioparcia*, sp. nov., *Erismatura vittata*, sp. nov., *Chrysomitris barbata*.)

(7) "Beschreibung zweier neuen Chilenischen Vögel aus den Geschlechtern *Procellaria* und *Caprimulgus*, von Dr. R. A. Philippi und Ludw. Landbeck," Wiegmann. Arch. 1860, p. 279. (*Caprimulgus andinus*, *Thalassidroma segethi*.)

(8) "Neue Wirbelthiere von Chile, von Dr. R. A. Philippi und Ludw. Landbeck," Wiegmann. Arch. 1861, p. 289. (*Upucerthia albibentris*, *Larus frobenii*, *Larus cinerco-caudatus*.)

(9) "Ueber die Chilenischen Wasserhühner aus der Gattung *Fulica*, Linn., von Ludw. Landbeck," Wiegmann. Arch. 1862, p. 215. (*F. chloropoides*, *F. chilensis*, *F. rufifrons*.)

(10) "Beiträge zur Fauna von Peru, von Philippi und Landbeck," Wiegmann. Arch. 1863, p. 118. (*Synallaxis striata*, *Chlorospiza erythronota*, *Pitylus albociliaris*, *Sterna lorata*, *St. frobenii*, *St. comata*, *Leistes albigipes*, *Recurvirostra andina*, *Dasycephala livida*, *D. maritima*.)

(11) "Ueber die Chilenischen Gänse, von Dr. R. A. Philippi und Landbeck," *ibid.* p. 184. (*Bernicla melanoptera*, *B. dispar*, *B. chilensis*, *B. antarctica*.)

(12) "Beschreibung einer neuen Ente und einer neuen See-Schwalbe, von Denselben," *ibid.* p. 202. (*Querquedula angustirostris*, *Sterna atro-fasciata*.)

(13) "Beiträge zur Ornithologie Chile's, von Dr. R. A. Philippi u. Ludw. Landbeck," Wiegmann. Arch. 1864, p. 41. (*Accipiter chilensis*, *Chlorospiza plumbea*, *Sycalis aureiventris*.)

(14) "Beiträge zur Ornithologie Chile's, von Luis Landbeck," *ibid.* 1864, p. 55. (*Dendroica atricapilla*, *Arundinicola citreola*.)

(15) "Beiträge zur Ornithologie von Chile, von Dr. R. A. Philippi u. C. L. Landbeck," *ibid.* 1865, p. 56. (*Pteroptochos castaneus*, *Certhilauda frobeni*, *C. isabellina*, *Geobanion fasciata*, et *Muscisaxicola*, sp. varia.)

(16) "Beiträge zur Fauna Chiles, von Dr. R. A. Philippi u. L. Landbeck," *ibid.* 1866, p. 121. (*Pteroptochos castaneus*, *Sterna luctuosa*, *Synallaxis masafueræ*, *Numenius microrhynchus*.)

Meyen (Nova Acta, xvi. Suppl. p. 74) says that *Turdus rufiventris* occurs in Chili. This is, in all probability, an error.

Turdus subcinereus, mihi (P. Z. S. 1866, p. 320), is said to be from Chili, on dealers' authority.

Fam. TROGLODYTIDÆ.

Of this family I have likewise seen but two representatives from Chili—*Troglodytes magellanicus*, Gould, and *Cistothorus platensis* (Gm.), of both of which Messrs. Philippi and Landbeck have sent me specimens. Of the former, which appears to be scarcely more than a pale variety of the extensively diffused *T. furvus*, Messrs. Philippi and Landbeck's skins are marked *T. platensis*. But on referring to Buffon's 'Planches Enluminées,' 730. fig. 2, upon which Gmelin's name *platensis* was founded, it will be at once apparent that the bird there depicted is the *Cistothorus*. The same error has been committed by Burmeister (Syst. Ueb. iii. p. 137, and La Plata-Reise, ii. p. 476). Burmeister has likewise described the *Cistothorus* as new (Cab. Journ. f. Orn. vii. p. 252), under the name *C. fasciolatus*. Messrs. Philippi and Landbeck's specimens of this bird are marked *Troglodytes hornensis*; and it is certainly the species described by Lesson (L'Inst. 1834, p. 316) under this name, although Gray and Hartlaub have referred Lesson's name to *T. magellanicus*. Hence has arisen continual confusion between these two very different birds. The *Troglodytes magellanicus* is stated to be called "Chercan" in Chili; the *Cistothorus platensis* "Chercan de las Vegas."

Fam. MOTACILLIDÆ.

Four specimens of an *Anthus* forwarded by Messrs. Philippi and Landbeck are marked *Anthus correndera*, Vieill., and, as far as I can tell, correctly.

Fam. MNIOTILTIDÆ.

Landbeck (Wieg. Arch. 1864, p. 56) describes a *Dendroica atricapilla* from Chili. I agree with Professor Baird (Rev. Am. B. i. p. 193) in being unable to distinguish this supposed species from the North-American *D. striata*; and as this species goes as far south as Bogota (Cf. P. Z. S. 1855, p. 143, and Baird, l. c.), it is quite possible that an individual may occasionally wander onwards to Chili.

Fam. HIRUNDINIDÆ.

The only species of Swallow forwarded by Messrs. Philippi and Landbeck is *Hirundo cyanoleuca*, Vieill.—a very wide-ranging species in South America. But *Hirundo meyeri* (*Hirundo leucopyga*, Meyen) also occurs near Valparaiso. I have specimens of it in my collection which I believe to be Chilean.

Professor Baird has lately described a new species of *Progne* (*P. furcata*, Baird, Rev. A. B. p. 278) from "Chili" (auct. Verreaux).

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Fam. CÆREBIDÆ.

Diglossa brunneiventris, Des Murs (Icon. Orn. pl. 43), is stated to be from Chili upon Gay's authority. But Gay's authority is worth very little, and the bird is not mentioned in Gay's 'Fauna Chilena.' Moreover Lafresnaye (Rev. Zool. 1846, p. 318) gives its locality as "Peru," and Cassin (Pr. Acad. Phil. 1864, p. 274) as "Bolivia;" either of which localities are much more likely to be correct.

Fam. FRINGILLIDÆ.

Phrygilus gayi, *P. alaudinus*, and *P. fruticeti* are all well-known Chilean species of the genus *Phrygilus*, which is characteristic of the Chilean and Patagonian region of South America, and extends northwards along the Andes to Bogota. To these we may add *Phrygilus unicolor* (*Emberiza unicolor*, Lafr. et D'Orb. Syn. Av. i. p. 82), of which Messrs. Philippi and Landbeck have forwarded specimens of both sexes, from the Cordillera of Santiago, under the name *Chlorospiza plumbea**. These agree with my skins from Bolivia and Ecuador. *Diuca grisea*, nob.† (*Fringilla diuca*, Mol.), is a closely allied Chilean form.

Zonotrichia pileata (sive *matutina*), one of the most widely distributed of American Passeres, also occurs in Chili (testibus Meyen, Darwin, &c.).

The only two remaining genera of Fringillidæ which occur in Chili are *Chrysomitris* and *Sycalis*, concerning each of which I must say a few words, as there has been some confusion regarding them.

Of *Chrysomitris*, on which genus Mr. Cassin has lately given us some excellent notes‡, there are two distinct species found in Chili—*C. barbata* (Mol.), and *C. uropygialis*, mihi. The former has been treated of by Dr. Philippi§, and its synonymy partly given. It is not, however, the true *Fringilla campestris* of Spix, although it is the bird so called by Des Murs. Mr. Cassin has lately shown us that it is the *Carduelis stanleyi* of Audubon. The best figure of this species is that given by the latter author in Gilliss's 'Astronomical Expedition,' pl. 17, under the name "*Chrysomitris marginalis*, Bp." An immature skin from the Falklands in my collection, spoken of by Capt. Abbott (Ibis, 1861, p. 154) as *C. magellanica*, and also referred to by me (P. Z. S. 1861, p. 46), appears to belong to this species. It is very common in Chili, according to Dr. Philippi, and is the *Silguero* of the natives.

C. uropygialis is a well-marked species of the genus, described in my 'Catalogue of American Birds' (p. 124, note). It is allied to *C. atrata*, but is easily known by its yellow uropygium and upper belly, which in *C. atrata* are deep black—only the lower portion of the belly being yellow in *C. atrata*. Cassin, in Gilliss's 'Expedition'

* As described by them, 'Arch. f. Nat.' 1864, p. 47.

† Cat. Am. B. p. 111.

‡ Pr. Acad. Phil. 1865, p. 89.

§ Arch. f. Nat. 1860, p. 27.

(ii. p. 181), gives this bird as Chilian under the name *C. atrata*, as he has himself stated (Pr. Acad. Phil. 1865, p. 91); and examples transmitted from Chili by Mr. Leybold of Santiago bear the same name upon them.

Of *Sycalis*, a genus closely allied to the African Canaries (*Cri-thagra*), there are likewise two distinct species found in Chili, of both of which I have received examples from Mr. Landbeck. The larger of these is the *Sycalis aureiventris*, Ph. et Landb. (Arch. f. Nat. 1864, p. 49), allied certainly to *S. luteocephala* (Lafr. et D'Orb.) of Peru and Bolivia, as its describers justly observe, but apparently well distinguished by the want of any yellow edgings to the remiges and rectrices, and not, as far as I am aware, previously described. The second is the *Sycalis arvensis* of my American Catalogue (*Fringilla arvensis*, Kittlitz). The examples of this species forwarded by Messrs. Philippi and Landbeck are labelled "*Cri-thagra brevirostris*, Gould"—a name which apparently belongs to a different species of the same genus.

Fam. ICTERIDÆ.

Agelasticus thilius (Cab. Mus. Hein. i. p. 188) is a common Chilian bird, and figured in Gay's 'Historia' under two names—*Cacicus chrysocarpus* and *Xanthornus cayennensis*! (Cf. Philippi, Wieg. Arch. 1855, p. 13). The female or young bird is brown striated with black, as in *Agelæus*, from which this form is hardly distinguishable generically.

Sturnella militaris and *Curæus aterrimus* are two other well-known species, both belonging to this group. The former is widely diffused over the extreme of South America and the Falkland Islands; the latter I have only seen from Chili.

Fam. DENDROCOLAPTIDÆ.

Of the genus *Geositta* I have met with three Chilian species, namely:—

1. *G. cunicularia* (Vieill.); *Certhilauda cunicularia*, Ph. et Landb. (l. c. 1865, p. 59). "Found in the provinces of Colchagua, Santiago, and Aconcagua, on the Subandean plains and sea-coast region." The examples of this species forwarded by Messrs. Philippi and Landbeck are quite identical with those previously in my collection, and thus named (Cat. Am. B. p. 146).

2. *G. isabellina*; *Certhilauda isabellina*, Ph. et Landb. l. c. p. 63. Of this fine species Messrs. Philippi and Landbeck have transmitted me examples of both sexes. It was not previously known to me.

3. *G. fasciata*; *Geobamon fasciata*, Ph. et Landb. l. c. p. 68. Messrs. Philippi and Landbeck have likewise sent me two examples of this species, of which I had previously an indifferent specimen in my collection, purchased of Parzudaki in 1854. This I had referred doubtfully (and probably erroneously) to *G. maritima*, Lafr. et D'Orb.; but I shall now adopt the name given by Messrs.

Philippi and Landbeck, at any rate until I have an opportunity of inspecting typical examples of Lafresnaye and D'Orbigny's species.

Messrs. Philippi and Landbeck place this bird in Burmeister's genus *Geobamon*. What this genus may be it is difficult to say from the very short characters given; but the present species seems to me to go very well as a *Geositta*, being hardly distinguishable in any respect except by its straighter and rather stouter beak.

Certhilauda nigrifasciata, Lafr. Mag. de Zool. 1836 (not 1863, as given by Messrs. Philippi and Landbeck), which these authors take so much pains to discriminate from the present bird, is nothing more than *C. cunicularia*. The name is dropped altogether by Lafresnaye in the Synopsis of D'Orbigny's birds, published in the 'Magasin de Zoologie' for 1837; but I have seen specimens of *C. cunicularia* marked with it.

Upucerthia dumetoria was observed by Mr. Darwin near Coquimbo. I have not seen typical specimens of *U. atacamensis* of Philippi (Reise d. d. Wüste Atacama, p. 162, pl. 3); but it is probably the same as my *Cinclodes bifasciatus* (P. Z. S. 1858, p. 448).

Ochetorhynchus ruficaudus is described by Meyen from examples obtained at a height of 10,000 feet, on the Volcano of Maypu, Central Chili*. It is doubtful whether *Cinclodes* can be maintained as a separate genus from this. Three species of the latter group occur in Chili, namely:—

(1) *C. nigrifumosus* (Lafr. et D'Orb.). Northern Chili, near Coquimbo (Darwin).

(2) *C. patachonicus* (Gm.). Chiloe and Central Chili (Darwin).

(3) *C. minor*, Cab. et Heine. Araucana (Heine).

Of all these three species I have specimens in my collection reputed to be Chilean.

Of Synallaxinæ, the Chilean species are—

Sylviorhynchus desmursi.

Oxyurus spinicauda (Gm.).

Phleocryptes melanops (Vieill.).

Leptasthenura ægithaloides (Kittl.).

Synallaxis humicola, Kittl.

S. anthoides, King.

S. sordida, Less.

Of the last species I have a skin, received from Leybold of Santiago, marked *S. rufa*, Landbeck, nov. sp. My specimen of the nearly allied *S. modesta*, Eyton, distinguishable by its red throat-spot and the black inner webs of the rectrices, is likewise marked "Chili;" but as the skin was purchased of a dealer, I am not sure of the locality.

Of the typical Dendrocolaptinæ, *Pygarrhichus albigularis* (King) of Southern Chili is, as far as I know, the only species that occurs in the country.

* This species is erroneously inserted in my American Catalogue. I do not possess it, and have never met with authentic examples of it.

Fam. PTEROPTOCHIDÆ.

This singular group of birds is one of the most characteristic forms of the peculiar avifauna of Chili, nearly one-half of all the known species of the group (some sixteen or seventeen in number) occurring within the republic. The species definitely ascertained to be Chilian are—

1. *Scytalopus magellanicus* (Lath.); G. R. Gray in Zool. Voy. Beagle, iii. p. 74.—*S. fuscus*, Gould; Sclater, C. A. B. p. 168.—*Pteroptochos albifrons*, Landb. Wieg. Arch. 1857, p. 273. This species extends from Southern Chili, throughout Patagonia and the adjacent Chonos archipelago, into the Falkland Islands. Messrs. Philippi and Landbeck's specimens are from Valdivia and Colchagua. The white spot on the head of the adult is described by Mr. Gould, and figured in Sir William Jardine's plates; so that there is no doubt, I think, of Landbeck's *Pt. albifrons* being the same bird as Gould's *S. fuscus*, whatever may be the case as regards *Sylvia magellanica* of Latham, which I adopt as a synonym on Mr. Gray's authority.

2. *Scytalopus fuscoides*, Lafr. Contr. Orn. 1851, p. 149.

Messrs. Philippi and Landbeck send two examples, which I refer to this species, under the name "*Scytalopus obscurus*." They are from the province of Santiago. This species is immediately distinguishable from the preceding by its larger size, lighter, more cinereous colouring, and longer tail. It is more like *S. senilis*, Lafr., of New Granada.

3. *Triptorhinus paradoxus* (Kittl.); Cab. Orn. Not. p. 219; Bp. Consp. p. 205.

Messrs. Philippi and Landbeck send a fine series of this curious form from Valdivia, under the name "*Scytalopus magellanicus*."

4. *Pteroptochos rubecula*, Kittl. ex Chil. merid.

5. *P. albicollis*, Kittl. ex Chil. centr.

6. *Hylactes megapodius*, Kittl. ex Chil. centr. et bor.

7. *H. tarnii* (King) ex Chil. merid.

These are all four well-known species.

8. *Pteroptochos castaneus*, Phil. et Landb. Wieg. Arch. 1865, pp. 56, 121.

This is a very fine species, most nearly allied to *H. tarnii*, and belonging to the same section (*Hylactes*), with developed hind claw, but quite distinct. I have long had a skin of it in my collection, obtained years ago in Chili by the late Mr. Bridges, and had wrongly referred it to *H. tarnii**, which I do not possess. *H. castaneus* is from the province of Colchagua, while *H. tarnii* has a more southern range.

Fam. TYRANNIDÆ.

Genus AGRIORNIS.

A. livida (Kittl.) and *A. maritima* (Lafr. et D'Orb.) are both well-known Chilian species of this genus. The former is abundant

* Cf. Cat. A. B. p. 170.

everywhere in Chili*; the latter in the Andes, at a height of from 5000 to 10,000 feet.

Genus TÆNIOPTERA.

Tænioptera pyrope (Kittl.) is the only Chilean bird of this group I am acquainted with. It is found along the coast as far north as Copiapo, but is common in the south (Darwin). It is not a very typical species of the genus; and Messrs. Cabanis and Heine separate it as *Pyrope kittlitzii* (Mus. Hein. ii. p. 45).

Genus MUSCISAXICOLA.

Of this essentially Chilean genus I have lately given a synopsis of all the species known to me in the 'Ibis'†. The fine series now transmitted by Messrs. Philippi and Landbeck does not affect the determinations there arrived at upon the faith of skins received from Herr Leybold. The Chilean species of the genus are the following:—

1. *M. nigrifrons*, Ph. et Landb. Wieg. Arch. 1865, p. 101.
2. *M. cinerea*, Ph. et Landb. *l. c.* p. 80.
3. *M. mentalis*, Lafr. et D'Orb.

As I have already pointed out (Ibis, 1866, p. 58), *M. macloviana*, of the Falklands, is a larger form of this species.

4. *M. flavinucha*, Lafr. Rev. Zool. 1855, p. 59 = *M. flavivertex*, Ph. et Landb. *l. c.* p. 98.
5. *M. rubricapilla*, Ph. et Landb. *l. c.* p. 93.
6. *M. rufivertex*, Lafr. et D'Orb.
7. *M. maculirostris*, Lafr. et D'Orb.

Oethoëca chilensis, Hartl. (Naum. 1853, p. 212), has been already‡ correctly referred to *M. mentalis* (jr. av.), as I learn from a communication from Herr Finsch.

Centrites niger (Bodd.), a form allied to *Muscisaxicola*, widely distributed over the southern end of the American continent, occurs, according to Mr. Darwin, as far north as Copiapo. Another isolated type, nearly allied (*Muscigralla brevicauda*), is found on the coast of Peru and Ecuador, and has been stated to occur in Chili also§, but not upon very good authority. The locality of the skin in my collection (1254a, Cat. A. B. p. 206) rests merely on dealers' authority. I believe the specimen to be more probably from Western Peru.

Mr. Landbeck sends me an example of *Arundinicola citreola*, Landb. (Wieg. Arch. 1864, p. 58), which is certainly very closely allied to *Hapalocercus flaviventris* (Lafr. et D'Orb.). But my single skin of the latter bird is not in very good condition, and I should be unwilling to unite the two before examining other specimens.

* Ph. et Landb. Wieg. Arch. 1863, p. 136 *et seq.*

† Ibis, 1866, p. 56, "Note on the Species of the Genus *Muscisaxicola*." See also for the description of an additional species (*M. fluviatilis*), P. Z. S. 1866, p. 187.

‡ Cat. Am. B. p. 205.

§ Cf. Gay, F. C. Zool. i. p. 333.

Cyanotis azaræ (Naum.) (*C. omnicolor*, auct. ex Vieill.) is stated by Gay to be found throughout Chili (*op. cit.* p. 321), although not very abundantly. Lieut. Gilliss also notes its occurrence in Chili*.

Serpophaga parvirostris (Gould) and *Anæretes parulus* (Kittl.) are both unquestionable Chilian species. Of the latter Mr. Salvin has a skin received direct from Herr Leybold of Santiago. I have reputed Chilian specimens of both these species, and have compared those of the former with Mr. Gould's types in the British Museum.

Of the difficult genus *Elainea* but one species, as far as I know, occurs in Chili. This is the bird called "*Elainea albiceps*, D'Orb.," in the 'Zoology of the Voyage of the Beagle' (iii. p. 47), and stated by Mr. Darwin to be "occasionally found near Valparaiso in Central Chile." I have two examples of this species from Chili, one of them received direct from Mr. Leybold; so that there can be no doubt about the locality. They agree quite well with the typical specimens of my *E. griseigularis* from Ecuador†, and are probably of the same species. I am also now of opinion that they can hardly be separated from *E. modesta*, Tsch., although I have kept these two species apart in my American Catalogue (p. 217). But I am doubtful as to whether they have been rightly referred to *E. albiceps* (Lafr. et D'Orb.). The species I have hitherto placed under the latter designation is decidedly distinct, being much larger in size, though generally similar in colouring. The descriptions given of *E. albiceps* would apply nearly equally well to both of these birds; and I therefore propose for the present to retain *modesta* as the name of the Chilian bird, until reference can be made to D'Orbigny's types.

Fam. PHYTOTOMIDÆ.

Phytotoma rara, the oldest and best-known species of this group, is from Chili; and, according to D'Orbigny, is common in the ravines in the environs of Valparaiso.

Order PICARIÆ.

Fam. ALCEDINIDÆ.

Ceryle stellata (Meyen).

It seems to be very doubtful whether this Western-Coast form, which Meyen first separated from *C. torquata*, is really specifically distinct. Mr. G. R. Gray has reunited them (Zool. Voy. Beagle, iii. p. 42; and List of Fissirostres, p. 61). I have a skin from Cayenne, which appears to be quite as much spotted on the back and wing-coverts as the Chilian bird.

Fam. CAPRIMULGIDÆ.

The only Chilian species of this family of which I have seen au-

* Gilliss's Exp. ii. p. 186.

† P. Z. S. 1858, p. 554, pl. 146, fig. 1.

thentic specimens is *Stenopsis bifasciata* (Gould)*, of which I have skins sent by Mr. Leybold and Messrs. Philippi and Landbeck. The *Caprimulgus andinus* of the latter gentleman† is, as I have already suggested‡, and can now state positively from the examination of marked specimens received from the describer, merely the young of *S. bifasciata*.

Lesson has described a *Capr. exilis* from "Chili" (Rev. Zool. 1839, p. 45), but it is impossible to say what species he refers to.

Fam. TROCHILIDÆ.

The Humming-birds found in Chili are three in number, namely—

Oreotrochilus leucopleurus, Gould.

Patagona gigas (Vieill.).

Eustephanus galeritus (Mol.).

Of these the *Oreotrochilus* belongs to a strictly Andean genus, of which the present bird is the most southern representative. Mr. Bridges describes it as inhabiting a zone of elevation of from 6000 to 8000 feet above the sea-level; but near Hueso Predo Dr. Philippi§ assures us that it descends to 1000 feet above the sea-level. *Patagona gigas*, which is common in Central Chili, ranges as far north as Quito; and *Eustephanus galeritus* southwards to Tierra del Fuego, and northwards to the vicinity of Lima in Peru.

Fam. PICIDÆ.

Three Woodpeckers only, as far as I know, have been hitherto recorded as Chilian, namely *Campephilus magellanicus*||, *Picus lignarius*, and *Colaptes pitius*.

Fam. PSITTACIDÆ.

Three species of Parrots are likewise certainly correctly assigned to Chili, namely *Henicognathus leptorhynchus*, *Conurus cyanolyseos*, and *C. smaragdineus*:

Order ACCIPITRES.

Fam. VULTURIDÆ.

Sarcorhamphus gryphus and *Cathartes aura* are well known to be both abundant in Chile; *C. atratus* is stated by Mr. Cassin (Gilliss's Exp. ii. p. 173) to be "occasionally met with in the interior," though Mr. Darwin says (Zool. Beagle, iii. p. 7) that he never observed it. The bird is certainly common in the vicinity of Mendoza (Darwin, l. c. p. 7), whence, Bridges also states, it sometimes crosses the frontier¶ into the province of Colchagua.

* Cf. P. Z. S. 1866, p. 140.

† Wiegman. Arch. 1860, p. 279.

§ Reise d. die Wüste Atacama, p. 160.

|| Cf. Vigors, P. Z. S. 1841, p. 94.

¶ P. Z. S. 1843, p. 108.

‡ P. Z. S. 1866, p. 140.

POLYBORINÆ.

Three species of this group are found in Chili, namely *Polyborus tharus*, *Milvago chimango*, and *M. megalopterus* (Meyen). Of the last of these Messrs. Philippi and Landbeck have transmitted adult and young examples from the Cordillera of Santiago, under the name "*Caracara montanus*." But according to Pelzeln (*Birds of Novara-Voyage*, p. 3) the Chilian *Milvago* of this section is not the same as *Phalcobæus montanus* (Lafr. et D'Orb.), which he imagined to be the Bolivian form of this species, while he has proposed to call the Chilian bird *M. crassirostris**. But if the differences between these two forms are allowed to be specific, we must nevertheless adopt for the Chilian bird the name *megalopterus* of Meyen, the bird figured by Meyen (Nov. Act. xvi. Suppl. p. 64, pl. 7) being undoubtedly a young bird of this form, and being stated by that author himself to be from Chili.

BUTEONINÆ.

Two species of this group seem to be undoubted natives of Chili, namely *Urubitinga uncinata* (Temm.) and *Buteo erythronotus* (King). Whether *Aquila braccata* of Meyen is really different from the latter we are not able to say at present. Herr von Pelzeln registers the two species as distinct (*Verh. zool.-bot. Ges.* 1862, p. 142).

AQUILINÆ.

Geranoæetus melanoleucus (Vieill.) is found in the retired woody and mountainous parts of Chili (Bridges, *P. Z. S.* 1843, p. 108), but has also a wide range over the continent, extending as far north as the vicinity of Bogota.

ACCIPITRINÆ.

Accipiter chilensis, lately described by Messrs. Philippi and Landbeck (*Wieg. Arch.* 1864, p. 43), and stated to be the *only* species of this group known to them in the country (though no less than *five* have been said to occur there), is, in our opinion, an excellent species, allied to *A. cooperi*, although readily distinguishable in the adult dress. There are several examples of it in the British Museum, obtained in Chili by Bridges, and the Magellan Straits by Capt. King. Mr. G. R. Gray has registered these specimens as *A. pileatus*†, from which, however, it is likewise distinct. Messrs. Philippi and Landbeck have transmitted specimens of this bird in the immature plumage to the Norwich Museum. We hope to be able to give a figure of this species in an early number of 'Exotic Ornithology.' Herr von Pelzeln (*Novara Voyage*, p. 13), having had only young specimens to judge from, has erroneously reunited this bird to *A. cooperi*, to which in immaturity it is certainly very like.

* Sitz. Akad. Wiss. xlv. p. 9 (1861).

† List of Accipitres, 1848, p. 72.

FALCONINÆ.

Three true Falcons only appear to occur in Chili, namely *Falco peregrinus*, Linn., *Hypotriorchis femoralis* (Temm.), and *Tinnunculus sparverius*.

Falco nigriceps, figured and described by Cassin in Gilliss's 'Expedition' (ii. p. 176, t. 14), seems to have been intended to comprise the Peregrines of Western America, both North and South; but Chilian specimens are not considered by Mr. Gurney to be separable from the European *F. peregrinus*.

MILVINÆ.

Elanus leucurus, Vieill., a wide-ranging species in America, occurs in Chili, as recorded by most writers. Salvin has a specimen received from the vicinity of Santiago.

CIRCINÆ.

Of this group one species only has been hitherto generally recognized as Chilian, namely *Circus cinereus* (Vieill.), which extends throughout Patagonia into the Falkland Islands, and on the eastern side over La Plata up to Corrientes and the southern parts of Brazil. Philippi (Wieg. Arch. 1855, p. 14) records *Circus macropterus*, Vieill., as also of occasional occurrence there; and more recently Pelzeln (Novara Voyage, pp. 13, 14) mentions two other species as having been obtained in Chili by the naturalists of that expedition, namely *C. poliopterus*, Tsch., and *C. megaspilus*, Gould. The former of these is doubtless a good species; but the latter, as figured by Gray (Genera, pl. 11), is probably a young bird, and is referred by Schlegel (Musée des P.-B., *Circi*) to the young of *C. poliopterus*.

Order COLUMBÆ.

The following are the recognized species of this order inhabiting Chili:—

(1) *Columba araucana*, Less.; G. R. Gray, List of Columbæ in B. M. p. 33.

(2) *C. meridionalis*, King; Bp. Consp. ii. p. 52.

(3) *Zenaida auriculata* (Gay); Bp. Consp. ii. p. 82.

(4) *Melopelia meloda* (Tschudi).

This species, which is stated by Gay* and Bonaparte† to have been met with in Chili during the voyage of the 'Bonite,' is not included in the zoology of that voyage; but Herr Landbeck informs me, in a letter, that he has lately obtained an undoubtedly Chilian specimen of it.

(5) *Metriopelia melanoptera* (Gm.); Bp. Consp. ii. p. 75.

(6) *Columba strepitans* (Spix); Pelzeln, Novara-Reise, Aves, p. 109.

* *Z. souleyetiana*, Gay, F. Ch. Aves, p. 380.

† Consp. ii. p. 81.

Order GALLINÆ.

Tinamous are the only representatives of the Gallinaceous order in Chili, and of these *Rhynchotus perdicarius* (Kittl.), which is said to be common all over the republic, is the only Chilean species I am acquainted with. Gay describes a second species (*Nothura punctulata*), which seems to be closely allied; and in the British Museum is a specimen from Coquimbo belonging to a third species, which is referred by Mr. Gray to *Nothura cinerascens*, Burm. But I consider that these two last species require confirmation.

Order GRALLÆ.

Fam. THINOCORIDÆ.

Thinocorus rumicivorus, Eschsch.

T. orbignyianus, Geoffr. et Less.

Attagis gayi, Less.

Chilian specimens of all these three birds are in Messrs. Salvin and Godman's collection. *Thinocorus swainsoni* of Lesson appears to be only the male of *T. rumicivorus*. Von Pelzeln (Novara-Reise, Aves, p. 113) also gives *T. ingæ*, Tsch., as Chilean—a species I am not acquainted with.

Fam. CHARADRIIDÆ.

The Chilean species of this family are:—

Vanellus cayanensis (Gm.).

Charadrius virginicus, Borkh.

Eudromias modesta (Licht.).

Ægialites nivosus, Cassin.

It appears to be this species which is spoken of by Darwin (Zool. Voy. Beagle, iii. p. 127) under the name *Hiaticula azaræ* from Chili. Schlegel unites this species to the European *Æ. cantianus*; but, as far as I can tell from examination of skins in Mr. Salvin's collection, the two species are distinct, although no doubt closely allied.

Ægialites falklandicus (Lath.).

Oreophilus ruficollis (Wagl.).

Aphriza virgata (Gm.)*.

Leptosceles mitchelli (Fraser).

Fam. HÆMATOPODIDÆ.

The Black Oyster-catcher of South America should be called *Hæmatopus ater*, Vieill., as I have already pointed out (P. Z. S. 1860, p. 386), *niger* having been applied by Pallas to the species from the Northern Pacific. Prof. Schlegel considers the South African *niger* (of Gray) identical with the South American species, which may very likely be the case.

* Mus. Brit. ex Chili (*Bridges*), Gray, Cat. Gall. &c., p. 72.

Fam. SCOLOPACIDÆ.

The South American Phalarope has been regarded as specifically distinct by some authors, and is the *Lobipes antarcticus*, Less., and *Steganopus tricolor*, Vieill. (ex Azara). But Fraser (P. Z. S. 1843, p. 118) and Pelzeln (Novara-Reise, Aves, p. 132) concur in identifying it with the northern bird, which Mr. Salvin has already traced south as far as Guatemala. Schlegel also unites the two birds without hesitation.

Gallinago paraguaiæ (Vieill.).

Schlegel unites *Scolopax magellanica*, King, with this species, of which he has Chilean specimens received from the Santiago Museum.

Gallinago paludosa (Gm.).

Schlegel unites Hartlaub's *Scolopax spectabilis* from Valdivia (Naum. 1853, p. 216) with this species.

Tringa bairdi, Coues.

Mr. Salvin has received three skins of this bird from Herr Leybold of Santiago. They are all of immature birds, but appear to agree with other specimens from New Granada, Panama, Mexico, and North America. This is probably the bird referred to by Cassin as *Tringa pectoralis*, Gilliss's Exp. ii. p. 195.

Tringa bonapartii, Schlegel.

This is the species usually called *Tringa* or *Schœniclus schinzii*, and so named in the British Museum 'Catalogue of Grallæ, &c.,' p. 105. Mr. Bridges obtained specimens of it in Chili; and there are examples of it in the Leyden Museum, sent by Prof. Philippi from near Santiago (see Schlegel's Musée d. P.-B. *Scolopaces*, p. 42).

Gambetta melanoleuca (Gm.).

This widely diffused American species has already been recognized as occurring in Chili (Cf. Gray, Cat. Gall., &c., p. 99, & Schlegel, Mus. d. P.-B. *Scolopaces*, p. 69; Hartlaub, Naum. 1853, p. 222). A specimen of it, received by Mr. Salvin from Leybold, is marked *Totanus chilensis*, and is doubtless the species so described by Philippi (Wiegmann, Arch. 1857, p. 264).

Gambetta flavipes (Vieill.).

Gay's *Totanus stagnatilis* may probably be intended for this species, of which Salvin has a specimen received from Leybold of Santiago; and Dr. Segeth obtained examples in Chili during the Novara Expedition*. Mr. Salvin has likewise Brazilian specimens of this species, collected by Natterer; and Darwin records its occurrence at Monte Video (Zool. Voy. Beagle, iii. p. 129).

Limosa hudsonica (Lath.).

Chili (Bridges, P. Z. S. 1843, p. 118).

* Cf. Pelzeln, Orn. Nov. Exp. p. 151.

Numenius hudsonicus (Lath.).

Mr. Salvin has a Chilian specimen of this bird, received from Herr Leybold. Darwin says it is common on the mud-banks of Chiloe (Voy. Beagle, iii. p. 129).

Numenius borealis, Forst.

We have little doubt that *N. microrhynchus* of Philippi (Wieg. Arch. 1866, p. 129) is referable to this species, which, under its synonym of *N. brevirostris*, Temm., is already known to occur at Buenos Ayres (Darw. Voy. Beagle, iii. p. 129).

FAM. RALLIDÆ.

RALLUS SANGUINOLENTUS, Sw. An. in Men. p. 335; Darwin, Zool. Beagle, iii. p. 133.

Rallus cæsius, Tsch. F. P. Aves, p. 301; Schlegel, Mus. d. P.-B. Ralli, p. 8.

R. bicolor, Gay, F. C. Aves, p. 434.

R. ricordi, Bp. (teste Schlegelio).

Of this Rail, which appears to be peculiar to Chili, Mr. Salvin has a skin received from Leybold. Dr. Schlegel appears to have quite overlooked Swainson's description of it, and his accurate distinction of it from the nearly allied *R. nigricans* of Eastern South America.

RALLUS ANTARTICUS, King, Zool. Journ. iv. p. 95.

Rallus rufopennis, G. R. Gray, MS.

R. uliginosus, Phil. Wieg. Arch. 1858, p. 83.

A skin of this species in Salvin's collection was received by Mr. Gould from Dr. Philippi along with some Humming-birds. It was not marked as belonging to the species described as *R. uliginosus*, but appears to agree with the characters given *l. c.*

Porzana jamaicensis (Gm.).

Three skins of a Crake, received by Mr. Salvin from Dr. Philippi through Mr. Gould, do not differ appreciably from northern specimens of this species, of which I have also a specimen from the intermediate locality of Lima, transmitted to me by Prof. Nation.

HYDROCICCA MELANOPS (Vieill.).

Rallus melanops, Vieill. (ex Azara, 373).—*Gallinula crassirostris*, J. E. Gray; Bridges, P. Z. S. 1843, p. 118.

Mr. Salvin has an example of this bird received from Leybold of Santiago.

Three species of *Fulica* inhabit the fresh waters of Chili, and are fully described by Herr Landbeck (Wieg. Arch. 1862, p. 214) under the names *F. chloropoides*, *F. chilensis*, and *F. rufifrons*. Unfortunately Landbeck was not acquainted with Dr. Hartlaub's excellent article on *Fulica* in the extra heft of Cabanis's 'Journal f. Orn.' for 1853, and has consequently misnamed them all. According to Hartlaub *F. rufifrons*, Landbeck, is *F. leucopyga*, Licht., which is

confirmed by Schlegel (Mus. d. P.-B. *Ralli*, p. 64), having marked examples for comparison. Landbeck's *F. chilensis* is, according to Hartlaub, *F. armillata*, Vieill., and his *F. chloropoides*=*F. stricklandi*, Hartlaub. But Schlegel makes *F. stricklandi* the young of *F. chilensis*, Gay!

Fam. ARDEIDÆ.

Five species of this family have been recorded as Chilian, namely:—(1) *Ardea cocoi* (Linn.); (2) *Nycticorax obscurus*, Licht. (Bp. Consp. ii. p. 141), hitherto usually confounded with *N. gardeni*; two White Egrets, namely (3) *Ardea candidissima* (Gm.) and (4) *A. egretta* (Gm.) (*leuce*, Licht.); and (5) *Ardetta exilis* (Gm.). By some authorities the last-named species is held to be distinct from the North American form, and called *A. erythromelas* (Bp. Consp. ii. p. 134). I have had no opportunity of comparing specimens.

Fam. CICONIIDÆ.

Ciconia maguari (Gm.). An interesting note on the nidification of this bird is given by Bridges (P. Z. S. 1843, p. 116).

Fam. PLATALEIDÆ.

The American forms of *Ibis falcinellus* (Linn.), usually called *I. ordi* and *I. guarauna*, are stated by Schlegel to be inseparable from the European *I. falcinellus*.

Fam. PHENICOPTERIDÆ.

*Phenicopterus igni-palliatu*s, Geoffr. et D'Orb.—*P. chilensis*, Bridges, P. Z. S. 1843, p. 117. Abundant in the freshwater lakes of Chili.

Phenicopterus andinus, Philippi, Ann. Univ. Chili, 1864, p. 337; Wiegman. Arch. 1855, p. 10; Reise d. die Wüste Atacama, p. 164, Zool. t. 4 et 5; Cassin, Gilliss's Exp. ii. p. 198. This species inhabits the cordilleras of Copiapo in Northern Chili, according to its discoverer, but does not go further south. Northwards it appears to have been observed by Bollaert near Tarapaca in Bolivia.

Fam. ANATIDÆ.

Two species of Swan occur in South America, *Cygnus nigricollis* and *C. coscoroba* (Mol.). Lieut. Gilliss tells us that the former is abundant in most of the small mountain-lakes of Chili.

Messrs. Philippi and Landbeck have given excellent notices of the four species of Geese found in Chili, in 'Wiegman's Archiv,' 1863 (p. 185 *et seq.*), but have wrongly identified some of them. They should stand as follows:—

- (1) *Bernicla melanoptera* (Eyton); Ph. et Landb. *l. c.* p. 185.
- (2) *Bernicla antarctica* (Gm.); Ph. et Landb. *l. c.* p. 199.
- (3) *Chloephaga dispar* (Ph. et Landb.).—*Bernicla magellanica*, Cassin (nec Gm.),—*B. dispar*, Ph. et Landb. *l. c.* p. 190.

(4) *Chloephaga poliocephala*, Gray, MS.; Sclater, P. Z. S. 1857, p. 128; 1858, p. 290.—*Bernicla chiloensis*, Ph. et Land. l. c. p. 195.

I have already given full notes on these species of Geese in some remarks on Messrs. Philippi and Landbeck's paper on this subject in the 'Ibis' for 1864 (pp. 121, 122); and need not repeat them now.

The well-authenticated Chilian Freshwater Ducks are about twelve in number, namely:—

1. *Mareca chiloensis* (King).

2. *Anas iopareia*, Philippi, Wieg. Arch. 1860, p. 24. I have not yet seen examples of this species.

3. *Anas specularis*, King.

4. *Anas melanocephala*, Vieill.; Cassin in Gilliss's Exp. ii. p. 202, t. 25.

Mr. Salvin has specimens of both sexes of this species, received from Herr Leybold. The male is well figured by Cassin l. c. The female has the throat white, the occiput blackish, and the sides of the head marbled with brown.

5. *Anas cristata* (Gm.); Gray, List of Anseres, p. 136 = *A. pyrrhogaster*, Meyen.

6. *Querquedula torquata* (Vieill.).

This species is not included by Gay in his work; but there are specimens in the Paris Museum, labelled "Chili (Gay)."

7. *Querquedula cyanoptera* (Vieill.).

8. *Q. versicolor* (Vieill.).

9. *Q. creccoides* (King).

Querquedula angustirostris, Phil. et Landb., Wieg. Arch. 1863, p. 202, from Peru, would appear to be *Q. flavirostris* (Vieill.) (the true *Anas oxyptera* of Meyen), which is not the same as *Q. creccoides*. According to Hartlaub (Naum. 1853, p. 217) *Q. flavirostris* also occurs in Chili; but there is some confusion between these two species, which I am not able to rectify for want of specimens.

10. *Dafila bahamensis*, Linn.

11. *Dafila oxyura* (Meyen).—*Anas oxyura*, Meyen; Cassin, Gilliss's Exp. ii. p. 202; Burm. La Plata, Reise, ii. p. 515.

Considered by Burmeister to be separable from, although nearly allied to, the eastern *A. spinicauda*, Vieill.

12. *Spatula platalea* (Vieill.) = *Rhynchaspis maculata*, Jard. & Selb.

Of the group of Fuligininæ only one species seems to have been recorded as common in Chili, *Fuligula peposaca* (Vieill.) (*Anas metopias*, Pöppig); but *Micropterus cinereus* also occurs in the southern provinces (Pelzeln, Novara-Reise, Aves, p. 139).

Erismatura ferruginea, Eyton, is the only Chilian species of this genus I have met with. It inhabits the freshwater lakes of Central Chili, according to Gay. Philippi's *E. vittata* (Wieg. Arch. 1860,

p. 26) seems to be only the young of this species, as far as I can make it out.

Fam. PELECANIDÆ.

Schlegel unites *Pelecanus thagus* sive *molinae* with *P. fuscus*, and also indicates *Pelecanus philippensis* as occurring in Chili! (Mus. de P.-B. *Pelecani*, pp. 28, 35). In the former identification I believe he is wrong. In the latter also I think there *must* be an error. The question is, are there two species of Pelican found in Chili? If so, the second is *more likely* to be *P. trachyrhynchus*.

Dr. Hartlaub gives five species of Cormorants as occurring in Chili. But *P. gracilis* seems, according to Bonaparte (Consp. ii. p. 173), to be scarcely separable from *P. brazilianus*; and *P. albigula*, Brandt, is *P. bougainvillii*, Lesson. On the other hand we may add *P. cirrhatu*s and *P. purpurascens*, Brandt, if Bonaparte's localities (Consp. ii. pp. 174, 177) are to be trusted; and there will thus remain still five Chilian species, besides *Graculus elegans* of Philippi (Wieg. Arch. 1850, p. 303), which may possibly be the same as one of the former.

Sula variegata of Tschudi, which was referred by Bonaparte, doubtfully, to *S. cyanops*, is recognized by Pelzeln (Novara-Reise, Aves, p. 157) as a distinct species; but is this view correct?

Fam. PROCELLARIIDÆ.

Messrs. Philippi and Landbeck's *Thalassidroma segethi* (Wieg. Arch. 1860, p. 282) seems to be identical with *Thalassidroma gracilis*, Elliot (Ibis, 1859, p. 391), which name has the priority. *Procellaria oceanica*, Kuhl, and *P. melanogastra*, Gould, are also given by Schlegel as having been obtained on the coast of Chili by D'Orbigny. *Puffinus carneipes*, Gould, and *Thalassoica glacialioides* (Smith) are also Chilian, on the same authority. I follow Dr. Schlegel also in referring the *Halodroma* of the western coast of South America to *H. gairdneri*.

Fam. LARIDÆ.

Larus kittlitzii of Bruch is founded on a figure of a bird obtained on the Chilian coast by Kittlitz, and may probably be the same as *Larus franklini*, which was obtained by Burnett and Fitzroy at Valparaiso, and has been recently redescribed by Messrs. Philippi and Landbeck as *Larus cinereocaudatus* (Wieg. Arch. 1861, p. 293). So we may strike *L. kittlitzii* out of Dr. Hartlaub's list, and in lieu thereof put in *Larus modestus*, Tsch. (*L. bridgesi*, Fraser), obtained by Bridges at Valparaiso. *Larus scoresbii*, Trail (*hæmatorhynchus*, King), occurs in Southern Chili.

The only Terns which I can identify positively as occurring on the Chilian coast are:—(1) *Sterna cassini*, nobis (P. Z. S. 1860, p. 391, = *S. antarctica*, Peale, nec Less., nec Forst. = *S. meridionalis*, Cassin, nec Brehm), allied to our *S. hirundo* and *S. macrura*; (2) a small species, named in the British Museum "*Sterna exilis*, Tsch.," of

which I have also lately received a skin from Lima*; (3) *Anous inca* (*Sterna inca*, Less.) ; and (4) *Hydrochelidon fissipes*, Linn., spoken of by Pelzeln (Novara-Reise, p. 155) as *H. plumbea*. I do not know *Sterna atro-fasciata*, Ph. et Landb., Wieg. Arch. 1863, p. 204, nor *S. luctuosa*, ibid. 1866, p. 126.

Fam. PODICIPIDÆ.

Dr. Hartlaub, in describing *Podilymbus antarcticus* (*Podiceps antarcticus*, Less.) in his article in 'Naumannia,' does not appear to be aware that it is the same as *P. brevirostris* of Gray's 'Genera.' The error appears to have occurred from it not being stated on the plate in the 'Genera' that the figure of *P. brevirostris* is reduced in size.

The typical specimens of *P. brevirostris* were obtained in Chili by Mr. Bridges. I cannot find any difference between them and specimens of a *Podilymbus* collected on the lake of Atitlan in Guatemala by Mr. Salvin; so that it would appear that this species ranges all along the Andes into Central America.

Fam. SPHENISCIDÆ.

The only Penguin that I know of occurring on the Chilian coast is *Spheniscus humboldtii*, Meyen, which ranges as far north as Peru, and, according to Meyen, is common in the harbour of Callao.

I conclude these notes with a nominal list of what I believe to be the authentically determined species of Chilian birds, amounting in all to 209, namely—

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	<hr/>
	209

I. PASSERES.

1. <i>Turdus falklandicus</i> .	7. <i>Hirundo cyanoleuca</i> .
2. <i>Mimus thenca</i> .	8. — <i>meyeni</i> .
	9. <i>Progne furcata</i> .
3. <i>Troglodytes magellanicus</i> .	
4. <i>Cistothorus platensis</i> .	10. <i>Phrygilus gayi</i> .
	11. — <i>alaudinus</i> .
5. <i>Anthus correndera</i> .	12. — <i>fruticeti</i> .
	13. — <i>unicolor</i> .
6. <i>Dendroeca atricapilla</i> .	14. <i>Diuca grisea</i> .
	15. <i>Zonotrichia pileata</i> .

* See below, p. 344.

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| 16. <i>Chrysomitris uropygialis</i> . | 40. <i>Scytalopus fuscoides</i> . |
| 17. — <i>barbata</i> . | 41. <i>Triptorhynchus paradoxus</i> . |
| 18. <i>Sycalis aureiventris</i> . | 42. <i>Pteroptochus rubecula</i> . |
| 19. — <i>arvensis</i> . | 43. — <i>albicollis</i> . |
| | 44. <i>Hylactes megapodius</i> . |
| 20. <i>Agelasticus thilius</i> . | 45. — <i>tarnii</i> . |
| 21. <i>Curæus aterrimus</i> . | 46. — <i>castaneus</i> . |
| 22. <i>Sturnella militaris</i> . | |
| | 47. <i>Agriornis livida</i> . |
| 23. <i>Geositta cunicularia</i> . | 48. — <i>maritima</i> . |
| 24. — <i>isabellina</i> . | 49. <i>Tanioptera pyrope</i> . |
| 25. — <i>fasciata</i> . | 50. <i>Muscisaxicola nigrifrons</i> . |
| 26. <i>Upucerthia dumetoria</i> . | 51. — <i>cinerea</i> . |
| 27. <i>Ochetorhynchus ruficaudus</i> . | 52. — <i>mentalis</i> . |
| 28. <i>Cinclodes nigrofumosus</i> . | 53. — <i>flavinucha</i> . |
| 29. — <i>patachonicus</i> . | 54. — <i>rufivertex</i> . |
| 30. — <i>minor</i> . | 55. — <i>rubricapilla</i> . |
| 31. <i>Sylviorhynchus desmursi</i> . | 56. — <i>maculirostris</i> . |
| 32. <i>Oxyurus spinicauda</i> . | 57. <i>Centrites niger</i> . |
| 33. <i>Phleocryptes melanops</i> . | 58. <i>Hapalocercus citreolus</i> . |
| 34. <i>Leptasthenura ægithaloides</i> . | 59. <i>Cyanotis azaræ</i> . |
| 35. <i>Synallaxis humicola</i> . | 60. <i>Serpophaga parvirostris</i> . |
| 36. — <i>anthoides</i> . | 61. <i>Aneretes parulus</i> . |
| 37. — <i>sordida</i> . | 62. <i>Elainia modesta</i> . |
| 38. <i>Pygarrhicus albogularis</i> . | |
| | 63. <i>Phytotomu rara</i> . |
| 39. <i>Scytalopus magellanicus</i> . | |

II. PICARIÆ.

- | | |
|--|---|
| 1. <i>Ceryle stellata</i> . | 6. <i>Campephilus magellanicus</i> . |
| | 7. <i>Picus lignarius</i> . |
| 2. <i>Stenopsis bifasciata</i> . | 8. <i>Colaptes pitius</i> . |
| | |
| 3. <i>Oreotrochilus leucopleurus</i> . | 9. <i>Henicognathus leptorhynchus</i> . |
| 4. <i>Patagona gigas</i> . | 10. <i>Conurus cyanolyseos</i> . |
| 5. <i>Eustephanus galeritus</i> . | 11. — <i>smaragdineus</i> . |

III. ACCIPITRES.

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| 1. <i>Sarcorhamphus gryphus</i> . | 10. <i>Accipiter chilensis</i> . |
| 2. <i>Cathartes aura</i> . | 11. <i>Hypotriorchis femoralis</i> . |
| 3. — <i>atratus</i> . | 12. <i>Tinnunculus sparverius</i> . |
| | 13. <i>Falco peregrinus</i> . |
| 4. <i>Polyborus tharus</i> . | 14. <i>Elanus leucurus</i> . |
| 5. <i>Milvago chimango</i> . | 15. <i>Circus cinereus</i> . |
| 6. — <i>megalopterus</i> . | 16. — <i>macropterus</i> . |
| 7. <i>Urubitinga unicincta</i> . | 17. — <i>poliopterus</i> . |
| 8. <i>Buteo erythronotus</i> . | |
| 9. <i>Geranoæetus melanoleucus</i> . | 18. <i>Glaucidium nanum</i> . |

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| 19. <i>Athene cunicularia</i> . | 22. <i>Bubo virginianus</i> . |
| 20. <i>Syrnium hylophilum</i> . | 23. — <i>crassirostris</i> . |
| 21. <i>Otus brachyotus</i> . | 24. <i>Strix perlata</i> . |

IV. COLUMBÆ.

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| 1. <i>Columba araucana</i> . | 4. <i>Melopelia meloda</i> . |
| 2. — <i>meridionalis</i> . | 5. <i>Metriopelia melanoptera</i> . |
| 3. <i>Zenaida auriculata</i> . | 6. <i>Columbula strepitans</i> . |

V. GALLINÆ.

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| 1. <i>Rhynchotus perdicarius</i> . | 3. <i>Rhynchotus cinerascens</i> . |
| 2. — <i>punctulatus</i> . | |

VI. GRALLÆ.

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| 1. <i>Thinocorus rumicivorus</i> . | 26. <i>Limosa hudsonica</i> . |
| 2. — <i>orbignianus</i> . | 27. <i>Numenius hudsonicus</i> . |
| 3. — <i>ingæ</i> . | 28. — <i>borealis</i> . |
| 4. <i>Attagus gayi</i> . | |
| 5. <i>Vanellus cayanensis</i> . | 29. <i>Rallus sanguinolentus</i> . |
| 6. <i>Charadrius virginicus</i> . | 30. — <i>antarcticus</i> . |
| 7. <i>Eudromias modesta</i> . | 31. <i>Porzana jamaicensis</i> . |
| 8. <i>Ægialites nivosus</i> . | 32. <i>Hydroicca melanops</i> . |
| 9. — <i>fulklandicus</i> . | 33. <i>Gallinula galeata</i> . |
| 10. <i>Oreophilus ruficollis</i> . | 34. <i>Fulica leucopyga</i> . |
| 11. <i>Aphriza virgata</i> . | 35. — <i>armillata</i> . |
| 12. <i>Leptosceles mitchelli</i> . | 36. — <i>stricklandi</i> . |
| | |
| 13. <i>Strepsilas interpres</i> . | 37. <i>Ardea cocoi</i> . |
| 14. <i>Hæmatopus palliatus</i> . | 38. <i>Nycticorax obscurus</i> . |
| 15. — <i>ater</i> . | 39. <i>Ardea candidissima</i> . |
| | 40. — <i>egretta</i> . |
| | 41. <i>Ardetta exilis</i> . |
| 16. <i>Himantopus nigricollis</i> . | |
| 17. <i>Phalaropus wilsoni</i> . | 42. <i>Ciconia maguari</i> . |
| 18. <i>Gallinago paraguaiæ</i> . | |
| 19. — <i>paludosa</i> . | 43. <i>Platalea ajaja</i> . |
| 20. <i>Rhynchæa semicollaris</i> . | 44. <i>Ibis melanops</i> . |
| 21. <i>Tringa bairdi</i> . | 45. — <i>fulcinellus</i> . |
| 22. — <i>bonapartii</i> . | |
| 23. <i>Calidris arenaria</i> . | 46. <i>Phœnicopterus igni-palliatus</i> . |
| 24. <i>Gambetta melanoleuca</i> . | 47. — <i>andinus</i> . |
| 25. — <i>flavipes</i> . | |

VII. ANSERES.

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| 1. <i>Cygnus nigricollis</i> . | 5. <i>Chloephaga dispar</i> . |
| 2. — <i>coscoroba</i> . | 6. — <i>poliocephala</i> . |
| 3. <i>Bernicla melanoptera</i> . | 7. <i>Sarcidiornis regia</i> . |
| 4. — <i>antarctica</i> . | 8. <i>Mareca chiloensis</i> . |

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| 9. <i>Anas iopareia</i> . | 33. <i>Procellaria melanogastra</i> . |
| 10. — <i>specularis</i> . | 34. <i>Puffinus carneipes</i> . |
| 11. — <i>melanocephala</i> . | 35. <i>Thalassoica glacialis</i> . |
| 12. — <i>cristata</i> . | 36. <i>Halodroma garnoti</i> . |
| 13. <i>Querquedula torquata</i> . | |
| 14. — <i>cyanoptera</i> . | 37. <i>Larus belcheri</i> . |
| 15. — <i>versicolor</i> . | 38. — <i>dominicanus</i> . |
| 16. — <i>creccoides</i> . | 39. — <i>franklinii</i> . |
| 17. <i>Dafila bahamensis</i> . | 40. — <i>glaucotis</i> . |
| 18. — <i>oxyura</i> . | 41. — <i>modestus</i> . |
| 19. <i>Spatula platalea</i> . | 42. — <i>scoresbii</i> . |
| 20. <i>Fuligula peposaca</i> . | 43. <i>Sterna cassini</i> . |
| 21. <i>Micropterus cinereus</i> . | 44. — <i>exilis</i> . |
| 22. <i>Erismatura ferruginea</i> . | 45. — <i>atrofasciata</i> . |
| 23. <i>Merganetta armata</i> . | 46. — <i>luctuosa</i> . |
| | 47. <i>Hydrochelidon fissipes</i> . |
| 24. <i>Pelecanus thagus</i> . | 48. <i>Anous inca</i> . |
| 25. <i>Phalacrocorax gaimardi</i> . | 49. <i>Rhynchops nigra</i> . |
| 26. — <i>brazilianus</i> . | |
| 27. — <i>cirrhatu</i> . | 50. <i>Podiceps calipareus</i> . |
| 28. — <i>bougainvillii</i> . | 51. — <i>rollandi</i> . |
| 29. — <i>purpurascens</i> . | 52. — <i>leucopterus</i> . |
| 30. <i>Sula variegata</i> . | 53. — <i>chilensis</i> . |
| | 54. <i>Podilymbus antarcticus</i> . |
| 31. <i>Procellaria gracilis</i> . | |
| 32. — <i>oceanica</i> . | 55. <i>Spheniscus humboldti</i> . |

3. On the Birds of the Vicinity of Lima, Peru. By P. L. SCLATER, M.A., Ph.D., F.R.S. &c. With Notes on their Habits; by Professor W. NATION, of Lima, C.M.Z.S. (Part II.)*

(Plates XX. & XXI.)

A second small collection of birds received from Prof. Nation contains examples of the following twelve species, several of which are of great interest. I have added to my remarks on each bird Prof. Nation's notes on its habits:—

1. GEOTHLYPIS ÆQUINOCTIALIS (Gm.); Sclater, C. A. B. p. 27.

One example agreeing with specimens from Cayenne and Trinidad. "Found amongst weeds, in company with *Cyanotis omnicolor* and *Troglodytes furvus*. It is rare. I have only obtained two specimens."—W. N.

— 2. HIRUNDO ERYTHROGASTRA, Bodd.; Scl. C. A. B. p. 39.

"Very rare in Lima. I have only seen it twice in ten years, but

* Continued from P. Z. S. 1866, p. 100.

have ascertained that it is common in the warm valleys of the Andes, about forty miles away, and builds its nests in corners against the walls, like our familiar species in England. Ten years ago I met with a flock near here in a field of *alfalfa* (lucerne), and was fortunate enough to kill the one I sent you. Last New-year's day, in the same field, I saw a flock of about two hundred, and killed four, three males and a female."—W. N.

3. TANAGRA DARWINI, Bp.

"I have now one of these beautiful birds alive. It will not eat seeds of any kind, only fruit."—W. N.

4. SPERMOPHILA TELASCO (Less.); Bp. Consp. p. 496.

I have previously seen specimens of this scarce species only in the Museums of Paris and Philadelphia.

"I have hitherto thought that this bird left us in winter, but have recently discovered that its plumage is then so different as to have led me to take it for another bird. The female lays two eggs, of a bluish green."—W. N.

— 5. POOSPIZA BONAPARTII. (Pl. XX. ♂ et ♀.)

Poospiza dominicensis, Bp. Consp. i. p. 473 (?).

Supra cinerea, interscapulio brunnescente lavato; capitis lateribus nigris, superciliis elongatis albis: alis fusco-nigris, primariis et tectricibus albo, secundariis fulvo marginatis: cauda fusco-nigra, rectricum lateralium omnium pogoniis internis fere omnino albis: subtus alba, torque gutturali nigro, lateribus cinerascens, crisso medio rufescente: tectricibus subalaribus et remigum marginibus internis albis: rostro et pedibus pallide corneis: long. tota 5 poll. Angl., alæ 2·5, caudæ 1·9, rostri a rictu 0·6, tarsi 0·8.

Fœm. Supra fusca, nigricante substriata; alis caudaque nigro-fuscis, brunneo marginatis; superciliis elongatis, sordide albis: subtus fulvescenti-albida, lateraliter cinereo flammulata, torque nigro vix apparente.

Hab. in Peruvia occident. prope Lima (*Nation*).

Obs. Similis *P. torquata* (D'Orb. et Lafr.) sed crisso rufo vix tincto et rostro crassiore longiore et ad basin carneo distinguenda.

This is a very distinct species of the genus *Poospiza*, quite unknown to me, though it may possibly be identical with the bird described in Bonaparte's 'Conspectus' as *P. dominicensis*. If this be the case, however, the locality assigned is quite erroneous, and I propose to give the bird a new specific name.

P. bonapartii is most nearly allied to *P. torquata*, as I have pointed out above, having a similar black breast-band, which is almost obsolete in the female bird.

"Resident with us a few weeks every year, and usually met with in company with *Zonotrichie* and *Spermophili* &c."—W. N.

6. *SYCALIS LUTEIVENTRIS* (Meyen).

Prof. Nation's specimen of this species agrees best with a skin collected by Fraser at Cuenca in Ecuador, which I have hitherto referred (Cat. A. B. p. 126) to *S. arvensis* of Chili. Chilian examples, however, are certainly rather larger in size, and not so bright in colouring, so that it may be necessary to separate the northern form. In this case the latter may take the name *luteiventris* of Meyen*, which is founded on Peruvian specimens.

"This bird does not reside with us all the year round, but breeds here. I have one in a cage, and never heard any South-American bird sing so sweetly."—W. N.

7. *EUPSILOSTOMA PUSILLUM*, Sclater, P. Z. S. 1860, pp. 68, 283, et Cat. A. B. p. 215.

These skins agree very well with the types described *l. c.*, which were collected by Fraser at Pallatanga and Babahoyo.

"This little bird is quite new to me. It is so small and so secluded in its habits as to have hitherto escaped my notice. I have lately found its nest, and, knowing its haunts, shall soon get a clue to its habits."—W. N.

8. *TYRANNUS MELANCHOLICUS*, Vieill.

Agrees with the northern form called *satrapa* by Cabanis and Heine, and in my 'American Catalogue.'

"Very rare in Lima. I found four birds on a dry branch of a tree overhanging a mud wall, in which Mason-wasps (*Pelopæus flavipes*) were making their nest. By the aid of a glass I observed that every time a *Pelopæus* passed the Tyrants captured it, and returned to the branch to eat it. I obtained two specimens."—W. N.

† 9. *ANTROSTOMUS ÆQUICAUDATUS* (Peale).

Caprimulgus æquicaudatus, Peale, Zool. Expl. Exp. Birds, p. 168.

"*Stenopsis parvulus*, Gould," Cassin, *ib.* ed. 2. p. 188.

"Near Lima, and probably all along the Peruvian coast, we have only the present species of *Caprimulgus*. Its favourite haunts are dry stony places, where there is little or no vegetation, and no water near. In such spots the colour of the earth harmonizes with the plumage of the bird, so that even a hawk cannot see it at a few yards distance. Nestled on the shady side of a stone or clot of dry earth to protect it from the scorching sun, it must be almost trodden upon before it takes to wing, and flies noiselessly to a few yards distance, where it settles again on the ground without outspread wings. If repeatedly disturbed it will fly to a greater distance, but returns to its old haunts when alarm has subsided.

"The female makes no nest, but lays one egg, of a bluish grey marbled with brown, on the ground. Having observed that our European species will remove its egg if touched, I was curious to see whether this Goatsucker would do likewise. On finding, therefore,

* Nov. Act. xvi. Suppl. pl. 12. f. 3.

an old bird sitting, I moved the egg on more than one occasion, but never found the old bird carry away the egg. If the young bird is moved it is sometimes taken away by the old birds. Last year, upon one occasion, I found a young bird, and brought it home to draw. Having finished, I took it back to the same spot and waited to see whether the old bird would find it again. In about half an hour, the low plaintive cry of the young bird brought the old one, who carried it away to a distance of about 200 yards."—W. N.

In my notes on the American *Caprimulgidae*, published in the last volume of the Society's 'Proceedings', I remarked that I much doubted whether Mr. Cassin had correctly united *C. æquicaudatus*, Peale, with *C. parvulus*, Gould. The specimen now sent me by Prof. Nation proves that my suspicions were correct. There can be little doubt that the present species is the same as that discovered by Peale, as it agrees tolerably well with his figure and description, and is also from the same locality, where also Prof. Nation tells us it is the only species that occurs. It is, however, certainly distinct from the true *Antrostomus parvulus* of Brazil and La Plata, having a longer and more compressed bill, being much more sandy and paler above, and wanting the distinct ocellated spots on the wings which distinguish the Brazilian bird.

The single specimen sent by Prof. Nation is a female, and has the wing-band rufous, and the gular spot indistinct and fulvous.

+10. PORZANA JAMAICENSIS (Gm.).

"Found in the alfalfa-fields."—W. N.

Does not seem to differ from Guatemalan specimens.

+11. PORZANA ERYTHROPS, sp. nov. (Pl. XXI.)

"Found in the ditches, where there is much vegetation."—W. N.

I have not been able to find any description of this very well-marked species, which may be described as follows:—

Supra fuscescenti-olivacea, alis et cauda concoloribus: capitis et cervicis lateribus cum corpore subtus pallide plumbeis, gula albicante: hypochondriis, alarum tectricibus inferioribus et crisso nigricantibus albo transfasciatis: ano fulvescente: rostro ad basin sanguineo, inde corneo, apice flavo: pedibus flavidis: long. tota 7·5, alæ 4·2, caudæ 1·2, rostri a rictu 0·9, tarsi 1·2, dig. med. c. ungue 1·3.

Hab. in vicin. Limæ in Peruv. transand.

This bird is of about the same size as *P. carolina*, and has the bill of nearly the same form, but seems to be shorter and stouter in general aspect. The wings are short and concave, the second and third primaries being longest, and the next following gradually diminishing in length. But the most remarkable parts of the bird's structure are the feet, the tarsi being shorter and stouter, and the toes much shorter than in any other Crake with which I am acquainted. It may probably be necessary to institute a separate genus

* P. Z. S. 1866, p. 138.

for this bird; but the single specimen sent is not in a very good state, and does not permit a very accurate description of the feet to be made.

12. *STERNA EXILIS*, G. R. Gray in Mus. Brit.

Sterna exilis, Tsch., Wieg. Arch. 1843, p. 389, et F. P. Aves, p. 306 (?).

Prof. Nation sends a single specimen of a well-marked species of Tern "from the vicinity of Callao," which is the same as one in the British Museum from Chili, marked "*Sterna exilis*, Tsch." Whether, however, it can really be Tschudi's bird appears to me to be very doubtful, as it does not accord well with his description. The present species is of about the same size as *Sterna superciliaris* of Eastern South America, but distinguishable by its long, thin, pointed, and slightly incurved bill (which is yellow at the base and black for the terminal half), its longer and deeply cleft tail, and its grey colour underneath.

4. Descriptions of some New Species of Birds from the Seychelles Islands. By EDWARD NEWTON, M.A., C.M.Z.S.

(Plate XXII.)

Before proceeding to name and describe some birds obtained by myself during a stay of a month in the Seychelles Islands, from January 24th to February 24th of the present year, I may state that, previously to my visit, only the following six land-birds had been described as coming from those islands, and these, so far as is known, are not found elsewhere. They are—

Tinnunculus gracilis (Less.); Desm., Iconogr. pl. 25.

Nectarinia dussumieri, Hartl., Journ. f. Orn. 1860, p. 340.

N. seychellensis, Hartl., Orn. Beitr. Madag. p. 35 (an errore?).

Copsychus sechellarum, A. Newton, Ibis, 1865, p. 322, pl. viii.

Turtur rostratus, Bp., Cosp. Av. ii. p. 62.

Erythrænas pulcherrima (Scop.); Temm., Pig. pl. 20.

The birds I have now to describe are—

HYPSSIPETES CRASSIROSTRIS: vulgo "Merle."

Hypsipetes H. olivaceo *admodum similis sed rostro valde robustiore, gula, pectore abdomineque flavescentibus.*

Descr. maris adulti.—*Supra fuscus, nonnihil ad olivaceum vergens, pileo nigro; subtus gula pectoreque cinereis flavo tinctis; abdomine albido-flavescente; remigibus rectricibusque fuscis, secundariis quibusdam externe rufis; rostro sordide aurantiaco; pedibus fusco-flavis, unguibus nigris, iridibus fusco-rubris.*

Long. tota 10·75, alæ 5·3, caudæ 4·5, acrotarsi 1·05, dig. med. sine ungue 0·8, hallucis sine ungue 0·5, maxillæ a fronte 1·1, ejus-

dem a rictu 1·25, mandibulæ ab articulo 1·81; rostri altitudo ad frontem 0·41 poll. Angl.

Descr. fœminæ adultæ.—*Mari similis sed minor, secundariis omnino fuscis, et rectricibus albo terminatis; rostro vivide aurantiaco; pedibus flavis.*

Junioris (masc.?) *rostrum fuscum, pedes brunneo-flavi sunt.*

Hab. in insulis Sechellis.

Mus. A. et E. Newton (exempla iii.).

TCHITREA CORVINA: vulgo "Veuve."

T. major: mas adultus *omnino chalybeo-niger, mediis rectricibus longissimis.*

Fœmina et mas juvenis, *capite chalybeo-nigro; corpore supra castaneo, subtus albo; remigibus fuscis, externe castaneo limbatis.*

Descr. maris vestitu nuptiali.—*Unicolor, chalybeo-nigra sic ut Corvus, rostro pedibusque nigris.*

Long. tota (rectricibus mediis exceptis) circa 8·75, alæ 3·45, caudæ 11·5 (!), acrotarsi 0·75, dig. med. sine ungue 0·5, hallucis sine ungue 3·5, maxillæ a fronte 0·53, ejusdem a rictu 0·99, mandibulæ ab articulo 1·35 poll. Angl.

Hab. in insula Sechellarum "Praslin" dicta.

Mus. A. et E. Newton (exempla v.).

ZOSTEROPS MODESTA.

Z. obscure fusco-grisea, annulo periophthalmico niveo, loris nigris.

Descr. maris adulti.—*Supra olivaceo-grisea, subtus fusco murina; hypochondriis brunneo tinctis; annulo periophthalmico niveo, loris nigris; remigibus rectricibusque fuscis, illis externe griseo limbatis, et interne albido marginatis; rostro griseo; pedibus obscure plumbeis.*

Long. tota circa 4·8, alæ 2·3, acrotarsi 0·72, dig. med. sine ungue 0·46, hallucis sine ungue 0·3, maxillæ a fronte 0·41, ejusdem a rictu 0·58, mandibulæ ab articulo 0·95 poll. Angl.

Fœmina *mari omnino similis.*

Hab. in insula Sechellarum "Mahé" dicta.

Mus. A. et E. Newton (exempla vii.).

ZOSTEROPS SEMIFLAVA: vulgo "Serin."

Zosterops Z. poliogastræ simillima sed epigastrio abdomineque omnino flavis, et hypochondriis badiis.*

Descr. maris adulti.—*Supra flavo-olivacea, uropygio flavo; subtus flava, hypochondriis badiis; annulo periophthalmico niveo; remigibus rectricibusque atro-fuscis, illis externe flavo limbatis, et interne albido late marginatis; rostro pedibusque plumbeis.*

Long. tota circa 4·3, alæ 2·28, caudæ 1·85, acrotarsi 0·75, dig. med. sine ungue 0·39, hallucis sine ungue 0·3, maxillæ a fronte 0·47, ejusdem a rictu 0·64, mandibulæ ab articulo 0·92 poll. Angl.

* Heuglin, Ibis, 1861, p. 357, pl. xiii.; *Z. euryophthalmos*, ejusd., Sitzungsber. k.-k. Akad. Wien, 1856, p. 276 (descr. nulla).

Fœmina mari similis.

Hab. in insula Marianna Sechellarum.

Mus. A. et E. Newton (exempla ii.).

FOUDIA SECHELLARUM: vulgo "Mangeur du riz."

F. fusco-brunnea; fronte, occipite et mento aureo tinctis (vestitu hiemali).

Descr. maris adulti vestitu hiemali.—*Supra fusco-brunnea, fronte occipiteque aureo et nucha olivaceo tinctis; capitis lateribus olivaceis; subtus pallidior, mento et gula flavescentibus; remigibus rectoribusque fuscis olivaceo limbatis; rostro nigro; pedibus fuscis.*

Mas juvenis vel fœmina aureo caret colore in fronte et mento, aliter colores viridiores, præsertim in remigum marginibus, habet; rostro pedibusque hepaticis.

Long. tota circa 4·9, alæ 2·95, caudæ 2·1, acrotarsi 0·85, dig. med. sine ungue 0·52, hallucis sine ungue 0·41, maxillæ a fronte 0·65, ejusdem a rictu 0·67, mandibulæ ab articulo 0·98 poll. Angl.

Hab. in insula Marianna Sechellarum.

Mus. A. et E. Newton (exempla iii.).

Obs. Hujus avis vestitus nuptialis mihi ignotus est, forte caput totum ea tempestate flavum est.

PALÆORNIS WARDI: vulgo "Cateau vert."

Palæornis P. alexandri similis sed rostro robustiore; fasciis humeralibus phæniceo-rubris; nucha sine fascia rubra.

Descr. adulti.—*Pileo et gula cærulescentibus, genis ochraceo-viridibus, torque perignathico nigro a rictu ad nucham ducto; dorso alisque gramineo-viridibus; uropygio viridiore; singulis fasciis latis humeralibus phæniceo-rubris; remigibus et rectoribus saturate viridibus cæruleo lavatis, his subtus flavescentibus, fuscis illis; gastræo flavescenti-viridi; rostro vivide coccineo, apice pallidiore; pedibus fuscis.*

Long. tota circa 16, alæ 7·75, caudæ 9, acrotarsi 0·75, dig. med. sine ungue 0·95, hallucis sine ungue 0·5, maxillæ a fronte 1·4, ejusdem a rictu 1·15, mandibulæ ab articulo 1·4 poll. Angl.

Fœmina vel mas junior *mari adulto simillimus, sed coloribus obscurioribus.*

Hab. in insulis Sechellis.

Mus. A. et E. Newton (exempla iii.).

Obs. Ex dono SWINBURNE WARD, armigeri, totarum Sechellarum præfectus, et in ejus honorem nominata.

CORACOPSIS BARKLYI: vulgo "Cateau noir." (Pl. XXII.)

Coracopsis C. comorensi quoad colorem admodum similis sed valde minor.

Descr. maris adulti.—*Brunneo-nigra, remigibus rectoribusque saturatioribus ardesiaco tinctis; rostro, cera pedibusque nigro-fuscis.*

Long. tota circa 13, alæ 8·1, caudæ 6, acrotarsi 0·76, dig. med.

sine ungue 1·0, hallucis sine ungue 0·48, maxillæ a fronte 0·95, ejusdem a rictu 0·95, mandibulæ 1·37 poll. Angl.

Fœmina mari similis sed minor.

Hab. in insula Sechellarum "Praslin" dicta.

Mus. A. et E. Newton (exempla iii.). *Vivar.* Soc. Zoolog. Londinensis, ex dono S. Ward.

Obs. In honorem HENRICI BARKLY, ordinis honorabilissimi Balnei equitis aurati, insulæ Mauritanæ et terrarum dependentium proconsulis, scientiarum amici, nominata.

5. On some Fishes from the Wynaad.

By Surgeon FRANCIS DAY, F.Z.S., F.L.S.

Whilst collecting the fishes which reside on and around the Neilgherries in 1866, I solicited from residents in neighbouring parts contributions from the piscifauna of their localities. John Burnett, Esq., of Cholady, Vithery, in the Wynaad, near Calicut, was good enough to favour me with eight species, of which I propose giving short descriptions. His coffee-estate is situated in the Wynaad range of hills, about 3000 feet above the level of the sea; and the water from which these species were obtained is a small rivulet about 200 yards from his bungalow.

The following is a list of the specimens received, with the Tamil names as applied in that locality:—*Ophiocephalus gachua*, Buch. Ham.; *Hara malabarica*, Day (*Cutti meen*, Tam.); *Saccobranchus singio*, Buch. Ham.; a small Loach (*Cul irum*, Tam.); *Homaloptera brucei*, Gray (*Cul candee*, Tam.); a *Garra* (*Cul korava*, Tam.); and three others of the Carp family, which I have previously described as new:—*Puntius melanampyx*, *Paradanio aurolineatus*, and *Rasbora woolaree*.

I think that the capture of the *Homaloptera brucei* in this part of India is exceedingly interesting, when coupled with the fact that I took the *Garra gotyla* in an adjacent locality, as described in my "Fishes of the Neilgherries." It makes it exceedingly probable that General Hardwicke's drawings of these species came originally from Buchanan Hamilton's collection, and that the latter obtained his specimens when travelling through this portion of the Madras Presidency, as described in his 'Journey through Mysore.' Another reason for believing this solution to be correct is, that these species of fish do not appear to have been obtained since then in Bengal.

NEMACHEILUS STRIATUS, sp. nov.

Cul irum (Tam.).

B. iii. D. 2/8. P. 11. V. 8. A. 2/5. C. 17.

Length of head $\frac{1}{7}$, of pectoral $\frac{1}{7}$, of caudal $\frac{1}{7}$ of the total length. Height of head $\frac{1}{11}$, of body $\frac{1}{11}$ of the total length.

Eyes not covered by skin. Diameter nearly $\frac{1}{4}$ of length of head.

Dorsal profile more convex than that of the abdomen, which latter is nearly horizontal. Body laterally compressed posterior to the dorsal fin. Back moderately broad, and in the mesial line near the caudal fin slightly elevated.

Mouth almost below, surrounded by fleshy lips. Two pairs of cirri on the snout, the external reaching the posterior, and the internal the anterior margins of the orbit; they are not united at their bases. The maxillary cirri extend to beneath the anterior margin of the orbit. There is no spine on the head. Nostrils generic.

Fins. Dorsal arises slightly in advance of the ventral, and its base is situated midway between the snout and the posterior extremity of the caudal fin; whilst the anal is in the posterior fourth of the body. The caudal, which has a broad base, is slightly lobed at its posterior extremity.

Scales well developed over the whole of the body, not on the head.

Lateral line passes direct from the centre of the orbit to the middle of the caudal fin.

Colours. Reddish brown, with very narrow light-reddish vertical bands, most distinct in the posterior part of the body, where there are sixteen posterior to the commencement of the dorsal fin, and several more between that and the head, which last is marked all over with black lines and spots on a light reddish base. A very black bar exists at the base of the caudal fin. Dorsal fin with a light margin, bounded below by a jet-black band, and having a dark base, between which two marks it is brilliant orange. Anal orange, with some dull black spots. Caudal yellow, with some dull marks.

Grows to $2\frac{1}{2}$ inches in length.

Hab. Wynaad, at 3000 feet elevation.

HOMALOPTERA BRUCEI.

Balitora brucei, Gray, Ill. I. Z. pl. 41. f. 1; Cuv. et Val. xviii. p. 101.

Platy cara brucei, McClelland, J. A. S. xix. pp. 299, 428.

Platy cara australis, Jerdon, Mad. J. L. & S. no. 35, p. 333.

Cul candee (Tam.). The Stone Carp.

B. iii. D. $\frac{3}{8}$. P. 19. V. 9. A. $\frac{2}{4}$. C. 17. L. 1. 70.

Length of head $\frac{1}{6}$, of pectoral $\frac{1}{5}$, of base of dorsal $\frac{1}{3}$, of base of anal $\frac{1}{3}$, of caudal $\frac{1}{6}$ of the total length. Height of head $\frac{1}{4}$, of body $\frac{1}{4}$, of dorsal $\frac{1}{4}$, of ventral $\frac{1}{6}$ of the total length.

Eyes directed upwards and outwards. Diameter $\frac{1}{5}$ of length of head, 2 diameters apart, nearly 3 diameters from end of snout.

Head posteriorly wide, and becoming rather pointed towards the snout; anteriorly it is so much depressed that the dorsal profile is slightly convex, whilst that of the abdomen is horizontal.

Mouth small, transverse, and on the abdominal aspect of the fish, posterior to the snout; cleft very short, the upper jaw in advance of the lower. Lips fleshy. Two pairs of short cirri are situated on the anterior inferior aspect of the snout, their length being equal to two-thirds of the diameter of the orbit. There is also a pair of cirri

at the angle of the mouth, thicker and slightly longer than the other two pairs. The lips do not cover the jaws. Snout soft; nostrils at anterior superior angle of the orbit, the posterior oval, the anterior circular, the two divided from one another by a valve. Summit of head smooth. Branchial aperture small, vertical. Isthmus wide. Branchiostegal membranes concealed.

Fins. Dorsal situated midway between end of snout and the base of the caudal fin, as well as opposite the ventral. Pectoral arises nearly under opercles, and extends to the base of the ventral. The anal is situated in the posterior fifth of the body. Dorsal fin highest anteriorly. Pectoral subhorizontal, with a broad fleshy base, its anterior margin rounded. Ventral also subhorizontal, and its front margin rounded. Caudal lobed in its posterior third, and the inferior rays produced.

Scales small, none above, or on the head, or anterior surface of the abdomen; a few before the anus (except in the mesial line), which is situated opposite the posterior extremity of the ventral fin. They are roughened in circular or horizontal furrows; edges smooth.

Teeth. Pharyngeal teeth 5/5.

Lateral line straight from behind the orbit to the centre of the caudal fin. It consists of single tubes in each scale.

Colours. Dull olive, becoming yellow beneath, with deep-brown blotches. Fins diaphanous; dorsal with three rows of dark spots; ventral with three or four; anal with two; pectoral yellowish, dark anteriorly, and with three rows of dots across it; caudal with three irregular bands and black tips.

Out of eight specimens the largest was $3\frac{1}{2}$ inches long.

Hab. Wynaad, in streams.

GARRA ALTA, sp. nov.

Cul korava (Tam.). Stone *Ophiocephalus*.

B. iii. D. 2/8. P. 15. V. 10. A. 2/5. C. 17. L. 1. 32. L. tr. 5/3.

Length of head $\frac{1}{5}$, of pectoral above $\frac{1}{6}$, of base of dorsal $\frac{1}{7}$, of anal $\frac{1}{15}$, of caudal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{9}$, of body $\frac{1}{5}$, of dorsal $\frac{1}{5}$, of anal $\frac{1}{7}$ of the total length.

Eye circular, situated near to the upper profile of the head, and directed slightly outwards and upwards. Diameter $\frac{1}{6}$ of length of head, $2\frac{1}{2}$ diameters apart, $3\frac{1}{2}$ diameters from end of snout.

The abdominal profile in this species is nearly horizontal, from the anterior extremity of the snout to the base of the caudal fin; whilst the dorsal profile is much elevated, forming a curve, from the anterior margin of the snout to the base of the dorsal fin. The head at the occiput is broad, whilst the snout is also comparatively wide.

Snout with a badly developed transverse cleft, and the whole covered with very large glands. Mouth transverse and below, its gape equal to two-thirds the length of the base of the dorsal fin. An oval suctorial disk situated behind the lower jaw. One pair of cirri on snout, equal in length to the diameter of the orbit; the maxillary pair only one-third of that length.

Fins. The anterior extremity of the dorsal is midway between the snout and base of caudal; whilst the ventral is under its centre. Anal is situated in the posterior fourth of the body. The caudal has a broad base, and is lobed in its posterior half.

Colours. Rifle-green, with a bluish-green stripe along the centre of the body and middle of the caudal fin. Abdomen greenish yellow. Fins yellow; dorsal, pectoral, and ventral externally stained darkish. Edges of scales darker than their centres. Eyes golden.

Hab. Wynaad, in rapid streams.

6. Additional observations on *Hyalonema mirabile*.

By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S. &c.

Since my paper on *Hyalonema mirabile*, read January the 10th at the Zoological Society, I have been favoured by my friend Mr. Henry Lee with the loan of a specimen of that species singularly illustrative of the nature and structure of the corium, the outer coat of that organ having little or no sand or other extraneous matter imbedded in it. At the first view this singular specimen might readily be mistaken for a new species, the thin smooth corium quite destitute of sand gives it an appearance so very unlike the usual description of specimens; but a close examination of its structural characters quickly disabuses us of this idea. The cruciform and other spicula imbedded in the corium; the spiral column and the other structures of the basal mass of the sponge, are identical with the corresponding structures of the well-known specimens of *Hyalonema*. It is the absence of the usual sand which alone makes the difference between them, and at the same time greatly facilitates our knowledge of the structures of these curious animals.

The whole of the corium in Mr. Lee's specimen is divided into lozenge-shaped areas of various sizes, a thin protuberant line forming the common boundaries of the adjacent areas; at each side of this line the motive filaments are based, and from these points they pass in direct lines to the protuberant osculum in the middle of the area, passing up the sides, and on to the apex, where they terminate in a ring formed by the outer margin of the apical membrane of the osculum. The fibres are broad and flat at their bases, gradually attenuate in breadth and slightly increase in thickness as they approach their distal terminations.

Two of the oscular bodies which were raised but very little above the surface of the corium, when mounted in water, exhibited the radial arrangement of the fibres in their natural condition in a very satisfactory manner: forty-four were counted; but this was evidently not the whole of them, as many others were indistinctly apparent behind those which were counted. In another specimen in my collection which has been soaked in solution of potass I counted sixty-three; and in one of the large areas containing an osculum in Mr. Lee's specimen I counted ninety-six motive fibres, radiating from the

apical portion of the organ to the distal portions of the area; while in a smaller one from the same sponge there were only twenty-eight; so that it appears that no two of these organs are furnished with precisely the same number of motive filaments, and that they increase in number as the organ increases in age and size. The fibres on the apices of the oscula of Mr. Lee's specimen, when immersed in water only, were not above half the diameter of those which had been operated upon with caustic potass.

The inner membrane of the corium in Mr. Lee's specimen is very thin; in a portion of it removed and immersed in water for examination there were numerous minute lentiform cells and a considerable number of gemmular bodies, identical in size, form, and structure with those with which we are so familiar in Halichondroid sponges, and which also occur abundantly in the genus *Dactylocladyx*; but I could not detect any traces of fibro-cellular organs.

The more repeatedly and closely we examine the curious protuberant organs on the corium the more strongly we are confirmed in the opinion that every part of *Hyalonema mirabile* is of a purely spongy nature. The discrepancy in the numbers of the supposed tentacula beneath the apices of the oscular organs (no two appearing to have anything like the same number of fibres in their circular series), the invariable attachment of both their basal and apical terminations to their respective membranes, their complete immersion in the parietes of the oscular organs, the firm and solid structure of the fibres themselves, and the undoubted keratose structure of the mass on which they are imbedded, all concur in proving them to be anything rather than polypiferous organs. On the contrary, in numerous specimens of *Zoanthus sulcatus*? in my possession, dispersed in patches on the surface of *Desmacidon Jeffreysii* from Shetland, the structure of the polypidom is widely different from that of the protuberant organs of *Hyalonema*. In *Zoanthus* it is simply formed of grains of sand cemented by coagulable lymph, as in the sand-tubes of *Terebella*, and, like them, rapidly decomposing after the death of the animal. In the polypidoms of the *Zoanthus* on *Desmacidon Jeffreysii* no radiating fibres like those in *Hyalonema* are to be found, nor could I detect any distinct remains of the polypes that once inhabited them.

7. On *Alcyoncellum speciosum*.

By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S. &c.

ALCYONCELLUM SPECIOSUM, Quoy et Gaimard.

Euplectella aspergillum, Owen, Trans. Zool. Soc. iii. p. 203.

E. cucumer, Owen, Trans. Linn. Soc. London, xxii. p. 117, pl. 21.

A considerable number of this beautiful sponge have recently been imported, and its natural history has again been the subject of much interest among zoologists. The first notice of its existence occurs

in the 'History of the Voyage of the Astrolabe,' the zoological portion of which was written by MM. Quoy and Gaimard; and as their account of the sponge is short, it has appeared to me advisable that the whole should be quoted, that we may obtain a clear comprehension of its early history; and this course is the more necessary as the original name has been supplanted by that of *Euplectella aspergillum*, apparently without any sufficient reason for such an alteration, and contrary to all our notions of the rights of priority in nomenclature.

The authors of the 'Natural History of the Voyage of the Astrolabe' have referred this beautiful sponge to De Blainville's genus *Alcyoncellum*; and in vol. iv. p. 302, pl. 26 (Zoophytes). f. 3, they give the following description of it:—

"Corps phytoïde, sub-pierreux, solidifié par des spicules tricuspidés; à branches peu nombreuses cylindriques, fistulaires, terminées par un orifice arrondi, à parois épaisses, composées de granules réguliers, polygones, alvéoliformes, percés d'un pore à l'extérieur et à l'intérieur.—Bl.

"*Alcyoncelle specieux*."

"*ALCYONCELLUM SPECIOSUM*, nob.

"*Alcyoncellum cylindricum, cavum, extremitate rotundum, album, reticulis lapideis elegantissime contextum.*

"Cette singulière production donnant lieu au genre ci-dessus représente un cylindre creux de sept à huit pouces d'étendue, en forme de phallus, arrondi et un peu dilaté à une extrémité, ouvert à l'autre, à parois minces, formées de filets très déliés, lâchement accolés les uns aux autres, entrecroisés dans tous les sens de manière à former des nombreuses mailles arrondies, presque régulières, comme celles de la dentelle ou bien des sièges tissés en rotang. Ce qui fait que toute la masse est à jour. En voyant l'élégante blancheur et la régularité d'un tel tissu, on a de la peine à se persuader qu'il est le produit d'une réunion d'animaux. On aime mieux en voir un seul au fond de la mer travailler à se faire ce logement pour un but quelconque, en tirant de sa propre substance, comme le font certaine chenilles, la matière, qui se pétrifie aussitôt qu'elle est en contact avec l'eau.

"Ce zoophyte habite, nous a-t-on dit, de grandes profondeurs d'où il a été amené par une sonde. Les éclats qu'on remarque à une de ses extrémités indiquent qu'il doit être fixé. Nous le devons à M. Merkus gouverneur des Moluques, qui s'est plu à favoriser avec la plus grande obligeance nos recherches d'histoire naturelle pendant le temps que nous avons passé dans les îles qu'il administre."

The generic and specific characters assigned to this sponge by MM. Quoy and Gaimard, and those published in the second edition of Lamarck's 'Animaux sans Vertèbres,' appeared to me to be so vague and insufficient when I was preparing my paper on the "Anatomy and Physiology of the Spongiadae," published in the 'Philosophical Transactions of the Royal Society' for 1862, p. 1102, that

I proposed the following as an amended description of the generic characters:—

Sponge fistulate; fistula single, without a massive base. Skeleton—primary fasciculi radiating from the base in parallel straight or slightly spiral lines; secondary fasciculi at right angles to the primary ones. Oscula congregated, with or without a marginal boundary to their area.

I have lately acquired two fine specimens of the sponge, and have been enabled to examine the structure of the skeleton more minutely than I could venture to do that of the rare and beautiful specimen in the possession of the late Mr. Cuming; and I have ascertained that the skeleton is not composed of fasciculi of spicula, as at that time I believed it to be, but that it is a regular and very delicate siliceo-fibrous structure. This fact necessitates a further correction of the generic characters, which I propose to be as follows:—

Sponge fistulate; fistula single, without a massive base. Skeleton siliceo-fibrous; primary lines radiating from the base in parallel straight or slightly spiral lines; secondary lines at right angles to the primary ones. Oscula congregated, with or without a marginal boundary to their area.

The siliceo-fibrous structure of the skeleton necessarily removes this genus from the group of genera with which I had placed it, and associates it with *Dactylocalyx* and other siliceo-fibrous sponges; and this association will be seen, when we consider the specific characters of the sponge, to be in very close accordance with the peculiar interstitial and other remarkable spicula of that beautiful group of sponges.

The siliceo-fibrous structure of *Alcyonellum* decidedly separates this genus from *Polymastia*, in which the primary and secondary lines of the skeleton are invariably composed of elongate fasciculi of spicula; and although in the latter genus the general arrangement of the skeleton-structures are so similar to those of the former that slightly magnified drawings of the one could scarcely be distinguished from those of the other, the singularly beautiful forms of interstitial spicula so abundant in *Alcyonellum* are entirely absent in the corresponding portions of the structure of *Polymastia*. I will not repeat my reasons for differing in opinion from Prof. Owen regarding the alteration he has proposed of Quoy and Gaimard's generic name of *Alcyonellum* to that of *Euplectella*, in his paper on that subject, published in the 'Transactions of the Zoological Society of London,' vol. iii. pt. 2. p. 203, pl. 13, as I have fully discussed that portion of my subject in my paper on the "Anatomy and Physiology of the Spongiadæ" (Phil. Trans. Roy. Soc. 1862, p. 1102).

Having thus rectified the errors in the descriptions of the genus, I shall proceed to consider the specific characters of the species *Alcyonellum speciosum*, Quoy et Gaimard (*Euplectella aspergillum* and *E. cucumer*, Owen); and in doing so I may state that my knowledge of the beautiful structures I shall have to describe was derived from the first specimen, imported by the late Mr. Hugh Cuming, who in 1856 obliged me with the loan of the sponge for several weeks that

I might make a searching investigation of the peculiarities of its structure. Dr. A. Farre also allowed me the free examination of his specimen, described and figured in the 'Transactions of the Linnean Society of London,' vol. xxii. p. 117, pl. 21, as *Euplectella cucumer*, Owen. I have repeated these investigations on two other specimens in my possession, of nearly the same size and form as that formerly possessed by Mr. Cuming, but now in the British Museum; and I have found that the structure of their skeletons and the curious and beautiful forms of spicula contained in their interstices are perfectly identical even to the minutest form; so that we may reasonably and safely conclude that there is but one species of this beautiful sponge known to us at present in England, and that it is identical with the species described by MM. Quoy and Gaimard in their 'Zoology of the Voyage of the Astrolabe.' Neither of the above-named authors, nor Prof. Owen in either of his descriptions of the sponge, has given us a detailed statement of its specific characters; I shall therefore proceed to endeavour to rectify this omission as follows:—

ALCYONCELLUM SPECIOSUM, Quoy et Gaimard.

Sponge sessile, cylindrical, more or less curved, enlarging progressively from the basal to the distal extremity; upper portion furnished with numerous sharp ridges of interlacing fibres disposed diagonally and somewhat symmetrically; apex truncate, closed by a coarse, ventricose, fibrous network, and encircled by a strongly produced fibrous ridge or frill. Base furnished with numerous fasciculi of large and long prehensile spicula projected downward: spicula attenuato-quaternate, barbed alternately for about one-third of their length from the distal extremity. Oscula congregated, terminal. Pores congregated; inhalant apertures symmetrically equidistant, disposed in lines radiating from the base to the apex of the sponge. Dermal membrane unknown. Skeleton symmetrical; primary lines radiating from the base to the apex, equidistant; secondary lines at right angles to the primary ones; interstitial structures interlacing diagonally. Spicula of the membranes:—interstitial spicula rectangulated, attenuated hexradiate spicula, short and stout, rarely completely developed; and the same form with slender and delicate radii, fully developed; also attenuated rectangulated triradiate, apically spined. Spicula of the sarcode:—trifurcated attenuato-hexradiate; and florico-mo-hexradiate, very minute.

Colour, skeleton very light amber-yellow.

Hab. Philippine Islands, Island of Bohol, 10 fathoms (*Mr. Hugh Cuming*); Island of Zebu, about 24 fathoms (*Mr. R. Geale*).

Examined in the skeleton state.

The form of the skeleton of the sponge is exceedingly graceful; it is that of an elongated Cornucopia, composed of a beautiful and regular network of siliceous fibres. It has no solid base to retain it in an erect position; but in lieu of this support it is furnished with a vast number of curious and beautiful retentive spicula, each acting the part of a line and grapnel when their recurvo-quaternate heads

are immersed in the sand, as appears to have been the case with the greater number of the specimens that I have examined, or when inserted in, or adherent to the tissues of another sponge, as in the case of the specimen in the possession of Dr. A. Farre. The recurvo-quaternate terminations of their distal ends are short and stout; and the terminal boss whence they spring is very strongly produced, so as to give them great retentive power. There are usually but four hooks; but in one instance I observed that number was doubled by each ray being replaced by two somewhat smaller ones. The shaft of the spiculum is barbed alternately at nearly regular distances for about one-fourth of its length from the recurvo-quaternate apex, the barbs pointing towards the smooth attenuating basal portion of the shaft, and they decrease in length and number from the apex of the spiculum downward. The structure of the apex of the fibre, combined with the numerous stout spines of the distal portion of the shaft, gives them remarkably strong prehensile power. These organs occur in large fasciculi, each consisting of numerous spicula. Their basal portions are clustered around the primary lines of the skeleton near their bases, and are firmly cemented to them for about a half or one-third of their length, from which attachment they ultimately pass off, diverging in various directions in search of points of adhesion. Their length frequently exceeds 3 inches. Although siliceous, they are remarkably flexible and strong. The shaft consists of numerous concentric layers containing comparatively a large amount of animal matter.

The structure of the fibre of this sponge is solid and siliceous, like that of *Dactylocalyx*; but the mode of its disposition in the skeleton is very different. The primary lines consist of nearly parallel continuous fibres anastomosing laterally at irregular distances; so that in the aggregate they form a single circular series of strong and rigid compound columns of support bounding the large tubular internal cavity, and firmly braced in their proper positions by the secondary series of similarly constructed fibres, placed at right angles to the primary ones. This arrangement is further strengthened by numerous small fibres disposed in various diagonal lines to the primary and secondary series of the skeleton-tissues. This admirable arrangement produces a structure combining the greatest amount of lightness, strength, and beauty that can well be conceived to exist in nature. At a short distance above the base of the sponge it is further strengthened by numerous strongly produced angular ridges of fibrous tissue disposed in lines which are always more or less diagonal to the long axis of the sponge, and usually somewhat flexuous. The ridges are but slightly produced near the base of the sponge, but they increase both in height and strength as they approach its apex. The summits of the ridges are composed of strong lines of anastomosing fibres; and two or three such lines of fibres are frequently to be seen beneath the outer one. These ridges do not appear to have ever formed portions of the terminal ridge or frill of the sponge, bounding the oscular area, although they agree perfectly in the mode of their structure; and it is probable that the circular

ridge is coeval with a very early condition of the animal, and that the increment of the sponge has taken place in the space existing between its base and apex. In the type specimen formerly in the collection of the late Mr. Cuming, a few ridges such as occur on its outer surface were apparent on its inner one, a little below the oscular area; but I have not detected them in the corresponding situation in the specimens in my own possession.

The oscular area within its beautiful circular frill or ridge is entirely filled with oscular orifices. The network of which it is formed is simple and irregular in its structure; the rete is composed of numerous closely compacted fibres, so arranged as to afford the greatest amount of resistance in the least possible space. A transverse section of one of these fibres would be like that of a double convex lens. The excurrent orifice of this great terminal network is well indicated by the absence of interstitial spicula within its area, although on the inner surface of the oscular ridge bounding it they are in as great abundance as on other parts of the body of the sponge. In the living condition there is little doubt that the whole of the area would be furnished with a stout dermal membrane containing the true oscula of the sponge. In one of the areas of the oscular network of one of my specimens, near its margin, I found a fragment of such a membrane, about an eighth of an inch in diameter, in a fine state of preservation. It was furnished with a reticulation formed of numerous long acerate spicula closely fasciculated together; and in conjunction with this network there was a layer of sarcodous membrane, in which several of the well-known forms of the interstitial spicula of the sponge were imbedded, thus verifying the reticulated structure as a portion of the tissues of *Alcyoncellum*; but the semi-detached state of the fragment forbids our assigning it with certainty to the dermal tissues of the sponge. The sarcode is abundant on this fragment; and, as in other smaller fragments of that substance which I have found adhering to parts of the skeleton, the colour is that of a full amber-yellow.

The series of equidistant circular apertures disposed in single lines between the primary lines of the skeleton are evidently the inhalant areas of the sponge; and above each of these in the living condition there is most probably a congregation of pores, like those above the intramarginal cavities in *Geodia* and *Pachymatisma*. The margins of these apertures consist of a stout ring of siliceous fibres, very like those at the summits of the diagonal ridges on the body of the sponge.

The interstitial spicula of this sponge afford a numerous and beautiful series of objects for the microscopist; and some of them appear to be peculiar to this species. In well-preserved specimens of the sponge that have not been washed and bleached to make them look pretty, they are so numerous and so closely packed together that in some parts they entirely obscure the view of the skeleton-lines beneath them; and, if we may judge by analogy, their office is to afford points of adhesion to the interstitial membrane, and thus to vastly increase the amount of surface of the nutrient membranes and sar-

code of the sponge. They consist of attenuated rectangulated hexradiate spicula and of rectangulated triradiate ones.

There are two well-characterized descriptions of the attenuated rectangulated hexradiate spicula. The first has the radii comparatively short and very stout; this form is exceedingly protean, the full complement of rays being rarely developed. They vary from the form of an inequiacerate spiculum to the completely developed hexradiate one, with intermediate incomplete forms in every imaginable variety. They are dispersed abundantly on the outer surface of the skeleton-tissues, especially near the bases of the diagonal ridges. The varieties of this form of spiculum are described in detail in the 'Philosophical Transactions of the Royal Society' for 1858, p. 309, pl. 25. figs. 24 to 33, and in 'Monograph of British Spongiadæ,' vol. i. p. 52, pl. 7. figs. 174 to 183.

The second form of attenuated rectangulated hexradiate spiculum is much more constant in its development, an incomplete one being of rare occurrence; their proportions are more equable and slender than those of the first description. Their radii are comparatively long and slender; and the basal ray of the axial portion is frequently very much elongated, and has its termination somewhat clavate and more or less spinous, while the distal and lateral rays are usually acute and without spines. These spicula *in situ* are grouped together in considerable numbers in the interstitial spaces of the skeleton, their positions being coincident, and their axes frequently very nearly touch each other. Their office is apparently the same as those of the larger and stouter description of the same form—that of affording points of attachment to the interstitial membranes, so as to produce innumerable surfaces for the multiplication of the nutrimental membranes of the sponge. They are described and figured in the 'Philosophical Transactions' for 1858, p. 310, pl. 25. fig. 34, and in 'Monograph of British Spongiadæ,' vol. i. p. 260, pl. 7. fig. 184.

The attenuated rectangulated triradiate spicula are not the triradiate stage of development of a hexradiate spiculum; their form is a normal one, and their proportions are distinctly different from either of the hexradiate ones. Sometimes the radii are attenuated and smooth; but usually the apices of the rays are more or less spinous, and occasionally somewhat clavate. They are not so numerous as the hexradiate forms. They are described and figured in the 'Philosophical Transactions' for 1858, p. 313, pl. 26. fig. 7, and in 'Monograph of British Spongiadæ,' vol. i. p. 260, pl. 9. fig. 198.

The sarcode of this sponge affords two of the most elegant and complicated forms of spicula with which we are acquainted—the trifurcated attenuato-hexradiate, and the floricom-hexradiate form. The first is not peculiar to *Alcyoncellum*, as it is also found abundantly in the sarcode of *Dactylocalyx pumicea* and other siliceo-fibrous sponges. The latter I have never found in any other sponge than the one under consideration.

The trifurcated attenuato-hexradiate stellate spiculum, with a power not exceeding four or five hundred linear, appears as a simple multiradiate spiculum; but viewed with a power of about 1000 linear

its structure can be distinctly made out. It consists of a central primary rectangulated hexradiate spiculum, the rays of which are short and stout, each furnished with three attenuating slightly radiating secondary spicula, which terminate acutely. See 'Philosophical Transactions,' 1858, p. 311, pl. 25. fig. 39, and 'Monograph of British Spongiadæ,' vol. i. p. 55, pl. 8. fig. 189.

The floricommo-hexradiate form is the most elegant and elaborately constructed spiculum I have ever seen. It consists of six short primary rectangulated central radii of equal length and diameter, the terminations of which are slightly expanded; and from each of these seven or more delicately formed petaloid secondary spicula radiate, but not in straight lines; each curves slightly outward from its base, and then curves inward again until they nearly meet a little below their distal terminations; and then again they curve outwards, so as to allow of the full expansion of their beautiful petaloid apices, the margins of which are delicately dentate, the whole structure simulating a beautiful flower. See 'Philosophical Transactions,' 1858, p. 312, pl. 26. figs. 3 and 4, and 'Monograph of British Spongiadæ,' vol. i. p. 55, pl. 8. figs. 193 and 194.

This form of spiculum is by no means rare in *Alcyoncellum*, but it is not frequently that a perfect one is obtained. I found them abundantly at the base of the terminal fringe of the sponge, and also at the bases of the diagonal ridges. I have never found any of these complicated forms of hexradiate spicula in any other sponges than the siliceo-fibrous ones.

Alcyoncellum speciosum is not the only species of that genus known to science. There is an imperfect specimen of very delicate texture in the Museum of the Jardin des Plantes at Paris, from which I obtained the bifurcated rectangulated hexradiate form of spiculum represented in the 'Transactions of the Royal Society' for 1858, pl. 25. fig. 38, and 'Monograph of British Spongiadæ,' vol. i. p. 55, pl. 8. fig. 188. This singular form is peculiar to that species; and there are other forms of spicula and peculiarities of structure that unmistakeably stamp it as a distinct species from *A. speciosum*. The large longitudinal radial lines of the skeleton do not all pass into the great terminal oscular area of the sponge; the greater portion of them terminate when they reach the marginal ring of the oscular area; about one in every three or four pass the ring and form a portion of the reticulation of that great area. The distal termination of this sponge very closely resembles that of *Alcyoncellum speciosum* (*Euplectella aspergillum*, Owen), figured in the 'Transactions of the Zoological Society,' vol. iii. p. 203. The primary or radial lines of the skeleton of this species are symmetrically parallel, and are nearly straight from the lower part of the sponge to its apex. The secondary or transverse series of skeleton-structures pass round its parietes within the primary or radial lines of the skeleton, at about right angles to them. This species is designated by Prof. Valenciennes *Alcyoncellum corbicula*. It was obtained in 80 fathoms off the Island of Bourbon.

There is in the French Museum another specimen of *Alcyoncellum*,

which differs in its construction from all the other specimens of that genus known to us either in the French Museum or in the English collections. This sponge is about 8 inches in height, $2\frac{1}{2}$ inches in diameter at the apex, and $1\frac{1}{2}$ inch at the base, and the body is cylindrical. The parietes of the sponge are of about the same thickness as those of *A. speciosum*. The primary lines of the skeleton are wide apart, irregular, and run diagonally and flexuously over its surface. The basal end of the sponge is closed and rounded, and one side of it is rather longer than the other, and there is not the slightest indication of its having been furnished with prehensile spicula similar to those of *A. speciosum*. The attachment of the sponge is partly on one side, in the form of a thick incrustation, and partly close to the base, by a similar patch of thickened tissue.

But the most striking and characteristic difference in its structure is in the apical termination of the sponge, which is totally destitute of the great marginal ring that surrounds the oscular area in *A. speciosum*, the sides and oscular area merging in each other insensibly and without the slightest trace of a boundary line. In this character this species closely resembles the distal extremity of *Polymastia mammillaris* and other species of that genus, which have not the oscular area confined within a marginal ring.

The specimen appears to have been too well washed, as no remains of interstitial spicula could be discovered with a 2-inch lens. The sponge is exceedingly beautiful, and the skeleton-structures appear by the aid of the lens like twisted spun glass.

Beside those described above, there is another specimen of *Aleyoncellum* in the Museum of the Jardin des Plantes, which is also named *A. corbicula*; but it differs so much in its structural characters as to render it highly probable that it is a distinct species. It is about 5 inches in height, $2\frac{1}{2}$ or 3 inches across at its apex, and at the base it is $1\frac{1}{2}$ inch in diameter. The base is round and smooth, but the body of the sponge assumes a square form. The texture of the sponge is very much thickened and woolly in appearance, and the spaces in its sides much larger than those in the other specimen designated by the same name. The primary lines of the skeleton are rather flexuous towards the base of the sponge, but they become more regular and straight as they approach its apex. There are no indications of elevated ribs either on the exterior or interior of this sponge. I have had no opportunity of examining its structural peculiarities; but I have little doubt of their being different from those of the sponge bearing the same name in the French collection.

8. On the Coleoptera of the Azores.

By GEORGE R. CROTCH, M.A.

(Plate XXIII.)

The Azores, though not less interesting, have yet received a far less share of attention, as far as their fauna is concerned, than the

neighbouring groups of Madeira and the Canaries. The exploration of these, however, is due almost entirely to the laborious and unremitting exertions of Mr. T. V. Wollaston, who has devoted himself to working out the Coleopterous fauna of the Atlantic region with a care and perseverance that, unfortunately, finds too few imitators. The fourth group, viz. the Cape de Verde Isles, have also been recently explored by him, and have produced a magnificent series of novelties. It is with considerable pleasure, then, that I am able, through the kindness and liberality of Mr. Godman, to supplement his researches with an enumeration of the Azorean Coleoptera. Our previous knowledge of this group of islands was very limited, but will be found admirably summed up in M. Drouet's 'Éléments de la Faune Açoréenne.' Indeed it is to him and his companion M. Morelet that we owe any detail of the insects, shells, &c. at all. Of Coleoptera he enumerates fifty-nine, and comments upon their European character, five only being peculiar; these were described in part by M. Tarnier in M. Morelet's 'Notice sur l'histoire naturelle des îles Açores;' and one (*Lapar. azoricus*) by M. Drouet himself in his 'Coleoptères Açoréens.' The remaining species cited by him are of the most ordinary character, and show certainly the cultivated state of the islands. In 1865, however, Mr. Godman undertook a voyage to these islands with a view to get a more satisfactory *résumé* of their fauna; and in order that the Coleoptera might receive due attention, he was accompanied by an energetic and well-known English collector, Mr. J. A. Brewer. They arrived at S. Miguel on the 21st of March, and remained there a month. On the 21st of April they visited Terceira for a day, and went on to Fayal; thence they crossed, with some difficulty, to Flores and Corvo. After this Mr. Godman was obliged to return; but his collector (Mr. Brewer) subsequently visited Sta. Maria, though it was then somewhat late in the season. The material thus amassed was liberally placed in my hands by Mr. Godman to be worked out; and it shows a very great advance upon that of MM. Drouet and Morelet, including as it does 213 species, of which thirteen are new to science, and thirty-seven new to the Atlantic district, and redeems the fauna from its purely European character. Of the nine islands, three remain practically unvisited—one, indeed (Pico), being probably the best island for characteristic species, being much the most wooded.

Analogy would lead us to put the fauna at, at least, double the present number; and much of the increase would consist of new species, since, in comparing it with that of the other Atlantic groups, it presents some singular features.

Thus of the 1450 species comprised in the 'Coleoptera Atlantidum' one-fourth are European, one-fourth probably geographical races, and one-half indigenous. Thus in the combined groups only 350 European species occur, while here we have already 160; hence no great increase of this class can be expected. The proportions here take the form of three-fourths European, and about one-tenth, or less, indigenous. This is no doubt due to this collection having

been made more in cultivated districts and the neighbourhood of towns than under canvas in remote ravines, as Madeira has been worked; still it shows that the prevailing Atlantic forms are here only scantily represented. The characteristic genera *Laparocerus*, *Acalles*, *Tarphius*, *Attalus* (all containing eighteen or nineteen species in the other groups) have only solitary representatives. The prevailing genera are *Cryptophagus* (6), *Homalota* (11), *Philonthus* (6), *Lithocharis* (5); but they contain almost entirely introduced species. The two new genera of *Rhynchophora*, *Asynonychus*, and *Neocnemis* barely redeem the general poverty of the fauna; both, however, are very anomalous in their affinities. Two very abundant Madeira forms (*Mesites* and *Dasytes*) are here represented by European species (*M. tardii*, Curt., and *D. nobilis*, Ill.), in place of the cognate species found in the former group; and this is the more singular, as so marked a connexion with Madeira exists in some species*. The conclusions derived from M. Drouet's lists of the other classes accord with some of these deductions: thus the almost total absence of peculiar Vertebrata (no Reptiles) would seem to show that it had been under very different conditions from the Canaries. In its land-shells, which afford a good parallel to the insects, out of seventy-six species, one-half are peculiar, one-seventh Atlantic, and one-third European; among these *Viquesnelia*, peculiar to the Azores and India, though found fossil in the Pyrenees, is the most remarkable.

A detailed analysis of the 170 European species may throw some light on their origin. I have distributed them into two groups (70 possibly indigenous, and 101 almost certainly introduced by colonists), sorted into eight sections, those printed in italics being new to the Atlantic fauna.

(1) Cosmopolitan species, which are introduced in articles of commerce, especially provisions, to all parts of the world. These are totally without significance in any fauna, their number depending only on the assiduity with which search is made in warehouses &c. in the sea-ports. Cutting off, therefore, the twelve here enumerated, leaves the real fauna at 200 species.

<i>Carpophilus dimidiatus</i> .	<i>Anobium paniceum</i> .
— <i>mutilatus</i> .	<i>Calandra oryzæ</i> .
<i>Silvanus advena</i> .	— <i>granaria</i> .
<i>Nausibius dentatus</i> .	<i>Tribolium ferrugineum</i> .
<i>Corticaria serrata</i> .	<i>Tenebrio obscurus</i> .
<i>Ptinus testaceus</i> .	<i>Alphitobius piceus</i> .

(2.) Species also introduced by the medium of commerce, but which may be characterized rather as frequenters of refuse: they

* The most striking group in the collection is, however, the *Elateridae*, with six fine species belonging to as many genera. When we remember that in the Canaries and Madeira this family is represented by the ill-defined and inconspicuous genus *Coptostethus*, Woll., this is very remarkable. Upon examination, however, two appear to be American and two European, thus leaving only two as really indigenous.

are found, for the most part, in the débris of hay- or straw-ricks, about hotbeds, and, indeed, in all vegetable refuse not too rotten*.

<i>Sericoderus lateralis.</i>	<i>Latridius nodifer.</i>
* <i>Ptenidium apicale.</i>	<i>Corticaria fulva.</i>
<i>Nitidula 4-pustulata.</i>	<i>Typhæa fumata.</i>
— colon.	<i>Mycetæa hirta.</i>
* <i>Monotoma 4-foveolata.</i>	<i>Dermestes frischii.</i>
*— <i>spini-collis.</i>	<i>Acritis minutus.</i>
— <i>quadricollis.</i>	<i>Carcinops pumilio.</i>
* <i>Aglenus brunneus.</i>	* <i>Trox scaber.</i>
<i>Cryptophagus dentatus.</i>	<i>Blaps similis.</i>
— <i>affinis.</i>	<i>Anthicus floralis.</i>
*— <i>cellaris.</i>	<i>Falagria obscura.</i>
— <i>punctipennis.</i>	<i>Philonthus æneus.</i>
— <i>saginitus.</i>	— <i>umbratilis.</i>
— <i>schmidtii.</i>	<i>Leptacinus pusillus.</i>
* <i>Atomaria munda.</i>	<i>Xantholinus punctulatus.</i>
* <i>Epistemus gyrinoides.</i>	<i>Stilicis affinis.</i>
<i>Latridius minutus.</i>	<i>Lithocharis ochracea.</i>

(3) Species introduced in old wood, &c., in houses.

<i>Opilus mollis.</i>	<i>Gracilia pygmæa.</i>
<i>Anobium domesticum.</i>	<i>Clytus 4-punctatus.</i>
<i>Hylotrypes bajulus.</i>	<i>Leptura, sp. — ?</i>

(4) Species inhabiting dung. Here it may be remarked that if islands are dependent on colonization for their Mammalia, their coprophagous insects must also be introduced; special attention should therefore be paid to any new species having these habits. Of course many of the decaying-vegetable feeders will take to dung under certain circumstances.

<i>Sphæridium bipustulatum.</i>	<i>Homalota atramentaria.</i>
<i>Cercyon obsoletum.</i>	— <i>melanaria.</i>
<i>Onthophagus vacca.</i>	— <i>nigra.</i>
— <i>taurus.</i>	<i>Philonthus sordidus.</i>
<i>Aphodius granarius.</i>	— <i>scybalarius.</i>
— <i>lividus.</i>	<i>Oxytelus sculptus.</i>
<i>Aleochara nitida.</i>	— <i>complanatus.</i>
— <i>puberula.</i>	— <i>nitidulus.</i>

(5) Species introduced with pine trees, as in Madeira. In the Canaries, where pines are apparently indigenous, the insects are all cognate species.

<i>Pissodes notatus.</i>	<i>Hylurgus ligniperda.</i>
<i>Hylastes ater.</i>	<i>Homalium pusillum.</i>

* As an exemplification of the above, it may be interesting to mention that the conditions under which these species thrive seem to have culminated in a small shed used for picking fowls near Horta in Fayal. Under the feathers, &c., were found ten of the species here enumerated, which, however, occurred nowhere else in the islands.

(6) Species found in water. These are very few in these islands; why, it is difficult to say; but with the exception of one *Agabus*, which may be new, all are the most ordinary European forms. The three new to the Atlantic fauna are probably introduced.

Hydroporus planus.

Philhydrus lividus.

Colymbetes pulverosus.

(7) Species introduced with garden plants, &c., about cultivated ground.

Melanotus dichrous?

Sitones flavescens.

Athous obsoletus?

— *lineatus*.

Ceuthorhynchus nigroterminatus.

— *gressorius*.

Hypera variabilis.

Bruchus pisi.

Otiorhynchus scabrosus.

Psylliodes chrysocephala.

— *sulcatus*.

Haltica ampelophaga.

(8) Of the eighty-six European species remaining, the following fourteen are probably mere recent introductions:—

Calathus mollis.

Saprinus semistriatus.

Bradycellus distinctus.

Ptilinus pectinicornis.

Phalacrus coruscus.

Tomicus saxeseni.

— *consimilis*.

Hypoborus ficus.

Nitidula obsoleta.

Coccinella 7-punctata.

Anthrenus varius.

Chilocorus bipustulatus.

Saprinus cærulescens.

Scymnus minimus.

(9) Sixteen species remain, now brought forward as new to the Atlantic fauna, concerning whose origin I am not able to offer any conjecture:—

Licinus brevicollis.

Meligethes incanus.

Anchomenus parum punctatus.

Psammodius plicicollis.

Pterostichus vernalis.

Dolichosomus nobilis.

Harpalus ruficornis.

Mesites tardii.

— *griseus*.

Coccinella 11-punctata.

Stenolophus brunnipes.

Lithocharis ripicola.

— *luridus*.

— *apicalis*.

Corytholophus sublævipennis.

Trogophloeus subtilis.

(10) M. Drouet enumerates a few species which have escaped Mr. Godman, but which he appears to have found in some numbers:—

Calathus flavipes.

Anobium tomentosum.

Saprinus rugifrons.

Xantholinus glabratus.

Coccinella variabilis.

(11) We then get the following thirty-two as being found in the three Atlantic groups and South Europe, and representing perhaps the remains of a common fauna:—

Dromius maurus.

Anchomenus albipes.

Pristonychus complanatus.

— *marginatus*.

<i>Stenolophus teutonius</i> .	<i>Opatrum hispidum</i> .
<i>Tachys 4-signatus</i> .	<i>Anthicus hispidus</i> .
<i>Parnus prolifericornis</i> .	<i>Homalota longula</i> .
<i>Dactylosternum abdominale</i> .	— <i>coriaria</i> .
<i>Cercyon littorale</i> .	<i>Habrocerus capillaricornis</i> .
— <i>centromaculatum</i> .	<i>Conosomus sericeus</i> .
<i>Saprinus apriciarius</i> .	<i>Philonthus nigrutilus</i> .
— <i>dimidiatus</i> .	<i>Xantholinus hesperius</i> .
<i>Psammodius porcicollis</i> .	<i>Lithocharis ruficollis</i> .
— <i>sabulosus</i> .	— <i>debilicornis</i> .
<i>Mezium sulcatum</i> .	<i>Stenus guttula</i> .
<i>Rhizobius litura</i> .	<i>Platystethus spinosus</i> .
<i>Blaps gages</i> .	<i>Trogophloeus riparius</i> .
<i>Hegeter tristis</i> .	— <i>corticinus</i> .

Their European connexion being thus analyzed, it only remains to trace their affinities to the other Atlantic groups, and first with Madeira.

The two have in common 140 species, or very nearly three-fourths of the entire fauna: (1) 97 of these, however, are common to the Azores, Madeira, the Canaries, and Europe, and are hence unessential; (2) 26 are found in Madeira and Europe, and of these 17 may be considered introduced into both islands; the remaining 9 indigenous species are as follows:—

<i>Pterostichus nigerrimus</i> .	<i>Bembidium rufescens</i> .
<i>Amara trivialis</i> .	<i>Phloeophagus spadix</i> .
<i>Anisodactylus binotatus</i> .	<i>Homalota luridipennis</i> .
<i>Harpalus rotundicollis</i> .	<i>Sunius gracilis</i> .
— <i>distinguendus</i> .	

(3) Eight are found in Madeira and the Canaries, but not in Europe as yet, viz. :—

<i>Cercyon inquitum</i> .	<i>Cryphalus aspericollis</i> .
<i>Læmophloeus clavicollis</i> .	<i>Apion chalybeipenne</i> .
<i>Paramecosoma simplex</i> .	<i>Psylliodes vehemens</i> .
<i>Corticaria maculosa</i> .	<i>Silaria proteus</i> .

These represent the purely Atlantic species; but the *Paramecosoma* alone has strong claims to be considered really peculiar, or "autochthonous," to use Mr. Wollaston's expression.

(4) Eight also have been found hitherto in the Azores and Madeira only :—

<i>Trechus fimicola</i> .	<i>Scymnus durantæ</i> .
<i>Bembidium schmidtii</i> .	<i>Homalota oblique-punctata</i> .
<i>Malachius militaris</i> .	<i>Philonthus proximus</i> .
<i>Phloeophagus tenax</i> .	<i>Homalium clavicorne</i> .

These show the strong connexion with Madeira, since five of these are modified into insular species in the Canaries, but reach here

unchanged; the *Homalium* and *Phlæophagus* are the only two "autochthones."

Their connexion with the Canaries is very slight and little marked, 114 species only being common to the two groups. Of these—

(1) Ninety-seven are, as before, universal.

(2) Seven are common also to Europe; and four of them, at least, are introduced.

Hydroporus planus.

Gyrinus dejeani.

Dermestes frischii.

Trachyscelis aphodioides.

Anthicus humilis.

Ocypus olens.

Homalota nigra.

(3) Eight are, as before, common to Madeira.

(4) Two only remain as peculiar to the Canaries and Azores; and of these one (*Anobium villosum*) is a mere introduction; but the other (*Calosoma azoricum*) is a very singular insect, representing the *C. maderæ* of Madeira, and extending even to the Cape de Verde Islands. The Canaries are remarkable for possessing both forms, though in separate islands.

With the little uninhabited rocks called the Salvages, the Azores have two species in common (*Harpalus rotundicollis* and *Phaleria bimaculata*), both occurring in some abundance.

But the most remarkable portion of the Azorean fauna remains yet to be noticed, viz. those species which it has in common with America. These are—

Æolus melliculus.

Monocrepidius posticus.

Tæniotes scalaris.

The *Heteroderes azoricus* also is probably a mere modification of an American species, which has succeeded in establishing itself here. The *Tæniotes* also appears thoroughly naturalized. Whether these species owe their introduction to colonization and human intercourse or to natural means must remain an open question. For the former much is to be said. An open and continual communication exists between S. Miguel and Bahia; and Mr. Godman informs me that very large quantities of plants and trees are imported to form gardens. This latter fact may account for the numerous European species also. On the other hand, the occurrence of *Clytus erythrocephalus* on the desolate rocks of the Salvages, where it could not have been introduced, suggests that, after all, the Gulf Stream may have been the origin of these peculiar species. This is borne out by the fact that they are all wood-feeding species, so that they would readily come in logs in the pupa state without injury; and by the fact that the *Het. azoricus* must have been introduced at a period previous to the Portuguese colonization to account for its abundance in several islands and its modified characters. Some light may be thrown on this also by the occurrence of *Cynthia huntera* in the Canaries.

Further, an African connexion is suggested by the *Staphylinus hesperus* (a close ally of a Cape species), and by the very remarkable

Elastrus dolosus, which has congeners only in Madagascar, but in external form simulates some Cape *Elaters* so as to be undistinguishable except by a close examination. This Madagascar connexion is found also in the Cape de Verde Islands, which have two or three species in common with it.

To sum up these affinities numerically, we find that of the 213 species 168 are European, 18 Atlantic, and 23 peculiar—or that 168 are common to Europe, 140 to Madeira, and 114 to the Canaries. The proportions of the families vary a little from those observed in Madeira and the Canaries.

	Azores.	Mad. et Can.
<i>Brachelytra</i>	48	215
<i>Necrophaga</i>	38	219
<i>Rhynchophora</i>	27	282
<i>Geodephaga</i>	27	188
<i>Priocerata</i>	16	135
<i>Cordylocerata</i>	16	64
<i>Heteromera</i>	15	172
<i>Philhydrida</i>	8	29
<i>Pseudotrimeria</i>	7	30
<i>Eucerata</i>	5	22
<i>Phytophaga</i>	3	64

The most notable displacements here are the very great absence of *Phytophaga*, the lowering of the standard of *Rhynchophora*, always much the largest group in the other islands, and the singular paucity of *Heteromera*. The large development of *Necrophaga* and *Brachelytra* is due to their containing many introduced species. All this seems to show that, on the hypothesis of a connected continent, the fauna of the Azores was drawn from a much more northern source than that of the other islands. This is particularly evinced by the absence of *Heteromera*. The paucity of water-beetles, notwithstanding their rainy condition, is less easily accounted for; but the same occurs in Madeira, where previously to the destruction of the forests there must have been water enough, and yet even the universal *Gyrinus dejeani* does not occur there. A more restrained type of fauna is indicated by the solitary representatives of the Atlantic genera (*Tarphius* &c.), which further south develop numerous forms in each island; it may, indeed, have been that the Azores formed almost the western boundary of land in this direction.

This brief sketch will show how full of interest the subject is, and how much yet remains to be done even in the groups apparently most explored. I shall now enumerate in order the 213 species at present known as inhabitants of these islands, and describe those which appear to be new, reproducing the novelties already described by MM. Drouet and Morelet.

1. CALOSOMA AZORICUM, Heer.

Under stones in S. Miguel, Terceira, and Santa Maria, but rarely. This agrees precisely with the specimens recorded by Mr. Wollaston from Lanzarote in the Canaries, and forms the only link between

these two groups; it is not, however, confined to them, as it has since been brought from the Cape de Verde Islands. M. Drouet has erroneously identified it with *C. olivieri*, Dej.

2. *BLECHRUS MAURUS*, Sturm.

Under stones in S. Miguel, not common. None of the examples agree with the allied *B. glabratus*; but this form will also not improbably occur.

3. *LICINUS BREVICOLLIS*, Dej.

Abundant on the sand-hills at Praya in Terceira. New to the Atlantic fauna, but widely spread in the Mediterranean district. Its localization suggests that it may be a ballast importation.

4. *PRISTONYCHUS COMPLANATUS*, Dej.

Universal in the various Atlantic islands, including even St. Helena, and common also in parts of South Europe. Specimens are before me from S. Miguel and Flores; but M. Drouet records it from all the islands.

5. *CALATHUS FLAVIPES*, Payk. (*FULVIPES*, Gyll.).

Recorded by M. Drouet from all the islands. There is nothing in Mr. Godman's material at all resembling it.

6. *C. MOLLIS*, Marsh.

One specimen from the borders of the Lagoa das Furnas, S. Miguel. M. Drouet records it also from Pico, saying that it is common under stones near the sea. The single specimen before me differs a little from the English form, being larger and with the elytra more deeply striate. The occurrence of two European species only of a genus which almost seems characteristic of the Canaries and Madeira is very remarkable.

7. *ANCHOMENUS APTINOIDES*, Tarnier.

I have not seen this species, described on a unique specimen by M. Tarnier. It would appear to be allied to *A. nichollsi*, Woll., from the Canaries.

8. *A. ALBIPES*, Fabr.

Common in damp places in S. Miguel. Also not rare in Madeira; but in the Canaries it is confined to Fuerteventura.

9. *A. MARGINATUS*, Linn.

Margins of the Lagoa das Furnas, S. Miguel, common; M. Drouet adds Terceira. It is common in both the other Atlantic groups.

10. *A. PARUMPUNCTATUS*, Fabr.

New to the Atlantic fauna. It is not rare in S. Miguel, and also (*teste* Drouet) in Fayal and Terceira.

11. *PTEROSTICHUS NIGERRIMUS*, Dej.

Under stones on the sand-hills at Praya, Terceira, rare. It occurs also in Madeira and South Europe, and is probably a race of *P. aterrimus*, Hb.

12. *P. VERNALIS*, Pz.

New to the Atlantic fauna. M. Drouet records it from all the islands; but I have only seen it from S. Miguel, where it appears to be rare.

13. *AMARA TRIVIALIS*, Gyll.

S. Miguel and Flores; but also in all the islands, according to M. Drouet. This insect ranges over the whole northern hemisphere.

14. *ANISODACTYLUS BINOTATUS*, Fabr.

S. Miguel and Terceira. M. Drouet says that it occurs in all the islands.

15. *HARPALUS (OPHONUS) ROTUNDICOLLIS*, Fairm.

Common at Angra, Terceira, and Santa Cruz in Flores. M. Drouet records one specimen from S. Miguel. Previously one was known from Madeira and one from the Salvages; hence its occurrence in some numbers is interesting.

16. *H. (PSEUDOPHONUS) RUFICORNIS*, Fabr.

This species abounds in S. Miguel under stones, also in the other islands (Drouet). It is new, however, to the Atlantic fauna.

17. *H. (PSEUDOPHONUS) GRISEUS*, Panz.

Found rarely with the preceding, of which I am disposed to consider it a variety. The only two specimens I have seen are from Terceira and Fayal respectively. They agree with undoubted European specimens; but I cannot think their separation justifiable.

18. *H. DISTINGUENDUS*, Duft.

This common Madeira insect is probably universal in the Azores. I have seen it from S. Miguel, Terceira, and Fayal.

19. *STENOLOPHUS TEUTONUS*, Schrank.

S. Miguel, Terceira, and Fayal. Probably universal, as in the Canaries.

20. *S. (ACUPALPUS) BRUNNIPES*, Sturm.

Not uncommon in S. Miguel, Terceira, and Flores; also in S. Maria, according to M. Drouet. It takes the place of *St. dorsalis*, which is common in Madeira and the Canaries, and of which I regard it as a black variety. Its occurrence unmixed with the type form is of considerable interest.

21. *S. (ACUPALPUS) LURIDUS*, Dej.

On the coast in S. Miguel and Terceira. This is new to the Atlantic fauna; and it is very curious that the pale form should occur, whereas the dark form of the preceding is present.

22. *BRADYCELLUS DISTINCTUS*, Dej.

One specimen only, from the Lagoa das Furnas, S. Miguel. It is new to the Atlantic fauna. Compared with English examples, the elytra are more ventricose and have the interstices perceptibly flatter. If further material should show that it is really distinct, I shall propose the name "*azoricus*" for it.

23. *TRECHICHUS FIMICOLA*, Woll.

One specimen, from Fayal. This does not quite agree with Madeiran types in the British Museum, being distinctly paler, and with more faintly striate elytra. Further material can alone decide whether these characters are permanent or not.

24. *TACHYS 4-SIGNATUS*, Duft. (*CURVIMANUS*, Woll.).

Not rare in S. Miguel, Terceira, and Fayal. Those from Terceira are paler and more faintly striate. It is common in South Europe, Madeira, and the Canaries; at least I am unable to distinguish between specimens from Spain and the latter locality.

25. *BEMBIDIUM (OCYS) RUFESCENS*, Fabr. (*DUBIUM*, Woll.).

S. Miguel, Fayal, and Flores; also in Santa Maria (Drouet). A careful comparison of it with English specimens and with Mr. Wolleston's type in the British Museum has convinced me that they should be referred to one species.

26. *B. (LOPHA) SCHMIDTII*, Woll.

This insect, which assumes a different form in South Europe, Madeira, and the Canaries, here appears to approximate most closely to the Madeiran race; the coloration, however, is darker, the testaceous patches being less developed. It is not common in S. Miguel and Fayal.

27. *B. (LEIA) HESPERUS*, n. sp.

Two examples only, under marine rejectamenta at Praya in Terceira. It is most nearly allied to *B. latum*, Brullé.

28. *HYDROPORUS PLANUS*, Fabr.

Not rare in ponds in Terceira, Fayal, and Flores. It is darker than the ordinary English form, but I am unable to detect any tangible differences.

29. *COLYMBETES (RHANTUS) PULVEROSUS*, Sturm.

New to the Atlantic fauna, but is probably introduced; and when one reflects on the introduction of goldfish, it is easy to see that
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some water insects at least must have accompanied them. The specimens before me are darker than English ones, a circumstance probably to be accounted for by the method of preservation adopted.

30. *AGABUS GÖDMANNI*, n. sp.

This fine species is by no means rare in Terceira, Fayal, and Flores; and it is with some doubt that I have ventured to regard it as new; but it agrees with no published description that I have access to.

31. *GYRINUS DEJEANI*, Brullé.

Common in Flores and Santa Maria, as also in Teneriffe, though not in Madeira. M. Drouet in his brief list records no Water-beetles.

32. *PARNUS PROLIFERICORNIS*, Rossi.

S. Miguel and Santa Maria; also in Graciosa and Flores (Drouet).

33. *PHILHYDRUS LIVIDUS*, Forst.

Not rare in Terceira, but new to the Atlantic fauna, representing the *Ph. melanocephalus* of the other groups.

34. *SPHÆRIDIDIUM BIPUSTULATUM*, Fabr.

Common in S. Miguel, Santa Maria, Terceira, and Flores, and is probably, as all the dung species may be presumed to be, universal.

35. *DACTYLOSTERNUM ABDOMINALE*, Fabr.

Two specimens, under dung in Fayal. It is somewhat curious that this species should be so rare here, occurring as it does in the Mediterranean, Madeira, and the Canaries.

36. *CERCYON OBSOLETUM*, Gyll.

At Ponte Delgada, S. Miguel, and also in the higher parts of the island, but not common.

37. *C. LITTORALE*, Gyll.

Fayal and S. Miguel; one specimen only from each. This species appears to decrease in abundance southwards.

38. *C. INQUINITUM*, Woll.

One specimen, at Ponte Delgada, S. Miguel. A Madeiran insect, but probably of wider range in reality.

39. *C. CENTROMACULATUM*, Sturm.

Flores and S. Maria, not common. The name "*nigriceps*, Marsh.," has been adopted by some for this species. The description is inapplicable; and he has in his collection placed specimens to represent four different species; hence he could not have had a very clear idea of its characters.

40. *CORYTHOLOPHUS SUBLÆVIPENNIS*, Duv.

Four or five specimens, from flowers at Horta, Fayal. It seems to agree sufficiently with the European species described by Duval, and is like our common species, but paler and obsoletely punctate.

41. *SERICODERUS LATERALIS*, Gyll.

S. Miguel and Fayal, in refuse.

42. *PTENIDIUM APICALE*, Sturm.

Fayal, in a shed, among feathers &c., with several other insects of the same imported class.

43. *PHALACRUS CORUSCUS*, Panz.

One specimen, from Santa Maria. It occurs also in the Canaries, but not in Madeira.

44. *P. (OLIBRUS) CONSIMILIS*, Marsh.

Abundant in S. Miguel and Fayal; probably an introduced species.

45. *CARPOPHILUS DIMIDIATUS*, Fabr.

From decaying oranges near Ponte Delgada in S. Miguel.

46. *C. MUTILATUS*, Fabr.

Two specimens, with the preceding; both seem nearly cosmopolitan.

47. *MELIGETHES INCANUS*, Er.

One, from flowers at Horta in Fayal. It was identified by M. Brisout de Barneville with the above species; and I think the *M. tristis* of Mr. Wollaston's work must also be referred to it.

48. *NITIDULA 4-PUSTULATA*, Fabr.

One specimen, from Ponte Delgada, S. Miguel; clearly introduced.

49. *N. (OMOSITA) COLON*, L.

In S. Miguel and Fayal, but always in the vicinity of towns.

50. *N. (EPURÆA) OBSOLETA*, Fabr.

S. Miguel, Terceira, and Fayal, under bark and refuse &c. In comparison with Madeiran specimens it would seem to be more strongly punctured, and with the thorax just perceptibly more emarginate in front.

51. *MONOTOMA 4-FOVEOLATA*, Aubé.

In the fowl-shed at Horta, Fayal, abundantly.

52. *M. SPINICOLLIS*, Aubé.

Near Horta, Fayal, rarely.

53. *M. QUADRICOLLIS*, Aubé.

Ponte Delgada, S. Miguel, one specimen only.

54. *TARPHIUS WOLLASTONI*, n. sp.

In dead *Euphorbia*-stems near Santa Cruz, Flores, not rare. One of the very few remnants of the old laurel-fauna.

55. *AGLENUS BRUNNEUS*, Gyll.

In the fowl-shed at Horta, Fayal, abundantly.

56. *LÆMOPHLEUS CLAVICOLLIS*, Woll.

One specimen, at Ponte Delgada, S. Miguel, but probably more widely distributed.

57. *SILVANUS ADVENA*, Waltl.

At Horta, Fayal, in the fowl-shed, not rare.

58. *NAUSILIUS DENTATUS*, Marsh.

One specimen, in sugar at Santa Cruz, Flores.

59. *CRYPTOPHAGUS CELLARIS*, Scop.

In the fowl-shed at Horta, Fayal, rare.

60. *C. DENTATUS*, Hb.

One specimen with the preceding, and one taken by sweeping in S. Miguel.

61. *C. AFFINIS*, Sturm.

Two specimens; one from S. Miguel, the other from Terceira.

62. *C. PUNCTIPENNIS*, Bris.

One specimen, at Santa Cruz, Flores. This was named for me by M. Brisout himself, and is a species recently described from France.

63. *C. SAGINATUS*, Er.

Santa Cruz, Flores, in houses.

64. *C. SCHMIDTII*, Er.?

One specimen, taken with the preceding, appears to me not to differ from the European species. It is new to the Atlantic fauna.

65. *PARAMECOSOMA SIMPLEX*, Woll.

Not rare under refuse in S. Miguel and Fayal. This species has not yet occurred in Europe, though pretty common in all the three groups of islands.

66. *ATOMARIA MUNDA*, Er.

In the fowl-shed at Horta, Fayal, abundantly.

67. *EPISTOMUS GYRINOIDES*, Marsh.

With the preceding, also under refuse in S. Miguel.

68. *LATRIDIUS MINUTUS*, L.

One specimen only, at Santa Cruz, Flores. This insect positively swarms in Madeira and the Canaries.

69. *L. NODIFER*, Westw.

In decaying oranges at Ponte Delgada, San Miguel—and also at Horta, Fayal, but rarely. This insect has been hitherto confined to England, where it was some years ago of the utmost rarity; now, however, it is universally spread over the country, and in the greatest abundance. It is probably a mere importation into the Azores, but is not without significance.

70. *CORTICARIA MACULOSA*, Woll.

At Ponte Delgada, S. Miguel, three specimens only.

71. *C. FULVA*, Com.

Two specimens only, in S. Miguel and Fayal respectively, and both probably introduced.

72. *C. SERRATA*, Gyll.

One specimen, in the fowl-shed at Horta, Fayal.

73. *C. CURTA*, Woll.

S. Miguel and Fayal, under refuse. This species occurs in many parts of Europe, and is scattered in collections as *C. truncatella*, Mannh.

74. *TYPHÆA FUMATA*, L.

Abundant in S. Miguel and Fayal, under refuse.

75. *MYCETÆA HIRTA*, Marsh.

Also not rare in S. Miguel and Fayal, in out-houses &c.

76. *DERMESTES FRISCHII*, Kug.

S. Miguel, Terceira, and Fayal, in dead fish &c. All the specimens I have examined are referable to this species; but its congener, *D. vulpinus*, must also occur.

77. *ANTHRENUS VARIUS*, Fabr.

Very common in flowers in Fayal and Flores, and very variable in size and markings.

78. *ACRITUS MINUTUS*, Hb.

In garden-refuse at Ponte Delgada, S. Miguel, rarely.

79. *CARCINOPS PUMILIO*, Er. (14-STRIATUS, Steph.).

One specimen, at Horta, Fayal. Mr. Wollaston has employed the

Stephensian name to designate this species, which, however, is posterior to Erichson's by five years.

80. *SAPRINUS CÆRULESCENS*, Ent. H. (*SEMIPUNCTATUS*, Fab.).

One specimen, from Ponte Delgada, S. Miguel, has been sent to Mr. Godman since his return. M. Drouet records it from Terceira. It is new to the Atlantic fauna. As the Fabrician insect was different from Herbst's (whose name he quotes), it is impossible to retain the name.

81. *S. SEMISTRIATUS*, Scriba (*NITIDULUS*, Fabr.).

S. Miguel, Fayal, and Terceira; also common throughout, according to M. Drouet. Scriba's name has eleven years of priority over that of Fabricius.

82. *S. APRICARIUS*, Er.

Abundant in Fayal, under dead fish.

83. *S. DIMIDIATUS*, Ill.

Abundant with the preceding; M. Drouet also records the species. It must be very close to *S. lobatus*, Woll., if not identical with it.

84. *S. RUGIFRONS*, Payk.

"Under stones on the sea-shore in Terceira."—*Drouet*. I have not seen any specimens of this species.

85. *ONTHOPHAGUS TAURUS*, Schreb.

Common in all the islands, and affording a good example of the rapid distribution of an insect in a congenial locality.

86. *O. VACCA*, Fabr.

One only, from Angra, Terceira. M. Drouet also records one.

87. *APHODIUS GRANARIUS*, L.

S. Miguel, Terceira, and Fayal, abundant.

88. *A. LIVIDUS*, Oliv.

Not rare in Terceira and Fayal.

89. *PSAMMODIUS SABULOSUS*, Muls.

One specimen only, from Praya, Terceira; probably, however, not rare.

90. *P. PLICICOLLIS*, Er.

New to the Atlantic fauna; two specimens were taken at Horta, Fayal.

91. *P. PORCICOLLIS*, Ill.

Abundant near Horta, Fayal,

92. *P. CÆSUS*, Pr.

Several specimens, from Flores, Terceira, and Fayal.

93. *Trox scaber*, L.

Abundant in the fowl-shed at Horta, Fayal; but clearly introduced. In Madeira a single specimen only has been noticed.

94. *Heteroderes azoricus*, Tarn. (*atlanticus*, Cand.). (Pl. XXIII. fig. 2.)

Very abundant under stones, and probably universal. I have seen specimens from S. Miguel, Flores, Terceira, Fayal, and Corvo. M. Drouet also records it from Santa Maria. Mr. E. W. Janson, to whom I am indebted for a careful examination of this and the following *Elateridae*, informs me that it is nearly allied to *H. rufangulus*, Gyll., of Brazil. This and the remaining *Elateridae* are entirely new to the Atlantic fauna.

95. *Æolus melliculus*, Cand. (*moreleti*, Tarn.).

Mr. Janson informs me that the specimens taken by Mr. Godman are not distinguishable from the original Dejeanian types of the above South American species. It is very widely spread from Carthagena to Buenos Ayres, according to Candèze. The *Æ. moreleti*, Tarnier (1860), is slightly different in coloration; but of the few specimens before me no two are precisely alike. They were all taken at Horta, Fayal, under dead weeds.

96. *Monocrepidius posticus*, Erichs.

A single specimen taken by Mr. Godman in Fayal is referable, as Mr. Janson informs me, to the above common Brazilian species.

97. *Elastrus dolosus*, n. sp.

One specimen only, in S. Miguel. This is probably the *Ampedus*, sp.?, of M. Drouet's catalogue.

98. *Melanotus dichrous*, Erichs.?

Mr. Janson refers a single specimen taken in Santa Maria to this South European species.

99. *Athous obsoletus*, Ill.?

Three specimens taken in a garden at Ponte Delgada, S. Miguel, appear to be identical with the above species, which is an inhabitant of South Europe, and is new to the Atlantic fauna.

100. *Attalus miniatocollis*, Tarnier.

Terceira and Fayal, common on flowers. M. Drouet records it from Santa Maria. It is very closely allied to the Canarian *A. ruficollis*, Woll.

101. *Malachius militaris*, Woll.

A single female specimen, from flowers near the Furnas. It differs

from Madeiran examples, communicated to me by Mr. Wollaston, by the form of the thorax, which in them is slightly narrowed behind and sinuate, whereas in this it is nearly quadrate; but the punctuation is nearly identical.

102. *DOLICHOSOMUS NOBILIS*, Ill.

Probably universal, as Mr. Godman brought it from Terceira, S. Miguel, Fayal, Flores, and Corvo. M. Drouet also records it from Santa Maria. Its occurrence is somewhat remarkable, since in Madeira it is represented by the nearly allied *D. illustris*, Woll.

103. *OPILUS MOLLIS*, Linn.

One specimen, from a house in Ponto Delgada, S. Miguel. M. Drouet speaks of it as common.

104. *PTINUS TESTACEUS*, Oliv.

Two specimens in the fowl-shed at Horta, Fayal.

105. *MEZIUM SULCATUM*, Fabr.

In Terceira, Fayal, and Santa Maria, not rare. This species is probably universal, being very abundant in Madeira and the Canaries, where it seems truly indigenous.

106. *ANGBIUM DOMESTICUM*, Fourc. (*STRIATUM*, Oliv.).

Terceira and Santa Maria, in houses. M. Drouet says that it occurs throughout the group.

107. *A. VILLOSUM*, Brullé?

M. Drouet records *A. tomentosum* as common throughout the group, referring probably to the above Canarian species; but I have seen no specimens of it as yet.

108. *A. PANICEUM*, Linn.

From Flores only; but doubtless universal in towns.

109. *PTILINUS PECTINICORNIS*, Linn.

In houses at the Furnas and other places in S. Miguel, but clearly introduced.

110. *HYLASTES ATER*, Fabr.

From pine trees at Horta, Fayal. New to the Atlantic fauna.

111. *HYLURGUS LIGNIPERDA*, Fabr.

With the preceding, but more abundant.

112. *TOMICUS SAXESENSI*, Ratz.

In abundance in one tree in S. Miguel.

113. *HYPORHUS FICUS*, Er.

Abundant in a dead fig-tree at Horta, Fayal. This is evidently

introduced from the Mediterranean, where it takes the place of the Canarian genus *Liparthrum*. It is new to the Atlantic fauna.

114. *CRYPHALUS ASPERICOLLIS*, Woll.

With the preceding, but more rarely. This pretty little insect is universal in the Atlantic groups, extending even to St. Helena.

115. *MESITES TARDII*, Curt.

From *Erica*-stems in S. Miguel, and afterwards from a dead *Euphorbia* in Flores; the latter locality, however, must be merely accidental. After a very careful comparison with English and Irish specimens, I am unable to detect any difference between them, improbable as such identity would at first appear to be.

116. *PHLEOPHAGUS SPADIX*, Hb. (*SULCIPENNIS*, Woll.).

Under rubbish at Horta, Fayal; it occurs also in Madeira, and was described by Mr. Wollaston, who, however, expressed his opinion that it might prove to be only a geographical state of *P. spadix*. After comparing a large number of specimens, I think the characters pointed out by him shade away insensibly.

117. *P. TENAX*, Woll.

Taken pretty abundantly in an *Erica*-stem at the Furnas, S. Miguel, also in Fayal. The specimens before me differ from Madeciran types sent me by Mr. Wollaston in being less evidently punctate and more rugose on the elytra. The sculpture of this genus, however, is liable to considerable variation in this respect.

118. *P. VARIABILIS*, n. sp.

Common in S. Miguel, Fayal, Flores, and Corvo, and assuming a slightly different form in each island. It feeds on fig-trees and Euphorbias, in a manner analogous to the *P. laurineus*, Woll., and, like that, is more sparingly punctured when found on Euphorbias.

119. *CALANDRA GRANARIA*, L.

Two specimens from Terceira.

120. *C. ORYZÆ*, L.

Very abundant in grain in S. Miguel, Terceira, and Fayal.

121. *CEUTHORHYNCHUS NIGRO-TERMINATUS*, Woll.

Not rare on flowers in S. Miguel and Fayal. It occurs also in Europe, and even in England.

122. *ACALLES DROUETII*, n. sp.

This beautiful species was taken in tolerable numbers from some decayed Euphorbia-stems in Flores.

123. *APION CHALYBEIPENNE*, Woll.

By sweeping in Fayal and Flores, not rare.

124. *PISSODES NOTATUS*, Fabr.

From pine trees at Horta, Fayal ; but evidently introduced.

125. *LAPAROCERUS AZORICUS*, Drouet.

M. Drouet described this on specimens from Fayal ; Mr. Godman, however, found it abundantly in S. Miguel under stones. It represents a curious form of the genus, differing from the Canarian species considerably in aspect.

126. *OTIORHYNCHUS SCABROSUS*, Marsh.

Beaten from hedges at Ponta Delgada, S. Miguel. New to the Atlantic fauna.

127. *O. SULCATUS*, Fabr.

One specimen, from the Lagoa das Furnas. M. Drouet records it from Terceira. It is new to the Atlantic fauna, though doubtless introduced.

128. *HYPERA VARIABILIS*, Hb.

Under refuse in Terceira, not common.

129. *ASYNONYCHUS GODMANNI*, n. sp.

Two specimens of this new and interesting form were beaten from brambles at Horta, Fayal.

130. *NEOCNEMIS OCCIDENTALIS*, n. sp.

One specimen only was swept from flowers in Santa Maria by Mr. Brewer.

131. *SITONES LINEATUS*, L.

In S. Miguel, Terceira, and Fayal, common. M. Drouet records it also from Pico.

132. *S. FLAVESCENS*, Marsh.

One specimen only, by sweeping in Santa Maria. This is a curious variety with a triangular pale sutural patch, not rare in South Europe. It is, however, new to the Atlantic fauna.

133. *S. GRESSORIUS*, Fabr.

Abundant in Terceira and Fayal, in cultivated grounds.

134. *BRUCHUS PISI*, L.

Abundant in gardens in S. Miguel and Flores.

135. *B. AZORICUS*, n. sp.

In S. Miguel, Terceira, and Fayal, not rare in flowers. This species is probably not indigenous ; but I have been unable to identify it with any described form.

136. *B. BREWERI*, n. sp.

Two specimens were taken by Mr. Brewer in Santa Maria.

137. *HYLOTRYPES BAJULUS*, L.

Several specimens, in and about houses at Ponte Delgada, S. Miguel.

138. *CLYTUS 4-PUNCTATUS*, Fabr.

In a chestnut stump at Ponte Delgada, S. Miguel. It was accompanied by the variety *C. griseus*, where the ochreous pubescence is replaced by pale grey. The occurrence of this species here throws light on the question discussed by Mr. Wollaston as to its occurrence in the Canaries. It would appear not improbable that Mr. Webb did in reality obtain specimens either in Madeira or in the Canaries; but the *C. webbia* is obviously a mere variety of the type form.

139. *GRACILIA PYGMÆA*, Fabr.

One specimen, in a house at Horta, Fayal.

140. *TÆNIOTES SCALARIS*, Fabr.

This fine Brazilian species appears to have made good its position in these islands, where it does considerable damage to the fig-trees. It is most abundant in S. Miguel; but M. Drouet states that it occurs also in Fayal and Terceira.

141. *LEPTURA*, sp.?

This very European-looking *Leptura* was sent to Mr. Godman after his return, but arrived in so fragmentary a condition that it is almost impossible to identify it with certainty. It does not appear, however, to agree with any European species exactly.

142. *HALTICA AMPELOPHAGA*, Guér.

Abundant on the vines in Santa Maria, but has been clearly introduced; it is, however, curious that it should not have found its way to Madeira or the Canaries.

143. *PSYLLIODES CHRYSOCEPHALA*, L.

Apparently nearly universal, being found in S. Miguel, Terceira, Fayal, and Flores. It is also common in Madeira.

144. *P. VEHEMENS*, Woll.

Not rare in Fayal, and probably in the other islands also. It is very abundant in the other Atlantic groups.

145. *COCCINELLA 7-PUNCTATA*, L.

One specimen only, from Santa Maria.

146. *C. 11-PUNCTATA*, L.

From S. Miguel, Terceira, and Flores; also in Santa Maria, according to Drouet.

147. *C. VARIABILIS*, Fabr.

M. Drouet states this insect to be common throughout the group; no trace of it, however, exists in the material now before me; yet it is impossible to believe that so well-known a species can have been confused with anything else.

148. *CHILOCORUS BIPUSTULATUS*, L.

One specimen only, from Santa Maria.

149. *SCYMNUS DURANTÆ*, Woll.

Not rare on flowers in Terceira and Fayal. This species has been hitherto considered peculiar to Madeira, and is represented by a cognate form in the Canaries.

150. *S. MINIMUS*, Rossi.

A few specimens have occurred in Fayal and Santa Maria.

151. *RHIZOBIUS LITURA*, Fabr.

Very abundant in S. Miguel, Fayal, and Terceira, and presenting, as usual, considerable variation in colour.

152. *BLAPS GAGES*, L.

S. Miguel and Fayal, in gardens, cellars, &c., not rare. This has been found on the Salvages.

153. *B. SIMILIS*, Latr.

Very common in S. Miguel, Fayal, and Flores.

154. *B.*, sp.?

Two specimens were taken under a stone near the Lagoa das Farnas. I am not able to refer this to any described species, but am unwilling to add to the confusion already existing in the group by adding another doubtful species.

155. *HEGETER TRISTIS*, Fabr.

S. Miguel, Terceira, and Fayal, but rare. This insect is excessively abundant in Madeira and the Canaries.

156. *OPATRUM HISPIDUM*, Brullé.

Abundant in S. Miguel, Terceira, and Fayal, and probably universal.

157. *HELOPS AZORICUS*, n. sp.

Under the bark of a poplar tree at the Furnas, S. Miguel. This is very near one of the Madeiran species, but not, I think, identical with it.

158. *PHALERIA BIMACULATA*, Herbst.

Abundant under dead fish at Horta, Fayal. M. Drouet records

the *P. cadaverina* from Terceira and S. Miguel, but he evidently means the present species.

159. *TRACHYSCELIS APHODIODES*, Latr.

One specimen only, on the sea-shore at Horta, Fayal.

160. *TRIBOLIUM FERRUGINEUM*, Fabr.

Recorded by M. Drouet from Santa Maria; it is a cosmopolitan insect, and hence of little interest.

161. *TENEBRIO OBSCURUS*, Fabr.

In S. Miguel, Santa Maria, and Graciosa, in bake-houses &c.

162. *ALPHITOBIOUS PICEUS*, Oliv.

One specimen, with the preceding, from S. Miguel.

163. *ANASPIS (SILARIA) PROTEUS*, Woll.

Abundant on flowers at Fayal. M. Drouet records *A. humeralis*, Fabr., from Santa Maria and S. Miguel; but I feel no doubt that he alludes to this species, which swarms in Madeira and the Canaries, and is very closely allied to a South European form, if not identical with it.

164. *ANTHICUS FLORALIS*, L.

One specimen of this common insect has occurred in Fayal.

165. *A. HUMILIS*, Laf.

Not rare round the lake at Praya, Terceira.

166. *A. HISPIDUS*, Rossi.

Under refuse in S. Miguel and Flores.

167. *FALAGRIA OBSCURA*, Grav.

Not common, but found in S. Miguel, Fayal, and Santa Maria.

168. *ALEOCHARA NITIDA*, Grav.

Abundant in dung in S. Miguel, Terceira, Fayal, and Flores.

169. *A. PUBERULA*, Klug.

Only one specimen, from dung in Fayal.

170. *HOMALOTA OBLIQUEPUNCTATA*, Woll.

Several specimens, from the margins of the Lagoa das Farnas. It agrees almost exactly with the Madeiran specimens; but the oblique markings are less evident.

171. *H. LURIDIPENNIS*, Mannh.

One specimen, taken near the Furnas in S. Miguel.

172. *H. LONGULA*, Heer.

Found, but very rarely, in the bed of a stream in Fayal.

173. *H. ATRICILLA*, Er. (*FLAVIPES*, Thoms.).

One specimen, from the coast at Ponte Delgada, S. Miguel. This species is new to the Atlantic fauna, and is interesting as showing the wide distribution of these sea-weed infesting forms.

174. *H. PUTRESCENS*, Woll. ?

From Flores, under refuse. These are not in good condition; but appear to be near Mr. Wollaston's species. They will almost certainly prove to be European also.

175. *H.*, sp. ?

S. Miguel, under refuse.

176. *H. CORIARIA*, Kraatz ?

Three specimens, from S. Miguel. This and the preceding are both females, and I am unable to identify them satisfactorily. Both, however, appear to be European forms.

177. *H. NIGRA*, Kraatz ?

This little species, which is not rare in dung, appears to agree with the Canarian specimens referred to *H. nigra*, Kr., by Mr. Wollaston.

178. *H. ATRAMENTARIA*, Gyll.

Not rare in dung in S. Miguel, Fayal, and Flores, and probably universal.

179. *H. MELANARIA*, Sahlb.

Abundant in dung in Terceira, Fayal, and S. Miguel.

180. *XENOMMA MELANOCEPHALA*, n. sp.

Two specimens were obtained from the rubbish in S. Miguel. It is allied to the other Atlantic species, but is abundantly distinct from them.

181. *HABROCERUS CAPILLARICORNIS*, Grav.

Two specimens, from vegetable refuse in S. Miguel. This would appear to be a remnant of the old laurel-fauna.

182. *CONOSOMUS SERICEUS*, Latr. (*PUBESCENS*, Payk.).

A single mutilated specimen, from a Euphorbia-stem in Flores.

183. *CREOPHILUS MAXILLOSUS*, L.

Local, but occasionally abundant in S. Miguel and Fayal. M. Drouet records it also from Flores and Graciosa.

184. *STAPHYLINUS HESPERUS*, n. sp.

Abundant under stones near Terceira. It appears to be allied to a Cape species.

185. *OCYPUS OLENS*, Müll.

Common throughout the group, as it is also in the Canaries. Its absence from Madeira is a very curious and important fact.

186. *PHILONTHUS ÆNEUS*, Rossi.

Rare in S. Miguel and Fayal, and probably a mere introduction.

187. *P. SORDIDUS*, Grav.

In vegetable refuse and dung in S. Miguel and Fayal.

188. *P. UMBRATILIS*, Grav.

Tolerably common in S. Miguel and Fayal. M. Drouet records *P. ventralis*; but I am inclined to imagine he had the present species in view, notwithstanding the discrepancy in the thoracic punctures.

189. *P. SCYBALARIUS*, Nordm.

Two specimens taken in Fayal are referable to this species.

190. *P. NIGRITULUS*, Grav.

Very abundant in damp places in S. Miguel, Terceira, Flores, and Fayal.

191. *P. PROXIMUS*, Woll.

A single specimen, from a mountain-stream in Fayal. This species was supposed to be peculiar to Madeira, where it is very rare.

192. *XANTHOLINUS GLABRATUS*, Grav.

According to M. Drouet this was found by M. Hartung under stones in Graciosa. If this indication be correct, it is a species new to the Atlantic fauna. Possibly he may allude to the analogously coloured *X. marginalis*, Woll., hitherto found only in the Canaries.

193. *X. PUNCTULATUS*, Payk.

Not rare in S. Miguel and Terceira.

194. *X. HESPERIUS*, Er.

In San Miguel and Fayal under refuse.

195. *X. LINEARIS*, Oliv.

With the preceding, and also in Terceira.

196. *LEPTACINUS PUSILLUS*, Steph. (*LINEARIS*, Grav.).

Under refuse at Ponte Delgada, S. Miguel. Gravenhorst's name is inapplicable, having been adopted erroneously from Olivier.

197. *STILICUS AFFINIS*, Er.

With the preceding, but rarer.

198. *SUNIUS GRACILIS*, Payk. (*ANGUSTATUS*, Pk.).

Under stones in S. Miguel, Fayal, and Flores, not rare. Paykull's name "*angustatus*" was preoccupied; hence we should use the name he subsequently proposed for it.

199. *LITHOCHARIS RIPICOLA*, Kraatz.

New to the Atlantic fauna. One specimen only, in S. Miguel.

200. *L. APICALIS*, Kraatz.

Two specimens, at Horta, Fayal, under refuse. Also new to the fauna.

201. *L. OCHRACEA*, Grav.

One example only, from Fayal, with the preceding.

202. *L. RUFICOLLIS*, Kraatz (*TRICOLOR*, Woll.).

Not rare in S. Miguel, under stones &c. Mr. Wollaston has used Marsham's name for this species; but his description is quite valueless, and moreover he adopted the name erroneously from Fabricius.

203. *L. DEBILICORNIS*, Woll.

Not rare near Ponte Delgado, under refuse.

204. *STENUS GUTTULA*, Müll.

At the roots of grass round the mountain-streams in S. Miguel, but rare.

205. *PLATYSTETHUS SPINOSUS*, Er.

Under marine rejectamenta in Terceira and Fayal. These agree with the depauperated phase found in Madeira.

206. *OXYTELUS SCULPTUS*, Grav.

Very common in dung in S. Miguel, Terceira, Fayal, and Flores.

207. *O. COMPLANATUS*, Er.

With the preceding, and even more abundant.

208. *O. NITIDULUS*, Grav.

Widely spread over Terceira, Fayal, Flores, and S. Miguel.

209. *TROGOPHLEUS RIPARIUS*, Lac.

Common in S. Miguel, Fayal, and Flores, in damp places.

210. *T. CORTICINUS*, Grav.

One specimen, from a stream at Horta, Fayal.

211. *T. SUBTILIS*, Er.

Two specimens, with the preceding. It is new to the Atlantic fauna.

212. *HOMALIUM PUSILLUM*, Grav.

Two specimens only, from pines—one at Horta, and one at Santa Cruz, Flores.

213. *H. CLAVICORNE*, Woll.

Abundant in Euphorbia-stems in Flores; it is also not rare in Madeira.

Descriptions of the New Species.

ANCHOMENUS APTINOIDES, Tarn. (in Morelet, Nat. Hist. Ins. Açor. 91).

A. elongatus, piceus, nitidus; capite lævi, biimpresso, ore antennisque rufis; his longitudine plus dimidio corporis, articulo 2° 3° dimidio brevioribus; thorace oblongo testaceo, disco piceo, basi paullo angustato, angulis posticis rotundatis, disco sat convexo longitudinaliter impresso; elytris ovatis, convexis, fuscis, sutura marginibusque anguste rufis profunde striatis, interstitiis convexis, 3° punctis 2, uno paullo ante medium, altero apicem versus, 8° punctis plurimis impressis; corpore subtus testaceo, tarsis articulo penultimo fere bilobo. L. 12 mm.

Hab. Ponte Delgada, in ins. S. Miguel, semel captus in mense Junio (ex Drouet).

BEMBIDIUM HESPERUS, n. sp.

B. cupreo-cæneum, nitens, creberrime subtilissime ruguloso-punctulatum; capite striis 2 juxta oculos; thorace cordato, angulis posticis rectangularibus, fovea profunda haud punctata sed rugulosa, linea discoidali vix abbreviata; elytris punctato-striatis, stria 7^a obsoleta, interstitio 3° foveolis 2, una prope basin, altera ultra medium, impressis; antennis pedibusque testaceis, illis apice infuscatissimis. L. 1 $\frac{1}{4}$ lin.

Closely allied to *B. lætum*, Brullé, but abundantly distinct by its coloration. The reflexed margin of the elytra is of a bright copper-colour; the suture also has a tendency to be cupreous. It would seem very rare, only two examples having been captured in Terceira.

AGABUS GODMANNI, n. sp. (Pl. XXIII. fig. 3.)

A. niger; capite antice, thorace disco infuscatissimo elytris fulvis, antennis pedibusque rufis; femoribus posticis obscuris. L. 3 $\frac{3}{4}$ lin.

♀. *Totus opacus, subtiliter denseque reticulatus.*

Black, above fulvous. Head finely reticulate; mouth, front, and two spots on the vertex fulvous. Thorax short, finely margined, very faintly reticulate, anterior margin punctated, and a few scattered punctures along the sides; fulvous with a central cloud variable in extent, but frequently leaving only the margins pale. Scutellum

tellum smooth. Elytra extremely finely and slightly reticulate, having almost the appearance of a sparse punctuation, with the three series of impressed lines confused together in the posterior third. In the female both elytra and thorax are coarsely but very closely reticulated and opaque, the impressed punctures becoming invisible, and the colour deepening to dark brown. Body beneath black, margins of the segments paler. Legs and antennæ red, the femora and tibiæ sometimes infusate.

This species, in its singular disparity of sex, approaches *A. dispar*, Bold (*uliginosus*, Payk.); but this peculiarity is not always present, at least not in other species. They both (*A. dispar* and *A. congener*) have opaque females in England, though not in Sweden. *Hydaticus zonatus* varies in the same way.

TARPHIUS WOLLASTONI, n. sp. (Pl. XXIII. fig. 1.)

T. oblongus, brunneus, granulatus, setis fulvis erectis obsitus; thorace lateribus æqualiter rotundatis, basi bisinuato; elytris distincte nodosis, antennis pedibusque rufo-piceis. L. $1\frac{1}{4}$ – $1\frac{1}{2}$ lin.

Hab. In ins. Fayal infra euphorbiam emortuam sat copiose captus.

Head strongly granulated, sides swollen and elevated. Thorax strongly granulated, sides bordered with stiff setæ and broadly flattened, towards the base somewhat contracted, in front produced, acuminate; disk uneven, with a longitudinal channel at times very well marked, but often obsolete. Elytra deeply punctate-striate and transversely rugulose, the nodules well developed and clothed with short pale setæ.

I have named this species in honour of Mr. T. V. Wollaston, in default of whose unwearied exertions our knowledge of this genus would be still confined to its solitary European representative.

ELASTRUS DOLOSUS, n. sp. (E. W. Janson *in litteris*). Pl. XXIII. fig. 8.)

E. rufo-brunneus, nitidus, pubescens; fronte convexa, antice rotundata; antennis rufo-testaceis, articulo 3^o 2^o sesqui fere longiore; thorace latitudine longiore, a basi angustato, dense punctato, angulis posticis breviter unicarinatis; elytris brevibus, thorace haud sesqui longioribus, striatis, striis punctatis, intersitiis planis, parce punctulatis; pedibus rufo-testaceis. L. $3\frac{1}{2}$ lin.

Reddish brown, shining, sparsely clothed with a short yellowish-grey pubescence; head pitchy black; antennæ, legs, and anterior angles of thorax rufo-testaceous.

Mr. Janson, to whom I am indebted for the above description of this interesting species, adds that it so closely resembles certain species of *Anchastus* (*A. rufivellus*) as on a superficial inspection to be mistaken for them. He goes on, however, to say that the total absence of membranous tarsal appendages precludes its location among the *Myorhinites*.

This genus is hitherto peculiar to Madagascar; and its occurrence in the Azores is hence somewhat remarkable.

ATTALUS MINIATOCOLLIS, Tarnier (*l. c.*). (Pl. XXIII. fig. 5.)

A. niger nitidus, parce nigro pilosus; capite piceo, bifoveolato; thorace rufo, quadrato, postice valde rotundato, paullo convexo; elytris viridibus, parce punctatis, postice dilatatis; pedibus nigris, coxis anticis rufis; antennis nigris, articulis 3 primis apice rufescentibus. L. $1\frac{3}{4}$ lin.

Mas. *Antennis longitudine plus dimidio corporis.*

Hab. In insulis Terceira et Fayal, in floribus copiose lectus; in ins. Santa Maria (*Drouet*).

Nearly allied to the Canarian *A. ruficollis*, Woll., but distinct by its punctuation &c.

PHLÆOPHAGUS VARIABILIS, n. sp.

P. æneo-piceus; capite parce subtilius punctato, rostro substrigoso; thorace antice subtilius, postice et lateribus fortiter punctato; elytris grosse punctato-striatis, interstitiis irregulariter biseriatim punctatis. L. $1\frac{1}{2}$ lin.

The above diagnosis will apply to nearly all the phases of this variable species, which may be further characterized as follows:—

Var. α . Thorax finely and sparingly punctured, very shining; head extremely finely punctured; elytra with the punctures in the striæ faint. From an elder-tree near the Furnas; very rare.

Var. β . Thorax more coarsely punctured, but shining; elytra with the punctures more deeply impressed, glossy æneo-piceous. Very common in Euphorbia-stems in Flores and Corvo.

Var. γ . Thorax much more strongly punctured, especially behind, so that the interstices between the punctures no longer glisten; elytra with the striæ hardly deepened, so that the punctures stand out isolated. Smaller than the last. Abundant in old trees in S. Miguel.

Var. δ . The extreme form in this direction, with the thorax almost scabrous, and the rostrum strigose. It is also smaller in size. In old fig-trees.

The above range of variation is paralleled in the Canarian *P. laureneus*, which under similar circumstances runs through partly the same changes. The lightly sculptured ones seem always attached to the *Euphorbiæ*. It is somewhat curious that in the allied genus *Mesites*, where some are found on laurel and some on *Euphorbiæ*, the two form distinct sections, instead of merely varieties as here.

ACALLES DROUETHI, n. sp. (Pl. XXIII. fig. 4.)

A. brunneus, squamis ochraceis densissime tectus; thorace confertim granulato, lateribus valde ampliatis carinatis, dense squamoso, linea media cinerea, nodulis 2 discoidalibus marginibusque setis erectis obsitis; elytris punctis magnis seriatim dispositis, interstitiis vage punctulatis, nodulis 2 anticis approximatis et 2 posticis maximis setis erectis vestitis, totis dense squamosis fusco varie-

gatis, regione apicali cinerea; pedibus dense ochraceo squamosis; rostro nudo strigoso, basi dense squamoso. L. 3-4 lin.

Hab. In ins. Flores intra euphorbiam emortuam sat copiose lectus.

This very beautiful *Acalles* is one of the most striking insects here described. The singular dilatation of the sides of the thorax and the numerous erect setæ render it unmistakable. I have dedicated it to M. Drouet, to whom we are indebted for the first exploration of these islands and for a careful summary of the results of his work, including three or four new species and eight not since found.

LAPAROCERUS AZORICUS, Drouet, Col. Açor. 19. (Pl. XXIII. fig. 6.)

L. niger, nitidus; capite fortiter punctato, fronte canaliculata; thorace parce fortiterque punctato et subtilissime fulvo pubescente, quadrato, antice paullo angustiore, lateribus rotundatis, linea media abbreviata lævi; elytris seriatim punctatis, interstitiis fortiter biserialim scabro-punctatis, ovalibus, humeris rotundatis, sutura apice carinata, lateribus et apice pube fulva tessellatis; scutello nitido, lævi, triangulari; subtus pectore scabro, abdomine punctato, segmentibus margine rufescentibus; pedibus piceis, tarsi tibiisque fulvo ciliatis pallidioribus, femoribus inflatis; antennis piceis, parce ciliatis, clava pubescente.

Hab. Sub lapidibus in ins. Fayal mense Augusto copiosissime lectus (*Drouet*); in iisdem locis in ins. S. Miguel mense Martio (*Godman*).

This fine addition to the Atlantic fauna is larger and stouter than the Madeiran forms, or even than the Canarian, and bears more the aspect of an insect fitted to live in arid places under stones than near woods. The outline is more that of the *Herpysticus eremita*, Oliv. (Canaries).

ASYNONYCHUS*, n. g.

Rostrum as long as the head, subparallel, rounded at the anterior angles, subemarginate in front, with a broad but shallow longitudinal impression, scrobes oblique, not reaching the eyes, badly defined. Antennæ subterminal, smooth, slender; scape a little longer than the head, abruptly clavate; funiculus with the first joint equal to the third, second twice as long as the first, joints four to six subequal, shorter than the third, seventh equal to the third; club oblong ovate, slender, acuminate, articulated. Eyes rounded, prominent. Thorax quadrate, cylindric, truncate before and behind. Elytra ovate, base slightly emarginate, humeral angles rectangular. Legs long, especially the anterior pair; anterior femora thickened; anterior tibiæ with the inner margin strongly serrate, having about eight teeth; corbeilles of posterior tibiæ large, with their edge very strongly ciliated; tarsi broad, hairy, claws free.

* a privative, *συνόνοχος*, with connate claws; in allusion to these parts being free in this case.

Type *A. godmanni*, n. sp.

This genus must be placed next *Brachyderes* in the arrangement of M. Lacordaire, to which it is allied in general appearance, but is at once distinct by its free claws (very rare in the family) and its serrate anterior tibiæ.

A. GODMANNI, n. sp. (Pl. XXIII. fig. 9.)

A. fusco-piceus, squamis rotundatis ochraceis sat dense vestitus; capite longitudinaliter canaliculato; thorace subquadrato, crebre punctato; elytris fortiter punctato-striatis, seriatim setosis; pedibus fuscis, parce squamosis, tarsis pilosis. L. 3-3½ lin.

Hab. Prope Hortam in ins. Fayal, duo specimina tantum lecta.

I have named this after Mr. Godman, in recognition of his unwearied and successful attempts to increase our knowledge of the Atlantic fauna in all its branches.

*NEOCNEMIS**, nov. gen.

Rostrum as long as the head, angular, slightly depressed longitudinally, separated from the front by an obsolete elevation; scrobes very well marked, extending to the level of the inner margin of the eyes. Antennæ thick, pilose; scape as long as head, clavate; funiculus with the first joint longer than the second, the rest short, obconic, subequal; club short, acuminate, obsoletely articulate. Eyes very prominent, conical. Thorax quadrate, sides rounded. Elytra oblong-ovate, base subemarginate, shoulders rounded. Legs moderate, femora thickened; tibiæ sinuate before the apex, with a strong inwardly directed spine; corbeilles but little defined, edge ciliate; tarsi short, claws soldered.

Type *N. occidentalis*, n. sp.

This genus is also a member of the "*Brachydérides vrais*" of M. Lacordaire, and must be placed next to *Strophosomus*, which it resembles in the contour of its head; the tibial spines and almost squamose corbeilles, however, readily distinguish it from any genus in the family.

N. OCCIDENTALIS, n. sp. (Pl. XXIII. fig. 7.)

N. nigra, dense griseo. squamosa; capite thoraceque setis brevibus, elytris longioribus sat dense obsitis; capite linea longitudinali impressa, postice emarginato; thorace scabro, linea discoidali obsoleta; elytris fortiter punctato-striatis, squamis subalbidis tessellatis; pedibus nigris, dense squamosis, femoribus mox ante apicem annulo albedo squamoso latiore. L. 2 lin.

Hab. In insula Santa Maria semel captus.

BRUCHUS BREWERI, n. sp.

B. niger, pube grisea dense vestitus; thorace profunde parce punctato, canalicula basali abbreviata; elytris punctato-striatis, inter-

* νέος, new, κνήμη, tibia, in allusion to the form of those parts being abnormal in the family.

stittiis fortiter seriatim punctatis, albido tessellatis; pygidio rugulose punctato. L. $1\frac{1}{2}$ –2 lin.

♂. *Antennis articulis 4 primis femoribusque rufis.*

♀. *Antennis pedibusque totis rufis.*

A pair of specimens, apparently male and female, were captured in Santa Maria, on some flowers, by Mr. Brewer. It does not appear to belong to any of Schönherr's species, but comes in his Section I., with the femora dentate and thorax entire. The surface, on removing the pubescence, is closely sculptured all over, as is generally the case with this genus. I have dedicated this species to Mr. Brewer, as a slight testimony to his exertions in procuring fresh contributions to the Atlantic fauna.

BRUCHUS AZORICUS, n. sp.

B. niger, pube fusca dense vestitus; thorace profunde punctato, macula alba ante scutellum; elytris maculis 4 denudatis striatis sat profunde transversim rugulosis; pedibus anticis tarsisque intermediis rufis; antennis nigris, articulis 5 primis rufis. L. $1\frac{1}{2}$ – $1\frac{3}{4}$ lin.

♂. *Tibiæ intermediæ intus mox ante apicem dentatæ.*

This species belongs to Schönherr's second section, having the femora dentate and the sides of the thorax produced about the middle into an abrupt tooth, but does not seem to accord with any of those described in his work.

HELOPS AZORICUS, n. sp.

H. rufo-piceus; capite thoraceque creberrime punctatis, hoc subtiliter marginato, quadrato lateribus rotundato, angulis anticis productis acutis, basi leviter emarginato; scutello transverso, vix punctato; elytris punctato-striatis, interstitiis crebre sed obsoletius punctatis; antennis pedibusque rufis. L. $6\frac{1}{2}$ –7 lin.

This species belongs to the same type as the Madeiran *H. vulcanus*, Woll., but cannot, I think, be referred to that protean species. The elytra have an abbreviated sutural stria, which is represented more or less obsoletely by a series of punctures the whole length of the suture. The male has the usual long antennæ of the genus, the joints keeping the same proportion, viz. first and second very short, third nearly twice as long as the fourth, fourth to eighth subequal, two last short, obconic, last ovate acuminate (♂), or short, obliquely truncate (♀).

XENOMMA MELANOCEPHALA, n. sp.

X. rufo-piceum; capite et abdominis segmentis 2^o–4^m nigris, capite et thorace nitidis, vix punctulatis, hoc postice foveolato; elytris thorace dimidio brevioribus, sat fortiter granulatis; abdomine laevi, apicem versus latiore; antennis articulis transversis, ultimo maximo; pedibus pallidis. L. 1 lin.

Nearly allied to *X. filiforme*, Woll., from the Canaries, but apparently distinct.

STAPHYLINUS HESPERUS, n. sp.

S. ater, ænescens, pube fusca sat dense vestitus; capite crebre punctato; thorace creberrime subtiliter æqualiter punctato, subtiliter marginato; scutello dense piceo tomentoso; elytris thorace dimidio brevioribus, crebre sat fortiter rugulosis; abdomine sat crebre punctato, segmentis 2^o–4^m macula aureo tomentosa basali; pedibus piceis, geniculis tarsisque rufescentibus, tibiis anticis aureo ciliatis; antennis piceis, articulo ultimo rufo. L. 6–7 lin.

Hab. Sub lapidibus prope Angram in ins. Terceira sat copiose lectus.

EXPLANATION OF PLATE XXIII.

- Fig. 1. *Tarphius wollastoni*, n. sp., p. 386.
 2. *Heteroderes azoricus*, Tarn., p. 375.
 3. *Agabus godmanni*, n. sp., p. 385.
 4. *Acalles drouetii*, n. sp., p. 387.
 5. *Attalus miniatocollis*, Tarn., p. 387.
 6. *Laparocerus azoricus*, Drouet, p. 388.
 7. *Neocnemis occidentalis*, n. sp., p. 389.
 8. *Elastrus dolosus*, n. sp., p. 386.
 9. *Asynonychus godmanni*, n. sp., p. 389.

April 11, 1867.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

Mr. P. L. Selater stated that the living Lyre-bird (*Menura superba*) alluded to by Dr. Bennett in his communication to the Society on this subject in March last year* had safely arrived in this country a few days since in the ship 'La Hogue,' under the care of Mr. Ross, its proprietor, by whom it had been deposited in the Society's Gardens. From the statements in Dr. Bennett's letter it would appear that this bird was now about two years and seven months old†.

Mr. Selater also reported the birth in the Society's Menagerie on the 17th ult. of a young male Giraffe, being the *sixteenth* that had been bred in the Society's Gardens. The event was of more than usual importance, as the fire of the 6th of November last, and the subsequent death of the adult male (aged 21 years) on the 22nd of January, had reduced the Society's stock to a single female. Mr. Selater laid before the Meeting the following list of the Giraffes that

* See P. Z. S. 1866, p. 167.

† This bird has since been purchased for the Society's collection.—P. L. S.

had been living in the Society's Gardens since the first acquisition of these animals:—

List of Giraffes which have lived in the Zoological Society's Gardens.

No.	Sex.	How acquired.	Date.	How disposed of.	Date.
1	Female	Imported	May 24, 1836	Died	Oct. 15, 1852
2	Male	Imported	May 24, 1836	Died	Oct. 29, 1846
3	Male	Imported	May 24, 1836	Died	Jan. 14, 1849
4	Male	Imported	May 24, 1836	Died	Jan. 6, 1837
5	Male	Born	June 19, 1839	Died	June 28, 1839
6	Male	Born	May 24, 1841	{ Presented to Dub- lin Zoological Soc. }	June 14, 1844
7	Male	Born	Feb. 25, 1844	Died	Dec. 30, 1853
8	Male	Born	Apr. 22, 1846	Died	Jan. 22, 1867
9	Male	Born	Feb. 12, 1849	Sold	Apr. , 1850
10	Female	Imported	June 29, 1849	Died	Nov. 3, 1856
11	Female	Imported	June 29, 1849	Sold	Oct. , 1853
12	Male	Born	Mar. 30, 1852	Sold	Mar. , 1853
13	Female	Born	Apr. 25, 1853	Living in the Gardens.	
14	Female	Born	May 7, 1855	Destroyed by fire	Nov. 6, 1866
15	Female	Born	July 16, 1859	Died	Dec. 2, 1859
16	Female	Born	May 20, 1861	Sold	May , 1863
17	Male	Born	Oct. 7, 1861	Died	Dec. 18, 1861
18	Male	Born	May 8, 1863	Sold	Nov. , 1863
19	Male	Born	Sept. 24, 1863	Died	Apr. 21, 1864
20	Male	Born	Mar. 31, 1865	Died	Apr. 3, 1865
21	Female	Born	Apr. 20, 1865	Sold	May 31, 1866
22	Male	Born	Sept. 14, 1866	Destroyed by fire	Nov. 6, 1866
23	Male	Born	Mar. 17, 1867	Living in the Gardens.	

The following papers were read:—

1. Note on the Nidification of *Baza subcristata*.

By E. P. RAMSAY, C.M.Z.S.

During my recent trip to the North Richmond River, *via* Grafton, I met with this rare species upon several occasions. I found it giving preference to the edges of the scrubs on the Richmond and Clarence Rivers, whence it would sally out to the more open parts in the mornings and evenings in search of food, and not unfrequently visit the slaughtering-establishments in the vicinity of the townships.

In plumage the sexes are alike; but the male may be distinguished by the occipital crest being more developed. I have two females, one procured on the Clarence and the other on the Richmond River, both of which have a slight wash of rufous round the ear-coverts and on the sides of the neck,—and one male, which, having the centre of the abdomen and under tail-coverts chestnut, has the bands on the breast and flanks slate-brown; whereas in other individuals these bands are of a chestnut hue. Others, again, have the throat, under-side of the neck, and chest slate-grey, with the rump and upper

tail-coverts of a bluish slate-grey. The irides in both sexes are of a beautiful deep yellow.

I was fortunate enough to procure three eggs of this species, taken by Mr. MacGillivray's black fellow "Daddy." Mr. MacGillivray informs me that, when Daddy was taking the eggs, the female dashed so close to him that he killed it with his tomahawk. The male bird belonging to the nest had been shot the day before. The nest was a comparatively small structure of sticks placed upon a horizontal bough, at a considerable distance from the ground. It contained three eggs, much smaller than I expected to find them. They have the peculiarity of being very much rounded at the larger end, are short upon the whole, and have the thin end pointed abruptly. Their average length is $1\frac{7}{10}$ inch by $1\frac{4}{10}$ inch in breadth; the ground-colour greenish white (the inside of the shell being of a pale steel-green), very sparingly smeared and blotched or spotted with light brown; one specimen has but two or three spots of a light brownish tint.

I know of no districts frequented by so many species of the Hawk-tribe as the brushes and flats in the neighbourhood of the Richmond and Clarence Rivers. During the first fifteen days of our sojourn in those parts we met with no less than fifteen species, well identified, besides one or two others, the species of which I was not quite sure of. Seven of these were skinned; others, being very common in the neighbourhood, were allowed to remain in peace. The following is the list of Hawks met with during our journey from the mouth of the Clarence River, *via* Grafton, to Lismore on the Richmond River:—

Aquila audax. Plentiful.

Polióætus leucogaster. Several pairs seen.

Haliastur spheonurus. Shot.

— *leucosternus*. Only one seen.

Falco lunulatus. Shot.

Hieracidea berigora. Shot.

Leucospiza novæ-hollandiæ. Shot (iris blood-red).

Astur radiatus. Shot (iris bright yellow).

— *approximans*. Shot.

Accipiter torquatus. Shot.

Milvus affinis. Several seen.

Elanus axillaris. Shot (iris blood-red).

Baza subcristata. Shot (iris bright yellow).

Circus jardinii. Shot.

— *assimilis*. Two specimens seen.

To these may be added *Milvus isurus*, *Falco melanogenys*, and *Gypsoictinia melanosternon*, all of which, I believe, were procured by Mr. MacGillivray in the Clarence River district. Of *Astur radiatus* I only obtained one specimen, a male; it seems to be a very rare species, and one which I had never before met with. Total length 23 inches. This specimen lost its life by coming too near our camp in pursuit of some Parrakeets (*Trichoglossus multicolor*), which it

was endeavouring to catch; its flight is remarkably strong and rapid. A pair of *Falco lunulatus* and a female of *Accipiter torquatus* committed the same rash act, and paid the penalty with their lives.

Haliastur leucosternus was one of the first birds that greeted us as we entered the Clarence River, and, after flying round the steamer once or twice, ascended the river before us. A fine specimen of this species was shot by Mr. MacGillivray on the Clarence River during 1865.

2. Notes on certain species of Cats in the Collection of the British Museum. By Dr. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

(Plates XXIV. & XXV.)

Having to name some of the Cats recently received, it was requisite to compare them with those already in the collection; and I herewith send some observations that I made on them when so occupied.

The Leopard and the Serval of Africa are too well known to require any observation, except to remark that the Serval is by no means so variable in the form and disposition of the spots as the Leopard.

There is a series of Cats from the West Coast of Africa that are very little known; and, fortunately, there are in the British Museum the type specimens on which three of the species have been founded, and of two of them other and better specimens of the skins than those first described have been received and are in the collection, showing the distinctness of the species, which were each described from a single imperfect skin.

The three very distinct species of Spotted Cats from West Africa, which have been described at different times by Mr. Waterhouse, Mr. Ogilby, and myself, all differ from the one from Guinea described by M. Temminck. My *Felis neglecta* agrees with *F. celidogaster* in many particulars; but the spots are much smaller than M. Temminck describes, they are by no means of a chocolate or bright brown colour, and the tail is not ringed. These are just the characters by which the three skins in the British Museum are distinguished from each other. It is most probable that the *F. celidogaster* of Guinea is distinct from the Cats from the Gambia and Sierra Leone which are in the Museum. All the three, and, indeed, very many other Spotted Cats, have the belly distinctly spotted and the throat with a half collar; so that the name *F. celidogaster* would be equally applicable to any of them.

The three species in the Museum may be distinguished thus:—

1. *FELIS NEGLECTA*, Gray, P. Z. S. 1860, p. 246; Mag. N. H. 1838, p. 27.

Grey; head and body marked with numerous small darker spots,

spots of the lower part of the sides rather larger; belly white, with large blackish spots; tail quite half the length of the body, with a dark line along the upper surface, sides paler, with obscure indications of darker bands.

Hab. Gambia (*Rendal*). The typical skin in British Museum.

2. *FELIS SERVALLINA*, Ogilby, P. Z. S. 1839, p. 4.

Fur fulvous, beneath white, middle of the back darker, with very numerous small black spots, spots on sides rather larger, on the belly much larger; tail short, fulvous, with five or six imperfect black rings and a pale tip.

Hab. Sierra Leone. Three skins in British Museum.

3. *FELIS RUTILA*, Waterhouse, P. Z. S. 1842, p. 130.

Red-brown, with indistinct darker spots on the back; belly white, with large brown spots; tail moderate, nearly half the length of the body, red-brown, with a dark central line down the upper surface, paler with obscure indications of bands on the sides.

Hab. Sierra Leone. Type and two other specimens in British Museum.

The skull of this species is in the British Museum. It is oblong; the orbit rather large, incomplete behind; the intermaxillary produced and extending halfway up the side of the nasal; the upper front false grinder very small.

Temminck has described a Cat purchased at the sale of Bullock's Museum in Piccadilly under the name of *Felis celidogaster* (Monogr. Mamm. 140), stating that he believes that it inhabits Chili or Peru (more lately it has been believed that it might be an Indian Cat—the *Felis viverrina* of Bennett, for example); but no Cat of the kind is known in those countries. In his 'Esquisses' he has re-described the species from a specimen received from Guinea. The following is a translation of his description:—

"*FELIS CELIDOGASTER*, Temm. Monogr. i. 140; Esquisses Zool. 87.

"*Felis chalybeata*, H. Smith, Griffith, A. K. ii. t. (not good).

"Tail rather shorter than half the length of the body and head. Length of body and head 26, tail 14 inches = 3 feet 4 inches.

"Fur short, smooth, shiny, grey, with a reddish tint, with chocolate or light brown spots; spots on dorsal line oblong, the others round; cheek and lips whitish, with small brown spots; throat and chest with six or seven half-circular brown bands; lower parts and inner side of the limbs pure white, with large round chocolate-brown spots; two bands of this colour on the inner side of the fore, and four on the hind feet; tail bay brown, with paler brown rings, end black brown; outer face of the ears black; claws white."

Lesson, in the 'Magasin de Zoologie' for 1839 (Mammifères, t. 10), has figured and described a Cat under the name of *Felis senegalensis*, which is said to have been brought from the river Senegal. It is thus described:—" *Felis* rufo-fulvoque-griseus, subtus rufescenti-

albidus, auriculis latis intus albidis, supra nigerrimis cum lunula nivea; dorso et lateribus tribus vittis nigris nec non lineis formatis numerosissimis maculis atris; cauda longa, rufescenti-grisea, nigro maculata; facie rufa, duabus lineis et naso aterrimis; rostro albo; pedibus rufo-griseo punctatis." The description and the figure do not agree with any of the three Cats from Africa in the British Museum.

The *Felis neglecta*, like the Serval, has no dark streak on the cheek, which is so generally found in Cats. In Lesson's figure only one throat-streak (the upper one in most other Cats) is marked, the second streak mentioned in the description being from the side of the forehead to the end of the nose. The tail in Lesson's figure is longer in proportion to the body than the tail of the Serval, or of any of the three African Cats here described; and the belly is not white, as it is in all of them and in *F. celidogaster* of Temminck. In some respects the Cat agrees with *Felis viverrina* of Bennett from India (can there be any mistake in the African habitat?); but the streaks on the side of the face are different from those of that Cat, which has two in the usual situation; indeed the streak in Lesson's figure is so unlike the streak in any Cat that I have seen that I almost doubt whether the artist has correctly represented it as going from the orbit to the middle of the front edge of the ear.

GUEPARDA GUTTATA, jr. (Pl. XXV.)

The young Hunting Leopard (*Gueparda guttata*) I do not recollect to have seen described. It is covered with long soft hair, of a dark blackish brown colour, on the limbs, sides, and beneath, and very obscurely spotted; the head, back of the neck, the back, and the upper surface of the tail are pale brown; back of ears black; an angular line from the front of the orbit to the angle of the mouth dark brown; the lips, chin, and sides of the nose white.

Hab. Cape of Good Hope.

There are two Cats in the British Museum (one from India and the other from Africa) which are peculiar for having the body marked with transverse or, rather, perpendicular bands which are more or less broken into spots; and they have more marked, wider, and black bands across the upper part of the fore and hind legs. The tail, which is not quite so long as the body, is of the same colour as the back, and has some narrow black rings near the tip, which is black.

The grey species comes from India. There is a single specimen of it in the British Museum, which in the 'List of Mammalia,' published in 1842, I named the Waved Cat (*Leopardus inconspicuus*), p. 42, referring it to the *Felis torquata* (*Chat de Nepaul*, F. Cuvier, Mamm. Lithogr. ii. t.) with doubt, because the tail of that species is represented as of the same colour as the back, with a series of triangular spots forming half bands on the lower surface for the whole length, and there is only one streak (the upper one) on the cheek, while our specimen, like almost all the species of Cats, has two well-marked streaks. As no specimen like the figure has been received from India, I am now inclined to believe that it is intended to represent the Cat in the Museum, and that the differences are

perhaps the errors of the artist. Indeed it is doubtful if the figure is not a copy of an Indian drawing, like several of the animals figured in that work, said to have been received from M. Duvaucel. I cannot agree with Mr. Blyth in thinking that *F. torquata* is the same as *F. ornata*.

Mr. Hodgson sent from Nepaul a very large specimen, which agrees with the typical specimen of *F. inconspicuua* in its most essential characters, but is much larger, and the waved bands are more broken into spots; these spots are all nearly of the same form. The head and body of the stuffed specimen is 25 inches, and the tail 11 inches long. In the list of Mr. Hodgson's specimens he asks "is it a Tame Cat?" p. 6. Mr. Hodgson, in his MS. list, called it *Felis viverriceps*. There is a third, smaller specimen in the British Museum, received through Capt. Boys from India.

The second, which varies from pale fulvous to grey, is the *Felis maniculata* of Rüppell (Zool. Atlas, t. 1), from various parts of Africa. There are several specimens of this species in the British Museum. The largest and darkest, being grey with darker bands, is a specimen from Tangiers, received from M. Verreaux, the body and head 24, and the tail 14 inches long; the darker bands are very indistinct. There is a second example, not quite so large, with bands darker, that lived several years in the Zoological Gardens, and was sent from Tunis by Sir Thomas Reade—and a smaller one, similar in colour, also from the Zoological Gardens, but without any special habitat attached, and a dark grey kitten from Kordofan.

Two other specimens are pale yellowish, slightly grizzled, with the streak and spot of the body rather darker yellow, and the rings on the end of the tail are black. One of these, brought from Macassar by Mr. Wallace, is rather darker than the other, and has the bands on the legs nearly black, like the Tunisian specimen. The other, from Kordofan, is rather paler, and the bands on the legs, like those on the body, are yellow.

Very nearly allied to these, and probably only a variety, is a small nearly white Cat, marked with pale yellow stripes, sent from Egypt by Mr. Christie, which I described in the 'Magazine of Natural History' for 1837 under the name of *Felis pulchella*. It differs greatly from all the other specimens of *F. maniculata* in the very large size of the ears; but it resembles them so closely that I am almost inclined to believe that it may be only a very pale variety of that species. The size of the ears may have been produced by the negligence of the stuffer; but that can only be decided by the examination of fresh specimens. Mr. Blyth thinks that this specimen is only "an Egyptian variety of the Common Cat" (P. Z. S. 1863, p. 184, note); but I cannot agree with that theory.

The three large specimens in the British Museum of these Cats come from South Africa. The largest was received from M. Verreaux, the next largest from the Zoological Society's Museum under the name of *Felis caffra* (*Felis nigripes* of Burchell), the other from Dr. Andrew Smith as *Felis caffra*.

The first two of these are dark grey, with distinct dark, blackish

bands and spots. Dr. Smith's specimen is much paler, yellow, with very indistinct rather darker yellow bands and spots, and very broad black bands on the legs.

The large specimens from Tunis and Tangiers are very like the largest dark one from the Cape.

A rather small specimen, received from Mr. Brandt of Hamburg as *F. caligata* from Africa, is only obscurely banded, is peculiar in the tail being black at the tip for about an inch, and in only having three or four very obscure narrow cross bands across the upper surface of the hinder two-thirds of the length of the tail.

A small specimen, very obscurely banded and having a redder fur with darker red streaks on the back, was received from Capt. Speke, marked "Menessá."

The *Felis caligata* of Africa and the *F. inconspicua* of India are nearly allied and very similar; but one is grey and the other more fulvous and rather differently marked—so much so that I think they are distinct. They and *Felis indica*, the "Domestic Cat of India," differ from *Felis chaus* of India (and Africa?) in the greater length of the tail. The first two are almost always more or less distinctly banded and spotted, the *F. chaus* and *F. indica* being very obscurely (if at all) banded, except on the legs and thighs.

I suspect that what have been called the African *F. chaus* may be only pale varieties of *F. caligata*; at least I have not seen any specimens of the true *F. chaus* from Africa. M. F. Cuvier's figures of *F. chaus* from Egypt are doubtful; for he describes the body and head as being 2-feet 4 inches long, and the tail 9 inches long; but the figure represents the tail as two-fifths, while the description represents it as being only one-fourth of the entire length. In the same manner the *Chat aux oreilles rouges*, figured by M. F. Cuvier, Mamm. Lithogr., from a specimen from India, is said to measure 24 inches from the end of the nose to the base of the tail, and its tail to measure 10 inches; and in the figure the tail is very nearly half the length of the head and body. Can both or either of these figures represent *F. chaus*, which is known by its short tail?

I believe that all these African Cats are of one species, varying greatly in size and colour. The synonymy will be as follows:—

Lynx, Bruce, Voy. viii. no. 30.

"*Felis caligata*, Bruce," Temm. Monogr. p. 123.

? *F. lybicus*, Olivier, Voy. p. 41.

F. caffra, Desm. Suppl. p. 540, 1822.

F. nigripes, Burchell, Travels, 1822.

F. maniculata, Rüppell, Zool. Atlas, i. t. 19 (pale variety).

?? *Chat aux Oreilles Rouges* ou *Chat botte* (*F. caligata*), F. Cuvier, Mamm. Lithogr. t. (pale variety).

F. pulchella, Gray, Mag. N. H. (very pale variety).

F. chaus, Rüppell, Atlas, i. t. 140.

? *Chaus*, F. Cuvier, Mamm. Lithogr. t.

F. obscura, Desm. Mamm. p. 250 (black variety).

The "*Chat noir du Cap*," F. Cuvier, Mamm. Lithogr., and *F.*

caligata, β , Fischer, Synopsis, p. 208 (from F. Cuvier's figure), is only a melanism.

The largest Cape specimen measures, body and head 30, tail 15 inches.

Most of the specimens of *Felis caligata* from Africa, like *Felis domestica*, *F. indica*, and *F. torquata* and many other species, have the hinder part of the feet black; but this is not a permanent character; for some of the smaller paler specimens of *F. caligata* have the hind feet paler than the back of the animal, and some of these have the heels more or less brown or blackish on the outer edges.

In the British Museum there is a specimen of *Felis domestica* that was collected, by Mr. Darwin, wild in the woods at Maldonado, mentioned in the 'Voyage of the Beagle,' Mam. p. 20. It shows how nearly the Domestic Cat is to the above species; it chiefly differs from *F. caligata* in the tail being more slender and tapering, the colours more intense and defined, and in the throat being pure white. It is dark grey, grizzled with black streaks and spots; the streaks on the legs are wide, those of the fore legs more or less confluent. The tail is grey for two-thirds of its length, with black rings, the hinder one being broadest; the hinder third of the tail is black, with a small pure-white tip. The stripes on the loins are straight and parallel, not subspiral as in the Tabby Cats. The cheek-streaks are black, the lower one indistinct and interrupted. The toes are white.

The smaller Spotted Cats of the warmer parts of Asia have all been regarded as one species by Mr. Blyth, following in the wake of Temminck; but it is to be observed that the latter naturalist only had the specimens from Java and Sumatra to examine. Perhaps if he had had in his museum specimens from Nepal, Bhootan, China, and the various districts of continental India, he would not have regarded them as belonging to the same species, as he did those from Java and Sumatra. They, no doubt, are very similar, and we know that the Spotted Cats, as the Leopard, the Jaguar, the Ocelots, and the Kuichua, of Brazil are very variable; but then in a large series of these specimens the varieties pass into each other, and the countries where the different varieties come from are contiguous, and different varieties come from the same locality. Now that is not the case with the small Spotted Cats of India; and until we have a series sufficiently large to show how the species do pass into each other, I think it is safer to regard them as valid.

Some of the smaller-sized Spotted Asiatic Cats have a long head, with an elongated skull, and complete bony orbits. The skulls are longest and the orbits more developed in the *Felis viverrina* of Bennett and the *Felis planiceps* of Vigors and Horsfield. But, besides these, *Felis rubiginosa* of I. Geoffroy, in Bélanger's 'Voyage,' and the Cat which I described under the name of *Leopardus ellioti* in the 'Annals and Mag. of Nat. Hist.' for 1837 (x. p. 260) have a rather elongated skull and complete orbits, though Mr. Blyth regards *F. ellioti* as only a variety of his *F. bengalensis*.

Of the small-sized Spotted Asiatic Cats, which have an ovate

skull and incomplete orbits, there are several specimens in the Museum which appear to be worthy of being noticed either as species or well-marked varieties. They all have two well-marked streaks on each cheek, and there is a pale or white streak up each side of the forehead, and one between the cheek-streaks.

To this group belong *Felis sumatrana* and *Felis javanensis* of Horsfield, Zool. Java; *Felis nepalensis*, Vigors and Horsfield, Zool. Jour. iv. t. 39; and *Felis chinensis*, Gray, Mag. N. H. 1837, from China. To these I wish to add the following:—

FELIS PARDINOIDES.

B.M.

Fur grey brown, with large black grey-varied spots; chin and beneath white. Spots of vertebral line black; of withers large, oblong; of loins linear; of sides, shoulder, and rump large, roundish, varied with grey hairs in the centre, making them appear somewhat as if they were formed of a ring of smaller black spots; of thigh and fore legs black, small, and there confluent into cross bands. Tail with black rings. Length, body and head 19, tail 9 inches.

Hab. India (*Capt. Innes*; from Zool. Soc. Mus.).

Skull, length $3\frac{1}{2}$, width $2\frac{1}{2}$ inches; orbits moderate, oblong; hinder nasal opening oblong, with an angular front edge.

FELIS WAGATI. The Wagati.

B.M.

Fur fulvous; nose, chin, throat, and underside of body, and streak on forehead and cheek, pale yellow. Spots of body few, large, irregular-shaped; of withers large, elongate, broad; of loins elongate, narrow, more or less confluent. Tail with round spots.

Felis wagati, Elliot (*vide* Blyth).

Hab. India.

Differs from *F. pardochroa* and *F. sumatrana* in the large size of the spots.

FELIS PARDOCHROA. Nepal Tiger.

B.M.

Fulvous, with various-sized and -formed black spots and streaks. Spots of the loins oblong, separate; throat, chin, and belly white, black-spotted. Tail irregularly and incompletely ringed.

Felis pardochrous, Hodgson, Calc. Journ. iv. p. 286; Horsfield, P. Z. S. 1856, p. 396.

F. nepalensis, Hodgson, icon ined.

Hab. Nepal (*Hodgson*).

Length, body and head 25, tail 12 inches. Skull, length 3 inches 11 lines, width 2 inches 8 lines.

Var. Fur shorter, closer.

B.M.

Hab. Tenasserim (*Packman*).

FELIS TENASSERIMENSIS.

B.M.

Fulvous, black-spotted; chin and beneath white. Spots of the body large, angular; of shoulder round; of thigh oblong; of the loins elongate, confluent; of the back of the neck elongate, double

at the hinder part, and on the withers nearly enclosing a lanceolate brown disk.

Hab. India; Tenasserim (*Packman*).

Like *F. pardochroa*, but larger; spots of withers and loins very different.

FELIS SERVALINA.

B.M.

Fulvous, black-spotted; streak on forehead and cheeks, chin, throat, and beneath yellowish white. Spots small, unequal-sized, far apart; of body oblong; of legs round; of loins elongate, sometimes confluent; of withers oblong.

Chaus servalinus, Gray, Cat. Mamm. B. M. 45 (excl. syn.).

Hab. India; Zanzibar.

Like *F. sumatrana*, but spots smaller and further apart.

FELIS JERDONI.

Fur grey, with a few small distant black spots. Spots of sides and legs roundish; of central line of the back linear, rarely confluent. Tail and feet darker grey brown, scarcely spotted; chin and beneath white, black-spotted.

Felis jerdoni, Blyth, P. Z. S. 1863, p. 185 (not described).

Leopardus sumatranus (var. grey), Gray, Cat. Mamm. B. M. 43.

Hab. Indian peninsula: Madras. Adult in British Museum.

“Very like *F. bengalensis*, but smaller; the ground-colour of the upper part grey, untinged with fulvous” (Blyth). Size of *F. rubiginosa*. The “kitten” that Mr. Blyth refers to as being in the British Museum is a nearly full-grown specimen.

The following rather short-tailed Indian Cat has not been well understood. It has been most oddly mixed up by Mr. Blyth and others with *Felis torquata* (the *Chat de Nepaul* of F. Cuvier, Mamm. Lithog. ii. livr. 54), also named *Felis bengalensis* by Desmarest in the Supplement to his Mammalia, which is a grey-waved Cat, nearly like the English Domestic Cat, and is probably a half-bred Domestic Cat of India, as is said to be the case with the *F. nepalensis* of Vigers and Horsfield (Zool. Jour. iv. t. 39), which resembles this figure in some respects.

As the wild Indian species has not been characterized, I here describe the specimen in the Museum:—

FELIS ORNATA, Gray, Illustr. Ind. Zool. i. t. 2.

Fur short, pale whitish brown, black-spotted. Spots small; on the middle of the back smaller, linear; on the front part of the sides larger, oblong; on the hinder part of the sides small, round; on the thighs and upper part of the legs confluent, forming interrupted cross bands. Tail reaching rather below the heel, pale at the lower half, with some interrupted black rings at the end, which is whiter than the rest of the tail, the tip black. Crown with lines of small spots; cheeks with two narrow dark lines; chin, throat, and spot

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over the orbits whitish; belly with black spots, like those on the side. Body and head 19, tail 8 inches.

Hab. India (*Capt. Boys*).

This Cat is at once known from all the other Indian species by the length and slenderness of the tail, and the small size and equal distribution of the spots. In this respect it resembles the Hunting Leopard; but the band on the legs, the shortness of the tail, and the terminal half of the tail being ringed at once distinguishes it from that Cat and all the other species. The tail is somewhat like that of *F. chaus*.

Mr. Blyth has kindly given to the British Museum a specimen of the Domestic Cat of India, which is generally distributed there. It agrees with *Felis chaus* in almost every character, but it is smaller in size. The tail is rather longer compared with the length of the body, has more narrow black rings, occupying full half of the length of the tail, and there are two narrow pale cheek-streaks.

In the Museum there are two larger and rather darker specimens, agreeing in almost every particular with the above. They are most likely hybrids between *F. chaus* and *F. domestica*. The Wild *F. chaus* is peculiar for having the cheek-stripes very indistinctly marked, or one or both entirely wanting.

As regards South or Tropical American Cats, I may observe the skull of the Jaguar (*Felis onca*, Linn.) is known from the skulls of all the other species of the genus *Leopardus*, and from the Lion and the Tiger, by having a distinct, but more or less developed, tubercle (probably for the attachment of one of the muscles of the eyeball) on the middle of the inner or nasal edge of the orbit, and there is also a well-marked half ovate notch in the middle of the truncated front edge of the internal nostril, which is not so distinctly developed in other large feline animals.

The specimen which I described under the name of *Leopardus hernandesii* in the 'Proceedings' of this Society (1857, p. 278, Mamm. t. 58), from Mexico, has come into the British Museum collection; and I cannot find any difference in the skull to distinguish it from the other specimens of the Jaguar; so I suppose it must be considered one of the varieties of that species, marked by the distance at which the small spots are placed from each other, only now and then forming anything like a distinct ring or row of spots.

The Ocelots are extremely variable; and though there is a very large series of specimens in the British Museum, I cannot make up my mind whether they are all one, or whether there are three or more species. There are two most distinct varieties as regards size—the large Ocelots, with very large heads, and the smaller Ocelots, with more moderate-sized heads; but each variety presents several variations of colour, and there are examples intermediate in size. The differences in the size of the Ocelots may depend on the temperature, the geographical disposition, and the abundance or scarcity of food in the district which they inhabit. I can well believe that the large variety is as dangerous and destructive as the Jaguar, as travellers assert.

My *Leopardus pictus* (Mag. N. H. x. 260, 1842) is one of the larger kind, and it has the spots very different from those of any other specimen in the collection; but this is such a difference as one may expect to find only a variation when one examines a large series of specimens.

My *Leopardus griseus* (Mag. N. H. x. 260, 1842) differs from the other Ocelots in having a grey fur with whitish sides. There are several specimens which agree in this peculiarity. The grey specimens offer several variations in the spotting, like the fulvous specimens. One specimen has a rather yellow tint in the middle of the back; otherwise the grey colour seems permanent. Mr. Blyth has observed that the smaller and darker Spotted Cats become more fulvous as they attain full age; but that cannot explain the greyiness of these specimens, as there are adult as well as young specimens of the grey colour.

Felis melanura (Ball, P. Z. S. 1844, p. 128) is a most strongly marked specimen, and in the whole series of specimens in the Museum stands alone for the intensity and clearness of the marking, both black, white, and fulvous. It may be a variety in which the colours, especially the black, are very much more developed than usual, and therefore the spots have become confluent, until the whole animal may be described as black with white and fulvous spots. It is not the common melanism, where the whole fur has become more or less black, the black spots being only a little more intense. We have an Ocelot of this latter variety in the British Museum; but it bears no resemblance to the type specimen described by Mr. Ball, which is also in the Museum collection.

In the British Museum there is a very small Spotted Ocelot, which may be recorded as a species or variety under the name of *F. pardoides*. The fur is grey, with a very large number of nearly equal-sized round or oblong dark spots; the spots on the loins and rump are larger, with a pale centre; the cheeks and nape with black streaks; belly white, with large black spots; tail ringed. Length of body and head 26, tail 13 inches. *Hab.* Tropical America.

The species or varieties are to a certain extent permanent; the young, in some instances at least, are like their parents; and the markings do not change with age (that is to say, they are the same on the kitten as on the adult); and there are adult specimens that are grey as well as fulvous, or fulvous and white; so that the grey colour does not depend on the youth of the specimen, as has been suggested.

Three species of small Spotted Cats have been described as inhabiting South and Tropical America. All these three species may be distinguished from the Ocelots (*Felis pardina*) by the smaller size of the head, and the spots not being united together in chains; but the latter character is not to be observed in all Ocelots. As these Cats, like the other Spotted Cats, vary greatly in the form, size, and disposition of the spots, the determination of the species has been attended with considerable difficulty, and it has been suggested that perhaps there are more than one species of the long-tailed American

Tiger Cat called *F. macroura*. There is a very large series of specimens of the long-tailed species in the British Museum (two Chatis and several Margays) from different localities. And if there were not so many offering such different variations of the first species in the collection (I had only a few selected specimens to describe from), I should have been inclined to separate them into more than one species; indeed, in 1842, when we had only four or five specimens, I did name one in the 'List of Mammalia' as a distinct species under the name of *Leopardus tigrinoides*.

These three species may be easily distinguished from each other by the kind and colour of the fur, and the colour and length of the tail. Thus *F. macroura* and *F. mitis* have soft bright fulvous fur, and tail distinctly ringed; and *F. tigrina* has a harsher grizzled fur, and the tail marked with series of dark spots, not forming distinct rings. They may be characterized thus:—

1. **FELIS MACROURA**, Pr. Max. Abbild. t. . The Kuichua.

F. wiedii, Schinz.

"*F. brasiliensis*, Cuvier."

Fur soft, bright fulvous, black-spotted; spots variable in shape and size, often with a pale centre; tail elongate, cylindrical, longer than the body, with from eight to ten broad, well-marked, often interrupted, black rings, and a black tip.

Var. Paler, spots larger.

Leopardus tigrinoides, Gray, List Mamm. B. M. 1842, p. 42.

Hab. Brazil.

2. **FELIS MITIS**, F. Cuvier, Mamm. Lithogr. t. . The Chati.

F. onca, Schreb. t. 102.

F. chati, H. Smith.

Fur soft, bright fulvous, black-spotted; spots variable in size and disposition, often with a pale centre; tail cylindrical, rather tapering at the end, nearly the length of the body without the head, with six well-marked, broad, sometimes interrupted black rings, and a black tip.

Hab. Mexico? Paraguay?

3. **FELIS TIGRINA**, Schreb. t. 106, from *Margay*, Buffon, H. N. xiii. t. 38. The Margay.

Fur rather harsh, dull, grizzled, varied with black spots and rings varying in size and form; tail moderate, nearly as long as the body, cylindrical, rather thick, truncated at the end, marked with small black spots often confluent but not forming continuous rings.

Hab. South America.

There is in the British Museum a Cat that was formerly alive in the Surrey Zoological Gardens, and was there called the Himalayan Cat, and which, in the 'List of Mammalia in the British Museum,' published in 1842, I called *Leopardus himalayanus*. This animal is figured, from the specimen at the Surrey Zoological Gardens, in Jardine's 'Naturalist's Library' as *Felis himalayanus*, Warwick. The

figure is by no means a characteristic one. The Cat has not been brought from Himalaya by any of the numerous sportsmen and collectors that have searched that country. It is not known to Mr. Blyth, nor to any other Indian zoologist to whom I have shown it; indeed Mr. Blyth states that he believes it to be a South American Cat.

The examination of the skull shows that it forms a group by itself; and in my paper, read at the last Meeting but one, I formed for it a genus under the name of *Pardalina*. As the species has not been well described, I herewith add a description of the type specimen:—

PARDALINA WARWICKII. (Pl. XXV.)

B.M.

Fur short, dusky whitish brown; chin, streak on cheek, and throat white; chest and underside paler, black-spotted; crown and nape with four, cheek with two, and between the withers one black streak; the four feet and body covered with very numerous, equidistant, nearly equal-sized small black spots; throat, chest, upper part of the inside and outside of fore and hind legs black-banded; tail spotted at the lower half, ringed at the end, with a black tip; ears black, with a large white spot.

Leopardus himalayanus, Gray, Cat. Mamm. B. M. p. 44.

"*Felis himalayanus*, Warwick," Jardine's Nat. Libr. t. 24 (not good).

Hab. Himalaya (*Cross, Warwick*).

Skull short, broad, length $4\frac{1}{4}$ inches, width 3 inches 2 lines; face short, broad; nasals moderately broad; forehead convex, rhombic; orbits rather small, incomplete behind. The skull is very unlike that of *Felis viverrina*.

3. On the Tracheal Pouch of the Emu (*Dromæus novæ-hollandiæ*, Vieill.). By JAMES MURIE, M.D., F.G.S., Professor to the Zoological Society.

History.—Peter J. J. de Fremery, in a concise Academical Thesis upon the Osteology of the Emu, published in 1819*, first pointed out in this struthious bird the existence of an anterior aperture in the trachea.

The late Dr. Robert Knox, when Lecturer on Anatomy at Edinburgh, independently discovered and communicated to the scientific world as new the fact of this bird's possessing a most remarkable "large muscular bag" opening into the windpipe. His paper, "Observations on the Anatomical Structure of the Cassowary of New Holland," was read before the Wernerian Natural History Society on the 26th April, 1823, and subsequently published in the 'Edinburgh Philosophical Journal' for 1823–24, vol. x. p. 132. In the same volume (p. 137) he added "Additional Observations on the Structure of the Trachea in the Cassowary Emu of New Hol-

* "Specimen Zoologicum sistens observationes præsertim osteologicas de Cassuario Novæ Hollandiæ."

land," accompanying these by figures, comparing the trachea of the Galeated Cassowary, the Emu, and Golden-eyed Duck.

A notice of Knox's papers followed in 'Froriep's Notizen,' no. 127, March 1824.

In the last-mentioned Journal, no. 177, in November of the same year, a short account was given of a dissection performed by Dr. Wedemeyer* in 1822, wherein the claim of the priority of having discovered the tracheal sac in the Emu was asserted, evidently unaware of Fremery's earlier observation.

A full translation of Dr. Knox's two papers appeared afterwards in Meckel's 'Archiv für Anatomie und Physiologie,' 1832, p. 263, &c., with footnotes apparently by Meckel himself; for there succeeds the concluding part of a long Essay† upon the Anatomy of the Indian Cassowary by him, and in which he alludes to the authors I have above referred to. In his 'Systematic Treatise on Comparative Anatomy,' Meckel‡ again recalls the opinions of the previously cited observers.

At the Meeting of the British Association in Bristol in 1836 (Report, p. 97), Dr. Macartney laid before the Section of Zoology and Botany "An Account of the Organ of Voice in the New Holland Ostrich;" and as nothing is said respecting what had already been published, I presume from his statement that he considered the fact new to science. Professor Owen, in his 'Memoir on the Anatomy of the Southern Apteryx' (Trans. Zool. Soc. vol. ii. p. 279, communicated in 1838)§, takes notice of Fremery's discovery; but he did not find such a structure existing in the Apteryx. Wagner mentions it in his 'Lehrbuch der Zootomie.' And, finally, Carus figures it in his and D'Alton's 'Tabulæ Anat. compar. illust.' 1848, pars vii. tab. 6. fig. 2.

I have been induced thus historically to call attention to accounts of the tracheal pouch of the Emu, because I find that later writers upon the Struthious Birds have not given sufficient importance to these observations upon this singular organization. Such a structure along with other anatomical differences, well pointed out both by Meckel and Knox in the papers cited, should fairly be taken into account and balanced with other characters, whether dermal or osteological, in order to arrive at not only a natural classification of the family, but its relation to allied groups.

Although the aforesaid sac has so often been made the subject of remark, no one seems to have figured the most important feature in connexion with it—namely, the open anterior slit in the tracheal rings. Dr. Knox's illustration is defective, inasmuch as it is small,

* "Der mit der Luftröhre des Emu Casuars in Verbindung stehende muskulöse Beutel," Froriep's Notizen, 1824-25, p. 7.

† The first part of which appeared in the 'Archiv.' for 1830, p. 200.

‡ *Traité Général D'Anatomie Comparée* par J. F. Meckel, traduit de l'allemand par Dr. Th. Schuster. Paris, 1838, x. p. 402.

§ The disposition of the sac to the trachea is therein correctly stated; but in Prof. Owen's more recent 'Anatomy of Vertebrates,' 1866, ii. p. 220, a slip evidently has occurred, in the statement that the cartilaginous rings are wanting *posteriorly* (whereas *anteriorly* undoubtedly must have been meant).

and the preparation with the distended sac is shown from behind. Carus's figure, of natural size and from an adult bird, only displays the profile contour of the tracheal expansion.

I bring the present paper before the Members of our Society, partly to give a figure supplying the deficiency just alluded to*, and partly to add fresh observation of facts connected with the size of the sac in the young and old birds, with additional remarks on its probable use.

Structure.—I have been enabled to examine, in all, three birds, which from time to time have died in the Society's Gardens,—the first an adult male, in which, unaware of the nature of the opening in the trachea, I had grave doubts that it might have been occasioned by faulty manipulation with the scalpel on my part. I, however, took a photograph of the portion of the trachea and its deficient anterior chink, which I exhibited at the meeting of the Society. The second bird was an adult female. In this case I carefully examined the trachea in order to ascertain whether the tracheal opening was a natural condition. I subsequently made myself acquainted with the labours of previous observers. The third bird was a young male, and in this I found a very great difference in the size of the sac compared with the older birds.

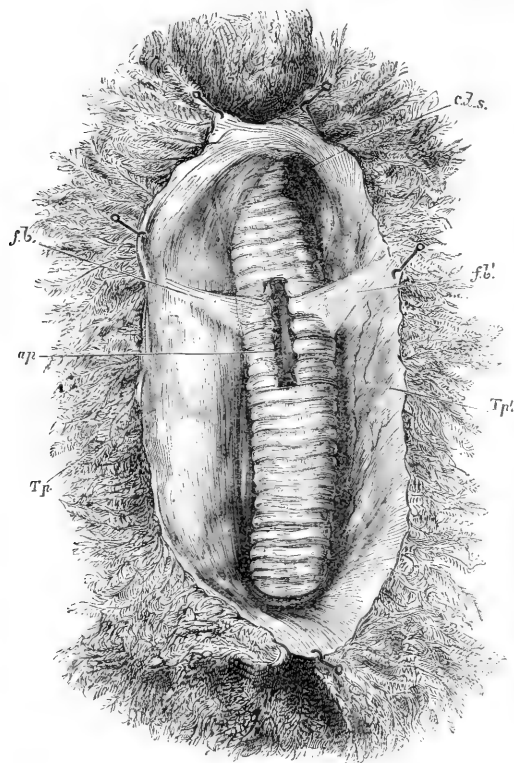
The descriptions of the several investigators spoken of corroborate each other in the main, and to some extent agree with what I have also seen in the adult Emu. I should consider it, therefore, superfluous to redescribe the entire structure, were it not that it enables us to compare the condition of the sac in the old and the young bird, and allows some part of the mechanism to be more fully explained.

In the adult female dissected by me the sac was of large size, and occupied the lower and anterior surface of the neck, its lower end reaching close to the sternum. Its exact shape when distended I did not ascertain; for, thinking I should be able to reflect the skin and tissues covering the bag previous to inflation, I accidentally cut into it while attempting this, the superincumbent coverings and its own walls being very thin. The sac when opened presents an oblong cylindrical form (as shown in fig. 1, *T. p. T. p'*). Each end is narrowed slightly and comparatively fixed, while the middle portion is freer, thus permitting a certain amount of outward expansion, from the anterior deficiency of the tracheal rings. This no doubt would give it a more oblate spheroidal form when blown up. In Knox's figure, where the sac and trachea are seen from behind, it is represented as being of a globular shape. The trachea in his woodcut appears considerably broader at the sac than above or below, because of the distention of the parts. In the accompanying woodcut (fig. 1),

* Since the reading of this paper, Prof. Alfred Newton, of Cambridge, has directed my attention to, and with his accustomed courtesy forwarded me, vol. vi. of the 'Naturalist' magazine (1856), where in the July number, p. 153, is a "Notice of a peculiar Organ in the Trachea of the Emu," communicated by Mr. Robert Anderson. Two woodcuts accompany the short paper, and one of these exhibits the tracheal chink; but both are very poor representations, and convey no idea of the mechanism of the parts. The author states "the opening extends along ten of the rings and dilates at each extremity."

which I have had drawn from nature, it will be seen, however, that in the undistended condition of the pouch the margins of the tracheal opening are not widely separated, the trachea itself being more or less uniform in calibre, while the walls of the sac are rather cylindrical than otherwise.

Fig. 1.



Lower portion of the neck of the adult ♀ Emu seen in front, displaying the tracheal pouch (*T.p. T.p'*) opened and dragged back on either side by hooks. The feathers are cut short at the tips. *ap.* Aperture or deficiency in the tracheal rings. *c. d. s.* *Cul de sac* of left upper end. *f. b. f. b'.* Fibrous bands which drag outwards the tracheal cartilages during inflation of the sac.

Dr. Knox has compared the size of the sac to that of a man's head; I have found it in the adult female to have the following dimensions when laid open:—Greatest length, taken upon the left side of the trachea, $14\frac{1}{2}$ inches; but over the trachea itself it measured only 11 inches. A little pouch or *cul de sac* (fig. 1, *c. d. s.*) reached upwards on the left side of the trachea for above 3 inches, giving the increased length at this part. This sacculus appears to correspond with a similar dilatation observable in Knox's figure. The

breadth about the middle of the sac, or its rough diameter, was between 3 and 4 inches.

My examination of the structure of the wall of the sac agrees with Wedemeyer and Macartney's observations, and not with Knox's, who describes it as a muscular bag. I find it to be composed of membranous white fibro-elastic tissue, overlaid, however, in part with some very delicate and widely scattered transversely striped muscular fibre, the remnants or representative of the *platysma myoides*. (Professor Owen* names this the "constrictor colli;" and remarks, "this muscle is well developed in the Emu, and acts when the drum-like dilatation of the windpipe is sounded.") The skin and subcutaneous tissues form the anterior boundary of the sac; while posteriorly it lies upon the vessels and muscles of the ventral surface of the neck, some of the former appearing as raised cords on its inner surface. Its fibrous envelope furthermore closely invests the anterior surface of the trachea, and at the fissure, presently to be described, appears almost to be continuous with the mucous tissue of the lining walls of the trachea itself. Traced in this way it seems like a kind of hernia of the lining membrane of the trachea, strengthened by the surrounding fibrous and other tissues. But at the same time it must be noted there is a visible though faint line of demarcation around the opening, at 0.2 inch from its edge.

The opening from the trachea into the sac (fig. 1, *ap.*), caused by deficiency of the tracheal rings in front, is $2\frac{3}{4}$ inches long; and the slit has an average breadth of 0.3 inch in the ordinary retracted condition, but when pulled apart it becomes of a very much wider oval figure.

In the female bird in question its position was between the fifty-fourth and fifty-ninth rings; in the young male between the fifty-eighth and sixty-third. Knox asserts there are about thirteen tracheal rings deficient, and that it commences at the fifty-second. Fremery's observation agrees more nearly with mine, as he notices its occurrence between the fifty-third and sixty-second rings. Wedemeyer gives $2\frac{1}{2}$ inches as the length of the opening.

As shown in fig. 1, on the right side there are six cartilaginous rings which do not meet, but on the left side only five; this is occasioned by the lowermost or fifth ring of the right side bifurcating as it approaches the open interspace. In the first male bird examined by me, in a similar manner, there were seven rings on the right side and six on the left. The photograph exhibited demonstrated this peculiarity.

The edges of the opening are not perfectly straight, but wavy, from the ring-cartilages projecting further than their fibrous interspaces. The edge of the rings beneath and above the opening forming the superior and inferior boundary of the vacuity are slightly emarginated. Between the second and third upper cartilages of the fissure on either side is a small fibrous band-like duplication of the wall of the sac, which stretches outwards and upwards, and seems to bind or form a stay and partial septum to the otherwise yielding wall of the sac (fig. 1, *f. b.*).

* Anat. of Vertebrates, 1866, vol. ii. p. 110.

If the sac were distended, these, from their position, would naturally pull outwards, and thus retain the orifice of the tracheal rings in an open state. The trachea itself, no doubt, is kept tense or relaxed according to the degree of contraction exerted by the sterno-tracheal muscles (fig. 2, *S. t. m'*).

The width of the trachea itself is about $2\frac{1}{4}$ inches; and it has a rather flattened or low arched curve from side to side.

In proceeding to note the differences exhibited in the young male I may say that this bird appeared as if little more than a third of the size of the adult female; but its exact age was not known. In this instance I managed to inflate the sac and raise the tissues from above it, so that the front and distended view was perfect. This is shown in the woodcut (fig. 2), where its diminutive size, as compared with the older female, is very marked.

In the first place its shape was decidedly oval, and it barely reached the borders of the trachea when fully blown out. Its greatest length then was 1.3 inch, and its greatest diameter 1.1 inch. During inflation the rings composing the borders of the opening rose up and became stretched outwards, giving an oval contour to the slit itself. There were five rings on either side of the opening, and above this fifty-eight rings, four rings lower therefore than in the adult female. The walls of the sac in the young bird under consideration were very thin and transparent, and seemed almost a continuation of the areolar tissue covering the trachea, but more directly springing from the cartilaginous edges of the longitudinal slit. When uninflated the sac could not be distinguished from the tissues of the trachea, and the slit in the windpipe shone distinctly through. The distance between the upper larynx and the anterior end of the opening was 15 inches. The opening itself was 1.1 inch long and 0.2 broad, and from its lower end to the sternum 3 inches.

This observation goes to prove that in the young Emu the tracheal sac is insignificant in proportion compared with the size that it afterwards attains. Its parietes then are also of extreme tenuity, and do not show any trace of vascularity. Moreover the differences existing in the two specimens here described, as also in the two birds examined by Fremery and Knox, are evidence of the opening occurring at no regular fixed ring, counting from above, the limits being in these cases between the fifty-second and fifty-eighth rings.

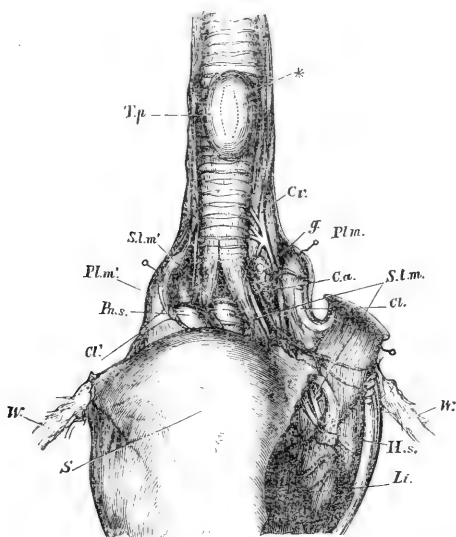
Lastly, it exists both in the male and female sex, as found by Fremery and myself. But Fremery has not noted whether the males or females have the largest sacs, and my own observations do not permit me to state positively regarding this point. In the adult male the tracheal opening was certainly as large as in the female; but, not being aware of the nature of the sac before the parts were cut through, I did not make sure of this point. It certainly was very much smaller in the young male bird; but imperfect development must be taken into account.

Function.—I have so far explained the appearances and differences in the stages of development of this remarkable appendage in the young and adult Emu. When, however, the function which it

performs in the animal's economy is inquired into, greater difficulty is found in satisfactorily demonstrating its definite nature and use than in merely describing its structure.

Fremery, the original discoverer, supposed the tracheal opening to be in some way connected with the well-developed thoracic air-sacs in this bird, and so to subserve the respiration and sanguification of the blood while running at a high speed.

Fig. 2.



Portion of thorax and neck of young ♂ Emu partially dissected, and with the ribs on the left side thrust outwards from the sternum (*S*) to show the insertion of the sterno-tracheal muscle (*S. t. m.* *S. t. m'*). *T. p.* Tracheal pouch. * points to the dotted line indicating the tracheal aperture. *S.* Sternum. *S. t. m.* *S. t. m'*. Sterno-tracheal muscles (on the left side the pointer only reaches the thoracic vein instead of the muscle lying beyond). *C. a.* Carotid artery. *C. v.* Carotid vein. *g.* Gland. *Pl. m.* *Platysma myoides*. *Pn. s.* Pneumatic sac. *Cl.* *Cl'*. Clavicles. *W.* *W'*. Wings, cut short. *H. s.* Hyosternal process (Geoff.) (costal process of some writers). *L.* Liver.

Dr. Knox has very oddly suggested the use of the sac as a swimming-bladder. Alluding to the occasional sudden inundations of the Australian plains and the termination of the rivers in marshes in that country, he says:—"The Emu, forced to seek his food amidst these fens, may, when obliged to have recourse to swimming (which must often be the case), fill the muscular bag of the trachea with air, and thus convert it into a swimming-bladder."

He further remarks it may be useful in running; for "by its means and the precaution of shutting the glottis the bird will be enabled to cause the air of one inspiration to pass and re-pass the

lungs, without being necessitated to allow it to escape, in order to perform the act of inspiration" (ibid. pp. 136-139).

Wedemeyer was inclined to regard it as an air-reservoir for oxygenizing the blood, as did Fremery.

Meckel, in summing up the opinions of these authors, gives his own to this effect:—"That it has no connexion with the voice, that more probably it facilitates running, and that in exceptional circumstances it may functionally answer as a swimming-bladder.

Dr. Macartney advances the idea that "the peculiar sound belonging to the New Holland Ostrich is entirely occasioned by the reverberation or resonance produced in the membranous bag connected with the front of the trachea," giving analogous instances in the bird, horse, howling-baboon, and bull-frog.

Professor Owen, as already mentioned, at least considers there is an existing relation between the sac and the sound. Dr. George Bennett* states, "the only sound emitted by the Emu is a sort of hollow booming note. It is considered to be produced in the female by means of the expansion and contraction of a large membranous bag surrounding an oblong opening through the rings of the trachea."

Mr. Bartlett, Superintendent of the Society's Gardens, has made many observations on the voices and habits of the Struthious Birds living in the Society's Menagerie.

On discussing the mooted question of the use of the sac with him, he supplies me with the following information:—"I have no reason to believe the sac and opening in the trachea in the Emu have anything whatever to do with swimming, breathing, or running, but I consider them as constituting simply the organ of sound employed by both male and female during the breeding-season. Probably at other times the sound produced by the female is louder and of a more regular drumming kind than in the male bird, also the lower part of the neck is inflated to a much greater extent in the female than in the male during the time these sounds are emitted. I am, moreover, unable to say whether the cavity is larger in the female than in the male."

In offering my own opinion upon the supposed function of this very remarkable tracheal appendage, unknown in any other species of bird, I must confess myself very undecided concerning its adaptation to one special use. Placing the opinions of the several authorities in a tabular form they may be stated as follows:—

1st. Respiratory purposes (oxygenation of the blood).

2nd. As a swimming-bladder.

3rd. As an air-reservoir in running.

4th. For simple vocal resonance.

5th. Sexual organ of sound during the breeding-season.

With respect to the first of these assigned functions, this may be looked at in a twofold view. The sac may either be regarded as a membranous expanse, the vascularity of which permits it to deoxygenize the inspired air, as does the lung; or it may merely supply the place of an air-reservoir to the lungs themselves. The first of

* Gatherings of a Naturalist in Australia (London, 1860), p. 219.

these two considerations involves the idea of the sac's possessing a structure analogous to those found in the respiratory surfaces generally. But so far as tissue is taken into account, its examination, by former observers as well as myself, does not show its texture to be sufficiently rich in vascular network to perform the function of aërication, at least such aërication as might be supposed to be required in a warm-blooded vertebrate.

No doubt this tracheal pouch might correspond to the thoracic and other pneumatic cavities which are present in this as in many other birds, these, as some maintain (an opinion I am inclined to adopt), subserving the purposes of respiration rather than that of buoyancy in flight, which formerly was considered their function. But as the act of filling the tracheal sac, unlike the other pneumatic chambers, involves unusual and highly increased muscular efforts, and as the sac does not, so far as has been observed in the living bird, retain regularly or dilate synchronously with ordinary respiration, it would follow that, in a mere occasional dilatation, so little advantage would accrue that one can hardly believe it possible that the physiological changes would be of the same nature as those occurring in the bone-cavities &c.

Concerning the second use, namely, as a swimming-bladder, the reasoning seems far-fetched. It is true that the Emu alone of all the struthious birds is known to take readily to the water; but the amount of buoyancy which such an air-sac would confer hardly seems equal to the occasion. If the bird depended on such an apparatus alone, muscular effort on its own part would far outbalance such a structure; and, moreover, in swimming-birds generally no such appliance is required, they remaining floating about for a long period, while the Emu, at most, would, in the event of crossing a swollen current, dash right through the watery element.

In considering the third suggested use, for running-purposes, if we found its presence in all the species of *Struthionidæ*, or such a structure in other animals noted for their speed of foot, we might the more readily believe it a necessity and adjunct to fleetness of progression. But this tracheal pouch, be it remembered, is strictly confined to *Dromæus novæ-hollandiæ*, and is found in no other species of the group, and, as I shall hereafter show, it occurs in a well-developed manner in slow-moving Reptilians, invalidating the idea of its being an accessory to celerity of motion. Besides the phenomenon of inflation has not been observed to take place in rapid movement, but rather at quieter times and at the will of the bird.

As for the fourth use, simple vocal resonance, this indeed may be augmented by the chamber in question; but that it represents a special organ of voice is, to say the least of it, doubtful. The comparison between the tracheal enlargement of Ducks and this sac does not strengthen the argument, as it is remarkable that the females of such birds often have the loudest voice, though no tracheal enlargement is present; whereas its presence in the males is not necessarily conjoined with voluminous vocal powers.

Regarding the fifth assigned use, the sexual organ of sound during

the breeding-season, this seems a more reasonable one, inasmuch as there are many instances of appearances and habits being temporarily assumed in birds during the breeding-time—*e. g.* the wattles of the Tragopan, and gular pouch of the Bustard &c. It agrees also with the fact that inflation of the sac is more often noticed then, and the peculiar drumming-noise is very frequent under sexual excitement.

The phenomena accompanying distention of this tracheal pouch in the birds in the Society's Gardens, as I have observed them, are as follows:—The head and the neck are slightly raised, the latter somewhat bent; then there appears a swelling in the lower part of the neck, and the bird with partly opened mouth gives utterance to a series of grunting-like sounds, during which there is observable a tremulous-like motion in the distended lower part of the neck, while a certain compressed state of the glottis appears to take place. The physiological action seems to be first a deep inspiration, followed by expiration of a forced kind with total or partial closure of the glottis, the tracheal pouch then fills, the aperture is more or less dilated, and as the glottis is temporarily and successively relaxed the air rushes from the lungs towards the open mouth, and, passing the orifice of the sac in jets, gives rise to the peculiar hollow metallic sounds, as does air when blown over the open bung-hole of a cask.

When an organ or appendage admits of so many ingenious suppositions as to its function as have been assigned to the one here treated of, it is not surprising that the precise one should remain uncertainly known. Interpreting the nature of the tracheal pouch from structure and position, as well as the mode and times of its being called into action, with the fact that the sac increases from the young to the adult stage, and that its maximum of size and apparent use correspond with the period of the procreative faculty, the following seems to be its use:—that it serves as an organ of sound employed by the bird under the phenomena incident to the passion of lust, and hence is more powerfully brought into play during the breeding-season.

Homology.—It is not my intention in the present communication to enter largely into the homology of this tracheal sac. Its wider relations in a homological sense evidently possess as much of interest as does the more limited study of its æconomical function in the Emu. I shall therefore only advert to the probable direction in which its homology is to be studied, by referring to a note by the French translators of Meckel's '*Vergleichende Anatomie*,' "*Ce sac peut être comparé aux sacs laryngiens des sauriens, à raison de l'influence qu'exerce la volonté de l'animal sur la distention de cette poche par l'air*"*. Among Reptilians, however, the Chameleon, as is well known, possesses a dilatable tracheal sac, in many respects closely resembling that existing in the Emu. In a specimen of this animal which I examined this pouch was of considerable size, and in its textural structure quite like that of the Emu. Instead, however, of being simple and ovoid or globular when distended, as in the Emu, it was pyriform, and with a partially constricted sacculus at

* Edition already cited, tome x. p. 405.

its free or distal extremity. The communicating aperture also was roundish, and placed high up in the trachea, close to the larynx, not slitlike or so low down as in the Emu. It is also worth while here to note that in the dead Chameleon the tracheal sac was with difficulty dilated from the mouth, but pressure on the thorax (representing forced expiration) distended it with ease, a fact corroborative of its mode of action in the living Emu.

With these homological remarks I have said enough to show that the accessory tracheal pouch in the Emu bears out the Reptilian affinities of the *Struthionidæ* which Huxley* and Parker† more clearly bring out from observations on their osteological development.

4. On the Classification of Birds; and on the Taxonomic Value of the Modifications of certain of the Cranial Bones observable in that Class. By THOMAS H. HUXLEY, F.R.S., V.P.Z.S.

The members of the class AVES so nearly approach the REPTILIA in all the essential and fundamental points of their structure, that the phrase "Birds are greatly modified Reptiles" would hardly be an exaggerated expression of the closeness of that resemblance.

In perfect strictness, no doubt, it is true that Birds are no more modified Reptiles than Reptiles are modified Birds, the reptilian and the ornithic types being both, in reality, somewhat different superstructures raised upon one and the same ground-plan; but it is also true that some Reptiles deviate so very much less from that ground-plan than any Bird does, that they might be taken to represent that which is common to both classes, without any serious error. A Lizard is not very far from being the centre of the circle, the periphery of which is occupied by Chelonia, Ichthyosauria, Plesiosauria, Pterosauria, and Aves.

That the association of Birds with Reptiles into one primary group of the Vertebrata, the SAUROPSIDA, which I have proposed elsewhere, is not a mere fancy, but that the necessity of such a step is as plain and demonstrable as any position in taxonomy can be, appears to me to be proved by an enumeration of the principal points in which Aves and Reptilia agree with one another and differ from Mammalia.

1. They are devoid of hair.
2. The centra of their vertebræ have no epiphyses.
3. Their skulls have single occipital condyles.
4. The prootic bone either remains distinct throughout life, or unites with the epiotic and opisthotic *after* these have become ankylosed with the supraoccipital and exoccipital.
5. The *incus* and *malleus* are not subservient to the function of hearing as *ossicula auditus*.

* Elements of Comp. Anat. 1861, i. (and unpublished Hunterian Lectures, 1867).

† Philosophical Transactions, 1866, pp. 113-183.

6. The mandible is connected with the skull by the intermediation of a quadrate bone (which represents the *incus* of Mammalia).

7. Each ramus of the mandible is composed of a number of separate ossifications, which may amount to as many as six in all. (Of these the *articularis* represents the *malleus* of Mammalia).

8. The apparent "ankle-joint" is situated not between the *tibia* and the *astragalus* as in the Mammalia, but between the proximal and the distal divisions of the *tarsus**.

9. The brain is devoid of any *corpus callosum*.

10. The heart is usually provided with two aortic arches; if only one remains, it is the right.

11. The red blood-corpuscles are oval and nucleated.

12. The cavities of the thorax and abdomen are never separated by a complete diaphragm.

13. The allantois, which is highly vascular, is very large, and envelops the embryo; but no villi for placental connexion with the parent are developed upon it.

14. There are no mammary glands.

I attach less weight to the first of these characters than to the rest, since the simpler kinds of feathers very closely approach hair in structure and development; but the other thirteen are, for the most part, of extreme importance, and define Birds and Reptiles, as a whole, very sharply from Mammals.

Closely as Birds approach Reptiles, however, and small as the divergence of the ornithic type from the reptilian appears to be, in view of the great divergences of Reptiles from one another, there are still a number of characters common to Birds which are absent in all recent Reptilia, and, so far as our knowledge goes, in extinct Reptiles—though it must be carefully borne in mind that our information respecting the latter is limited to an acquaintance with their osteology. Thus—

1. Birds possess epidermal appendages developed in sacs of the dermis, and having the structure of feathers.

2. More or fewer of the anterior vertebræ have centra with cylindrical articular surfaces†.

3. Although all birds possess a remarkably large sacrum, the vertebræ, through the intervertebral foramina of which the roots of the sacral plexus (and, consequently, of the great sciatic nerve) pass, are not provided with expanded ribs abutting against the ilium externally, and against the bodies of these vertebræ by their inner ends.

In recent Reptiles, possessing well-developed hind limbs, the intervertebral foramina through which the roots of the sciatic nerve

* See Gegenbaur, 'Archiv für Anatomie' (1863), and 'Untersuchungen zur vergleichenden Anatomie' (1864).

† *Archæopteryx* may possibly prove an exception to this rule. When certain of the vertebræ of Birds (as in the *Penguin*, *Larus fuscus*, and others) have centra with spheroidal articular surfaces, the anterior faces of the centra are convex and the posterior concave, which is the rarest case among the Reptilia. The procelous form of vertebra, so common among the Reptilia, has not been observed in the cervical or dorsal regions of the spine of Birds.

pass* are wholly, or in part, bounded by vertebræ provided with thick and expanded ribs; and these ribs are connected, more or less extensively, on the one hand, with the bodies of these vertebræ, and on the other with the iliac bones. The vertebræ in question, of which there are ordinarily two, constitute the sacrum. In Birds the arches of the vertebræ which correspond with these in their relation to the nerves (and therefore must also be termed "sacral") give off comparatively slender transverse processes, which seem to answer to those which unite with the tubercles of the ribs in the dorsal region; and it is by these transverse processes only that they are connected with the ilia.

4. The broad and expanded part of the sternum, which immediately follows the coracoidal articular surfaces, receives all the sternal ribs. In all recent Reptilia which possess sternal ribs, some of the latter articulate with narrow prolongations, which extend back from the posterior angle of the expanded rhomboidal sternal plate. The sternum in Birds ossifies in a manner which has not been observed in any Reptile.

6. The ischia never unite in a median ventral symphysis; and both pubes and ischia are directed backwards, approximately parallel with one another and with the spinal column.

7. The proximal constituent of the tarsus is ankylosed with the tibia into one tibio-tarsal bone†; the distal element of the tarsus similarly unites with the second, third, and fourth metatarsal bones, and gives rise to the tarso-metatarsal bone. The metatarsal of the hallux is shorter than the others, and does not reach the tarsus.

Unless, as Gegenbaur has rendered probable, the hind limb of the extinct reptile *Compsognathus* was similarly modified, these characters are diagnostic of birds. In any case they are highly characteristic of them.

8. Birds have hot blood, a muscular valve in the right ventricle, a single aortic arch, and remarkably modified respiratory organs; but it is, to say the least, highly probable that the Pterosauria, if not the Dinosauria, shared some of these characters with them. The amount of work involved in sustaining a Pterodactyle in the air would seem, physiologically, to necessitate proportional oxidation and evolution of waste products in the form of carbonic acid. If so, a proportional quantity of heat must have been evolved, and there must have been a ready means of eliminating the carbonic acid from the blood. We know of no such means, except those which are afforded by highly developed circulatory and respiratory organs; and therefore it is highly probable that the Pterodactyles had more perfect

* The sciatic nerve of the Crocodile is formed, for the most part, by a root which leaves the spinal canal by the intervertebral foramen, interposed between the two sacral vertebræ, and which passes between the two expanded sacral ribs. It receives a large accessory branch from the preceding, and a smaller from the succeeding, spinal nerve. In *Gecko* versus the root of the sciatic nerve, which passes out between the two sacral vertebræ, is smaller than that which lies in front of it, between the anterior sacral and the last lumbar vertebræ.

† See Gegenbaur, *l. c.*

organs of this kind than their congeners, accompanied by the correlative hot blood.

But since we know that the organs of respiration and circulation of a Bat are very different from those of a Bird, it is quite possible that those of a Pterodactyle may have been different, in detail, from either.

Having thus arrived at the conclusion that the class Aves, while well enough defined from all existing Reptiles, is nevertheless far more closely connected with the class Reptilia than with any other, I proceed to inquire how Birds may be subdivided into orders, suborders, and families, by characters equalling, or at any rate approaching, in definiteness those which mark out the corresponding groups among Mammals and Reptiles.

I propose to divide the class Aves into three orders: the SAURURÆ, the RATITÆ, and the CARINATÆ.

I. The SAURURÆ (Haeckel) are represented by the solitary fossil *Archæopteryx*, which seems to have been distinguished from all other birds by the following characters:—

1. The metacarpal bones are well developed, and are not ankylosed together.

2. The caudal vertebræ are both numerous and large, so that the caudal region of the spine is longer than the body, whereas in all other birds it is shorter than the body.

The furculum is complete and strong, and the foot extremely passerine in appearance. The forms of the skull and of the sternum are unknown*.

II. The RATITÆ (Merrem), or the Struthious Birds, differ from all others in the combination of the following peculiarities:—

1. The sternum is devoid of a crest, and ossifies only from lateral and paired centres.

2. The long axes of the adjacent parts of the scapula and coracoid are parallel or identical†. The scapula has no acromial process, nor has the coracoid any clavicular process; at most there are inconspicuous tubercles representing these processes.

3. The posterior ends of the palatines and the anterior ends of the pterygoids are very imperfectly, or not at all, articulated with the basisphenoidal rostrum, being usually separated from it, and supported, by the broad, cleft, hinder end of the vomer.

4. Strong "basipterygoid" processes, arising from the body of the basisphenoid and not from the rostrum, articulate with facets which are situated nearer the posterior than the anterior ends of the inner edges of the pterygoid bones.

5. The upper, or proximal, articular head of the quadrate bone is not divided into two distinct facets.

* The "retention of two unguiculate digits on the radial side of the metacarpophalangeal bones modified for the attachment of the primary quill-feathers" (Philosophical Transactions, 1863, p. 46) is no distinctive character of *Archæopteryx*, both *Struthio* and *Rhea* presenting "two unguiculate digits" in the manus.

† My friend Professor Newton informs me he had already drawn attention to this important point in his Lectures delivered at Cambridge last autumn.

6. The barbs of the feathers are disconnected.

7. There is no inferior larynx, and the diaphragm is better developed than in other birds.

Though comparatively but few genera and species of this order now exist, they differ from one another very considerably, and have a wide distribution, from Africa and Arabia over many of the islands of Malaisia and Polynesia to Australia and South America. Hence, in all probability, the existing Ratitæ are but the waifs and strays of what was once a very large and important group.

The Afro-Arabian genus *Struthio* is the type of one group of this order, characterized by:—

1. The prolongation of the maxillary processes of the palatine bones forwards, beneath the maxillo-palatines*, as in most birds.

2. The thickening of the inner edges of the maxillo-palatines, and their articulation with facets upon the sides of the vomer.

3. The shortness of the vomer, which does not articulate with either palatines or pterygoids posteriorly.

4. The slight, or wanting, ossification of the prefrontal processes of the primordial cranium.

5. The union of the bodies of the sacral vertebræ with the anterior ends of the pubes and ischia.

6. The presence of two shallow notches, on each side, in the posterior margin of the sternum.

7. The proportions of the fore limb. The humerus is about equal in length to the distance between the pectoral arch and the ilium, and is therefore much longer than the scapula. The antebrachium is not half as long as the humerus. The manus possesses the ordinary three digits; and two of these, the radial and the middle, are provided with claws†.

8. The union of the pubes in a symphysis.

9. The abortion not only of the hallux, but also of the distal end of the metatarsal bone and of the phalanges of the second digit of the foot, whence the foot is two-toed.

10. The presence of thirty-five precaudal‡ vertebræ.

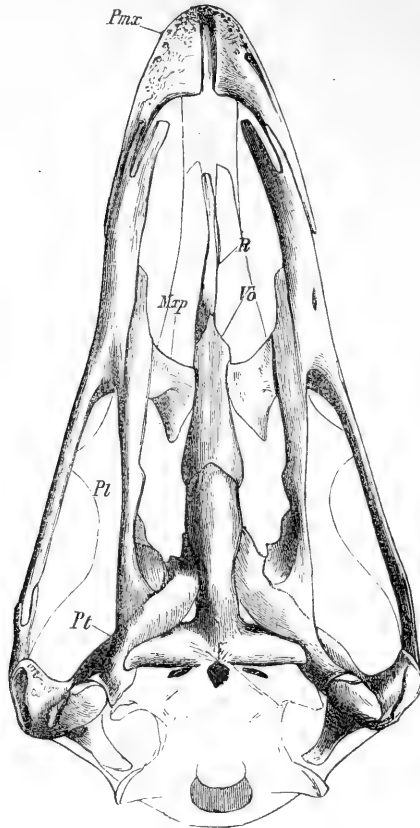
11. The feathers being devoid of aftershafts.

* By the term "*maxillo-palatines*" I designate those processes of the maxillary bones which extend, more or less horizontally, inwards and contribute to the formation of the roof of the mouth and the anterior and inferior walls of the nasal chambers. Nitzsch called them "*Muscheltheile*." Mr. Parker has included them, with the maxillæ of which they form a part, under the head of *prevomers*. I conceive these maxillo-palatine processes to answer to the palatine processes of the maxillary bones in the Mammalia.

† This interesting fact was first noted by Nitzsch (*Osteografische Beiträge*, p. 91), but has since been forgotten.

‡ I regard as "*caudal*" all those vertebræ of the bird's complex "*sacrum*" which lie behind the exit of the roots of the sacral plexus. The foremost of these caudal vertebræ are readily distinguished from the proper sacral vertebræ, which immediately precede them, by possessing inferior transverse processes, or, more strictly speaking, ankylosed ribs, which, like flying buttresses, pass from the bodies of the vertebræ upwards and outwards to the roof of the "*sacrum*" at its junction with the ilium.

Fig. 1.



Under view of the skull of *Struthio camelus*. From a specimen in the Museum of the Royal College of Surgeons.

Pmx. The præmaxillæ. *R.* The sphenoidal rostrum. *Vo.* The vomer. *Pl.* The palatine bone. *Mxp.* The maxillo-palatine plate of the maxillary. *Pt.* The pterygoid.

A second group is represented by the South American genus *Rhea*, in which—

1. The maxillary processes of the palatines are short, and unite with the inner and posterior edges of the maxillo-palatines.
2. The maxillo-palatines are thin, fenestrated plates, which do not articulate with facets on the edges of the vomer.
3. The vomer is as long as it usually is in birds, and articulates behind with the palatine and pterygoid bones.

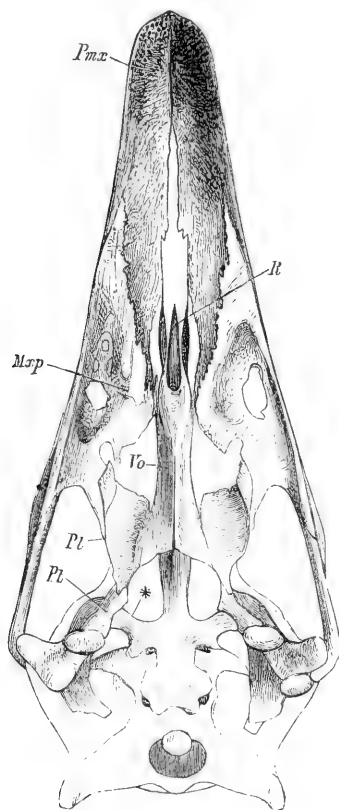
4. The prefrontal processes are little ossified.

5. The bodies of the proper sacral vertebræ do not unite with the pubes or ischia; and the centra of the sacral vertebræ, which ossify late, are extremely elongated and slender.

6. The short sternum narrows posteriorly, and presents a notch in the middle of its posterior edge.

7. The length of the humerus exceeds the distance between the shoulder-girdle and the ilium, and is of course greatly longer than the scapula. The manus has the same conformation as that of *Struthio*.

Fig. 2.



Under view of the skull of *Rhea americana*.

Pmx. The premaxillæ. *R.* The rostrum. *Mxp.* The maxillo-palatine. *Vo.* The vomer. *Pl.* The palatine. *Pt.* The pterygoid. * The basipterygoid process of the sphenoid.

8. The pubes are free ; but the ischia unite beneath the urosacral* vertebræ.

9. The hallux is absent ; but the second, third, and fourth digits are complete.

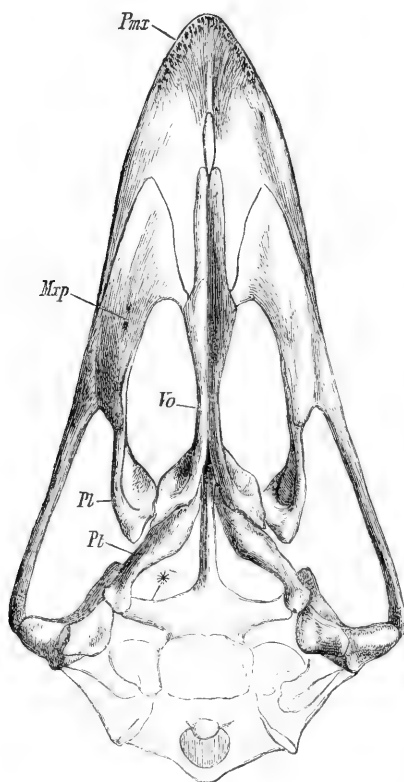
10. There are only thirty-two precaudal vertebræ.

11. The feathers are devoid of an aftershaft.

The Malayo-Australian genera *Casuarius* and *Dromæus* are members of a third group, which may be defined as follows :—

1. The maxillary processes of the palatines are short, as in *Rhea*.

Fig. 3.



Under view of the skull of *Dromæus nova-hollandiæ*. From a specimen in the Museum of the Royal College of Surgeons.

The letters have the same signification as in the preceding figures.

* I term "urosacral" those caudal vertebræ which unite with one another and with antecedent vertebræ to form the "sacrum" of a bird.

2. The maxillo-palatines are flat, imperforate plates, which unite solidly with the præmaxillæ and the vomer.

3. The vomer is long, and articulates behind with the palatine and pterygoid bones.

4. The prefrontal processes are large and well ossified.

5. The bodies of the proper sacral vertebræ do not unite with the pubes or ischia; and the bodies of the urosacral vertebræ are very large, thick, and well ossified.

6. The sternum is long and escutcheon-shaped, at first widening and then coming to a point behind.

7. The humerus is not nearly half so long as the distance between the pectoral arch and the ilium, and is much shorter than the scapula. The antebrachium is not more than half as long as the humerus. Only one digit, the median, is complete and bears a claw.

8. Neither the pubes nor the ischia unite in the middle line of the body.

9. The hallux is absent, but the other digits are complete.

10. There are thirty-five precaudal vertebræ.

11. The feathers have aftershafts as long as the principal shafts.

The extinct *Dinornis* of New Zealand differs from the other *Ratitæ*, and thus represents a fourth group, in exhibiting:—

1. A skull with high arched beak and projecting occipital condyle.

2. Flat, imperforate maxillo-palatine plates, which unite solidly with the præmaxillæ and probably with the vomer, as in *Dromæus*.

3. A *Dromæine* pelvis.

4. A broad sternum with two posterior notches.

5. A very rudimentary pectoral arch, which appears to have possessed no glenoidal cavity for the articulation of the humerus.

6. Three toes, the hallux being absent.

7. The feathers have an aftershaft*.

Lastly, the remarkable living New Zealand genus *Apteryx* represents a fifth division, having:—

1. The palatines short and broad, and uniting by an oblique suture with the expanded maxillo-palatines, which are flat, imperforate plates uniting with the premaxillaries and the vomer.

2. The vomer long and uniting with the palatines and pterygoids posteriorly.

3. The prefrontal processes very large and spongy.

4. The bodies of the proper sacral vertebræ not united with the ischia or pubes; the urosacrals large and well ossified.

5. The sternum broad and with two posterior excavations.

6. The humerus longer than the scapula, and extending for about half the distance between the pectoral arch and the ilium. The antebrachium about half the length of the humerus, and the manus possessing but one claw.

7. Neither the pubes nor the ischia united in the middle line of

* See Dallas, Proceedings of the Zoological Society, 1865.

the body; nor are the pubis and the ischium of the same side united by bone.

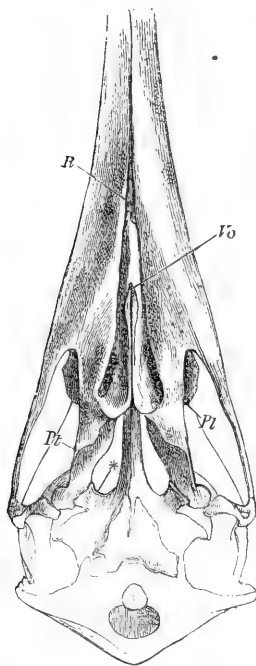
8. The hallux present, as well as the other three digits of the foot.

9. Only thirty-two precaudal vertebræ.

10. The feathers without any aftershaft.

It will be observed that in each of these families of the Ratitæ a particular form and arrangement of the bones of the palate accompany the other distinctive characters.

Fig. 4.



Under view of the skull of *Apteryx australis*. From a specimen in the Museum of the Royal College of Surgeons.

The letters as before.

III. The order CARINATÆ (Merrem) embraces all existing birds, except the Ratitæ. They have the following characters in common:—

1. The sternum possesses a keel, and ossifies from a median centre in that keel, as well as from lateral paired centres*.

* The sternum is thus ossified in all the Carinatæ which have yet been examined. The only apparent exception to the presence of a keel is the singular genus *Strigops*. A knowledge of the ossification of the sternum of this bird is greatly to be desired.

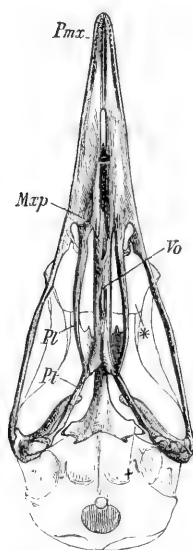
2. The long axes of the adjacent parts of the scapula and coracoid make an acute or a slightly obtuse angle, and are never, even approximately, identical or parallel*. The scapula always has a distinct acromion and the coracoid a clavicular process.

3. The vomer is comparatively small, and allows the pterygoids and palatines to articulate directly with the basisphenoidal rostrum†.

In this order the bones which enter into the formation of the palate are disposed in four different modes, which may be called respectively the *Dromæognathous*, *Schizognathous*, *Desmognathous*, and *Ægithognathous* arrangement.

I. The *Dromæognathous* Birds are represented by the single genus *Tinamus*, which (as Mr. Parker has shown‡) has a completely stru-

Fig. 5.



Under view of the skull of *Tinamus robustus*. From a specimen belonging to W. K. Parker, Esq., F.R.S.

The letters as before, except * the prefrontal, and + the basipterygoid, process.

thious palate. In fact the vomer is very broad, and in front unites with the broad maxillo-palatine plates, as in *Dromæus*; while behind

* The only genera in which, so far as I know, this angle is somewhat greater than a right angle are *Ocydromus* and *Didus*.

† *Tinamus* perhaps affords an exception to this character.

‡ "On the Osteology of the Gallinaceous Birds and Tinamous" (Transactions of the Zoological Society, vol. v., 1864). Sundevall, however, had already said of *Tinamus*, *Rhynchotus*, and *Crypturus*, "Struthionες parvos referunt."

it receives the posterior extremities of the palatines and the anterior ends of the pterygoid bones, which thus are prevented, as in the Ratitæ, from entering into any extensive articulation with the basisphenoidal rostrum.

The basipterygoid processes spring from the body of the sphenoid, not from its rostrum, and they articulate with the pterygoids very near the distal, or outer, ends of the latter bones. The head of the quadrate bone is single, as in the Struthious birds (Parker, *l. c.*).

But the sternum of *Tinamus* has a great crest, and the coracoid and scapulæ have the arrangement and structure usual in the Carinatae. And though the ischium is not united with the ilium by bone behind the acetabulum, so that the sciatic notch is not converted into a foramen by bone, this character is not universal among the Ratitæ, and, in *Tinamus*, a fibrous or cartilaginous bridge does connect the two bones.

Though the most Struthious of all Carinate birds, then, *Tinamus* cannot, I think, be removed from the order of the Carinatae.

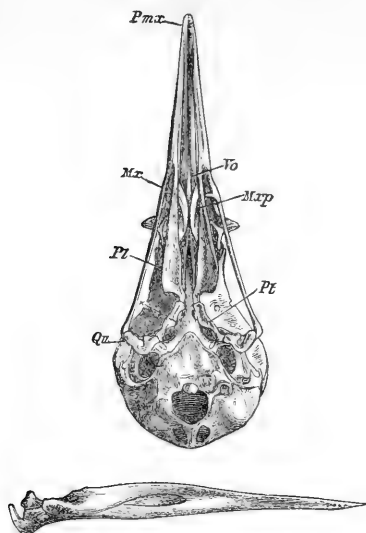
II. In the large assemblage of birds belonging to the Cuvierian orders Gallinæ, Grallæ, and Natatores, which may be termed *Schizognathous*, the vomer, sometimes large and sometimes very small, always tapers to a point anteriorly; while posteriorly it embraces the basisphenoidal rostrum, between the palatines. But the latter bones and the pterygoids are directly articulated with one another and with the basisphenoidal rostrum, and are not borne by the divergent posterior ends of the vomer.

The maxillo-palatines are usually elongated and lamellar; they pass inwards over the anterior processes of the palatine bones, with which they become united, and then bending backwards, along the inner edge of the palatines, leave a broader or a narrower fissure between themselves and the vomer, and do not unite with it or with one another.

This Schizognathous arrangement of the palatine bones is extremely well displayed by the Plover, as the accompanying figure of the parts in *Charadrius pluvialis* shows.

The palatine bone (fig. 6, *Pl*) presents an expanded part, which may be called its "*body*," the inner and outer edges of which are produced into internal and external "*laminae*," separated by a longitudinal groove or depression. In this bird the outer lamina descends much further than the inner. The free edge of the outer lamina joins the posterior margin nearly at a right angle, and thus gives rise to the "*postero-external angle*." The postero-internal angle of the body of the bone is produced into a "*pterygoid process*," which articulates with the pterygoid posteriorly, and with the basisphenoidal rostrum internally. Superiorly the body of the palatine bone passes into what may be termed its "*ascending process*," which bends round so as to form the posterior boundary of the nasal passage, and ends, on the inner side of that passage, in a slender prolongation which passes forwards and applies itself to one of the forks of the vomer (fig. 8, *Vo*).

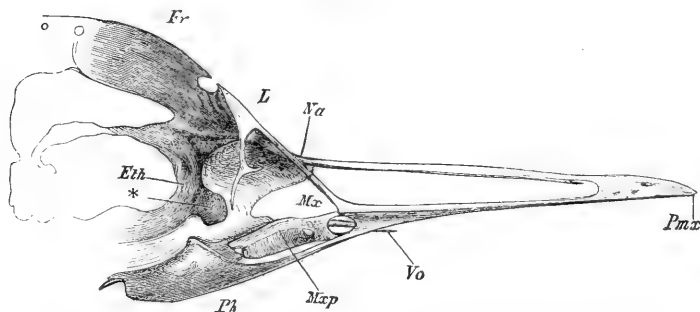
Fig. 6.



The inferior face of the skull, and a lateral view of the outer side of the right ramus of the mandible, of *Charadrius pluvialis*; of the size of nature.

Pmx. The præmaxilla. *Mr.* The maxilla. *Mxp.* Its maxillo-palatine process. *Pl.* The palatine bone. *Pt.* The pterygoid bone. *Qu.* The quadrate bone. *x* The basipterygoid process.

Fig. 7.

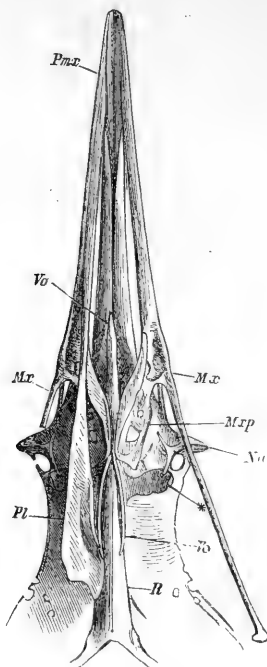


A side view of the fore part of the skull of *Charadrius pluvialis*, enlarged.

Pmx. *Mx.* *Mxp.* *Pl.* as before. *Na.* The nasal bone. *Fr.* The frontal. *Eth.* The ethmoid. *L.* The lacrimal. * The ossified prefrontal process of the ethmoidal cartilage, which separates the orbital from the nasal chamber.

Anteriorly the body of the palatine gradually narrows into its "anterior" or "*maxillary process*," the origin of which is coincident with the abrupt termination of the inner lamina. The slender anterior

Fig. 8.



Under view of part of a skull of *Charadrius plumbealis*, partially dissected and enlarged. The letters as before, except *R*, the basisphenoidal rostrum. The left palatine bone is removed, so as to expose the whole under face of the maxillo-palatine and prefrontal processes, and the left half of the hinder split moiety of the vomers.

extremity of this process coalesces with the maxillary and premaxillary bones of its own side. The vomer is deeply cleft behind, and embraces the sphenoidal rostrum by its two slender forks (fig. 8). In front it becomes flattened and slightly decurved (fig. 7), ending in a point opposite the level of the union of the palatines with the maxillaries and premaxillaries. Immediately behind the place at which the maxilla (*Mx*) gives off its ascending process to join the external descending process of the nasal (*Na*), it sends a slender stem of bone inwards; and this almost immediately expands into the oval, scroll-like, maxillo-palatine plate (*Mxp*), the convex face of which looks upwards and inwards, while its concave face looks downwards and outwards. The maxillo-palatine has an abruptly truncated posterior free edge, while in front it tapers off and becomes united with the upper surface of the maxillary process of the palatine (fig. 8). In the middle line, its rolled edge, which lies on the inner side of the maxillary process, comes very near that of its fellow; but

it remains perfectly distinct from the other maxillo-palatine and from the vomer. The plate is perforated by four holes, between which a sort of St. Andrew's cross of bone is left (fig. 8).

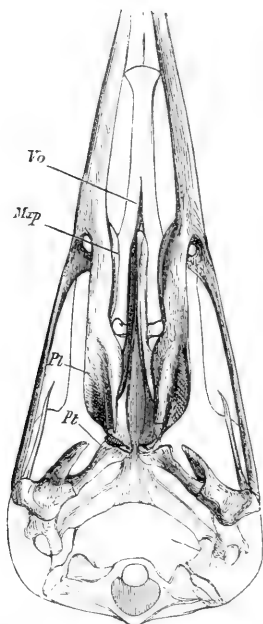
It follows from this description that, in the dry skull of the Plover, the blade of a thin knife can be passed, without meeting with any bony obstacle, from the posterior nares alongside the vomer to the end of the beak.

On each side of its commencement the basisphenoidal rostrum presents a small elevation, terminated by a flat oval facet (fig. 6, \times), which represents the basiptyergoid process of the Ratitæ. A corresponding facet on the inner edge of the pterygoid bone, nearer its anterior than its posterior end, articulates with this (fig. 6).

The angle of the mandible is elongated into a slender process, which bends abruptly upwards, and is frequently broken off (fig. 6).

The Pluvialine form and arrangement of the maxillary, palatine, and pterygoid bones just described are substantially repeated in the following Pressirostres and Longirostres of Cuvier:—*Charadrius*, *Œdicnemus*, *Vanellus*, *Hæmatopus*, *Cursorius*, *Scolopax*, *Numenius*,

Fig. 9.



Under view of the skull of *Grus pavonia*. From a specimen in the Museum of the Royal College of Surgeons.

The letters as before.

Rhynchæa, *Limosa*, *Tringa*, *Machetes*, *Phalaropus*, *Strepsilus*, *Totanus*, *Himantopus*.

The Cranes almost always lack basipterygoid processes and the corresponding facets upon the pterygoids, the only exception I have met with being *Grus antigone*. The Rails are always devoid of basipterygoid processes. In other points the palates of these birds, of *Eurypyga*, of the Kagu, of *Psophia*, and of *Otis* are similar to that of the Plover. The angle of the mandible, however, is obliquely truncated, and not produced into an upwardly curved process.

In the Gulls, the Divers, the Grebes, the Auks, and the Penguins, the bones which form the roof of the mouth have the same general arrangement and form as in the Plovers. But they are devoid of basipterygoid processes; and in the Penguins the pterygoids become much flattened from above downwards.

Fig. 10.

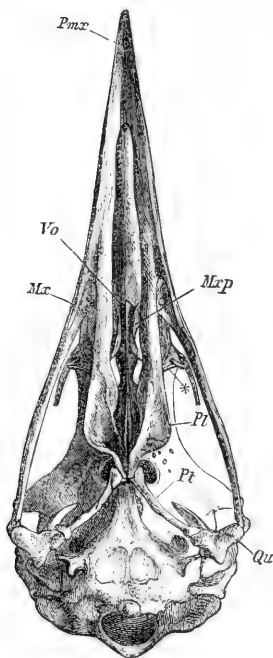
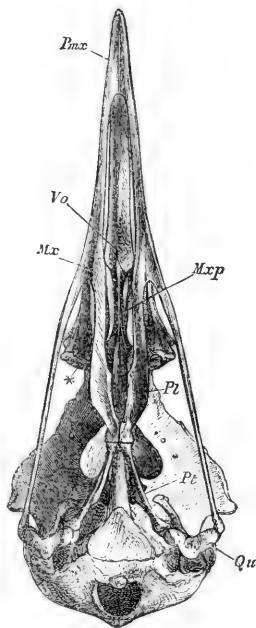
*Alca torda.*

Fig. 11.

*Larus rissa.*

Views of the inferior aspect of the skull in *Alca torda* (fig. 10) and *Larus rissa* (fig. 11), of the size of nature. The letters have the same signification as in the figures of *Charadrius*, a comparison with which will bring out the fundamental resemblance of the three skulls better than a description can do.

But the *Procellariidæ* differ from the families which have just been enumerated in the great expansion of the maxillo-palatines,

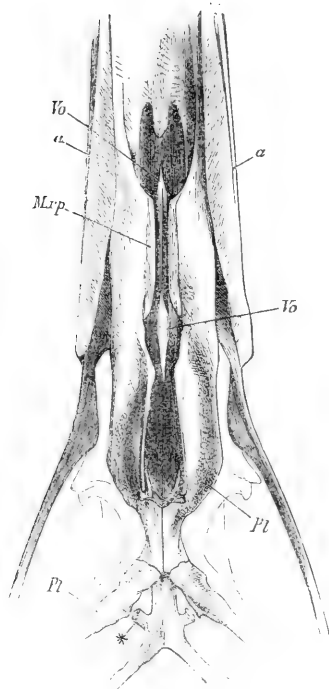
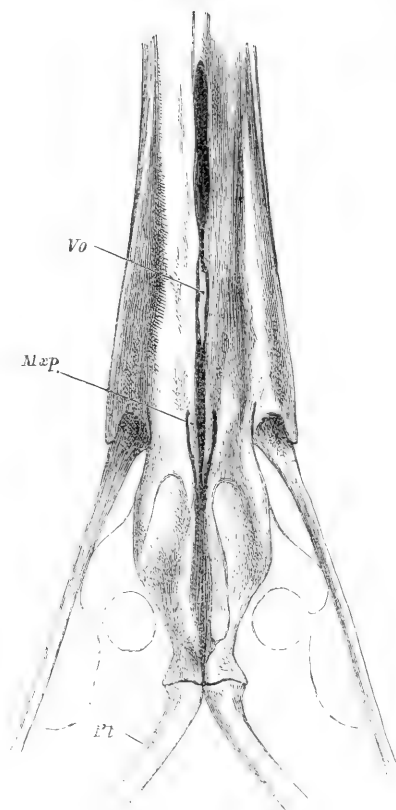
which become thick and spongy, and so closely approach the middle line that, in the Albatroses, only a very narrow cleft is left on each side of the vomer.

The front part of the vomer itself is much more strongly bent downwards than in the Gulls; and the ascending process of the palatine bone is greatly produced, and becomes anchylosed with the vomer.

Procellaria gigas holds a sort of middle place between the Gulls and the Albatroses, the maxillo-palatines being less swollen, and the clefts between them and the vomer far larger than in *Diomedea*. In this species again the basipterygoid processes are present, though I have not been able to observe them in other *Procellariidæ*.

Fig. 13.

Fig. 12.

*Procellaria gigantea.**Diomedea exulans.*

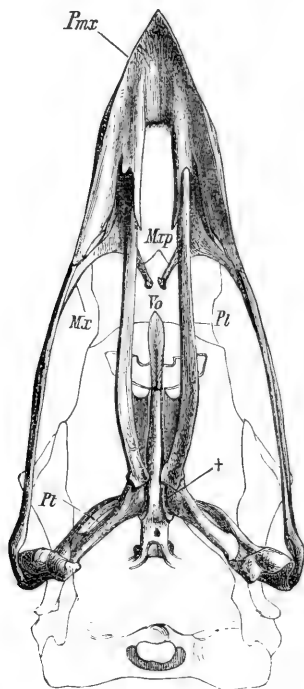
Under views of the skulls of *Procellaria gigantea* and *Diomedea exulans*. From specimens in the Museum of the Royal College of Surgeons.

The letters as before.

Among the Gallinaceous Birds, the *Phasianidæ*, *Turnicidæ*, and *Pteroclidæ* all have basipterygoid processes, which are situated upon the rostrum, and take the form of sessile, oval, articular facets for the pterygoid bones. The palatine bones have long and slender anterior processes, and completely rounded-off postero-external angles. They have generally small, and sometimes almost obsolete, maxillo-palatines, and very imperfectly developed vomers, so that the vomero-palatine clefts are wide and, usually, almost uninterrupted, throughout their length, which is, relatively, very considerable.

The angle of the mandible is prolonged and bent upwards, sometimes, as in *Tetrao*, acquiring a prodigious length.

Fig. 14.



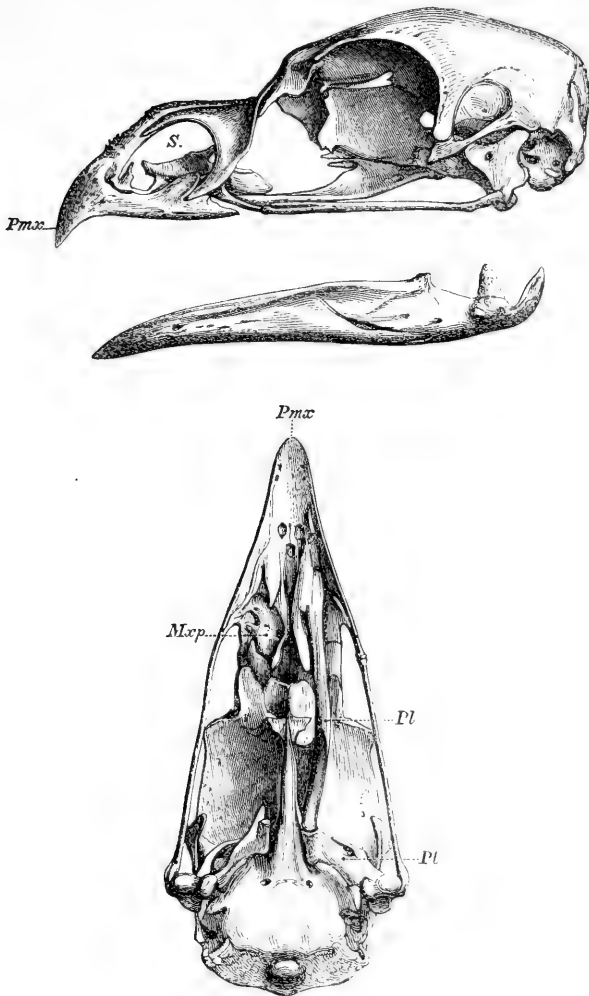
Under view of the skull of *Tetrao urogallus*. From a specimen belonging to W. K. Parker, Esq., F.R.S.

The letters as before.

In the *Megapodidæ* (e. g. *Talegalla*) the maxillo-palatines take the form of thin plates tapering to their free ends, which pass inwards and then, before they reach one another, bend back at a right angle.

The basiptyergoid processes are as in the preceding genera ; and the mandible has a strong recurved angular process.

Fig. 15.



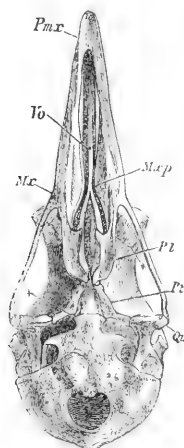
Lateral and inferior views of a skull of *Crax globicera*, in the possession of W. K. Parker, Esq., F.R.S.

In the side view *S* denotes the ossified septum. The strong recurved angular process of the mandible is well displayed ; the vomer is lost, and is not represented in the inferior view ; and the right palatine bone is removed to show the large maxillo-palatine plate of the maxillary (*Mxp*).

In the *Cracidae* the characteristic basipterygoid processes, the produced and recurved angle of the mandible, and the form of the palatines remain as in the last mentioned genera. But the maxillo-palatines are large and scroll-like, stretching inwards, and in some species (e. g. *Crax globicera*) even becoming united across the middle line with one another and with a small ossification of the *septum narium*.

All *Columbidae* (except *Didus*) have basipterygoid processes, and are completely Schizognathous. The maxillo-palatines are larger than in the ordinary Gallinaceous birds, and are elongated from before backwards, and spongy in texture, not scroll-like. The postero-external angles of the palatine bones are rounded off; but, in most of the *Columbidae*, their inner laminæ are more prominent than the outer, instead of being obsolete as in the Gallinaceous birds. The basipterygoid processes are prominent and rather resemble those of the Plovers than those of the last-named group. Finally, the angle of the mandible is neither produced nor recurved, but is more or less abruptly truncated. The vomer is very slender.

Fig. 16.



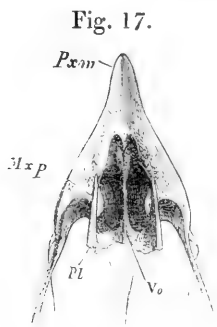
Under view of the skull of *Columba palumbus*. The letters as before.

Didus has no basipterygoid processes; but the articular end of its mandible resembles that of other *Columbidae*.

Didunculus more nearly resembles the ordinary *Columbidae* in possessing prominent basipterygoid processes; but the palatine bones are thick, their internal laminæ being altogether obsolete. The distal articular facet of the quadrate bone is elongated antero-posteriorly, and nearly resembles the same part in a Parrot. The axis of the fossa of the mandible which receives this facet nearly coincides with that of the ramus of the mandible; while in the other *Columbidae*

and in *Didus* it is nearly at right angles to the ramus of the mandible. The form of the angle of the mandible in *Didunculus* is quite unlike that observed in the other *Columbidæ* and in *Didus*. In these respects, therefore, *Didunculus* departs further from the ordinary *Columbidæ* than the Dodo does.

I am indebted to Mr. E. Higgins for a skin of that singular bird *Opisthocomus cristatus*, from which I was able to extract an imperfect skull, the inferior face of which is represented in fig. 17. The base of the cranium and the pterygoid bones are wanting. The underside of the unossified nasal septum supports the slender vomer (*Vo*), which expands and becomes bifurcated anteriorly, in a manner unlike anything which I am acquainted with in other birds*. The very slender anterior processes of the palatine bones



Opisthocomus cristatus.

Under view of an imperfect skull. The letters as before.

(the bodies of which are almost entirely wanting in this specimen) are overlapped by the short and broad maxillo-palatines, which remain very distant from the vomer and from one another. The angle of the mandible is slightly produced and bent upwards.

These are all the birds (leaving the *Cracidæ* aside) in which I have noticed the Schizognathous disposition of the palate, which, it must be observed, is characterized not only by the complete distinctness of the maxillo-palatines from one another and from the vomer, but by the slender and usually pointed form of the latter bone.

III. Those Cuvierian Grallæ and Natatores which are not Schizognathous, the Accipitres or Raptores, the Scansores, and, among the Passeres, most of the Fissirotres, all the Syndactyli, and *Upupa* may be termed *Desmognathous*.

In these birds the vomer is often either abortive, or so small that it disappears from the skeleton. When it exists it is always slender and tapers to a point anteriorly.

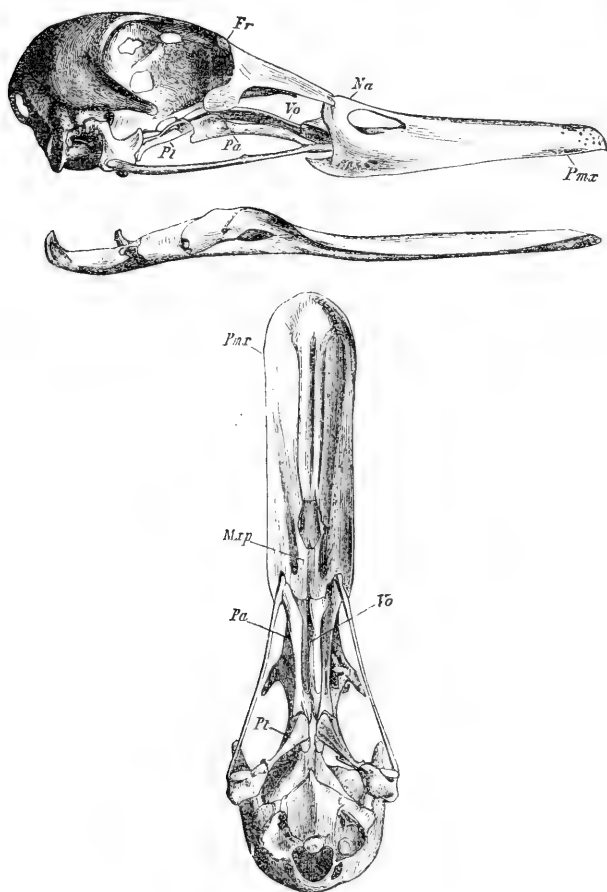
* In some of the Falcons the vomer has a nearly similar anterior termination, but its connexions are different.

The maxillo-palatines are united across the middle line, either directly or by the intermediation of ossifications in the nasal septum.

The posterior ends of the palatines and the anterior ends of the pterygoids articulate directly with the rostrum, as in the preceding division.

The desmognathous skull appears under its simplest form in *Palamedea* and the Lamellirostres. In these birds each maxillo-palatine is a broad, flat, and thin bony plate, which unites with its fellow in the middle line of the palate. The septum may be more

Fig. 18.

*Querquedula crecca.*

Side and inferior views of the skull and mandible. The letters as before.

or less ossified. The basipterygoid processes are represented by oval facets, sessile upon the rostrum, and placed so far forward that the surfaces which articulate with them are situated close to the anterior extremities of the pterygoid bones. In this respect, in the rudimentary condition of the inner lamina of the palatine bone, and in the circumstance that the angle of the mandible is strongly produced and upcurved, these resemble the Gallinaceous birds. They differ from the latter not merely by their "desmognathism" but by the absence of the rounding off of the postero-external angle of the palatine, which is so marked in the Fowls, and by the great proportional length of the region of the skull, which corresponds with the attachment of the lachrymal bone (*Fr* to *Na*, nearly, in fig. 18).

In *Ibis*, *Platalea*, and *Phœnicopterus* the maxillo-palatines not only unite across the vomero-palatine fissures, but, becoming enlarged and spongy, fill the base of the beak. The basipterygoids, rudimentary in *Phœnicopterus*, are absent in *Platalea* and *Ibis*. The angle of the mandible of *Phœnicopterus* has the same prolongation

Fig. 19.

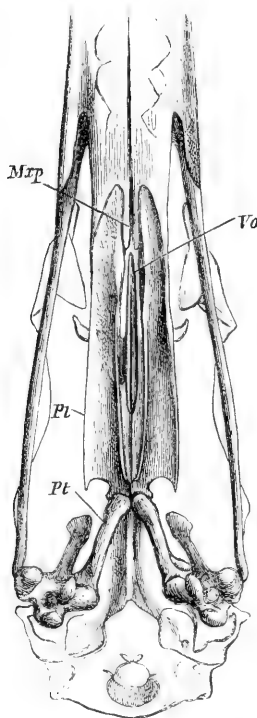
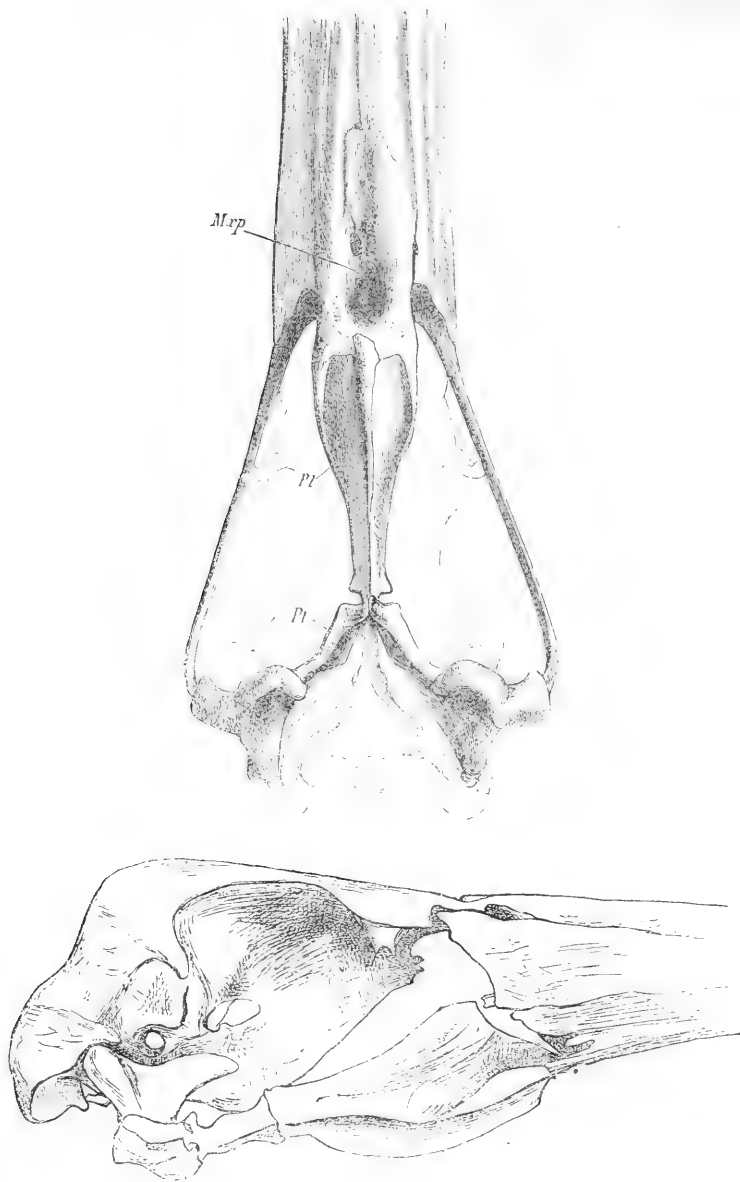
Under view of the skull of *Ardea cinerea*. The letters as before.

Fig 20.

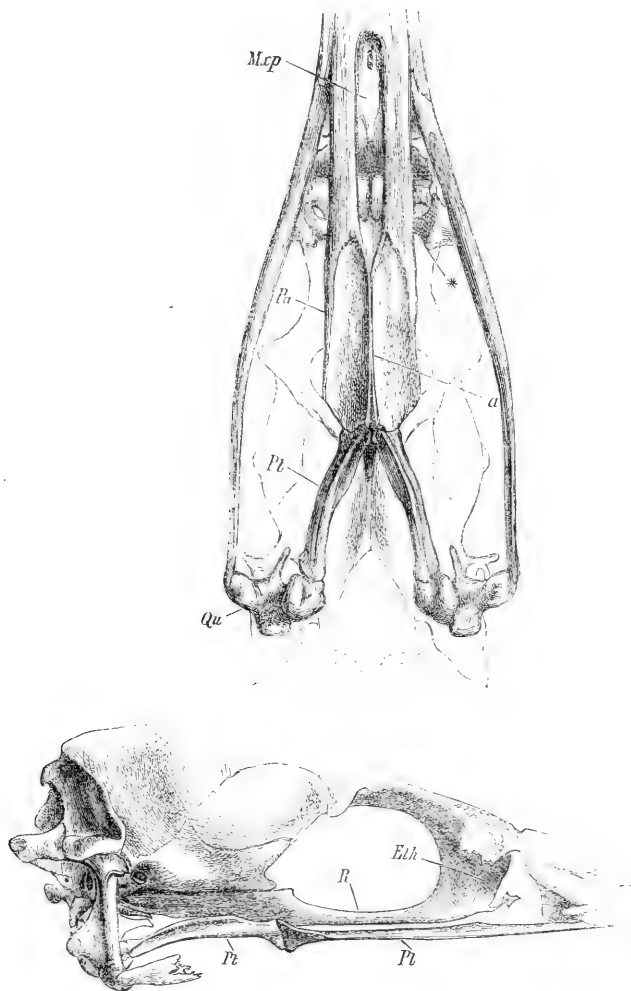


Under and side views of the skull of *Pelecanus onocrotalus*; two-thirds the size of nature. The letters as before.

and curvature as in the Lamellirostral birds; in *Platalea* and *Ibis*, while still recurved, it is much shorter and more Plover-like.

The *Ciconiidae* and *Ardeidae* have the maxillo-palatines disposed as in the foregoing group. There are no basipterygoids; the angle of the jaw is not prolonged and bent upwards; and the palatine bones are united for a considerable distance behind the posterior nares (fig. 19).

Fig. 21.



Under and side views of the skull of *Phalacrocorax carbo*.
The letters as before. *a*. The palatine crest.

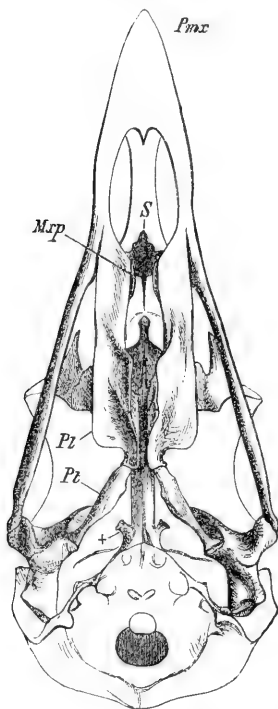
The same general arrangement is observable in the Cormorants and the Pelicans; but the inner edges of the palatine bones unite for a much greater distance behind the posterior nasal aperture, and a median ridge is sent down from the line of junction of the palatines. These birds thus present the most extreme modification of the palatine apparatus which is to be observed in the whole class.

In the *Pelecanidæ* the inferior edge of the ossified interorbital septum rises rapidly forward so as to leave a space at the base of the skull, which is filled by a triangular crest formed by the union of the greatly developed ascending processes of the palatines (fig. 20).

In the Cormorants, on the other hand, the inferior edge of the septum is horizontal, and the crest in question is not developed (fig. 21).

In all the Raptorial birds the nasal septum is ossified for a greater or less extent; and the vertical plate thus formed joins below, by

Fig. 22.



Under view of the skull of *Cathartes aura*. From a specimen in the Museum of the Royal College of Surgeons.

The letters as before. + The basipterygoid processes.

direct bony union, with the two maxillo-palatines, which are sometimes scroll-shaped, sometimes greatly swollen and spongy.

The vomer, sometimes slender, sometimes pretty broad, always tapers to a point anteriorly.

The basipterygoids sometimes are and sometimes are not present.

The angle of the mandible is not produced and recurved.

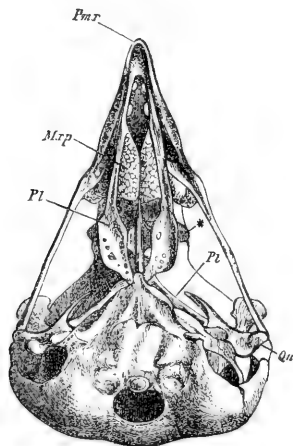
Four modifications of the general type of palatine structure are observable among the Raptorial birds:—

In the genera *Cathartes* and *Sarcorhamphus* the cleft between the thin and scroll-like maxillo-palatines is very deep and wide, and the ossification of the septum is small in extent, and only forms a sort of bridge over the deep and wide valley between the maxillo-palatines.

The basipterygoid processes are large and articulate with the pterygoids (fig. 22).

In all the Owls the maxillo-palatines are thick and spongy, and encroach upon the intermediate valley, though they never completely unite with one another across it or obliterate its upper part. The basipterygoid processes are always present (fig. 23).

Fig. 23.

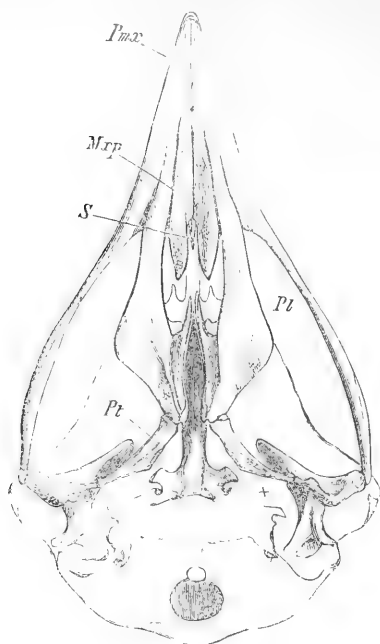


The base of the skull of *Otus vulgaris*.

The letters have the same signification as before. The inferior and internal margins of the spongy maxillo-palatines almost come into contact; but their inner faces are separated by a wide interval. * The prefrontal processes. The basipterygoid processes are not marked.

In the Secretary bird (*Gypogeranus*) the maxillo-palatines unite with one another and with the extensively ossified septum, so as to fill up the maxillo-palatine valley. There are well-developed basipterygoid processes.

Fig. 24.



Under view of the skull of *Gypogeranus serpentarius*; two-thirds the size of nature. From a specimen in the Museum of the Royal College of Surgeons.

The letters as before. + The basipterygoid processes.

In all the other Vultures, Hawks, and Eagles the maxillo-palatines unite with one another and with the largely ossified septum, and there are no basipterygoid processes.

These, therefore, are, so far as their cranial characters go, the highest of birds of prey, or those which depart most completely from the embryonic condition.

All the Parrots present wonderfully uniform cranial characters. The rostrum is articulated with the frontal bones by a complete hinge-joint. Not only is this the case, but the jugal arches and the palatine bones are moveably articulated by ligamentous joints with the rostrum. There are no basipterygoid processes.

The maxillo-palatines are very large and spongy in texture, and unite with one another and with the ossified nasal septum so as to fill up almost the whole base of the beak. Above, however, a nasal passage is left on each side; and, below, the maxillo-palatines stop short, so that, in the dry skull, a passage, leading into the cavity of the rostrum, is left on each side of the septum.

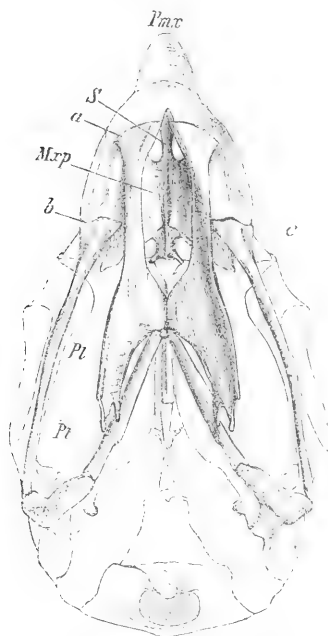
The palatine bones have a highly characteristic figure, being very

long, and for three-fourths of their length greatly flattened from side to side, with more or less notched, or festooned, posterior free edges.

Behind the posterior nares each palatine bone sends off a horizontal plate, which unites with its fellow for a considerable distance.

In front of this plate the palatine bones become first rounded and then flattened from above downwards, and, broadening out, articulate by transversely elongated heads with fossæ in the posterior margins of the floor of the rostrum.

Fig. 25.



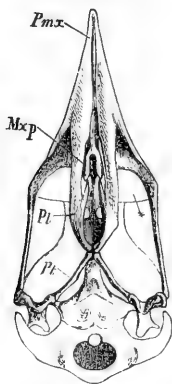
Under view of the skull of *Cacatua galerita*.

Pmx, *Mxp*, *Pl*, *Pt*, as before. *S*. The ossified septum narium. *a*. The joint between the palatine and the rostrum. *b*. That between the jugal bone and the rostrum. *c*. The joint between the rostrum and the frontal bones.

In the *Musophagidæ* (*Musophaga* and *Schizorhis*) there are no basiptyergoid processes. I have not seen the vomer; so that it is probably very small and readily detached. The palatines are considerably elongated, and their posterior external regions rounded off as in the Owls, Pigeons, and *Phasianidæ*. The two spongy maxillo-palatines meet in the middle line; and in these characters, as in the form of the beak, the *Musophagidæ* present a certain resemblance to the Owls.

The only *Trogon* skull I have had the opportunity of examining is that of *T. reinwardti*. It possesses basipterygoid processes, in which respect it resembles *Caprimulgus*, and is unlike all the other genera which remain to be mentioned. The palatines have a general resemblance to those of the *Musophagidæ*. The vomer seems to be equally rudimentary; and the maxillo-palatines, though less spongy, unite in the middle line.

Fig. 26.



Under view of the skull of *Cuculus canorus*. From a specimen in the Museum of the Royal College of Surgeons.

The letters as before.

Among the *Cuculidæ*, *Cuculus canorus* is devoid of basipterygoids; the palatines are rounded off postero-externally; the internasal septum is well ossified and unites with the maxillo-palatines.

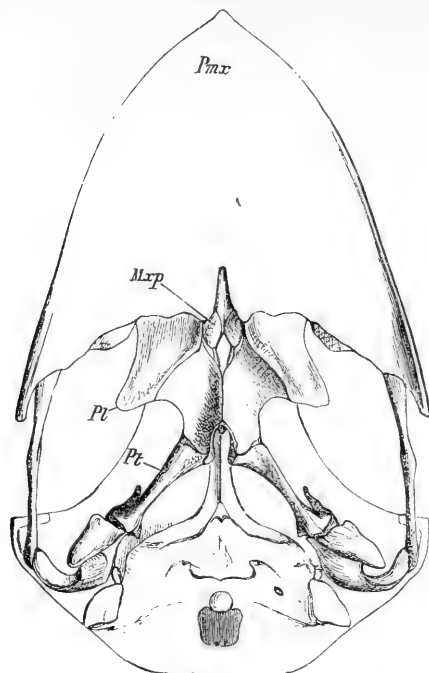
In *Geococcyx* the principle of construction is quite the same; but the postero-external angles of the palatines are distinctly indicated, and the beak is produced into an elongated triangular form. A slight oblique ridge marks off the flat surface of the maxillary process of the palatine from the excavated body of the bone. *Leptosoma* and *Phœnicophaus* present no important differences from *Geococcyx*.

In *Bucco* the general form and arrangement of the parts are as in *Geococcyx*; but the shorter palatines are produced postero-externally into a distinct backwardly directed point; the oblique ridge is much more distinctly defined, and the antero-internal angles of the palatines bend towards one another and nearly meet.

Galbula closely resembles *Bucco*; but the antero-internal angles of the palatines completely meet.

In *Rhamphastos* the only important difference from *Bucco* lies in the circumstance that the antero-internal angles of the palatines not only meet, but are united by bone, while the oblique ridge of the palatines is obsolete. The rostrum moves on the skull by a hinge, almost as freely as in the Parrots.

Fig. 27.



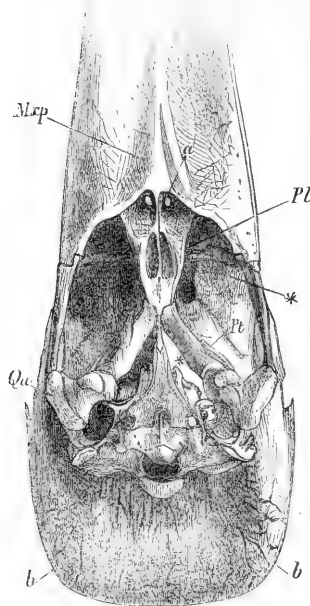
Under view of the skull of *Podargus humeralis*. From a specimen in Museum of the Royal College of Surgeons.

The letters as before.

In *Podargus* the disposition of the parts is essentially the same as in *Bucco* and *Galbula*; but the palatines are exceedingly broad, the oblique ridge in each being very distinct and often having the appearance of a suture. At its external termination the palatine is produced outwards and backwards into a strong process. The inner edges of the palatines unite for a considerable distance; and the form of the beak is completely changed, its great width giving it somewhat the appearance of an ace of spades.

Buceros, leaving aside the mere form of the beak and its frontal enlargement, resembles *Geococcyx* and *Bucco* in the structure of its palate. There are rudimentary basipterygoid processes, but the pterygoids do not articulate with them. The palatines have their postero-external angles completely rounded off and enter into solid union with one another and with the vomer, which has the form of a thin vertical lamella. The internal laminae of the palatines incline towards one another anteriorly, and meet in front of the posterior nasal aperture, as in *Galbula* and *Rhamphastos*. Anterior to this junction again are situated two considerable apertures (*a*) divided by

Fig. 28.

*Buceros.*

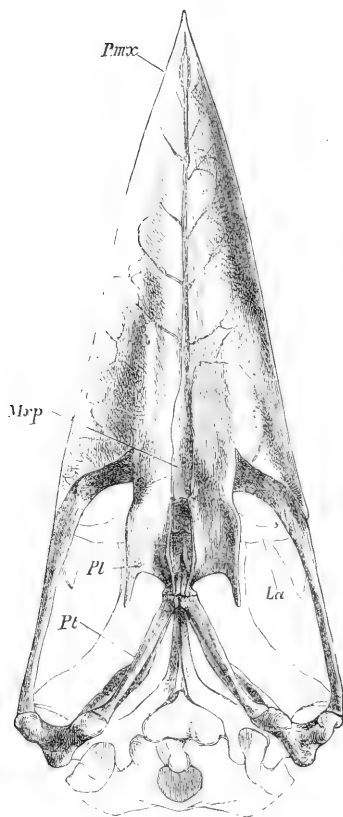
- a.* The apertures which lead into the cavity of the rostrum. *b.* The posterior part of the helmet. The other letters as before. [N.B. By mistake a * instead of a + is put opposite the rudimentary left basipterygoid process.]

a median septum; and these lead into the cavity which, for the most part, occupies the interior of the rostrum. I cannot say whether this septum is a prolongation of the vomer, or whether it belongs to the large and spongy maxillo-palatines, which bound the apertures in question and meet in the middle line with one another and with the vomer. In this genus the external nasal aperture is placed, as is well known, immediately in front of the anterior and upper part of the orbit. It leads into a horizontal passage, with thin, but dense, bony walls, which passes at first almost directly inwards, and then turns forwards at a right angle. The inner wall of the forwardly directed portion of the passage presents a rounded ridge, by which its cavity is imperfectly divided into an upper and a lower passage. The lower opens into the cavity of the rostrum; the upper bends back and opens into a vaulted chamber, to the roof of which a small pyriform "turbinal" is attached by its narrow end. From the inner end of this chamber a passage leads directly downwards and applies itself closely to that of the opposite side. At the level of the lower margins of the external nasal apertures the partition between the two

terminates by a sharp, free, curved edge; and in the dry skull, though probably not in the recent state, the nasal chambers of the two sides freely communicate. Lower down they are separated by the vomer, and terminate in the posterior nares.

Alcedo and *Dacelo* repeat the structure observed in *Geococcyx*, with minor modifications. For example, the postero-external angles of the palatines are even more produced backwards than in *Bucco* (fig. 29).

Fig. 29.

*Dacelo gigantea*.

The palatine aspect of the skull. The letters have the same signification as before.

This is still more the case in *Upupa*. Here the postero-external angle of the palatine is elongated into a slender, pointed process. The septum is ossified and unites with the maxillo-palatines, which form a transverse bony rafter across the palate.

In *Merops* the long and slender palatines are devoid of any postero-external elongations. The maxillo-palatines are slender and expanded at the end, as in Passerine birds, but they unite in the middle line with one another and with the ossified septum. As the vomer was absent in the specimen examined, I presume it to have been small and slender.

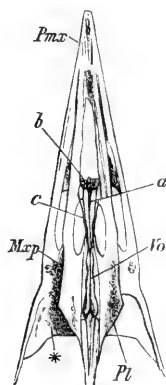
Coracias has the vomer exceedingly attenuated; and there are no basipterygoid processes. The spongy maxillo-palatines unite and form a thick transverse bar across the palate.

Eurystomus resembles *Coracias*, but has broader palatines:

It will be observed that all the genera of Birds which have been mentioned after the Parrots have their palates constructed upon the same principle as the Cuckoos. With one exception, basipterygoid processes are absent. The maxillo-palatines are united with one another, or with the ossified septum, or with both. The vomer is rudimentary, very small, and readily detached.

In *Picus viridis* there are no basipterygoid processes. Each palatine bone is flat and obliquely truncated posteriorly, the postero-external angles not being produced. An elongated oval foramen, filled by membrane in the fresh state, occupies the middle third of its inner moiety, and is bounded, in front and internally, by a very slender bar of bone (fig. 30, *c*). This bar is continuous with the palatine by its anterior end. Posteriorly, in some specimens, it appears to be continued directly into the ascending process of the palatine; but in one example I find it to terminate in a pointed end; and the slender bar which corresponds with its apparent continuation in other specimens, is a perfectly distinct ossicle (*Vo*, fig. 30).

Fig. 30.



The palate of *Picus viridis*.

- a*. The ossified septum. *b*. The transverse bar of bone connected with it. *Vo*. The ossicles which probably represent the vomers. *Pmx*, *Mxp*, *Pl*, ***, as before.

I am disposed to regard this ossicle and its fellow as the representatives of the vomers, which, if this interpretation be correct, remain exceptionally distinct from one another, but unite with the palatines. The antero-internal angle of the body of the palatine bone sends forwards a slender process, which forms the inner boundary of the posterior half of the palatine foramen.

The maxillo-palatines are broad plates, which appear to terminate by rounded internal edges close to and above the external margins of the palatines. But a tough membrane extends inwards from the free edge of each maxillo-palatine and meets with a delicate longitudinal ossification of the septum (*a*, fig. 30). Opposite the anterior termination of the external nasal aperture this ossification is connected with a transverse bar of bone, which stretches from one præ-maxilla to the other, and shuts off the cavity enclosed by the præ-maxillæ from the nasal chambers. The latter are greatly complicated by the development of twisted "turbinal" plates in connexion with the nasal and premaxillary bones and the ethmoid.

A prolonged and careful study of fresh specimens will be necessary before the arrangement of the parts in *Picus* can be thoroughly understood. In the meanwhile it is clear that, in this genus, the palate differs very widely from that observed in any of the preceding "cuculiform" genera.

In *Picus major* the palatine bones have the same structure and arrangement as in *P. viridis*, except that their posterior ends are transversely truncated and the postero-external angles are even a little produced. The maxillo-palatines are much smaller than in the preceding species, and their inner rounded edges do not nearly reach the level of the outer edges of the palatines.

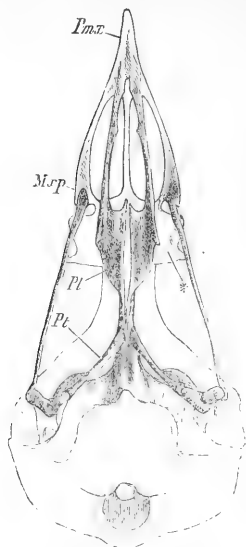
Picus canus resembles the preceding; but the postero-external angles of the palatines are rather better marked, and the maxillo-palatines a little larger.

Picus medius presents no difference of importance, except that the inner laminae of the palatines, obsolete in the other genera, are a little better marked, especially behind.

In *Picus minor* distinct maxillo-palatines can hardly be said to be present, the maxillary presenting only a slight dilatation at the point where they should exist. Minute points of bone projecting from the inner edges of the palatines alone indicate the position of the process (*c*) in *Picus viridis* and of the prolongation of the antero-internal angle of the body of the palatine. The "oval foramen" consequently is indicated only by a slight excavation of the inner margin of the palatine.

This species of *Picus* prepares one in some degree for the structure observed in *Yunx* (fig. 31). Here the ascending processes of the palatine bones are produced forwards into long and slender processes, slightly swollen at their anterior free ends, which may represent anchylosed vomers. The inner edges of the short and broad bodies of the palatine bones approach so nearly as only to leave a cleft for the posterior nares. The antero-internal angles are acute, but not greatly prolonged. The anterior processes of the palatines are very

Fig. 31.

View of the palate of *Yuna torquilla* ($\times 2$). The letters as before.

slender, and the inner edge of each is angulated near its anterior termination. This angulation may represent the process *c* (fig. 30) in *Picus viridis*. The maxillo-palatines are represented by mere ridges on the inner side of the maxillæ, bounding a fossa. No ossification of the septum remains in any of the skulls of *Yuna* I have examined.

I have discussed *Picus* and *Yuna*, in this place, because of the general agreement among ornithologists that *Picus* and its allies are closely related to the Cuckoos and other "Scansores." But it is clear that nothing can be more different than the cranial structure of the *Picidae* and that of any of the other "Scansores;" and, indeed, judging from the dry skull alone, the Woodpeckers are not even desmognathous. But, as I have already hinted, a question of this systematic importance cannot be finally settled without the careful investigation of fresh specimens.

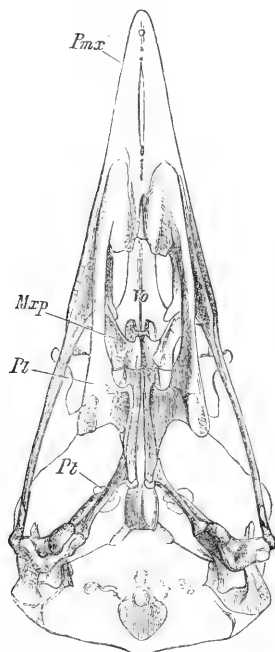
IV. The remaining Carinatae have a palatine structure which is in some respects intermediate between that of the Schizognathous and that of the Desmognathous groups, while in others it is peculiar.

This structure, which I term *Ægithognathous*, is well exemplified by any of the typical Passerine Birds, as, for example, a Raven (fig. 32).

The vomer is a broad bone, abruptly truncated in front, and deeply cleft behind, embracing the rostrum of the sphenoid between its forks. The palatines have produced postero-external angles. The

maxillo-palatines are slender at their origin, and extend inwards and backwards obliquely over the palatines, ending beneath the vomer in expanded extremities, which do not become united by bone, either with one another or with the vomer. The anterior part of the nasal septum (in front of the vomer) is frequently ossified in *Ægithognathous* birds, and the interval between it and the præmaxilla filled up with spongy bone; but no union takes place between this ossification and the vomer.

Fig. 32.

Under view of the skull of *Corvus corax*. The letters as before.

This structure (which was first accurately described and its systematic importance pointed out by Nitzsch*) is substantially repeated in the great majority of Passerine birds, though with minor modifications, which I suspect will turn out to be characteristic of the natural subdivisions of this great group. At present I can only mention two or three of these.

Menura differs from all the rest in possessing no ossified maxillo-palatines whatever. The vomer, though broad and deeply cleft posteriorly, is more rounded off than abruptly truncated at its anterior end.

* See the article "Passerinæ" in Ersch and Grüber's 'Encyclopædie,' 1840, and Nitzsch, "Ueber die Familie der Passerinen," in the 'Zeitschrift für die gesammten Naturwissenschaften,' 1862.

In *Tyrannus*, in *Cephalopterus*, in *Coracina* (according to Burmeister), and perhaps in others of the American Passerines without a singing-apparatus, the bases of the maxillo-palatines are broader than their free ends, and there is no narrow stem.

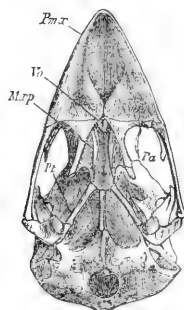
Chasmorhynchus nudicollis, however, has maxillo-palatines of the ordinary character; and in *Pteroptochus megapodius* they are long, slender, and recurved.

In *Gymnorhina* the septo-premaxillary ossification and the maxillo-palatines are confluent, though the latter and the vomer remain quite distinct from one another.

In these and the majority of typical Passerine birds the palatine bones are broad and comparatively flat posteriorly; but in the Finches the outer lamina of each palatine acquires a great downward development, and becomes a vertical plate, the free posterior edge of which is more or less notched. The anterior process of the palatine at the same time broadens out, and becomes connected by a truncated edge with the rostrum, which attains great height and breadth, and is sometimes hooked anteriorly.

The palate thus acquires a singular superficial resemblance to that of a Parrot, from which it differs, however, in the separation of the palatines in the middle line, in the form and size of the vomer, and in the slender, recurved, and separate maxillo-palatines (fig. 33).

Fig. 33.



Under view of the skull of *Coccythraustes vulgaris*. The letters as before.

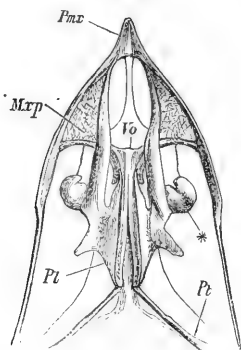
Pipra erythrocephala and *Tanagra cyanoptera* are similar to the Finches in the form of the palatines.

The Swallows completely agree with the other Passerine birds in the general form and arrangement of the bones which enter into the composition of their palates.

And the Swifts essentially resemble the Swallows, though the form and proportions of the palatine bones are somewhat different (fig. 34).

The skull of *Caprimulgus*, though it retains the general features of the Passerine cranium, departs from the typical Passerine structure still further than the Swifts, the body of the palatines having become exceedingly broad and flattened out, while the vomer is

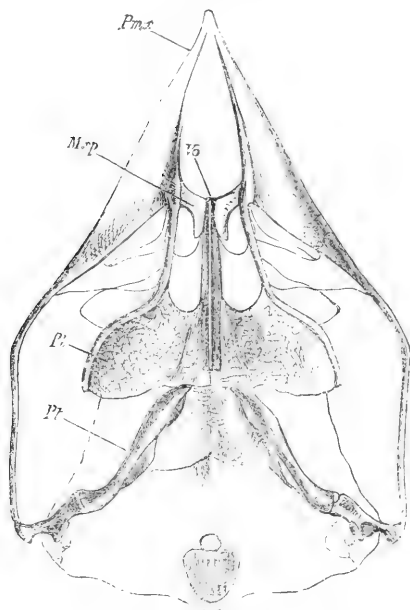
Fig. 34.



The palate of *Cypselus apus* ($\times 2$).

The anterior excavated end of the vomer has a crescentic shape, its angles terminating in free horns above the palatine bones, by which they are concealed in the figure. The inferior ends of the prefrontal processes (*) have a very peculiar form.

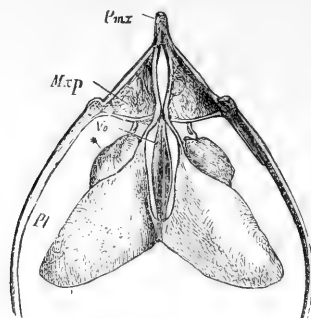
Fig. 35.



Under view of the skull of *Caprimulgus europæus* ($\times 2$).

The letters as before.

Fig. 36.

*Nyctibius jamaicensis.*

View of the palate without the pterygoid bones. The letters as before.

longer and narrower than in the Swifts or the typical Passerine birds. The expanded inner ends of the slender and characteristically Passerine maxillo-palatines are quite distinct from the vomer and from one another.

Caprimulgus further presents a remarkable contrast to the Swifts and all the true *Passeres* in having well-developed basipterygoid processes. These are absent in *Ægotheles novæ-hollandiæ*, the palate of which is intermediate between that of the Goatsuckers and that of the Swifts.

Nyctibius closely resembles *Caprimulgus*, even to possessing the very peculiar division of each ramus of the mandible into two portions, the one of which is moveable upon the other, pointed out in the latter genus by Nitzsch. But the slender anterior processes of the palatines are closely approximated in the middle line, instead of remaining widely separated as in *Caprimulgus* and *Trochilus*; and the maxillo-palatines are closely adherent to them and to the vomer, though a true ankylosis does not appear to have taken place.

Trochilus has the true Passerine vomer, with its broad and truncated anterior, and deeply cleft posterior end. I have not yet been able to obtain a perfectly satisfactory view of the structure and arrangement of the palatine bones in the Humming Birds.

That the birds of which I have spoken under the four heads of *Dromæognathous*, *Schizognathous*, *Desmognathous*, and *Ægithognathous* really possess the various arrangements of the palatine and adjacent bones which I have described, is a matter of observation which readily admits of confirmation or the reverse. It is another and very important question whether these cranial characters may safely be taken as indications of natural affinities; and I now propose to make a few remarks on that point.

It will not, I think, be disputed by any ornithologist that the *Schizognathous* birds constitute a very natural assemblage. Taking

the Plovers and their allies as the most central group of these birds, we may pass, without a break of more than family importance, along several distinct series, or gradations, of ornithic forms.

Thus, along one line, the Bustards are intermediate between the Plovers and the Cranes; while *Psophia* and *Rhinocetus* lead from the Cranes to the Rails.

Following another line, *Hemipodius* stands between the Plovers and the Fowls; while *Syrhaptus* inclines, on the one hand, to the typical Gallinaceous birds, and on the other to the *Columbidæ*.

A third series is commenced by the Gulls. The osteological resemblances between a Plover, a Gull, an Auk, and a Diver are so close that it is utterly out of the question to regard these Birds as members of different orders. But the Gulls grade insensibly into the *Procellariidæ*; and, though the *Apterodytidæ* appear to be separated by a broad gap from the *Alcidæ*, *Alca impennis*, in the form of its humerus, in the mode of articulation of the radius and ulna with the humerus, in the proportions and structure of the tarso-metatarsal bone, shows itself to be an almost intermediate form.

I am acquainted with only two birds, *Dicholophus* and *Crax globicera*, the structure of the skull of which would lead me to regard them as transitional between the Schizognathous and the Desmognathous sections, or, at any rate, as approaching the latter division.

Nitzsch and Burmeister have assigned to *Dicholophus* a position near the Cranes and the Rails, and, no doubt, justly on the whole, though I venture to think that they have underrated the points of resemblance to the birds of prey, and especially to *Gypogeranus*. In the skull of *Dicholophus* the internasal septum is ossified to a very slight extent, and the maxillo-palatine processes may meet in the middle line, in both of which respects it approaches the birds of prey. But the ossified part of the nasal septum does not unite below with the maxillo-palatines; and in this respect *Dicholophus* is unlike the Raptorial birds*.

Crax globicera, on the other hand, while it retains the characteristically Gallinaceous basipterygoid articular surfaces, palatine bones, angle of the mandible, and other peculiarities, has a partially ossified nasal septum, which divides below and unites with the maxillo-palatines, just as in the Raptorial birds.

The *Cuculidæ* and *Alcedinidæ* occupy nearly the same middle place in the Desmognathous series that the Plovers have among the Schizognathous families. The *Musophagidæ* bring them into relation with the Raptorial birds, the *Rhamphastidæ* with the Parrots, the *Podargidæ* with *Canceroma*†, and so with the Herons and Storks. But these last are clearly affined, on the one hand, with the Cormorants and Pelicans, on the other with the Flamingos, and through the latter with the Lamellirostres.

* Mr. Parker is inclined to lay a still greater stress than I have done upon the many Raptorial characters of *Dicholophus*.

† A hazardous suggestion, but one the temerity of which will perhaps appear less after a careful comparison of the skulls of these two birds.

It is unnecessary to enumerate the arguments by which the close affinity of the proper Passerine birds (which make up the great bulk of the *Ægithognathous* section) may be demonstrated, as the eminently natural character of this group is admitted by every one.

In their cranial characters, the Swifts are far more closely allied with the Swallows than with any of the *Desmognathous* birds, the Swift presenting but a very slight modification of the true Passerine type exhibited by the Swallow. No distinction can be based upon the proportions of the regions of the fore limb; since in all the Swallows which I have examined* the manus and the antebrachium, respectively, greatly exceed the humerus in length, though the excess is not so great as in *Cypselus*.

The modification commenced in the Swift is greatly exaggerated in *Egotheles* and *Caprimulgus*; while we have almost a transition to the *Desmognathous* structure in *Nyctibius*.

But if palatine characters have the taxonomic value which the facts just enumerated appear to indicate, it follows that the *Dromæognathous* structure, so different from what is to be seen in any other Carinate birds, has as much value as the rest, notwithstanding the small actual extent of the group in which it obtains.

It thus appears that the *Dromæognathous*, *Schizognathous*, *Desmognathous*, and *Ægithognathous* arrangements of the maxillary and palatine bones, respectively, characterize divisions of the Carinæ, all the members of which are mutually affined in other respects. And I propose to regard these divisions as suborders, and to name them *DROMÆOGNATHÆ*, *SCHIZOGNATHÆ*, *DESMOGNATHÆ*, and *ÆGITHOGNATHÆ*†.

† The suborder *DROMÆOGNATHÆ*, containing only one family, the *Tinamidae*, admits of no subdivision into groups of larger extent than families; but the other three suborders are very extensive, and, I think, may be so subdivided in an approximately satisfactory manner, though any definition of these subdivisions which can be proposed at present must be regarded as provisional and open to extensive revision as our knowledge of the details of ornithic organization widens.

† The *SCHIZOGNATHÆ*. In addition to their cranial characters, the birds composing this suborder often want intrinsic muscles in the lower larynx, and never possess more than one pair of them.

With the exception of *Podiceps*, all the genera which have been examined have two carotid arteries.

Six groups of allied families are distinguishable in this suborder. These may be termed the *CHARADRIOMORPHÆ*, the *GERANOMORPHÆ*, the *CECOMORPHÆ*, the *SPHENISCOMORPHÆ*, the *ALECTOROMORPHÆ*, and the *PERISTEROMORPHÆ*‡.

* *Hirundo pacifica*, *H. riparia*, *H. rustica*, *H. urbana*.

† *Dromæus*, the generic name for the cassowaries; σχίζω, to cleave; δεσμός, a bond; Αίγίθος, a sparrow.

‡ Χαραδριός, a sea-lark, or plover; Γέρανος, a crane; Κήξ, a gull; *Spheniscus*, a genus of penguins; Ἀλέκτωρ, a cock; Περιστέρα, a dove; μορφή, form.

† 1. The CHARADRIOMORPHÆ.

The rostrum is always elongated and comparatively slender. The base of the skull possesses narrow and prominent basipterygoid processes. The maxillo-palatines are concavo-convex and lamellar, never swollen or spongy. The angle of the mandible is produced into a slender and abruptly recurved process.

The sternum is sometimes singly, but, more usually, doubly notched.

The hallux, always small, is sometimes absent.

The phalanges of the anterior toes diminish in length from the basal to the penultimate.

The pterylosis of this group, which nearly corresponds with the pressirostral and longirostral Grallæ of Cuvier and with the *Limicolæ* and *Scolopacinae* of Nitzsch, has been carefully described by the latter writer, who remarks that, "next to the *Passerinae* and *Gallinaceæ*, this group appears to present the smallest pterylographic differences"*, and that in the form of the tracts it closely approaches *Psophia* and *Grus*.

The feathers always cease above the suffrago, though sometimes the bare area is very small; and the webs between the front toes are large only in *Recurvirostra*.

† 2. The GERANOMORPHÆ.

The rostrum is relatively stronger than in the preceding group, and may even be short and arched.

Basipterygoid processes are absent (ex. *Grus antigone*).

The maxillo-palatines are concavo-convex and lamellar.

The angle of the mandible is truncated.

In the typical groups the sternum is comparatively narrow and elongated, and may be deeply notched or entire.

The feet vary greatly, but the toes are never completely or even extensively webbed; and the ratio of the length of the phalanges of the toes is as in the preceding division.

A greater or less space above the suffrago is devoid of feathers; but there appears to be nothing characteristic about the pterylosis of this group.

I consider the Cranes and the Rails (between which *Psophia* and *Rhinocetus* are intermediate) the typical forms of this group.

Otis connects it with the Charadriomorphæ, and *Dicholophus* with the birds of prey; but it is a question whether these two genera may be better included in this group, or made types of separate groups.

† 3. The CECOMORPHÆ.

The rostrum varies greatly in shape; but is very generally compressed from side to side, and hooked at the extremity.

Procellaria gigantea alone has presented basipterygoid processes.

The maxillo-palatines are usually lamellar and concavo-convex as

* See Nitzsch, 'Pterylography' (Ray Society's Edition), p. 134.

in the preceding groups; but in the *Procellariidæ* they become tumid and spongy, and may enlarge so much as to leave a mere cleft in the place of each vomero-palatine space.

The angle of the mandible is not recurved.

The sternum varies extensively.

The hallux is weak, or absent, and (with the exception of the Grebes) the anterior toes are completely, or very largely, webbed. The ratio of the phalanges is as in the preceding groups.

This group contains the *Laridæ* (*Longipennes*, Nitzsch), the *Procellariidæ*, the *Colymbidæ*, and the *Alcidæ*. Nitzsch (*l. c.*) remarks that the pterylosis of the first-named family "approaches very closely to that of the Scolopacinae, and can hardly be distinguished therefrom by any character;" and the same may be said of the osteological and other peculiarities of the *Laridæ*, which come very near the Charadriomorphæ. The *Alcidæ*, on the other hand, in their pterylosis and other characters approach the Penguins—especially, as has been noted above, through *Alca impennis*. The *Colymbidæ* appear to be closely connected on the one hand with the Gulls, and on the other, more remotely, but still really, with the Rails.

The *Procellariidæ* are aberrant forms inclining towards the Cormorants and Pelicans among the Desmognathæ.

+ 4. The SPHENISCOMORPHÆ.

The beak is straight and compressed, the rostrum being, at most, slightly hooked at the tip.

There are no basipterygoid processes, and the pterygoids are flattened from above downwards.

The maxillo-palatines are concavo-convex and lamellar.

The sternum is greatly elongated.

The shaft of the humerus is flattened from side to side, and its distal end presents an obliquely truncated surface, with which the similarly compressed radius and ulna articulate—the former altogether with the fore part, the latter with the hinder part of the humeral articular surface.

There is no free pollex.

The pelvic bones are less firmly connected with the sacrum than in any other birds.

The short tarso-metatarsus is perforated by two very large clefts which lie between the middle and the lateral metatarsals. The small hallux is directed inwards or forwards. The ratio of the phalanges is as in the preceding groups.

The anterior toes are completely webbed.

This group answers to the *Squamipennes* of many authors, and contains the single family *Apterodytidæ*, comprising the genera *Eudytes*, *Spheniscus*, and *Apterodytes*.

Nitzsch has pointed out that these birds have no remiges distinct from the other feathers, which are distributed evenly over the whole body, and, though small and scale-like, are provided with an after-shaft.

† 5. The ALECTOROMORPHÆ.

The rostrum may be slender and depressed, or high and arched. Oval, flattened basipterygoid facets, sessile upon the basisphenoidal rostrum and articulating with corresponding surfaces upon the pterygoids, are always present. The maxillo-palatines are always lamellar, but vary greatly in size, being sometimes very small.

The palatine bones are relatively long and narrow, with obsolete internal laminae, and rounded-off postero-external angles.

The angle of the mandible is produced into a strong upcurved process.

The sternum has either one or more, generally two, very deep posterior notches on each side; when there are two, the external lateral processes thus marked out are much shorter than the internal.

The feet vary considerably in the relative size and in the position of the hallux, and in the development of spurs. They are never completely, or even largely, webbed. The ratio of the phalanges of the front toes is as in the preceding groups.

According to Nitzsch the feathers have aftershafts, and the pterylaxis is remarkably uniform in all the genera except the *Pteroclidæ*, a family which, in this and some other respects, but not in cranial characters, approaches the Pigeons.

Except in *Pterocles*, the oil-gland is surmounted by a circlet of feathers.

The inferior larynx is always devoid of intrinsic muscles.

Excluding the Pigeons and the *Tinamidæ*, this group corresponds with the Gallinæ of authors, and contains the families *Turnicidæ*, *Phasianidæ*, *Pteroclidæ*, *Megapodidæ*, and *Cracidæ*.

The *Turnicidæ* approach the Charadriomorphæ, the *Pteroclidæ* the Peristeromorphæ; while the *Cracidæ* have relations with the birds of prey on the one hand, and with *Palamedea* and the other Chenomorphæ on the other.

† 6. The PERISTEROMORPHÆ.

The rostrum is swollen at the tip, and provided at the base with a tumid membranous space, in which the nostrils open.

The skull is provided with narrow, but prominent, basipterygoid facets.

The maxillo-palatines are elongated and spongy.

The angle of the mandible is not produced and recurved.

The sternum has two posterior notches, the inner pair of which may be converted into foramina. The external lateral processes thus formed are, as in the Alectoromorphæ, much shorter than the internal lateral processes.

The hallux is on a level with the rest of the toes, and its metatarsal is peculiarly twisted. The anterior toes are not at all webbed. The ratio of the phalanges is as in the preceding groups.

The feathers have no aftershaft (? *Didus*), and the oil-gland is devoid of a circlet of feathers.

The inferior larynx is provided with a single pair of intrinsic muscles (? *Didus*).

The relations of the Peristeromorphæ with the Alektoromorphæ are very close. On the other side they seem to be allied with the Owls and the Vultures.

I have not been able to examine, for myself, more than an incomplete skull and the feet of *Opisthocomus*. The phalanges of the anterior toes (leaving the ungual phalanges out of consideration) are nearly equal in length. The tarso-metatarsus is similar to that of the Alektoromorphæ. But the extraordinary sternum, furcula, and the many other peculiarities of this bird described by L'Herminier, Deville, and Gervais lead me to think that it must be placed in a special subdivision of the Schizognathæ.

The DESMOGNATHÆ, like the Schizognathæ, may be without intrinsic muscles of the lower larynx, or they may possess only one pair, or they may have three pairs; but the lower larynx is never constructed on the plan of that of the song-birds.

The carotids may be double or single.

Not fewer than seven groups of families appear to me to be clearly distinguishable in this suborder, viz. the CHENOMORPHÆ, the AMPHIMORPHÆ, the PELARGOMORPHÆ, the DYSPOROMORPHÆ, the AETOMORPHÆ, the PSITTACOMORPHÆ, and the COCCYOMORPHÆ. In addition to these undoubted Desmognathæ I shall at the end of this series consider the Woodpeckers under the name of CELEOMORPHÆ*.

+ 1. The CHENOMORPHÆ.

The lachrymal region of the skull is remarkably long.

The basisphenoidal rostrum has oval, sessile, basipterygoid facets, like those of the Alektoromorphæ.

The flat and lamellar maxillo-palatines unite and form a bridge across the palate.

The angle of the mandible is greatly produced and recurved.

The sternum has a single pair of notches at its truncated posterior margin.

The feet generally have a short hallux, and the anterior toes are completely webbed; but *Palamedea* and *Anseranas* are remarkable exceptions to this rule. The phalanges of the anterior toes decrease in length from the basal to the penultimate.

The oil-gland is surmounted by a circlet of feathers, and the larynx has no intrinsic muscles (? *Palamedea*).

+ 2. The AMPHIMORPHÆ.

The genus *Phenicopterus* is so completely intermediate between the Anserine birds on the one side, and the Storks and Herons on

* *Χήν*, a goose; *ἀμφί*, on both sides; *Πελαργός*, a stork; *Dysporus*, a generic name applied to the gannets by Illiger; *Ἀετός*, an eagle; *Ψιττακος*, a parrot; *Κόκκυξ*, a cuckoo; *Κέλεος*, a woodpecker.

the other, that it can be ranged with neither of these groups, but must stand as the type of a division by itself.

Thus the skull has the long lachrymo-nasal region, the basipterygoid facets, the prolonged and recurved angle of the mandibles, the laminated horny sheath of the *Chenomorphæ*; but the maxillo-palatines are spongy, and the general structure of the rostrum is quite similar to that found in the Storks and Herons.

The lower end of the crus is bare; but the feet are fully webbed, and the pterylosis is said by Nitzsch to be "completely Stork-like."

+3. The PELARGOMORPHÆ.

There are no basipterygoid processes, and the palatines usually unite for a greater or less distance behind the posterior nares; but they send down no vertical plate from their junction.

The maxillo-palatines are large and spongy.

The angle of the mandible is truncated (except in *Platalea* and *Ibis*).

The sternum is broad, and may have two or four posterior notches.

The hallux varies in its proportions, but is not turned forwards or inwards, or united by a web with the other toes, the web between which is always incomplete. The ratio of the phalanges is as in the preceding groups.

The oil-gland is surmounted by a circlet.

The disposition of the carotids and the characters of the larynx vary.

I associate in this division the *Herodiæ*, *Pelargi*, and *Hemiglotides* of Nitzsch. The last group, including the genera *Ibis* and *Platalea*, differs from the rest in having a produced and recurved mandibular angle, and in some other respects approaches *Phœnicopterus*. The typical forms incline rather to the succeeding group.

+4. The DYSPOROMORPHÆ.

The rostrum is long and pointed and more or less curved, and the external nasal apertures are very small. There are no basipterygoid processes. The palate-bones unite for a considerable distance behind the posterior nares, and send down a vertical crest from their junction.

The maxillo-palatines are large and spongy.

The angle of the mandible is truncated.

The sternum is broad, and its truncated posterior edge is either entire or has a shallow excavation on each side of the middle line.

The hallux is turned forwards or inwards, and is united by a web with the completely webbed anterior toes. The ratio of the phalanges is as in the preceding genera.

The oil-gland is surmounted by a circlet of feathers.

This group answers to the "Steganopodes" of Illiger; and since the appearance of the admirable memoir of Brandt, 'Zur Ostéologie der Vögel,' in 1840, no doubt can have been entertained as to its extremely natural characters. The genera composing it are sharply

divided by the structure of the skull, described above, into two groups—the one containing the Pelicans, the other the remaining genera.

+ 5. The AETOMORPHÆ.

The rostrum is more or less arched and hooked at the tip, and at its base there is a cere in which the nostrils are pierced. Basipterygoid processes may be present or absent. The maxillo-palatine processes may be concavo-convex lamellæ, or may be spongy and fill up the base of the rostrum, but they are always united with an ossification of the septum.

The breadth of the articular surface at the distal end of the quadrate bone is greater than its length, the outer condyle extending about as far downwards as the inner.

The angle of the mandible is never recurved.

The sternum is broad, and has a strong carina. Its posterior edge may be entire, or may have one or two notches on each side.

The pelvis and the tarso-metatarsus vary greatly. The feet always possess a hallux; the fourth toe is never permanently turned backwards, and the anterior toes are never completely or even largely webbed. In other respects they vary.

There are always two carotids.

The inferior larynx may be wanting, and when developed has not more than one pair of intrinsic muscles.

The circlet of feathers may be present or absent upon the oil-gland; and the contour feathers have, or have not, an aftershaft.

The division of the Aetomorphæ is equivalent to the “Raptores” of Cuvier—an eminently natural assemblage, and yet one the members of which, as the preceding enumeration of their characters shows, vary in most important particulars.

They appear to me to fall naturally into four well-defined primary groups—the *Strigidæ*, the *Cathartidæ*, the *Gypaetidæ*, and the *Gypogeranidæ*. But this arrangement is so different from that ordinarily adopted, that I shall proceed to justify it by enumerating the principal circumstances in which the members of the several divisions agree with one another and differ from the rest.

In the *Strigidæ*, or Owls, the feathers want the aftershaft, and the oil-gland is not surmounted by a circlet of feathers. The hallux is more than half as long as the fourth toe, and on a level with the other toes. The claws are long, curved, and acute, and the fourth toe is reversible.

The first three phalanges of this toe are subequal and very short; all three together are not so long as the penultimate phalanx.

The basal phalanx of the third toe is not longer than the second, and is far shorter than the penultimate.

The tarso-metatarsus is extremely flattened, with strong lateral ridges, the inner edge being particularly thin; and, usually, there is an osseous loop for the extensor tendons on its front face.

The posterior face of the proximal end of the tarso-metatarsus presents two ridges (of which the inner is very much stronger and more prominent than the almost obsolete outer) separated by a deep and wide groove.

The skull is broad, and the bones of the brain-case have a spongy diploë. Basipterygoid processes are always present, and the tumid and spongy maxillo-palatines are separated by an interval, which may be wide throughout, or reduced to a cleft below.

The peculiarly spongy lachrymal remains distinct for a long time, if not throughout life, from the frontal bones and the prefrontal processes.

The external nares may be long, but are never pervious, the septum being well ossified.

The sternum is commonly four-notched, and has a manubrial process.

The proximal ends of the clavicles are comparatively little expanded or recurved, and become very slender towards their symphysis. The clavicular process of the coracoid fits into an excavation on the outer surface of the clavicle. The scapular process of the coracoid is prolonged forwards to meet the clavicle. The lower larynx possesses one pair of intrinsic muscles.

+ The *Cathartidæ* comprise the Vultures of the New World (*Cathartes* and *Sarcoramphus*)*. The feathers have no aftershaft, and the oil-gland wants the circlet of feathers. The phalanges of the hallux, taken together, are about half as long as those of the outer toe, and the articular surface of its short metatarsal lies above the level of the articular faces of the other metatarsals; the claws are blunt and comparatively straight, and the fourth toe is not reversible.

The second and third phalanges of the fourth toe, taken together, are as long as, or longer than, the basal phalanx.

The basal phalanx of the third toe is longer than either the second or the penultimate, the two latter being subequal.

The tarso-metatarsus is thick, and its inner edge rounded and not much thinner than the other.

The posterior face of the proximal end of the bone presents a broad and prominent process, with a truncated posterior surface. This surface has the contour of a heart with its apex downwards, and is divided by a low longitudinal ridge into two slightly excavated surfaces, of which the outer is the smaller. Below, the process passes into a ridge, which runs down upon the middle metatarsal.

The skull is provided with basipterygoid processes, and has an elongated rostrum. The valley between the lamellar maxillo-palatines is both deep and wide.

The lachrymal bones are so completely ankylosed with the frontals and with the broad prefrontal processes, that all traces of their primitive distinctness are completely lost.

* I have examined skeletons of *Cathartes fœtens*, *C. aura*, and *C. californianus*, of *Sarcoramphus gryphus* and *S. papa*, and compared them with species of *Neophron*, *Vultur*, *Gyps*, *Gypohierax*, and *Gypæetus*.

The external nares are extremely long and are pervious, the septal ossification not extending between them.

The sternum has, at most, a mere rudiment of the manubrial process; and its posterior margin exhibits either four slight excavations, or two holes externally and two notches internally.

The proximal ends of the clavicles are greatly expanded and recurved; and their outer sides present a deep and wide excavation, at the bottom of which lies the pneumatic foramen. A great part of this excavated surface is left uncovered in front of the clavicular process of the coracoid when the bones are articulated together.

The scapular process of the coracoid is not prolonged forwards to meet the clavicles.

The posterior or ischio-iliac edge of the *os innominatum* presents a deep notch, which is not found in the other Aetomorphæ.

No lower larynx is developed.

The group of the *Gypaëtidae* contains the Old World Vultures and the other "*Raptores diurnæ*," except *Gypogera* *anus*.

With the single exception of *Pandion* (according to Nitzsch) their contour feathers have aftershafts. The oil-gland is provided with a circlet of feathers.

The phalanges of the hallux, taken together, are much more than half as long as those of the fourth toe; and the articular surface of the metatarsal descends to the level of the other or nearly so.

The second and third phalanges of the fourth toe, taken together, may be longer or shorter than the basal; but the basal phalanx is always much longer than the second.

The basal phalanx of the third toe is longer than the second phalanx, which is sometimes (less commonly) longer, sometimes (more commonly) shorter than the penultimate phalanx.

The tarso-metatarsus is greatly flattened, and its inner edge thin and produced. On the upper part of its posterior face are two ridges (of which the inner is the more prominent) separated by a deep and wide groove.

There are no basipterygoid processes. The maxillo-palatines are more or less spongy; and narrow, or completely obliterate, the intervening valley.

The lachrymals commonly remain long distinct (especially in the Vultures).

The nasal apertures are usually little elongated, and are impervious by reason of the ossification of the septum.

The sternum has a more or less distinctly marked manubrial process. The posterior margin may be entire, and has not more than two holes or notches.

The proximal ends of the strong clavicles are expanded, recurved, and deeply excavated externally; but the large clavicular process of the coracoid fills the whole of the anterior moiety of this excavated surface when the bones are articulated. The scapular process of the coracoid sometimes is* and sometimes is not produced to the clavicle.

* *E. g.* in the Falcons proper and in *Polyborus*.

The inferior larynx is present, and has one pair of intrinsic muscles.

+ The division of the *Gypogeranidæ* consists of the single genus *Gypogeranus*, which, though allied to the Falcons in some respects, is so peculiar in others that it must be regarded as the type of a family apart. The feathers have an aftershaft, and the oil-gland a circle (Nitzsch). The phalanges of the elevated hallux, taken together, are not more than half as long as those of the outer toe.

The basal phalanx of the fourth toe is much longer than the distal, and longer than the second and third together. These are subequal and very short, shorter than the fourth phalanx.

The basal phalanx of the third toe is much longer than the second, and the second is slightly longer than the third.

The shaft of the long tarso-metatarsal bone is prismatic, its antero-posterior diameter being as great as, or greater than, the transverse. The upper part of its posterior face presents a prominent process terminated by an expanded cordate surface, somewhat as in the *Cathartidæ*.

The skull has basiptyergoid processes, and the spongy maxillo-palatines are completely united, so as to obliterate the intermediate valley. The lachrymal remains distinct; and the long external nares may be pervious, or not, according to the extent of the ossification of the septum. The sternum is escutcheon-shaped, and elongated. The posterior edge is convex, with two small emarginations on each side. There is a distinct manubrial process.

The proximal ends of the clavicles are not expanded, and are hardly excavated. A great median process extends from the symphysis of the clavicles, and becomes ankylosed with the sternum. The scapular process of the coracoid is not prolonged to meet the clavicle.

In the pelvis nothing is to be seen of that bending of the post-acetabular region of the ilium downwards and forwards, which is so strongly marked in most of the other Aetomorphæ.

+ 6. The PSITTACOMORPHÆ.

The rostrum is arched and hooked at the extremity, and is regularly articulated with the frontal region of the skull.

Basiptyergoid processes are wanting.

The palatines are vertically elongated posteriorly, while anteriorly they are horizontally flattened and moveably united with the rostrum. The maxillo-palatines are spongy. The lachrymal and the post-orbital bend towards one another and frequently unite below the orbit.

The orbital process of the quadrate bone is very small; and its distal end presents only one facet (which is compressed from side to side and convex from before backwards) for the mandible. The rami of the latter are deep, and pass into one another by a rounded truncated symphysis.

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The sternum is not notched, but may present two foramina posteriorly.

The clavicles are relatively weak, and may be disunited, or absent. When present, they are concave forwards as well as inwards.

The tarso-metatarsus is very short in relation to the tibia, broad, and flattened from before backwards. Its outer distal articular head is divided by a groove into two articular facets.

The fourth toe, articulated with this double facet, is permanently turned backwards. The basal phalanges of the second, third, and fourth digits of the foot are shorter than the penultimate.

The inferior larynx has three pairs of muscles, and is, in other respects, peculiar.

The contour-feathers have a large aftershaft, and the oil-gland when present has a circlet.

The Parrots constitute one of the best-defined groups of birds, having affinities, though of no very close character, with the Aetomorphæ and the Coccygomorphæ.

+7. The COCCYGOMORPHÆ.

The rostrum presents very various forms, and may be moveably articulated with the skull. Basipterygoid processes are present only in one genus (*Trogon*).

The maxillo-palatines are usually more or less spongy. The palatines are not developed into vertical plates, but are, as usual, horizontally flattened.

The distal end of the quadrate bone has the ordinary form.

The sternum usually presents two notches on each side, and has no bifurcated manubrial process (ex. *Merops*).

The clavicles are convex forwards, and without any process developed backwards from the summit of their symphysis.

The tarso-metatarsus is never remarkably elongated.

It does not appear that anything can be predicated in common of the pterylosis or of the characters of the oil-gland in this group.

The larynx has not more than one, or at most two, pair of intrinsic muscles.

The Coccygomorphæ are readily divisible into four groups by the characters of their feet, as follows:—

a. *The first toe turned forwards, as well as the others.*

Coliidæ.

b. *The fourth toe temporarily, or permanently, turned backwards, as well as the first.*

Musophagidæ.

Cuculidæ.

Bucconidæ.

Rhamphastidæ.

Capitonidæ.

Galbulidæ.

c. *The second, third, and fourth toes turned forwards; the first backwards.*

Alcedinidæ.

Meropidæ.

Bucerotidæ.

Momotidæ.

Upupidæ.

Coracidæ.

d. *The first and second toes permanently turned backwards; the third and fourth forwards.*

Trogonidæ.

This group, as I have already intimated, appears to occupy the centre of the Desmognathous division—the *Musophagidæ* approaching the Aetomorphæ, the *Trogonidæ* the Cypselomorphæ, and the *Alcedinidæ* the Pelargomorphæ.

It appears to me not improbable that it may hereafter be desirable to divide this group into four, retaining the title of Coccoygomorphæ for the second.

† The CELEOMORPHÆ.

The rostrum is straight and usually elongated, and there are no basipterygoid processes.

The maxillo-palatines are short lamellæ, which, when longest, do not extend beyond the outer edges of the palatines, and are sometimes altogether rudimentary.

The vomers are very delicate rod-like bones, which in some cases, at any rate, remain permanently separate.

The quadrate bone is remarkably short.

The sternum has two notches on each side, posteriorly, and a forked manubrial process. The carina extends to the summit of this process, its anterior edge being little (or not at all) excavated.

The clavicles have no median process; but their scapular ends are expanded, as in the typical passerine birds. The *scapula accessoria* has the same form as in the latter.

The upper and posterior process of the tarso-metatarsus is traversed by a number of canals (five in *Picus*) for the flexor tendons; and the outer distal head of the bone is divided into two parts, the fourth toe, which is articulated with it, being turned backwards.

In the second, third, and fourth toes the basal phalanx is shorter than the penultimate.

The tongue is long, slender, and protrusible; and there is only one carotid.

The oil-gland is surmounted by a circlet of feathers.

In this group I comprehend only the *Picidæ* and *Yungidæ*.

It is very difficult to assign the Celeomorphæ to their proper place. Ordinarily they are associated together with the Psittacomorphæ and Coccoygomorphæ in the 'order' Scansores; but several ornithologists have pointed out the thoroughly unnatural character of this assemblage; and it is more than thirty years since

Sundevall* proposed to break it up into the three distinct groups of *PICI*, *PSITTACI*, and *COCCYGES*,—the first to contain *Picus* and *Yunx*; the last *Pogonias*, *Bucco*, *Crotophagus*, *Phœnicophæus*, *Coccyzus*, *Centropus*, *Cuculus*, *Galbula*, *Dacelo*, *Merops*, *Colaris*, *Trogon*, and *Caprimulgus*.

Sundevall calls these groups “orders;” but, leaving the question of taxonomic rank aside, the first two exactly correspond with the *Celeomorphæ* and *Psittacomorphæ* of the present essay; while the third nearly answers to my *Coccygomorphæ*,—a coincidence which I the more desire to signalize, as the Swedish naturalist attends only to external characters, while I have, almost exclusively, been guided by the skeleton.

Kessler† takes very much the same view as Sundevall, though he is inclined to put *Bucco* along with the Woodpeckers, instead of arranging it, as Sundevall more justly does, with the Cuckoos.

Not that the resemblances pointed out by Kessler do not exist; they are genuine enough, just as are others which might be pointed out between the Woodpeckers and the Hornbills and other *Coccygomorphæ*; but the structure of the skull affords a very definite and complete distinction between the latter and any of the *Gecinomorphæ*.

The Woodpeckers, in fact, are not *Desmognathous*, the palate in these birds exhibiting rather a degradation and simplification of the *Ægithognathous* structure. The vomers retain throughout life the condition which is transitory in the *Coracomorphæ*. With the latter the *Celeomorphæ* have in common the shortness of the wing-coverts, the conical *scapulæ accessorie*, the bifurcate manubrium of the sternum, the multiperforate backward process of the tarso-metatarsus, and the brevity of the basal phalanges of the toes as compared with the penultimate.

Thus I conceive that the *Celeomorphæ* are intermediate between the *Coracomorphæ* and the *Coccygomorphæ*, and that they may be best associated with the former as an aberrant group of the *Ægithognathæ*, tending towards the *Coccygomorphæ* as the *Cypselomorphæ* do in another way.

The other *ÆGITHOGNATHÆ* are divisible into two groups, the *CYPSELOMORPHÆ* and the *CORACOMORPHÆ*.

† The *CYPSELOMORPHÆ*, like the *Gecinomorphæ*, are annectent forms between the *Coracomorphæ* and the *Coccygomorphæ*.

The vomer is truncated at the anterior end, and the maxillo-palatines slender and disposed nearly as in the typical *Coracomorphæ* (? *Trochilus*).

The sternum is broad and is devoid of a forked manubrium. Its posterior edge may be entire, or may have two excavations on each side.

The furcula has no backwardly directed median process, or only a

* Ornithologiskt System af C. J. Sundevall, Kongl. Vetensk. Akad. Handlingar, 1835, p. 68.

† “Beiträge zur Naturgeschichte der Spechte,” Bulletin de la Société Impériale des Naturalistes de Moscou, 1844, pp. 331–340.

rudiment of it ; and the scapular end of each clavicle is not expanded and T-shaped.

The lower larynx has not more than one pair of intrinsic muscles.

This group contains three very distinct families—the *Trochilidæ*, the *Cypselidæ*, and the *Caprimulgidæ*.

The first two families have a length of the manus and a brevity of the humerus which is peculiar to themselves, being only approached by the Swallows, and in a less degree by the *Caprimulgidæ*. In both *Caprimulgus* and *Egotheles* the manus is slightly longer than the ulna, and the latter considerably exceeds the humerus in length.

Both the Swifts and the Goatsuckers have a slight rudiment of a vertical process developed from the middle of the furcula. *Egotheles* approaches the Swifts more nearly than *Caprimulgus* does in the form of its palatine bones, and in the absence of basipterygoid processes.

The *Cypselidæ* are very closely related to the Swallows among the Coracomorphæ, while the *Caprimulgidæ* come near *Trogon*, and more remotely approach *Podargus* and the Owls.

THE[†] CORACOMORPHÆ.

There are no basipterygoid processes.

The vomer, single in the adult, is truncated in front and deeply cleft behind*. The maxillo-palatines are sometimes slender and rod-like, sometimes broader, but are never concavo-convex lamellæ, or tumid and elongated as in most Schizognathæ. The postero-external angles of the palatines are always well marked, and are frequently produced backwards.

The sternum has a forked manubrium, a strong carina with an excavated anterior edge, long costal processes, and, except in one or two cases (*Pteroptochus* and *Scytalopus*), its posterior edge has a single notch on each side.

The clavicles have expanded T-shaped scapular ends, and send back a vertical process from their inferior junction (except in *Menura*).

There is a conical *scapula accessoria*.

The tarso-metatarsus has a tuberosity perforated by six distinct canals for the flexor tendons.

The pollex is strong and turned backwards.

The basal phalanges are not longer than the penultimate, but usually much shorter in the anterior toes.

The contour-feathers have a small aftershaft, and the oil-gland has no cirlet of feathers.

There is only one carotid, the left.

The lower larynx presents every degree of complexity. It may be wholly tracheal, or, as is more commonly the case, partly tracheal and partly bronchial ; it may be devoid of muscles, or may have six pairs, or may be enveloped in a muscular mass.

* Nitzsch (Art. Passerinæ, Ersch und Grüber's 'Encyclopædie,' 1840) was the first to indicate this and many other distinctive characters of this group.

This immense group of birds corresponds in great part with the *PASSERES* of Linnæus and Cuvier, and wholly with the *VOLUCRES* of Sundevall, who thus defines it:—

Alarum tectrices breves. Pollex validus solus retroversus. Ungues compressi.

Alæ pennis cubiti magnis tetricibusque parvis instructæ; tectrices cubitales minorem quam dimidiam pennarum partem tegunt. Margo alæ plicatæ non a pennis cubiti obtegitur; prima enim earum ad ultimam remigum applicata manet. Digniti semper 4. Pollex crassior vel longior semper volumine major quam digitus internus. Unguis pollicis semper multo major quam laterales sed in quibusdam non major quam medius. Digitus externus toto articulo primo cum digito medio concretus. Phalanx digitorum penultima reliquis multo longior; basales (in digito externo et medio) breves. Cutis pedum firma, arcte applicata, antice scutata. Tarsus scutis 7: mediis longioribus, 2 infimis brevissimis superioribus et inferioribus opposita vice obliquis; raro plumatus, nunquam reticulatus. Interdum scuta omnia præter 2 infima in unum levissimum, suturis obsoletis confluent (tarsi caligati, Illiger). Digniti scutis phalangum 1 seu 2 longis, juncturarum brevibus. Apparatus musicus laryngis his avibus peculiaris.*

The *Volucres* thus defined are divided into two “orders,” as follows:—

Ordo I. PASSERES. *Rostrum crassius conicum capite brevius. Maxilla inferior marginibus validis inflexis convergentibus positice altioribus.*

Rostrum a cranio paullo deflexum exit sutura vix longiore quam dorso rostri. Hinc limes faciei rectus apparet, nec ut in sequentibus ad fauces longè retorsum angulatus. Maxilla inferior ad semina frangenda constructa, ut nuper descriptum qua conformatione in rostro hiantes fauces deflexæ apparent. Lingua parva subcrassa plerumque caret margine membranaceo. Ric-tus mediocris. Pedes minores graciles.

Ordo II. OSCINES. *Rostrum varium marginibus maxillæ inferioris simplicibus nec inflexis.*

Ordo polymorphus et specierum ditissimus cujus descriptio generalis adhuc fere tantum negativa existit.

Now the “*Passeres*” of Sundevall have all, so far as I have examined them, that peculiar form of the palatine bones which I have described as characteristic of the Finches; while the “*Oscines*” have the typical *Ægithognathous* arrangement. And, thus far, cranial characters appear to bear out the classification of Sundevall, though I neither think that the groups have the value he assigns to them, nor that their names are happily selected. It is quite impos-

* Scuta in *Ptilonorhyncho*, paucis *Myotheris*, *Coracina* et *Chasmorhyncho* 9. In quibusdam inter longilingues majores 8 parallela, æqualia.

sible, for example, to restrict a term so commonly used in a wide signification as *Passeres*, to the sense in which Sundevall employs it.

Müller divided the whole of the *Insectores*, according to the structure of the lower larynx*, into *OSCINES* or *POLYMYODÆ* (of which Sundevall's "*Passeres*" form one family—the *Fringillidæ*), having the lower larynx formed partly by the trachea and partly by the bronchi, and possessing five or six pairs of muscles attached to the ends of certain of the bronchial rings; *TRACHEOPHONÆ*, with the lower larynx formed exclusively by a modification of the lower part of the trachea; and *PICARIÆ*, with the larynx either partly tracheal and partly bronchial, or wholly bronchial and with not more than three pairs of muscles.

Under the head of *Picariæ*, however, Müller included the *Cypselomorphæ*, *Coccygomorphæ*, and *Psittacomorphæ*, as well as the two *Ægithognathous* families *Tyrannidæ* and *Ampelidæ*; and thus a group of "*Picariæ*" very different from that of Nitzsch was established.

Later authors, adopting Müller's term of *Tracheophonæ*, have unfortunately extended the group so named to include the *Tyrannidæ* and *Ampelidæ*, dividing the whole of the "*Passeres*" into *CANORÆ* and *TRACHEOPHONÆ*.

Burmeister, for example, proposes this arrangement in his excellent monograph on *Coracina scutata*, and speaks of that bird as one of the *Tracheophonæ*; whereas his account of its larynx shows that it is altogether dissimilar to the tracheal lower larynx of the *Myiotheridæ*, *Scytalopodidæ*, and *Anabatidæ*, in which alone that singular structure has been found. Müller would have put *Coracina* among his *Picariæ*.

If for "*Picariæ*" we substitute a name formed in a manner analogous to *Polymyodæ*, viz. *OLIGOMYODÆ*, the *Ægithognathæ* would be divisible according to their laryngeal structure into three groups; and it becomes an important question how far the three divisions thus formed are natural, or present other differences beside those of the larynx.

From this point of view, and regarded as primary subdivisions of the *Coracomorphæ*, it seems to me clear that they are not natural. Burmeister has described *Coracina*; I have examined *Cephalopterus*, *Tyrannus*, *Eurylaimus*, *Pterotochus*, and *Chasmorhynchus*; and in no one of them does the structure of the skull differ so much from that of a typical polymyodian *Coracomorph* (e. g. one of the *Corvidæ*) as does that of the also polymyodian *Coccothraustes*. *Pipra* resembles the Finches.

The sternum in most of these genera has the same characters as, and presents no greater varieties than are met with in, the *Polymyodæ*. But among the *Tracheophonæ* the small group of *Scytalopodidæ*, as Müller originally stated, have two notches on each side of

* Though he wavers in his estimate of the taxonomic value of these divisions. See his paper, "Ueber die bisher unbekannten typischen Verschiedenheiten, &c.," Abhand. d. Berl. Akad. 1846, p. 367.

the sternum, standing alone among the Coracomorphæ in this particular*.

So far as their osteology goes, the Polymyodæ, Oligomyodæ, and Tracheophonæ form one great group, in which the Finches and the Scytalopidæ alone are distinguishable from the rest by any very important characters.

But one genus, *Menura*, stands apart from all the other Coracomorphæ.

The vomer in this singular bird is broad and rounded off in front, and deeply cleft behind.

The maxillo-palatines are altogether obsolete, or at any rate unossified—a condition which I have not observed in any other Coracomorph.

The sternum has a well-developed and forked manubrium; but its posterior edge is strongly convex, and only exhibits a slight notch on each side. It is unlike the corresponding bone in any of the other Coracomorphæ, in all of which the posterior edge is straight.

The furcula has no median process, and its scapular ends are comparatively little expanded.

The tarso-metatarsus has the typical structure; and the penultimate phalanges are much longer than the basal ones in the anterior toes.

Thus, with my present information, I should be disposed to divide the Coracomorphæ into two primary groups—one containing *Menura*, and the other all the other genera which have yet been examined. How the latter is to be subdivided is a difficult question, upon the consideration of which I do not at present propose to enter.

In concluding this paper, I desire to offer my best thanks to my friends Dr. Günther, Mr. Parker, and Mr. O. Salvin for their kindness in supplying me with specimens, to the Museum Committee of the Royal College of Surgeons and to Dr. J. E. Gray of the British Museum for the opportunities of freely employing the collections under their charge which I have enjoyed, and especially to Dr. Selater for many valuable suggestions upon points of nomenclature.

P.S. I find I have omitted to refer to a memoir by Kessler entitled “Osteologie der Vogelfüße,” published in the ‘Bulletin de la Société Impériale des Naturalistes de Moscou’ in 1841, which is full of valuable information and suggestions. This writer was the first to draw attention to the great systematic value of the tarso-metatarsus and to what I have spoken of as the ratio of length of the phalanges. Kessler’s views are fully borne out by M. Alphonse Milne-Edwards in the introduction to his great work on Fossil Birds, now in course of publication.

* In a specimen of *Pteroptochus megapodius* from Chili, in the British Museum, the two notches extend for fully half the length of the sternum, and the middle and outer processes which bound them are very slender. There is a large bifurcated manubrium; and the costal process is long and pointed, being directed forwards and outwards.

May 9, 1867.

George Busk, Esq., F.R.S., V.P., in the Chair.

The Secretary called the attention of the Meeting to the following interesting additions to the Society's Menagerie :—

1. An example of the Parrot (*Coracopsis barklyi*) described by Mr. Edward Newton at the last Meeting of the Society, from Praslin Island, Seychelles; presented to the Society by Swinburne Ward, Esq., H.M. Commissioner to the Seychelles, on the 8th ult.

2. A Tortoise from Digué Island, Seychelles (*Sternotherus subniger*, Gray, P. Z. S. 1863, p. 195); presented by the same gentleman on the 23rd of March last.

3. A pair of Ka Ka Parrots (*Nestor hypopolius*), from New Zealand; presented to the Society by the Acclimatation Society of Canterbury, New Zealand, on the 25th of April.

4. A Boatbill (*Cancroma cochlearia*), obtained in exchange from the Zoological Gardens, Antwerp, on the 25th of April.

5. A male Ground-Hornbill, from West Africa (*Bucorax abyssinicus*); presented May 6th by C. B. Mosse, Esq., Staff-Surgeon; and very acceptable, as the Society's collection had previously contained three females of this rare and interesting species.

Mr. Selater exhibited a skull of *Tapirus bairdi*, which had been forwarded to him by Capt. J. M. Dow, C.M.Z.S. This skull had been obtained on the side of the Volcan Viejo in Nicaragua, and was of great interest in proving that this species of Tapir extended its range northwards so far. Mr. Selater also remarked that it would be of still greater interest now to ascertain to what species the Mexican Tapir was referable, it being well ascertained that a species of this genus occurs in the southern parts of Mexico*.

A letter was read from Dr. G. Bennett, F.Z.S., dated Sydney, February 21st, and addressed to the Secretary, in which details were given respecting the rediscovery of *Casuaris australis* in Queensland, and photographs were enclosed of a specimen of this bird recently received by the Sydney Museum.

Dr. Bennett's communication enclosed a copy of the following letter, addressed to the Editor of the 'Sydney Herald' by Mr. W. Carron, the only survivor of Kennedy's Expedition, during which the original example of *Casuaris australis* had been procured :—

"Botanic Gardens, Sydney,
8th February, 1867.

"SIR,—In the 'Herald' of to-day is a letter from Mr. G. Krefft

* "Our Museum" (*i. e.* that of Copenhagen) "possesses a very bad and much mutilated skin (without any bones) of a Tapir from Mexico (Oaxaca), brought back in 1843 by the late botanist Prof. Liebmann. It is indeed too bad to found any decisive opinion upon it; but I cannot find any difference between it and the common American Tapir (*Tapirus americanus*)."—Prof. REINHARDT, *in litt.*

of the Sydney Museum, giving the description of a Cassowary lately obtained by Mr. G. Randall Johnson at Rockingham Bay, and also alluding to one shot by Mr. Thomas Wall while on the expedition to Cape York with the late Mr. E. B. Kennedy.

"I have just seen the bird sent to the Museum by Mr. Johnson, and think it is identical with that shot by Mr. Wall in the vicinity of Weymouth Bay in November 1848; but the description given of the latter as quoted from Gould's work on 'Australian Birds' is not correct. I am aware that in the few remarks on Wall's bird, which appear in my narrative of Kennedy's expedition, there is an error as to the colour of its helmet or comb, which was *black*, not *red* (the redness referred to the wattles), an error which I have before corrected. As I was present when Wall's bird was shot, and helped to eat it, I had a good opportunity of knowing something about it. Instead of going in flocks of five or six together, it is certainly a solitary bird, and would appear to be very scarce, as only two others were seen by our party during the whole journey from Rockingham Bay to my furthest camp at Weymouth Bay, in latitude $12^{\circ} 25' S.$ This bird had shorter but larger legs, a heavier body, and shorter neck than the Emu, the colour very dark, its habits, too, being unlike those of the Emu. It appears to confine itself to the gullies in the thick jungles with the Brush-Turkeys and Jungle-fowl, feeding on the various fruits found there, even swallowing the large seeds of *Castanospermum* and *Pandanus*. Mr. Wall took every care of the skin he was able to do; but it was completely destroyed before he died, together with my own specimens at Weymouth Bay. This bird was certainly very large, and furnished our whole party with a better supper and breakfast than we had enjoyed for some months, or than poor Wall was destined to enjoy again (as he and all his companions, with the exception of myself and one other, had died in six weeks after from want of food); but there was not one in the party who would not have eaten more if he could have got it, every meal being divided with the greatest nicety, and having been so for a long time.

"I am, Sir, yours, &c.,

"W. CARRON."

A letter was read, addressed to Professor Owen by Sir Walter Elliot, K.S.I., F.Z.S., and communicated to the Society by Prof. Owen, containing some corrections of notes contributed by Sir Walter Elliot to paper recently contributed by Prof. Owen to the Society's 'Transactions'*.

This letter will be published entire in the Society's 'Transactions.'

Mr. E. Blyth, C.M.Z.S., exhibited a skin of a Quail shot near Missouree, new to the fauna of Continental India. This species had been described and figured in the 'Knowsley Menagerie,' pt. 2, as *Rollulus superciliosus*; but Mr. Blyth considered that it belonged

* "On some Indian Cetacea collected by Walter Elliot, Esq." By Professor Owen, F.R.S., F.Z.S., &c. (Trans. Zool. Soc. vi. p. 17).

more strictly to the true Quails, and should be made the type of a new genus proposed to be called *Malacoturnix*.

A communication was read from Dr. A. Leith Adams, containing a description of a new fossil Dormouse from the quaternary formations of Malta, proposed to be called *Myoxus melitensis*.

This paper will be published in the Society's 'Transactions.'

Dr. J. Murie read a memoir on the dermal and visceral structures of the Kagu (*Rhinochetus jubatus*), Sun-bittern (*Eurypyga helias*), and Boatbill (*Cancroma cochlearia*), as observed in specimens of these birds recently deceased in the Society's Gardens.

This paper will be published in the Society's 'Transactions.'

The following papers were read :—

1. On the Passage of the Young to the Pouch in the Kangaroos (*Macropus* and *Halmaturus*). By E. S. HILL. Communicated, with Remarks, by Prof. OWEN, F.R.S., F.Z.S., &c.

[I have been favoured by an esteemed correspondent with the following letter, which, from past experience of his accuracy of observation, I confidently communicate as a document of genuine scientific value, in elucidation of the interesting problem in animal-generation to which it relates.

I am not aware that the phenomena of the transport of the young to the pouch have been previously observed in Kangaroos in their native wilds; at least I know of no record of such observations. What physiology has hitherto taught on this subject has been based on experiments on Kangaroos in captivity made a few hours after the uterine fœtus had become a mammary one, and on the single observation by the Knowsley superintendent of the parturition of a captive Potoroo (*Bettongia*), recorded by the late Earl of Derby in the 'Proceedings' of this Society for November 12th, 1844.—R. O.]

" Woollahra, Sydney,
23rd January, 1867.

" Recently I visited the caverns (breccia caves of Wellington Valley) discovered by Sir T. L. Mitchell, our once Surveyor General, situated about 280 miles from Sydney, for the purpose of reporting whether it would be desirable to have a collection from that quarter. Mr. Krefft, of our Museum, was sent, and what bones he got will figure at the Paris Exhibition. Winter is the proper time to work there, and not less than two months for the purpose.

" At the risk of being tedious, I am about to mention a fact which occurred at the early part of last winter, one which may never occur to me again, and which in all probability has not occurred before under observation.

"Many people in this country still entertain the popular tale that the young of the Kangaroo is formed and grows on the teat, and cheat themselves into the belief that it is a truth. Others more industrious still disseminate the tales of stock-men, who broadly assert that they have watched the development, and have killed hundreds of adults with the young in that state. Backed by the fact that these young bled at the mouth when forced from the teat, it is very easy to swell the ranks of believers in these popular notions, but difficult to get any one to search out the truth or to alter their expressed opinions.

"Hunting on the mountains at the time referred to, about 100 miles from Sydney, for the double purpose of getting specimens of the Wallaroo (*Macropus robustus*) for our Museum, and entertaining a couple of friends in the sport, I was quietly ensconced under shelter of some rocks, waiting for any game which might be disturbed from the back country by my aborigines, who were sent around for that purpose as soon as we had taken up our proper position to receive any coming within range. I had not been placed half an hour before I heard the well-known sounds of game, and immediately afterwards saw in the van a fine doe Wallaroo, followed at some distance by half a dozen others of both sexes.

"I was perfectly secure, and down wind, and almost sure to get a shot, but desired to have a large black male, which I saw among the troop. So soon, however, as the doe came within 30 yards she sat up for a moment, then squatted and put her head towards the ground, and picked up, as I thought, a piece of stone with her lips; in an instant, with her hands back to back, she seized her pouch, stretched it open and inserted her head, ears and all, to the very neck, in which position she remained half a minute, then, withdrawing her head and looking all round (the companions had halted in the distance at the same time as herself) and seeing all safe, put her head in again as before. Suddenly there was a move among the lot, and to all appearance they were for another direction. I at once shot the doe, examined the pouch, and found that her care and solicitation had been bestowed on the young, just born, which had been conveyed to the pouch by her lips.

"That, however, was not conclusive to one of my friends. In the grey of the following morning, not far from our camp, very quietly on a ledge of rocks sat a Wallaby (*Halmaturus*) engaged at her pouch: it was shot; the young evidently had only just been conveyed there, and had not hold of the nipple. In the course of the day fourteen others were added to our bag, two females of which I dissected and found a young one, or fœtus, in each. This was conclusive.

"Believe me,

"Very faithfully yours,

(Signed)

"E. S. HILL."

[If reference be made to the 'Proceedings' of our Society for November 26th, 1833 (vol. i. p. 132), the conclusions from the experiments on *Macropus major* there recorded were "that parturition

takes place in the erect and not in the recumbent posture," "that the fore paws were not used for the transmission of the fœtus, but to keep open the pouch ready for its reception, while the mouth would be the means by which it would be deposited therein, and, perhaps, held over a nipple until the mother felt the sensitive extremity grasped by the young one." I was led, also, to suggest, from "the ease with which the mother could reach with her mouth the orifices of the vagina and pouch," that the young might be so transferred from the one to the other.

The superintendent of Lord Derby's menagerie, however, reported that the '*Bettongia*,' "backing as it were into a corner of her cage, in this situation produced the young one, which, after its birth, she took up in her fore paws and deposited in the pouch."

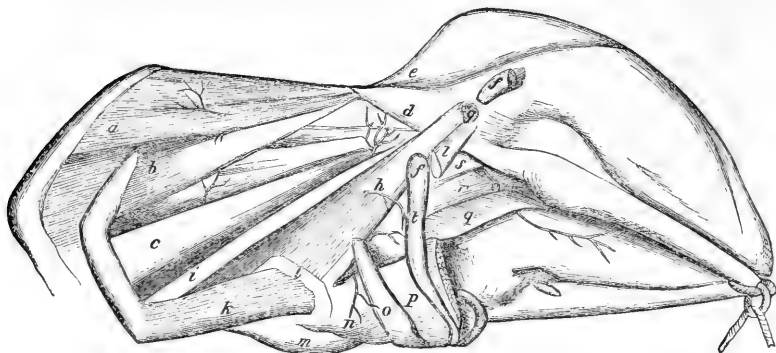
Mr. Hill's observations, in which I am disposed to place more confidence, distinctly testifies to the lips or mouth as the instrument of transport, the fore paws aiding precisely in the manner observed in my experiments. The Knowsley observation accords with Mr. Hill's in the circumstance of the fœtus being dropped on the ground when expelled from the vagina: as may be inferred, at least, from the expression that "after its birth she took it up and deposited it in the pouch" (Proc. Zool. Soc. 1844, p. 163). Whether this circumstance of the parturition is constant, viz. the dropping of the fœtus on the ground, or whether the fœtus may, occasionally, be received by the mouth from the vulva, I am still disposed to regard as a matter for ulterior observations. But the main fact of the conveyance of the fœtus to the pouch by means of the mouth may now be held as the more probable (at least the more usual, if not the constant) way in the genus *Macropus*.—R. O.]

2. On some Points in the Anatomy of *Globiocephalus svineval* (Gray). By ALEXANDER MACALISTER, M.D., Demonstrator of Anatomy, Royal College of Surgeons, Ireland.

Through the kindness of Dr. Carte, Director of the Natural History Museum of the Royal Dublin Society, I have had the opportunity of dissecting some parts of a Cetacean belonging to the above species, and in its structure I have found what I think are peculiarities worthy of record. The individual was a very young one, caught on the west coast of Ireland, near Ballina, north-west of co. Mayo, and when recent measured nearly 6 feet in length. The skeleton was but imperfectly ossified, the lateral and spinous processes of the vertebræ being yet cartilaginous and flexible for the most part. Most of the soft parts had been removed before the specimen was sent up to Dublin; but the pharyngeal and laryngeal apparatus was untouched, as likewise were the anterior extremity and a few of the spinal muscles; it was of these few parts that I was enabled to make a careful examination. (In the accompanying woodcut (p. 478) the

head is rotated a little, so that the under surface of the lower jaw is turned forwards; and the tongue is removed; the latter was gone before the animal was submitted to my notice.)

The observations which I have subjoined may be grouped into three series: 1st, regarding the anatomy of the pharynx and larynx; 2ndly, regarding the spinal muscles; and 3rdly, regarding the structures forming the anterior extremity.



Globiocephalus svineal.

- a.* Scalenus posticus. *b.* Scalenus medius. *c.* Scalenus anticus. *d.* Trachelomastoid. *e.* Rectus capitis posticus major. *f, f.* Stylo-keraticus. *g.* Squamokeratic joint. *h.* Stylo-pharyngeus. *i.* Carotid artery. *k.* Sterno-thyroid. *l.* Thyroid cartilage. *m.* Front of same. *n.* Thyro-hyoid. *o.* Posterior cornu of hyoid bone. *p.* Hyo-keratic. *q.* Superior constrictor. *r.* Pterygo-keratic. *s.* Superior constrictor. *t.* Stylo-hyoid.

The anatomy of the pharynx differs in many respects from that of *Balanoptera rostrata*, and likewise from that of *Delphinus* and *Phocæna*; in general, however, its modes of arrangement are more closely allied to those of the latter species than to those of the former.

The pharynx is a wide ovoid bag with a large anterior opening communicating with the mouth, from which, however, it was separated by a thick round crescentic fold, which bounded the isthmus faucium upon three sides, and was attached to the base of the tongue below by the extremities of its cornua. This fold was smooth, but showed no trace of a uvula in its centre; but on dissecting from its surface the mucous membrane, a thick sphincter isthmi faucium or palato-glossus muscle was brought into view. This muscle, in common with its fellow of the opposite side, arose from the middle line of the velum pendulum palati, and was inserted into the side of the base of the tongue; this muscle, when it acted, was capable of occluding perfectly the oral aperture of the pharynx, a condition of probable occurrence in the respiratory actions.

The openings of the posterior nares passed upwards and forwards from the pharyngeal cavity above and behind the opening into the mouth; these apertures were separated from each other by a septum, which did not extend as far backwards as the lateral boundaries of

the canal; so the tube was single at its pharyngeal end for a short distance; its mucous walls were thick and slightly moveable, having a muscular ring subjacent to the lining membrane. This sphincter-like arrangement arose from the median ridge of the basisphenoid, and surrounded the aperture of the nares; from its position it was evidently a displaced representative of the levator palati muscle; here, however, it is developed as a constrictor naris. Below, the pharynx contained the tubular prolongation of the glottis, which in this species resembled that of the Porpoise in the cohesion of its sides, as the aryteno-epiglottidean folds were prolonged nearly to the extremities of the arytenoid bodies and of the epiglottis; these folds contained the aryteno-epiglottic muscles. In *Balanoptera* the glottis differs remarkably in being arranged in a freer manner, as two-thirds of the prominent portions of the arytenoids and epiglottis are perfectly unattached to each other.

The opening of the œsophagus was marked by a sudden constriction, and was placed below the level of the cricoid cartilage, which was deficient anteriorly.

The pharyngeal mucous membrane being removed, the three constrictors were exposed, arranged nearly in their usual manner. The inferior had its origin from the posterior margin of the cricoid and thyroid cartilages, and was inserted into the median raphe; below it were the inferior laryngeal nerves; and in shape it was quadri-lateral and very narrow. The middle constrictor was rather thicker and somewhat triangular; it arose from the posterior cornu of the hyoid bone and by some fibres from the stylo-hyoid cornu (the latter corresponding to the occasional syndesmo-pharyngeus of some animals, and rarely of man); its fibres ran backwards, expanding, and were inserted into the median raphe, where they were wide and thin and overlapped by the last described.

The superior constrictor, whose fibres were closely connected to those of the palato-pharyngeus, formed a thick stratum surrounding the anterior extremity of the pharynx; it arose from the inner surface of the internal pterygoid plate, extending into the posterior nasal orifice to a distance of 3 inches from the pharyngeal level of that opening; its fibres likewise arose from the posterior border of the palatine bone and from a dense fascia, corresponding to an inwardly displaced intermaxillary ligament, which extends from the angle of the maxilla to the edge of the stylo-hyoid cornu; from these origins the fibres ran downwards, inwards, and backwards to be inserted into the raphe. The most internal fibres were continued over the others, and on a plane superficial to the middle and even to the inferior constrictor; these, though in this instance inseparable from the rest of the mass, yet, from the nature of their insertion, I would judge to be the representative of the muscle not infrequent in some animals, and called by Meckel *azygos pharyngis*. This muscle sometimes occurs as an irregularity in human anatomy (Proceedings of the Royal Irish Academy, vol. ix. pl. 5. f. 1a).

Within the constrictors, although there was no distinct posterior faucial pillar in relation to the soft palate, yet there was a strong

broad palato-pharyngeus muscle, which arose from the posterior border of the palate bones opposite the median line of the velum and above and behind the palato-glossus; from this point the muscles of both sides diverged, and, passing beneath or on the inner aspect of the superior constrictor, were inserted into the vertebral edge of the thyroid cartilage. There was no trace of a tonsil; nor anteriorly could any rudiment of a salivary gland be found, even though I searched in the locality corresponding to the place where Dr. Carte and I found a rudimental parotid in *Balænoptera rostrata*.

In the dissection of the neck I found the following muscles connected with the hyoid bone and larynx :—1. Sterno-hyoid, arose from the upper edge of the sternum and ran to the body of the hyoid bone. 2. Sterno-thyroid, from the back of the sternal extremity of the cartilage of the first rib to an angular line on the thyroid cartilage; in direction it ran upwards and inwards, and it overlapped the common carotid artery. This muscle was not found by Dr. Carte and myself in *Balænoptera*; its costal origin is interesting, as a corresponding attachment is sometimes its sole origin in Man, as described by Hallett and others. 3. Thyro-hyoid, from above the oblique line on the ala of the thyroid cartilage to the posterior border of the base of the os hyoides. 4. Crico-thyroid, quadrilateral in shape, entirely covered by the sterno-thyroid, passed from the front of the cricoid cartilage upwards and forwards* to the posterior edge of the thyroid. 5. Hyo-keratic (κέρας, cornu), probably a modified hyo-glossus, arose from the anterior edge of the body of the hyoid bone, and was inserted into the hinder and upper edges of the stylo-hyoid cornu; this muscle was short, broad, and thick. 6. Stylo-keratic, arose from the squamous bones, external to the articulation between the stylo-hyoid cornu and the base of the skull; from this point it ran downwards and backwards to be inserted into the upper third of the stylo-hyoidean cornu. 7. Stylo-hyoid, a pyriform muscle remote from the last named, arose from the squamous bone internal to the afore-mentioned articulation, and was inserted into the posterior or great cornu of the hyoid bone; its origin was placed on a plane in front of the next muscle, stylo-pharyngeus; its belly crossed over the stylo-hyoid bone, and its tendinous insertion crossed the external carotid artery and the lingual nerve. 8. Stylo-pharyngeus, arose from that portion of the squamous bone behind the styloid articulation, posterior to the last described, and was inserted into the superior edge of the thyroid cartilage, upon which there was an oblique ridge for its insertion. This muscle was narrow at its origin, and overlapped in its course the glosso-pharyngeal nerve, internal and external carotid arteries, and the rete mirabile formed by the former vessel; its insertion was superficial to the middle constrictor of the pharynx, and was separated from the attachment of the sterno-thyroid by a small part of the origin of the thyro-hyoid muscle. For these muscles I have preserved the name stylo, although they have in reality no true styloid attachment. 9. Basio-thyro-hyoid, arose

* All these positions have reference to the animal as placed resting on its ventral aspect.

tendinous from the basilar process of the occipital bone, and ran backwards to be inserted into the posterior border of the thyroid cartilage, the thyro-hyoid membrane, and the posterior cornu of the hyoid bone. This muscle underlay the last named, with which it was partly continuous; it seemed to be an expanded representative of the cephalo-pharyngeus of Theile (figured as a human muscle in the Proc. R. I. A. vol. ix. pl. 6. f. 1 b).

Relating to the actions of these muscles, there are many points very well worthy of note; but I refrain from making any observations at present on the subject, as they will be detailed at length by Dr. Carte and myself on a future occasion in connexion with the anatomy of *Balenoptera rostrata*.

The muscles of the spine which remained in the specimen were:—1. Depressor caudæ. 2. A fragment of levator caudæ. 3. A small part of latissimus dorsi; besides the following:—4. Scalenus anticus, from the first rib to the front of the transverse processes of the upper cervical vertebra. 5. Scalenus medius and posticus conjoined, from the first and second ribs to the upper cervical transverse and spinous processes; the portion attached to the latter was probably the germ of the serratus posticus superior, which otherwise was not visible. 6. Trachelo-mastoid, from the transverse process of the first cervical vertebra to the external side of the occipital bone at the junction of the exoccipital and paramastoid elements. 7. Rectus capitis posticus, from posterior part of the atlas to the hinder edge of the foramen magnum and occipital bone above that level. 8. Rectus capitis anticus, from the front of the bodies of the cervical vertebræ to the basilar process of the occipital bone.

There were some points of interest in the dissection of the paddle or fore limb. On removing its thick greyish-black integument, all the bony elements of the typical anterior extremity were found in it, although some, as the carpus, metacarpus, and phalanges, were purely cartilaginous; consequently the exact number of the latter could not be distinctly reckoned. The dorso-scapular group of muscles had been removed before the subject was examined; but traces of a deltoid supraspinatus and infraspinatus existed, though there was no sign of a teres minor or teres major, which are present in Dolphins.

The subscapularis, which was attached as usual to the subscapular fossa and inner side of the head of the humerus, was completely intersected by eight tendinous planes slightly radiating towards the posterior edge: this point is of interest, as in *Balenoptera rostrata* there is hardly any sign of these intersections, otherwise so uniformly found in so many animals. This muscle does not pierce the capsule of the shoulder, nor is there a bursa beneath its tendon.

The coraco-brachialis was short and fleshy, arising from the front of the coracoid process, whence it passed to be inserted into the capsule of the shoulder and into the front of the neck of the humerus. This corresponds to the short variety of this muscle described by many anatomists, noticed by Mr. Wood and others as an occasional occurrence in Man (Journal of Anat. & Phys. vol. i. p. 47. f. 2).

I have seen it in Man, *Cebus capucinus*, *Ateles*, *Cercopithecus*, *Macacus*, Horse, Seal (although Meckel denies its existence in the latter animal); and it has been noticed by others in the Dog, Cat, Ichneumon, Marmot, *Ornithorhynchus*, Deer, Porpoise, &c. (for references *vide* Wood, *loc. cit.* p. 51). The chief interest of this fasciculus consists in its being the fore-limb equivalent of the pectineus in quadrupeds (or the adductor brevis according to Mr. Wood).

There were no traces of any other muscles in the arm or forearm. The triceps and forearm muscles present in the *Balenoptera* were here represented only by intersecting threads of fibrous tissue totally devoid of muscularity. The shoulder-joint had a distinct capsular ligament lined by a synovial sac; the former was not perforated by any of the neighbouring tendons, and, though thicker below than above, yet had no trace of the inferior scapulo-humeral accessory ligament present in *Balenoptera*. No other joint in the upper limb presented a synovial membrane, all being referable to the amphiarthrodial order of synchondroses. Of the other joints in the body, a synovial capsule existed for the stylo-hyoidean articulation with the squamous bone, but I could not find one for the lower jaw.

I did not notice any undescribed peculiarities in the skeleton worthy of record; the stylo-hyoid cornu was joined to the body by a round arched ligament of some little length, not like the close union which occurs in *Balenoptera rostrata*; the latter is represented (I believe, erroneously) as possessing a long intervenient ligament, in the article "Cetacea" in Todd's 'Cyclopædia of Anatomy and Physiology.'

3. Description of a New Species of Cassowary from Northern Queensland. By GERARD KREFFT, F.L.S., C.M.Z.S., Curator and Secretary of the Australian Museum, Sydney.

The existence of a species of Cassowary in the northern part of Australia has been known for many years, from native ornaments in which Cassowary feathers form a part, and from the report of the survivors of Kennedy's expedition, who state that they actually shot one of these birds. Mr. W. S. Wall, late Curator of this Museum, has even gone so far as to give a very brief description of a Cassowary in a defunct Sydney newspaper, published in June 1854. Gould has quoted this description in his 'Handbook on the Birds of Australia,' accepting the name proposed by Wall, of *Casuarinus australis*, though Wall's description (?) was founded on nothing more than the remarks of one of Kennedy's men, that they had shot a bird unlike an Emu with wiry feathers and a topknot or helmet.

The brief account which Wall gives us is as follows:—"The body thickly covered with dark-brown wiry feathers; on the head is a large prominence or helmet of a bright red colour, and to the neck

are attached like bells six or eight round fleshy balls of bright blue and scarlet."

Mr. Carron, who gave some notes to Wall about this bird, has assured me that this specimen had no red helmet, that its plumage was not brown, but black, and that it was not true that twelve hungry men made a meal of a single leg, and had enough and some to spare. So much, therefore, for this very vague account quoted by Mr. Gould.

The Cassowary which I am now about to describe was presented to the Australian Museum by Mr. G. Randall Johnson, who informs me that it was shot by him when on a visit to Messrs. Scott and Co.'s, Herbert Station, in the Gawnie Creek Scrub, near Rockingham Bay. Mr. Johnson has furnished me with a description of the appearance of the fleshy part of the neck in the living bird, and is anxious to see some former statements made by him through Dr. Ferd. Mueller corrected; and as the newspaper account given by Dr. Mueller will probably be quoted by other writers, I call the attention of the Fellows of this Society to the fact that it contains many inaccuracies.

When announcing the discovery of a Cassowary, Dr. Mueller suggested that, if new, it should be named in honour of the discoverer; and acting upon this I beg to propose the name of *Casuarus johnsoni* for it.

General plumage black, the feathers being brown at the base, and black from about the middle to the tip; head surrounded by a compressed helmet, the height of which is about equal to its base; skin of neck smooth, without any folds or hair-covered ridges like those shown on the back of the neck of *Casuarus galeatus*; thin soft hair-like feathers cover the neck; on each side the lower part of the neck is furnished with a few thick glandular fleshy ridges, which in the living bird are deep blue; helmet horny colour (dirty light brown in Mr. Johnson's notes); irides rich light brown; the skin from the bill along the top of the head and extending 5 inches down the back of the neck marine blue; below this, still following the back of the neck down to the point at which the feathers become thick, the coloration is of a cinnabar-red; the underside of the head and throat from the bill downwards ultramarine blue; glandular portion of neck dark blue. Wattles, two in number, bright red, and 4 inches long. The rudimentary wings are provided on the right side with five long smooth shafts; a sixth, nail-like and not more than $\frac{1}{2}$ inch in length, finishes the series. The left wing has four long and straight shafts and a fifth curved one of about 2 inches in length. Toes moderate, rather blunt, except the inner one, which, springing from a broad base, is scarcely curved, and tapers towards a sharp point.

This Cassowary, I am told, confines itself almost entirely to the more open parts of the scrub, and seldom ventures out on the plains. During July, August, and September its food consists chiefly of an egg-shaped blue-skinned berry, the fruit of a large tree; this, together with herbage, probably forms its diet for at least that portion of the year.

4. Preliminary Observations on the Anatomy of *Pontoporia blainvillii*. By Dr. H. BURMEISTER, F.M.Z.S.

Some weeks ago one of my friends brought me the dry body of a specimen of *Pontoporia blainvillii*, which was taken living in the mouth of the River Gueguen Grande, in $38^{\circ} 33'$ S. lat. The body had lost all the external flesh and the greater part of the viscera, and could only be made use of for a skeleton, which is now exhibited in the public museum of Buenos Ayres.

As the internal structure of this interesting animal is entirely unknown, I beg leave to communicate to the Zoological Society my observations made during the examination of the body, some of them being very curious, and worthy, as I believe, to be known to science.

I will not speak of the general figure of the animal and its colour, because most of the external surface was lost; but I may mention that another entirely well preserved individual in our museum has no trace of the white stripe on each side of the body which is represented in D'Orbigny's figure (Voyage, Mamm. pl. 23). The upper part of the whole body is blackish grey, and the whole underside white, which colour extends halfway up the sides, and occupies also the under jaw and the sides of the head. But the general figure of both animals is the same, and therefore I cannot doubt that my species is the same as that figured by D'Orbigny.

As the skull is already well known by the figure in the work above mentioned, I will not enter into a description of that part of the skeleton, especially since Mr. Flower, one of the best-informed observers of the skeletons of the Cetacea, is occupied with a comparative description of the skulls of *Pontoporia* and *Inia*, the former sent by myself to Dr. J. E. Gray for the British Museum.

I will therefore begin my description with the vertebral column, which is composed of forty-two vertebrae, divided into seven vertebrae of the neck, ten of the back, seven of the lumbar portion, and eighteen of the tail, of which the first five are provided with inferior spines or hæmapophyses.

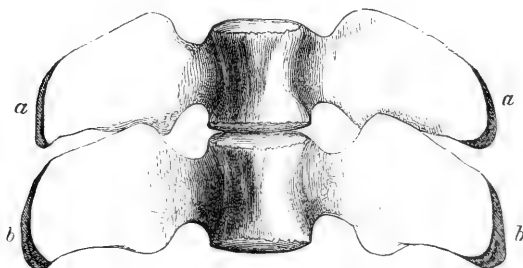
The seven vertebrae of the neck are all free, and none of them anchylosed; they have together an extent of $1'' 10'''$, each of the first two being $5'''$ long, and the five others $2\frac{1}{2}'''$. Only the second vertebra has a strong reclined spinous process, and very broad thick transverse processes; the five following have no spinous processes, but transverse processes of different size and form. The transverse process of the third vertebra is somewhat larger than the same part of the fourth, and the fifth vertebra has the smallest transverse process of all; but on the lower margin of the body of the same vertebra springs up another thick and short tubercle, which is already indicated on the fourth vertebra, and presents itself also on the two following. To this lower tubercle of the seventh cervical vertebra is attached the capitulum of the first rib.

The ten dorsal vertebrae have together an extent of 6 inches, each one being somewhat longer than its predecessor; so that the first is

only 3 lines long, and the last 10 lines. The spinous processes are not very high, but tolerably broad; the anterior one much inclined; the posterior directed more perpendicularly, and double the breadth of the former. The transverse processes decrease in length from the first to the seventh, but increase in breadth; and from there to the tenth they become again longer, as well as broader, the tenth being 16 lines long, and the seventh only 7 lines. Each of these processes has a projection on the anterior margin near the base, and an oblique truncated tip, to which the rib is articulated.

The seven lumbar vertebræ are the largest and strongest of all, the first being 11 lines long and the seventh 12 lines. All have high and large spinous processes, which become somewhat higher posteriorly, so that the three last lumbar vertebræ are the highest of all. The transverse processes of these same vertebræ are extremely broad, and not directed forwards as in the typical Dolphins, but rather backwards: near the base on the fore and hinder margin of each process is a prominent tubercle, which is stronger on the fore margin than on the hinder; and by these projections the processes are united to each other. Even on the fourth, fifth, and sixth lumbar vertebræ the tubercles overlap each other, the hinder of the anterior vertebra lying upon the fore ones of the posterior (see fig. 1), and

Fig. 1.

*Pontoporia blainvillii.*

The second and third lumbar vertebræ, natural size, seen from below.

a a. Second vertebra. *b b.* Third vertebra.

forming in this manner a sort of secondary articulation between the vertebræ, which must make the movement of the lumbar portion of the body very strong, and the vertebral column, if contracted, very firm.

The eighteen caudal vertebræ are of very different form and size, and have together a length of 9 inches 8 lines. The first five have inferior spinous processes, and the same, with the sixth, also superior spines; but each one is somewhat smaller and lower than the foregoing. The transverse processes are much shorter than in the lumbar portion, and do not touch each other with their tuberosities; they soon become smaller, and lose their prominent tip. This decrease is so rapid, that already the fifth caudal vertebra has no

longer a true transverse process, but only a sharp lateral crest perforated at the base by a perpendicular foramen. This perforation is also seen on the sixth, seventh, and eighth vertebræ, but becomes somewhat more directed to the centre of the vertebra. With the ninth caudal vertebra these two perforating channels go to the central part of the vertebral body, which is now only a circular piece of 3-4''' in thickness, somewhat more truncated on the under margin; and somewhat sharper on the upper. After the fourteenth vertebra I can find no more perforations, the four last being very small and short nodules of decreasing size. All these, as far as the twelfth from behind, are enclosed in the axis of the caudal fin.

The animal has ten pairs of ribs attached to the dorsal vertebræ. The first pair is short, only 2'' 4''' long; the largest ribs are from the fourth to the eighth, each of these is 6 inches; the last is 3'' long. The first four pairs have double attachments, and are divided at the superior end into two prominent processes; the lower, being the capitula costæ, are attached to the body of the last cervical and three first dorsal vertebræ; the upper are the tubercula costæ, of broader but shorter extent, and attached only to the transverse processes of the first four dorsal vertebræ. All the other ribs have only a single superior dilatation attached to the transverse process, and corresponding to the tuberculum of the former. At the lower end the ribs are somewhat broader, and truncated, and united by a small cylindrical sterno-costal bone with the breast-bone or sternum. This bone is composed of two distinct pieces, the anterior of broad subtriangular figure, the hinder smaller and oblong. To the very prominent parts under the fore edges of the first is attached the first pair of ribs, and near the posterior retracted edge the second pair. The second oblong piece of the breast-bone is united by a cartilaginous substance with the first, and bears also on each side two pairs of ribs, being united with them by sterno-costal bones. The first of these bones is broad and flat, and 7 lines long; the others more cylindrical, thinner, and longer, the fourth being 1'' 10''' long. The fifth and sixth ribs have also sterno-costal bones, united to the end of the sternum by elastic substance; but the hinder ribs have only a short incurved conical cartilaginous epiphysis.

The bones of the anterior members or breast-fins are of the common cetaceous form. The scapula is triangular, with a curved superior margin, $3\frac{1}{2}$ inches long, and has two large anterior processes above the glenoid cavity, the superior or acromion being 1 inch long, and the inferior or coracoid process $\frac{1}{2}$ inch. In the upper arm is a very strong bone, $1\frac{1}{3}$ '' long; and in the forearm the two usual bones of nearly equal size, the hinder or ulnar bone being somewhat more prominent at both ends. The whole carpus is cartilaginous, but includes four very small spherical bones, of which the largest, like a pea, is situated in front of the junction of the radius with the ulna, and the smallest, like a small shot, before the thumb. The two others are placed between the connexions of the second, third, and fourth metacarpal bones. These bones are tolerably strong; but the same bone of the thumb or first finger is extremely small, and en-

tirely attached to the cartilaginous carpus. It has only a short cartilaginous tip on the other end. The four following fingers have all a large cartilaginous articulated axis, which includes in the first or second articulation an ossified nucleus. The second finger has six, the third five, the fourth three, and the fifth two articulations, the last of all being only a thin conical prolongation. A similar cartilaginous conical piece is situated between the third and fourth fingers, in the substance of the fin near the exterior margin.

Of the posterior members I have found only the usual small pelvic bones, situated on each side of the anal cleft.

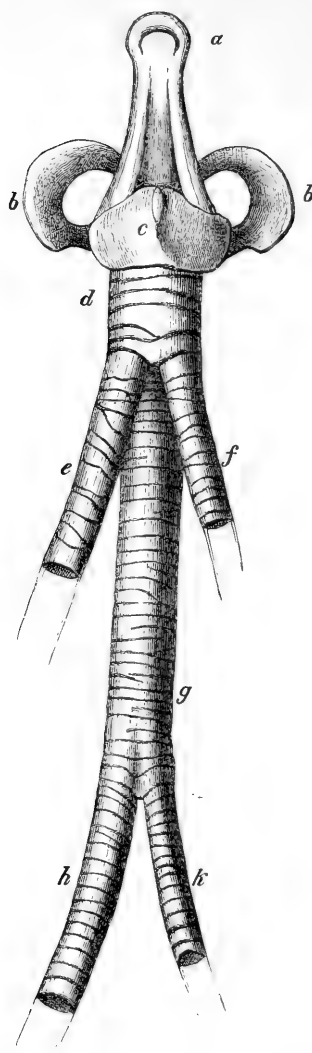
From the fortunate circumstance that some parts of the viscera were preserved in a dry state in the interior of the body, I had the good fortune to be able to examine the larynx with the trachea, and the œsophagus with the stomach. I found in one of these parts a curious peculiarity, which I will explain by the aid of the annexed figure, of two-thirds the natural size.

The larynx (fig. 2, p. 488), which has the usual prolonged conical form above (*a*), is very large below, the thyroid cartilage (*b*) being extended on each side to a distant arch, which is united behind by articulation with the cricoid cartilage (*c*). Beyond this cartilage the trachea begins as a large channel or tube, which is surrounded by three or four spiral cartilaginous rings of the construction usual in all Cetaceans (*d*). Then it divides into three branches of unequal size—two superior smaller, and one inferior wider. Of the two superior the left (*e*) is somewhat wider than the right (*f*), but of the same construction as the commencing trunk and the central branch of the trachea, and perhaps also of the same length; but both branches were cut away in the specimen examined, the left being $1\frac{1}{2}$ inch long and the right only 1 inch. The longer, middle branch (*g*) was preserved to the end, and had a length of 3 inches, then it divided into two branches, of which the left (*h*) is also somewhat wider than the right (*k*). There is no doubt that these branches represent the two bronchi of the other air-respiring vertebrata; but it is curious that the difference in size is much greater than is usually the case. I could follow both bronchi to their end, where they pass into the cellular texture of the lung and lose their cartilaginous rings. The right bronchus was shorter than the left, as well as narrower.

It would be very interesting to know whether the lungs are also divided into four parts, or only into two as is the rule; but having found no trace of this organ in the dry body I can say nothing of its form.

Of the other viscera, I have found in sufficiently good state of preservation the œsophagus and the stomach. The first is 6 inches long, a large channel without any peculiarity; but the second has also its peculiar configuration. It is formed by a great oviform sac, which is extended at both ends into a perpendicular pouch. The pouch of the left side, near the entrance of the œsophagus, is of the size of a pigeon's egg, but not very strongly separated from the central sac. The internal surface is somewhat rugulous, but the wrinkles are very fine and irregularly disposed. The central sac has a length of

Fig. 2.



Larynx and trachea of *Pontoporia blainvillii*, two-thirds of the natural size, seen from above (dorsal side).

- a.* Epiglottis. *b b.* Lateral arches of thyroid cartilage. *c.* Cricoid cartilage. *d.* Trunk of the trachea. *e.* Left branch. *f.* Right branch. *g.* Continuation of the trunk. *h.* Left bronchus. *i.* Right bronchus.

4 inches, is about 2 inches wide, and on the interior surface is provided with about six highly elevated folds, which have other, smaller folds between them. Both begin and end on the entrances of the two pouches at the ends of the stomach. The right pouch, situated near the pylorus, is smaller, but of the same figure and construction as the corresponding one of the other or left side. Over this pouch on the right end a high transverse circular fold separates a small chamber from the central stomach; and this part, after the fold, which is separated into three different lobes by other folds, must be regarded as a separate stomach, or a propylorus, because from it begins the duodenum. There was only a short portion of this intestine; but I could observe soon after the beginning of it an expansion, like a lateral pouch, which is also known in *Phocæna*, and very well figured by Rapp in his interesting work on the 'Cetacea' (Tübingen, 1837-38), pl. 6. f. 3f. I find thus a general resemblance in the stomach of *Pontoporia* to that of *Phocæna*, if we regard only the fundamental type of both, and not the particular execution of this type in the different genera.

In the pouch on the right side of the stomach I found some teeth of a Cephalopodous animal, belonging to the family of *Loligo*, and also the lenses of the eyes of animals of the same group. This proves that *Pontoporia* is a marine animal, and that it goes only from curiosity or necessity in stormy times into the mouths of rivers. The individual which we have had for a long time in the Museum was taken near Maldonado, and is also a young animal; but we have skulls of full-grown size, 16" long, which prove that the whole animal may be 4 feet long, the skull being somewhat more in length than the third part of the whole body. My young specimen is 30 inches long, and the skull measures 11 inches. Under these circumstances I cannot believe that the large Dolphin of 15 feet in length, seen by Freminville on the coast of Brazil, which Dr. Gray mentions in the 'Catalogue of Seals, &c.' p. 232, was of this species.

Note.—As I propose to give an extended description of the skeleton and the other parts, illustrated by well-executed figures, in one of the forthcoming numbers of the 'Años del Museo publico de Buenos Aires,' I have not thought it necessary to enter here into any further details respecting their structure.

5. Notes upon some Interesting Chinese Shells, with a Description of Two or Three New Species of *Unionidæ*, collected at Shanghai by Jones Lamprey, M.D., 67th Regiment, C.M.Z.S. By W. BAIRD, M.D., and H. ADAMS, F.L.S.

(Plate XXVI.)

Amongst a variety of land- and freshwater shells brought from Shanghai by Dr. Lamprey, and lately added to our National Col-

lection, there are several species which deserve some special notice, besides two or three which appear to be undescribed.

1st. *Unio douglasiae*. In 1833 Dr. Gray shortly described and accurately figured, in the twelfth volume of Griffith's edition of Cuvier's 'Animal Kingdom,' a species of *Unio* which he calls *Unio douglasiae*. The type specimen of this shell has always been, and still remains, in the collection of shells in the British Museum. Dr. Lamprey has brought a considerable series of this *Unio*, which seems to be not uncommon in the neighbourhood of Shanghai. Perhaps from not knowing the shell as figured in Griffith, Mr. Lea some years afterwards described and figured a species from China, which he named *Unio murchisonianus*, but which, there is no doubt, is the same as the *U. douglasiae* of Gray. Still later, in the seventh volume of his 'Observations on the genus *Unio*,' he describes and figures a species from Shanghai, which he calls *U. shanghaiensis*. A careful examination of the description and figures of the two last-named species, with the type specimen of that described and figured by Dr. Gray in Griffith's 'Animal Kingdom,' satisfies us that the three species are identical. The name *U. douglasiae* must therefore stand, having the precedence over the others by some years.

2nd. *Anodonta tenuis*. Another species of the family *Unionidae*, brought by Dr. Lamprey, appears to be the *U. tenuis* of Gray, figured also in Griffith's 'Animal Kingdom.' In the list of the figures of shells at the end of the twelfth volume of that work this shell appears twice, first under the name of *Anodon tenuis*, and secondly under that of *Unio tenuis*. An examination of the specimens brought by Dr. Lamprey shows that this species belongs more correctly to the genus *Anodonta* than to *Unio*, as no trace of teeth is to be seen in it. A reference to the figure will also demonstrate this; and this shell, therefore, though denominated in the plate *Unio tenuis*, must be now, as indicated in the letterpress, called *Anodonta tenuis*. From there being no lengthened diagnosis given with the figures, these two last-named species are but little known under their original names.

3rd. *Glaucomya primeana*? Two apparently distinct species of *Glaucomya* are in the collection of Dr. Lamprey. One of these appears to resemble somewhat the *G. chinensis* of Gray; and the other more nearly approaches to one lately described and figured in the third volume of the third series of the 'Journal Conchyliologique,' by MM. Crosse and Debeaux, under the name of *G. primeana*. Several specimens of these shells occur; and it is possible they may all be referred to this species, though they differ in some respects from the figure given in the above-mentioned work.

4th. *Anodonta gibba*. A very interesting series also occurs of the *Anodonta gibba* of Cantor and Benson, which shows how considerably this species varies according to age. When adult it is much more rounded, and appears shorter than the younger specimens.

5th. *Nanina ravid*a. A very interesting series of a species of *Nanina* was also brought by Dr. Lamprey. Several specimens undoubtedly represent the *Nanina ravid*a of Benson, have a tolerably

open umbilicus, and are of a large size; but along with these are a number of specimens which differ in size and have the umbilicus closed. In almost every respect the smaller of these shells resemble the *Nanina redfieldi* of Pfeiffer; but as there is one specimen with a closed umbilicus, nearly of the same size as the true *N. ravida*, and agreeing with it in every other point, it appears to be very difficult, with the exception of the closed umbilicus, to separate the two species from each other. There is also a small species of *Helix* in the collection, which appears to be an elevated variety of the *H. ciliosa* of Pfeiffer.

6th. Among the *Unionidæ* are several specimens of the rather rare *Unio nodosus* of Wood, and one valve, exactly similar to the *Barbala magnifica* of Lea from Japan. *Arconaia lanceolata* (*Triquetra lanceolata*, Lea) and one or two species of *Melania*, more especially *M. cancellata* of Cantor, likewise occur in the collection. A single specimen of *Meretrix* (*Cytherea*, Lam.) *zonaria* (a rare shell), and several others might be enumerated.

7th. Another very interesting shell was brought by Dr. Lamprey, a single specimen of a species of *Unio*, belonging to a form which, till very lately, had only been observed in North America. This may be the *Unio tientsinensis* of Crosse and Debeaux; but as it differs in some respects, from the figure given by these authors, we are inclined to consider it distinct.

UNIO (LAMPSILIS) SUBTORTUS, nob. (Pl. XXVI. figs. 1, 1 a.)

U. testa oblique ovata, valde inæquilaterali, solida, ventricosa, concentricè rugoso-striata, ad marginem dorsalem oblique nodoso-plicata; valvis subtortis; umbonibus lateralibus, prominentibus, erosis, ad apices tuberculosus; margine dorsali convexo; margine ventrali ovato; latere antico declivi, convexo; latere postico elongato, oblique ovato, obscure angulato; epidermide olivaceo-fusca, sericea; dentibus cardinalibus crassis, duplicibus, subverticalibus, sulcatis, dente valvæ sinistræ multum majore; dentibus lateralibus elongatis, subarcuatis, transverse sulcatis, in valva sinistra duplicibus; margarita albida.

Long. 55, alt. 50, lat. 28 mill.

Hab. Shanghai, North China (*Dr. Lamprey*).

The nodose plications on the dorsal edge are elevated, but worn. They appear almost to have been originally blunt spines. The shell is longer than the species figured by Crosse, and not so tumid.

UNIO (DYSNOMIA) LAMPREYANUS, nob. (Pl. XXVI. figs. 2, 2 a.)

U. testa subtriangulari, inæquilaterali, solida, compressa, concentricè late et valde plicata; margine dorsali arcuato; margine ventrali arcuato; latere antico circulari; latere postico oblique ovato; umbonibus prominentibus, erosis; epidermide nitida, luteo-olivacea, fusco-viridi radiata; dentibus cardinalibus crassis, verticalibus, duplicibus, sulcatis; dentibus lateralibus

curvatis, elongatis, in valva sinistra duplicibus; margarita argentea, iridescente.

Long. 49, alt. 41, lat. 24 mill.

Hab. Shanghai, North China (*Lamprey and Harland*).

ANODONTA HARLANDI, nov. (Pl. XXVI. figs. 3, 3a.)

A. testa transversa, elongato-ovata, inæquilaterali, tenuiuscula, inflata, concentrice striata; margine dorsali postice arcuato, antice excavato; margine ventrali convexo; latere antico rotundato; latere postico oblique subtruncato, declivitate umbonali obtuse angulato; umbonibus antemedianis, inconspicuis, sulcatis; epidermide fusco-olivacea; margarita cærulea, callositate apicali livido tincta.

Long. 70, alt. 45, lat. 33 mill.

Hab. Shanghai, North China (*Harland and Lamprey*).

Specimens of this interesting species from China were first sent over to the British Museum by the late Dr. Harland, to whose memory we have dedicated this shell.

DESCRIPTION OF PLATE XXVI.

Figs. 1, 1a. *Unio (Lampsilis) subtortus*, p. 491.

2, 2a. — (*Dysnomia) lampreyanus*, p. 491.

3, 3a. *Anodonta harlandi*, p. 492.

6. Notes on the Arrangement of Sponges, with the Description of some New Genera. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

(Plates XXVII., XXVIII.)

Dr. Solander, nearly a century ago, well observed that some sponges are "composed wholly of interwoven reticulated fibres, while others are composed of little masses of straight fibres of different sizes, from the most minute spicula to strong elastic shining spines, like small needles of one-third of an inch long; besides these there is an intermediate sort between the reticulated and the finer fasciculated kinds, which seems to partake of both sorts."—*Zoophytes*, p. 182.

In the 'Annals of Philosophy,' n. s. vol. ix. p. 431, 1825, I published a short notice on the "Chemical Composition of Sponges," in which I pointed out from chemical analysis, I believe for the first time, that the spicules of several sponges consist almost entirely of pure silica.

This paper was very shortly followed by two papers by Dr. Edmund Grant, entitled, 1st, "On Calcareous Sponges," 2nd, "On Siliceous Sponges," published in the 'Edinburgh New Philosophical Journal,' i. pp. 166 & 341, for 1826.

Since the publication of my paper and his, Dr. Grant has pro-

posed to divide sponges into those with calcareous and those with siliceous spicules, and those without any spicules and having only a horny skeleton, and to call them respectively *Spongia calcarea*, *S. silicea*, and *S. keratosa*.

Dr. Bowerbank and several zoologists have adopted this arrangement, changing the names of one or more of the divisions.

The division between the calcareous and the siliceous sponges is very distinct and natural; the separation between the siliceous and keratose sponges, on the other hand, is very indistinct and separates nearly allied genera. Some siliceous sponges are entirely formed of siliceous spicules, covered with a very small quantity of sarcode; in others the spicules are enclosed in a very thin coating of horny or keratose matter; in others the horny matter increases in thickness, and the spicules diminish in quantity until they almost entirely disappear; and sometimes the place of the spicules in the horny fibres is supplied by sand or other siliceous matter, which the fibres take up as they are formed; and the skeleton of some sponges is entirely formed of horny matter; and the passage of these forms into each other is so gradual that I believe it is better to unite the siliceous and keratose sponges of these zoologists into one group or order.

The spicula that form the main part of the skeleton of these siliceous sponges are of three shapes:—

Fusiform (acerate, *Bowerb.*), more or less cylindrical, and pointed at each end.

Needle-shaped (acuate, *Bowerb.*), cylindrical, blunt at one and sharp at the other end.

Pin-shaped (spinulate, *Bowerb.*), cylindrical, with a more or less spherical head and a tapering point.

There are spicula of many other shapes which have been represented by Bowerbank, Quekett, Carpenter, Oscar Schmidt, and other authors; but they are for special purposes, are found in certain parts of the sponge, and are peculiar to certain forms of sponges. Many spicula offer great variation in form in the same species of sponge, and also in the different parts of the same specimen and according to their state of development.

These spicules may be divided into three series, thus:—

(1) The spicula that Dr. Bowerbank calls retentive, and designates as anchorate, (bi- or quadri-) hamate, umbonate, and bi- or trirotulate, all belong to the same series, and each presents several modifications, sometimes in the same species of sponge, and they all gradually pass into each other.

In the same way (2) the *stellate* spicules and (3) the *three-pronged* spicules each belong to a separate series offering many modifications. The stellate are usually scattered in the sarcode; and the *three-pronged* are what Dr. Bowerbank calls *tension* and *defensive* spicules, supporting the outer surface of the sponge, and sometimes for this purpose even extending beyond their surface.

The forms of the spicules are characteristic of the different families, if they are not always absolutely peculiar to them, thus:—

The many-rayed stellate, with rays on all sides, and the three-

pronged or three-hooked elongate spicules are characteristic of the *Geodiadæ* and *Tethyadæ*.

The anchorate and birotulate spicules and other forms of the series are almost peculiar to the family *Esperiadæ*.

The six-rayed stars, often divided at the ends, are peculiar to the *Euplectellidæ* and *Dactylocalycidæ*.

The four-rayed stars, with elongate simple rays, to the *Carteria*.

Dr. Bowerbank has described and figured a large number of the forms of spicules, and the manner in which they are arranged in the different families and genera, in the 'Philosophical Transactions' for 1858, p. 274, and 1862, p. 747. The whole of these plates have been rather coarsely copied in his 'Monograph of the British Spongiadæ,' published by the Ray Society for 1864. And Prof. Oscar Schmidt has also given some excellent figures of the spicules in his work on the 'Adriatic Sponges,' and the two Supplements to that work, 1862 and 1866.

Various systems for arranging sponges have been proposed. The following are the most important:—

M. Ducrotay de Blainville, in his 'Manuel d'Actinologie ou de Zoophytologie,' 8vo, 1834, forms the sponges into a group he calls

LES AMORPHOZOAIRES (*Amorphozoa*), containing the genera:—

1. Alcyoncellum (*Alcyonella in index*). 2. Spongia. 3. Calci-spongia. 4. Halispongia. 5. Spongilla. 6. Geodia. 7. *Cæloptychium*. 8. Siphonia. 9. *Myrmecium*. 10. Scyphia. 11. *Eudea*. 12. *Hallirhoa*. 13. *Hippalimus*. 14. *Cnemidium*. 15. *Lymnorea*. 16. *Chenendopora*. 17. *Tragos*. 18. *Mamon*. 19. *Icrea*. 20. *Tethium*.

The names in *italics* have only been found in the fresh state. He places *Cliona* of Dr. Grant with the Zoophytaires sarcinoides, or Alcyonaires (*Alcyonaria*).

G. D. Nardo has published "Auszug aus einem neuen System der Spongiarien (Spongiariorum Classificatio)" in the 'Isis,' 1833, p. 520, and "De Spongiis," 'Isis,' 1832, p. 714, in which he divides sponges into three orders:—

I. *Spongiaria fulcimentis natura cornea*.

1. Spongia. 2. *Ircinia* (*Sp. cavernosa*, Linn.?). 3. *Aplysia*.

II. *Spongiaria fulcimentis natura silicea, aculeiformibus aut granulosus et substantiæ animalis ope vario modo coalitis*.

1. *Grantia* (*Sp. canabina*, Esper; *Sp. lamia*, *Sp. damicornis*, and *Sp. lactuca*, Esper, not Johnst.). 2. *Raspalia* (*Sp. dichotoma*, Link). 3. *Donatia* (*Sp. lyneurium*, *Sp. cydonium*). 4. *Rayneria*. 5. *Esperia*. 6. *Suberites* (*Alc. domuncula* and *A. ficus*). 7. *Litomena*.

III. *Spongiaria fulcimentis natura calcarea, etc*.

1. *Strangia* = *Alcyonium arboreum*, Linn. 2. *Vioa* = *Alcyonium asbestinum*, Linn.

The two latter are *Zoophytaria*, and not sponges. The arrangement is based:—"E solidarum natura ordines, e contextura generæ, e cæteris characteribus species et varietas."

Almost all the species mentioned as belonging to the genera are new and not described in this paper; so that it is impossible to determine what they are except for such persons as have specimens named by the author. When a described species is named it is quoted after the genus in the above extract.

In the 'Isis,' 1834, Nardo changed the names of the genera, *Aplysia* to *Aplysina* and *Ircinia* to *Hircinia*; and in 1844 he added the genus *Spongelia*, which is the same as *Duseideia* of Johnston, 1842.

In 1842 Dr. John Hogg (Ann. & Mag. N. H. viii. 1842, p. 5) proposed the following divisions of the "Order SPONGIÆ":—

Division I. *Spongiæ subcorneæ*. The fibres of a somewhat horny substance without any spicula. *Spongia pulchella*.

Division II. *Spongiæ subcorneo-siliceæ*. Fibres composed of a somewhat horny substance with numerous siliceous spicula. No British species.

Division III. *Spongiæ subcartilagineo-calcareæ*. Fibres of somewhat cartilaginous substance, with the spicula calcareous. *Spongia compressa*, *S. botryoides*, &c.

Division IV. *Spongiæ subcartilagineo-siliceæ*. Fibres composed of a somewhat cartilaginous substance with siliceous spicula. *Spongia tomentosa*, *S. palmata*, and *Spongilla fluviatilis*.

Division V. *Spongiæ subereo-siliceæ*. Fibres of a corky substance with long siliceous spicula. *Spongia verrucosa* and *S. pilosa*.

"At the Scientific Congress held at Lucca (1843) Dr. Nardo proposed a new classification of the *Spongiadæ*, dividing them into five families, under the names of *Corneospongia*, *Silicospongia*, *Calcispongia*, *Corneo-silicospongia*, *Corneo-calcispongia*. These families contain thirty genera."—*Morris, Ann. & Mag. N. H.* iv. p. 242, 1849; from the *Atti della quinta unione degli Scien. Ital. tenuta in Lucca* 1843, p. 436.

Hogg, in 'Ann. & Mag. N. H.' viii. p. 190, 1851, remarks, "By comparing these with my proposed division of the order Spongiæ, published two years before at pages 5 and 6 of the September number, 1841, of the 'Ann. & Mag. Nat. Hist.' (vol. viii.), it will be seen that Dr. Nardo's classification is in most essentials much the same as mine, the only new part appearing to me to be his last and fifth family, which I suppose comprises those species wherein horny fibres combined with calcareous spicula may have been detected."

Dr. Bowerbank, in his paper on *Spongiadæ* in the 'Philosophical Transactions' for 1862, p. 1091, gives the following tabular view of the systematic arrangement:—

Class PORIFERA. Order I. CALCAREA: *Grantia*, *Leucosolenia*, *Leuconia*, *Leucogypsia*.

Order II. SILICEA. Suborder 1. Spiculo-radiate skeletons: *Geo-*

dia, *Pachymatisma*, *Ecionemia*, *Alcyoncellum*, *Polymastia*, *Halyphysema*, *Ciocalypa*, *Tethea*, *Halicnemis*, *Dictyocylinthus*, *Phakellia*, *Microciona*, *Hymenaphia*, *Hymedesmia*. 2. Spiculo-membranous skeletons: *Hymeniacidon*. 3. Spiculo-reticulate skeletons: *Halichondria*, *Hyalonema*, *Isodictya*, *Spongula*. 4. Spiculo-fibrous skeletons: *Desmacidon*, *Raphyrus*. 5. Compound reticulate skeletons: *Diplodemia*. 6. Solid siliceo-fibrous skeletons: *Dactylocalyx*. 7. Canaliculated siliceo-fibrous skeletons: *Farrea*.

Order III. KERATOSA. Suborder 1. Solid non-spiculate kerato-fibrous skeletons: *Spongia*, *Spongionella*. 2. Solid semispiculate kerato-fibrous skeletons: *Halispongia*. 3. Solid entirely spiculate kerato-fibrous skeletons: *Chalina*. 4. Simple fistulo-fibrous skeletons: *Verongia*. 5. Compound fistulo-fibrous skeletons: *Auliskia*. 6. Regular semi-areno-fibrous skeletons: *Stematumenia*, &c. 7. Irregular and entirely areno-fibrous skeletons: *Dysidea*.

This paper contains some most valuable observations on the structure of the skeleton or framework of the different genera, illustrated by excellent figures made under the microscope by Mr. Lens Aldous.

Unfortunately the text is encumbered with a most complicated system of terminology, which renders the descriptions very difficult to understand. The names of the suborders quoted above is a good specimen of this.

Though this work is preceded by a table of the genera of exotic as well as British sponges known to the author, he does not refer to any of the exotic genera which I have described in the 'Proceedings of the Zoological Society' from specimens in the Museum Collection. This is the more remarkable as the Museum Collection of Sponges has been frequently studied by the author; indeed I placed it at Dr. Bowerbank's disposal, with the understanding that he would make a monograph of all the species of the family, or they would have been named some years ago.

The same arrangement is adopted in his work on 'British Sponges,' published by the Ray Society; but one or two new genera are added.

Dr. Oscar Schmidt, in his 'Spongen des adriatischen Meeres,' Leipzig, 1862, folio, with seven plates, divides the sponges into six families:—

1. Calcispongiæ. 2. Ceraospongiæ. 3. Gummineæ. 4. Corticateæ. 5. Halichondriæ. 6. Halisarcinæ.

Dr. Oscar Schmidt divides the *Calcispongiæ* thus:—

I. *Form more or less regular.*

Mouth of tube with simple vertical cilia SYCON.

Mouth of tube with vertical and horizontal cilia DUNSTERVILLIA.

Mouth of tube without cilia UTE.

II. *Form of sponge irregular.*

The wall of the sponge not perforated GRANTIA

The wall of the sponge perforated NARDOA.

Dr. Oscar Schmidt gives the following synoptical table of his genera of *Ceraospongiæ*:—

I. With only one kind of elongated, homogeneous, horny filaments.

Filament very elastic, difficult to split, and very variable in thickness	SPONGIA.
Filament slightly elastic, of unequal thickness	CACOSPONGIA.
Filament scarcely at all elastic, extremely brittle when dry	SPONGELIA.

II. With only one kind of elongated, non-homogeneous filaments.

The bark and axial substance of the filaments different APLYSINA.

III. With two kinds of horny filaments.

The second kind forming a superficial network	DITELLA.
The second kind terminating in a little head.	
Tissue of the finer filaments loose	HERCINIA.
Tissue of the finer filaments dense	SARCOTRAGUS.

The *Halichondriæ* he divides into genera thus:—

I. *The firm horny substance evident, surrounding the spicules.*

The whole sponge-body uniform, horny, and spicular.	
Branches numerous, anastomosing	CLATHRIA.
Branches slender, not anastomosing	RASPALIA.
Part of the sponge horny and part crustaceous.	
Sponge crustaceous; the horny substance forming irregular processes	SCOPALINA.
Sponge branching; the horny substance only in the axis	AXINELLA.

II. *The horny substance none, or little evident.*

The inhaling-pores in sieve-like groups	CRIBRELLA.
The inhaling-pores scattered.	
Oscules on peculiar papilla	PAPILLINA.
Oscules various.	
Skin-clothing very obvious, and alone pigmented . .	ACANTHELIA.
Skin-clothing when present without pigment, or with the parenchyma alone pigmented.	
Spicules or needles blunt at the end, and generally knobbed, with special hook-shaped corpuscles . .	ESPERIA.
Spicules or needles blunt at the end, and generally knobbed, without hook-shaped corpuscles	SUBERITES.
Spicules or needles very simple, generally with both ends pointed	RENIERI.
Spicules or needles smooth and nodose, mucous, gelatinous	MYXILLA.
Boring into limestone or shell	VIOA.

The *Corticatæ* into genera thus:—

I. *The cortical layer with stellules.*

Needles uniform, simple TETHYA.
Needles simple and anchor-shaped STELLETTA.

II. *The cortical layer with globules.*

Cortical layer with globules only CAMINUS.
Cortical layer with globules and needles GEODIA.

III. *The cortical layer without globules or needles.* . ANCHORINA.

Dr. Schmidt published a Supplement in 1864, and a second in 1866; in the latter he examined Dr. Bowerbank's genera in his work on 'British Sponges,' and states the genera to which he would refer them.

Dr. Schmidt's criticism on Dr. Bowerbank's genera is peculiar. Dr. Schmidt forms genera on a very different system to Dr. Bowerbank, and then refers certain species to the genera which he has himself used, and observes that the other species of Dr. Bowerbank belong to different genera.

Dr. Bowerbank might with equal fairness have criticised Dr. O. Schmidt's genera on the same system and with equal truth, except that he would not have been able to place the name of Nardo after the generic name; but this is also equally unfair, for, though the genera may bear Nardo's name after them, they are characterized and restricted by Dr. O. Schmidt.

MM. P. Duchassaing and G. Michelotti, in their 'Spongiaires de la mer Caraïbe,' Harlem, 1864, 4to, with twenty-five coloured plates, published in the 'Natuurk. Verh. Holland. Maat. Wet. te Harlem,' vol. xxi. 1864, proposed the following arrangement:—

Order I. DICTYOSPONGIÆ. Keratose network furnished with spicules; fibres forming a network.

Fam. 1. EUSPONGIÆ. Keratose network well developed; siliceous spicules wanting or very rudimentary.

Subfam. 1. *Penicillatæ*. Horny fibres forming nerves, pencils, or columns, but are never distinctly separate as in the other subfamilies.

Subfam. 2. *Heterogenæ*. Fibres distinct, and of two kinds.

Subfam. 3. *Homogenæ*. Fibres horny, hollow, very rigid, equal, and anastomosing into meshes, but never uniting into bundles.

Fam. 2. LITHOSPONGIÆ. Keratose network formed by siliceous fibres; texture decidedly stony.

Fam. 3. HALYSPONGIÆ. The spicules are siliceous and well developed, predominating over the others.

Subfam. 1. *Armataæ*. Spicules needle-shaped, forming a mesh with others, which are anchor-shaped.

Subfam. 2. *Subarmatae*. Only one system of acuiform spicules.

Subfam. 3. *Tricuspidatae*. With tricuspid spicules.

Order II. OXYSPONGIÆ. Keratose framework does not exist, or is almost completely atrophied.

Subfam. 1. *Imperforantes*. Numerous spicules support the soft portions of the sponge.

Subfam. 2. *Perforantes*. The spicules when developed only play a secondary part in giving a support to the soft parts.

These three works describe many species of sponges, and present genera formed on very different principles and characters. The work of MM. Duchassaing and Michelotti pays much less attention to the microscopic structure of the sponge and the form of the spicules than either of the others. The characters of Professor Oscar Schmidt are best; but the number of species which he describes is small, and his system is artificially founded on a few prominent characters that could be easily tabulated. The work of Dr. Bowerbank contains a much more extended series of observations, and would be far superior to either of the others, if it were not deformed by his prolix style and the extraordinary nomenclature that he uses. Though he repeatedly says that external form is of no importance in a generic point of view, yet some of his genera, indeed the most natural ones, arise from his having been influenced by studying the forms and other peculiarities of the sponge.

After many years attention to the study of sponges and their spicula, and the study of the various works published on them, especially those of Drs. Bowerbank and Oscar Schmidt, I would propose the following arrangement as bringing together the species which seem most allied, and also as facilitating the study of these very difficult and anomalous animals. The system was originally sketched out in 1840, and put aside. The works of Dr. Bowerbank and Dr. O. Schmidt and my subsequent observations have enabled me to improve it, and have confirmed me in the belief that it is an improvement on those before proposed.

The spicules are organized bodies, and are doubtless the most important part of the sponge; they are sufficiently varied in form to present excellent characters for the distinction of sponges into orders, genera, and species.

To properly distinguish the species of sponges it is necessary that all the kinds of spicules occurring in each species should be observed and noted. This being the case, the study of the sponges must be facilitated by their being divided into groups according to the form and structure of the spicules, subdivided according to the manner in which the various forms are combined in each species.

It is much more easy to find the species characterized by these spicules when the sponges are so arranged than to have to read the descriptions of the species arranged into a few genera, as in Dr. Bowerbank's and Prof. O. Schmidt's works, to discover which of the

species in these genera have the spicules of that form, or with the forms so combined together. The modification of the forms and the comparative sizes of the different forms as combined together afford good characters for the distinction of the species of the genera or subgenera.

There are more genera than I would willingly have made without more materials; but I could not exhibit the system which I wished to propose without forming some genera on very imperfect materials, as on a bihamate spicule figured in Bowerbank's 'British Sponges.'

I have no doubt that some, indeed many, zoologists will complain of the numerous genera into which the sponges are here divided; but I believe that sponges will never be properly distinguished into species until they are even more closely divided into genera or subgenera than is here proposed. At least this has been shown to be the case with *Diatomaceæ*, *Algæ*, and the animals which require the microscope to distribute them into groups or species.

No part of the sponge seems so well adapted for the purpose of so dividing them as the spicules that form their skeleton, which afford, both in their form and in the combination of one or more forms of the same kind, the best characters for the separation of the sponges into genera and the distinction of the species.

I may state that many of the names used for the genera have no derivations, but are mere fortuitous combinations of letters, so that compilers of indices of genera need not attempt to find derivations for them, or to correct the formation of some of them, as being more consistent with the derivations they may gratuitously assign to them, as has been done with some generic names of the same kind by Agassiz and others.

It is only necessary to look at Dr. Bowerbank's work on 'British Sponges,' to show that some other system than that which he has adopted is necessary; for out of 193 species of British sponges no less than 43 are referred to the genus *Isodictya*, 42 to *Hymeniacion*, 28 to *Halichondria*, and 11 to *Dictyocyclus*; so that 124 are referred to four genera, and the remaining 69 species are divided into 26 genera.

Class PORIPHORA.

Spongia, Linn.

Amorphozoa, Blainville, Manuel Act. 1821.

Poriphæra, Grant, Outlines of Anat. 1841.

Porifera, Bowerbank, Phil. Trans. 1850, p. 186; Brit. Sponges, 1862; Carpenter, Microscope, p. 536 (not Hogg, Ann. & Mag. N. H. 1840, iv.).

Porophora, Hogg, Ann. & Mag. N. H. 1840, iv.

Gelatinifera, Hogg, Ann. & Mag. N. H. 1840, iv.

Spongiotista, Hogg, Athenæum, 1867, p. 160.

Spongiadæ, Bowerbank, Brit. Sponges, 1864.

The sponges consist of a flesh or *sarcode* formed of aggregations of *amœba*-like bodies, some of which are furnished with one or more

long cilia, supported by a skeleton consisting of calcareous or siliceous spicules or horny network. The spicules have a distinct animal basis; hence it seems probable that each spicule was originally a segment of sarcode which has undergone calcification or silicification, and by the self-shaping power of which the form of the spicule is mainly determined.

The mass of sarcode and spicules called the Sponge is permeated by a series of canals having a distribution proper to each kind of sponge. The ciliated cells seem to form the walls of the canals, which may be said to commence in the small *pores* of the surface and to terminate in the large vents or *oscles*; and a current of water is continually entering at the former and passing forth from the latter during the life of the sponge, bringing in alimentary particles and oxygen, and carrying out excrementitious matter (see Dr. Carpenter's 'Microscope,' p. 530).

The sponges are reproduced or multiplied by gemmation, which is effected by the detachment of minute globular particles of sarcode (covered with a more or less distinct thin membranaceous skin) from the interior of the canals, when they sprout forth as little protuberances, whose foot-stalks gradually become narrower and narrower until they give way altogether. These *gemmules*, like the *zoospores* of Algae, possess cilia, and, issuing forth from the vent, transport themselves to distant localities, where they lay the foundation of new fabrics.

According to the observations of Mr. Huxley on the marine genus *Tethya* (Ann. & Mag. N. H. vii. 1851, p. 370), a true sexual generation also takes place, both ova and sperm-cells being found imbedded in the substance of the sponge. The bodies distinguished as capsules (ovisacs), which are larger than the gemmules, and which usually have their investments strengthened with siliceous spicules very regularly disposed, are probably the product of this operation. They contain numerous globular particles of sarcode, every one of which when set free by the rupture of the envelope (?) becomes an independent *amœba*-like body, and may develop itself into a complete sponge. The phenomena of sexual reproduction and development have since been more particularly studied in the *Spongillæ* or Freshwater Sponges, especially by Mr. Carter (Ann. & Mag. Nat. Hist. xiv. 1854, p. 334, & xx. 1857, p. 21), and by Lieberkühn in Müller's 'Arch.' 1856, in 'Reichert und du Bois-Reymond's Arch.' 1859, abstracted in 'Ann. & Mag. Nat. Hist.' xviii. 1856, p. 403, and the 'Quarterly Journ. of Microscopic Science,' v. 1857, p. 212.

From the observations of Mr. Carter (Ann. & Mag. Nat. Hist. iv. 1849, p. 81) the sponge appears to begin life a solitary *amœba*; and it is only in the midst of an aggregation formed by the multiplication of these that the characteristic *sponge*-structure makes its appearance, the formation of the spicules being the first indication of such organization.

In this essay I have made free use of the very accurate and admirable figures of the spicules in the plates that accompany Professor O. Schmidt's and, especially, Dr. Bowerbank's works and papers,

having perfect faith in Mr. W. Lens Aldous's accuracy. I can speak of the accuracy of the plates of both these authors from the result of my own observations; and having full reliance on them, they seem to be as available for my purpose as if I had myself repeated all their researches.

The arrangement here proposed is to be regarded as an attempt to divide the sponges into groups and genera, so as to enable the student to discover the name and alliance of the species under his examination, which I have been repeatedly told the [preceding systems have failed to effect. It is only a prodromus, and a very imperfect one, requiring revision, correction, and extension. For example, the large reticulated horny sponges, which form the greater part of collections in museums, and the external forms of which have been figured in Esper's, Duchassaing and Michellotti's, and several other zoological works, require to be microscopically examined and systematically described.

The British Museum have received from Dr. Oscar Schmidt typical specimens and preparations of the spicules of almost all the species he has described from the Adriatic Seas.

The class is divisible into two subclasses, according to the chemical constituent of the skeletons; in one the spicules are *calcareous*, and in the other when present siliceous, or more or less mixed with a horn-like animal material.

Subclass 1. PORIPHORA SILICEA.

The sponges provided with a siliceous or horny skeleton, or with a horny skeleton strengthened with siliceous spicules.

Porifera keratosa et *P. chalinida*, "Grant, Tabular View, 1861;" Bowerbank, B. Sponges, i. p. 154.

Porifera silicea et *P. keratosa*, Bowerbank, B. Sponges, i. pp. 155, 166.

SYNOPSIS OF FAMILIES.

Section I. MALACOSPORÆ (Soft-spored Sponges). *Reproduction by ova contained in a thin membranaceous ovicel not strengthened by siliceous spicules or by gemmules, scattered in the substance of the sponge.*

Subsection 1. Netted Sponges (DICTYOSPONGIÆ). *Skeleton formed of a continuous siliceous or horny network.*

Order I. CORALLIOSPONGIA. Sponges hard, coral-like, entirely formed of siliceous spicules anchylosed together by siliceous matter into a network. Mass covered with a thin coat of sarcode when alive.

Fam. 1. DACTYLOCALYCIDÆ. Sponge massive, expanded or flabellate, reticulate, angular.

Fam. 2. *APHROCALLISTIDÆ*. Sponge tubular; tubes reticulate, sub-circular, closed at the end with a netted lid.

Order II. *KERATOSPONGIA*. Sponge elastic. Skeleton formed of horny netted fibres, generally without, but sometimes more or less strengthened with, minute siliceous spicules or grains of sand.

Fam. 3. *SPONGIADÆ*. Skeleton formed of one kind of reticulated horny fibres, not enclosing any spicules or sand.

Fam. 4. *HIRCINIADÆ*. Skeleton formed of two kinds of horny fibres:—the one, forming the base of the skeleton, thick, reticulated, with a more or less distinct central line of minute spicules or grains of sand; the other very slender, at the apex of the branches, which do not anastomose.

Fam. 5. *DYSIDEIDÆ*. Skeleton formed of reticulated horny fibres with sand or spicules of other sponges imbedded in the centre, and covered with a more or less thick coat of horny matter. Brittle when dry.

Fam. 6. *CHALINIDÆ*. Skeleton formed of reticulated horny anastomosing filaments, which have one or more series of siliceous spicules in the central line.

Fam. 7. *OPHISTOSPONGIADÆ*. Skeleton netted horny, or expanded skin-like fibres, covered with superficial spicules, forming an irregular coat, or which are single or grouped, and divergent from the surface.

Fam. 8. *PHAKELLIADÆ*. Skeleton formed of closely reticulated horny fibres, forming an expanded mass; spicules numerous, in bundles, forming radiating, repeatedly branched lines, which do not anastomose on the surface.

Subsection 2. Spicular Sponges (*SPICULOSPONGIÆ*). *Sponge fleshy, more or less strengthened by fasciculated or scattered siliceous spicules, the bundle being sometimes slightly covered with a thin layer of horny matter. The sarcode is generally abundant; in some few, as Euplectella, it is thin, mucilaginous, and deciduous.*

Order III. *LEIOSPONGIA*. Sponge-spicules only of one kind, often varying in size and shape in the same species.

Fam. 9. *HALICHONDRIADÆ*. Skeleton composed of fusiform or pin-shaped spicules variously fasciculated together, or rarely united by a small quantity of horny matter. Sarcode granular or fleshy.

Fam. 10. *POLYMASTIADÆ*. Sponge with tubular fistulous branches; tubes open at the end, and formed of longitudinal and transverse fascicules of fibres.

Fam. 11. CLIONIADÆ. Sponge living and making holes in shells, corals, and limestone. Skeleton composed of pin-shaped fusiform and cylindrical spicules fasciculated together. Sarcoderm granular.

Order IV. ACANTHOSPONGIA. Spicules of more than one form or kind in the same sponge.

Fam. 12. EUPLECTELLADÆ. Sponge tubular. Skeleton composed of longitudinal, transverse, and oblique bundles of spicules intersecting each other and forming a network. Sarcoderm mucilaginous, studded with many-rayed stellate spicules.

Fam. 13. ESPERIADÆ. Sponge massive. Skeleton composed of fusiform and linear spicules, interspersed with anchorate, bihamate, or birotulate spicules. Sarcoderm soft.

Fam. 14. TETHYADÆ. Sponge subglobular or massive. Skeleton consisting of simple filiform spicules, with three prongs or three recurved points at the outer end, and with more or less globular many-rayed stellate spicules.

Subsection 3. Sand Sponges (ARENOSPONGIÆ). *Sponge consisting of a subcircular disk of agglutinated sand or siliceous spicula, with a series of diverging filiform spicules on the circumference, and pencils of similar spicules on the mouth of the oscules on the upper surface of the disk.*

Order V. ARENOSPONGIA.

Fam. 15. XENOSPONGIADÆ.

Section II. CHLAMYDOSPORÆ (Sponges with armed spores). *Reproduction by a thick ovisac, strengthened with siliceous spicules, the ovisac often at length becoming solid spheres formed of siliceous spicules radiating from a central point.*

Order VI. SPHÆROSPONGIA. Ovisac composed of closely packed fusiform spicules diverging from a centre, which, when the ova are emitted, extend internally and fill up the cavity, forming a nearly solid ball.

Fam. 16. GEODIADÆ. Globose or subglobose, fleshy; the ovisac forming a hard external coat.

Fam. 17. PLACOSPONGIADÆ. Branched; the ovisac forming a central axis and external plates, separated by sarcoderm and fasciculated spicules.

Order VII. POTAMOSPONGIA. Ovisac coriaceous, strengthened with various-shaped spicules placed on, or in the substance of, the ovisac.

Fam. 18. SPONGILLADÆ.

SYNOPSIS OF GENERA AND SPECIES.

Section I. MALACOSPORÆ, or Sponges with soft spores or gemmules.

Reproduction by ova contained in a thin membranaceous ovisac not strengthened by spicules or by gemmules, scattered in the substance of the sponge.

These sponges are easily known by the absence of the hard siliceous or siliceous-armed ovisacs that are to be found abundantly in the substance of those of the following section.

Subsection 1. Netted Sponges (DICTYOSPONGIÆ). *Skeleton formed of a continuous siliceous or horny network.*

The fleshy part of the sponge is generally gelatinous and dried up, leaving little to be observed in the dry sponges, and often easily washed away.

Order I. CORALLIOSPONGIA.

Sponge hard, coral-like. Skeleton entirely formed of siliceous spicules, anchylosed together by siliceous matter, forming a netted mass covered with sarcode.

The skeleton is formed of large siliceous spicules anchylosed together by siliceous matter. The sponges in which the siliceous element is the most developed are siliceous sponges *par excellence*.

Fam. 1. DACTYLOCALYCIDÆ.

Sponge massive, expanded or flabellate; the network with angular meshes.

Lithospongiæ, Duchass. & Michel. Spong. Caraïb. p. 25.

This beautiful family of sponges is at once known by having the skeleton formed of continuous anastomosing fibres formed of concentric lamina of silica, forming a hard brittle network. When alive they are covered with a continuous external skin, which is pierced with oscules on the upper and sometimes on the lower surface.

As most of the species have been described at length in the 'Proceedings of the Society,' I only give a synopsis of the genera for the purpose of bringing them together in one view.

* *Network irregular, not symmetrical.*

1. DACTYLOCALYX.

Dactylocalyx, Stutchbury, P. Z. S. 1841, p. 86; Bowerbank, B. Sponges, i. p. 203; ii. p. 11 (*Dactylochalix*, Bowerbank, in B. M.) *Iphyteon*, Valenc. Institut.

Sponge expanded, with large sunken grooves and oscules on the upper and lower surface. Spicules of skeleton tuberculated; spicular network rugose, tubercular. Sarcode with scattered radiated or stellate spicules, divided into branches near the base, and with knobs at the tip of the rays.

Sarcode studded with many-rayed stellate spicules; the six prin-

cipal rays diverging on all sides, and divided near the base into several elongated cylindrical linear rays, which diverge from each other, and are tipped with a small apical knob like the head of a pin (see Bowerb. Brit. Spon. t. 8. f. 190-192).

1. DACTYLOCALYX PUMICEA. (Pl. XXVII. fig. 2.) B.M.

Dactylocalyx pumiceus, Stutchbury, P. Z. S. 1841, p. 86; Bowerb. B. Sp. i. p. 204; ii. p. 11. f. 190, 191, 198, 275 (skeletons).

Iphiteon panicea, Valenc. Mus. Paris; Bowerb. B. Sp. f. 190, 191, 192, 275, 340, 341 (skeletons and gemmules).

Sponge broad, expanded; upper surface rather concave.

Hab. West Indies: Barbadoes (*Stutchbury*); St. Vincent's, West Indies (*Mr. Ingall*).

2. DACTYLOCALYX SUBGLOBOSA. (Pl. XXVII. fig. 1.) B.M.

Sponge subglobose, with a deep central concavity above; the outer surface with irregular anastomosing oscules.

Hab. Malacca?

3. DACTYLOCALYX PRATTII, Bowerb. B. Sp. i. p. 204. f. 52, 276, 278, 306 (spicular network).

Skeleton smooth in part, with crowded groups of tubercles, and with stellate spicules in the dermal surface (see Bowerb. B. Sp. i. p. 52).

Hab. —?

2. MYLIUSIA, Gray, P. Z. S. 1859, p. 439, t. 16.

The sponge conical, cup-shaped, pierced with numerous short truncated tubes, forming raised folded anastomosing lamina on the lower surface.

MYLIUSIA CALLOCYATHES, Gray, P. Z. S. 1859, p. 439, *Radiata*, pl. xvi. B.M.

Hab. West Indies.

Var.? In the British Museum there is a second specimen of a smaller size, very irregular in form, which is perhaps a second species.

Hab. West Indies. B.M.

Lithospongia torva, Duchass. & Michel. Spong. Caraïb. p. 64, t. 12. f. 3, 4, from the West Indies, appears to be a species of this family, with a skeleton of netted siliceous fibres with wide angular meshes and without any spines.

There are two smaller specimens in the British Museum which probably belong to the same species. The smaller one was collected by the Rev. L. Guilding at St. Vincent in 1840; and the other was received from the West Indies by Mr. Scrivener in 1842.

3. MACANDREWIA, Gray, P. Z. S. 1859, p. 438, t. 15.

The coral expanded, cyathiform; the upper and lower surface smooth, the upper surface with small oscules; fibres of skeleton small,

with stellate spicules on the dermal surface. The stellate spicules three-rayed; the rays forked and reforked.—*Bowerbank, B. Sp.* f. 53.

MACANDREWIA AZORICA, Gray, P. Z. S. 1859, p. 438, *Rad.* pl. xv. B.M.

MacAndrewsia azorica, Bowerb. B. Sp. p. 204, t. 15. f. 274 (skeleton).

Dactylocalyx bowerbankii, Johnson, P. Z. S. p. 186; Bowerb. B. Sp. f. 53. B.M.

Dactylocalix bowerbankii, Bowerb. B. Sp. p. 236. f. 53.

Hab. Azores: St. Michael (*MacAndrew*); Madeira (*Johnson*).

The specimen which Mr. J. Yate Johnson has described under the name of *D. bowerbankii* is larger, more orbicular, and expanded than the one I described years before as *MacAndrewia azorica*; but I cannot see any other difference.

** *Network symmetrical.*

4. *FARREA*, Bowerb. B. Sp. i. p. 204, ii. p. 12.

Skeleton reticulate, symmetrical; filaments regular, with a continuous central canal and conical granulated tubercles on each side of the intersections. Sarcodæ with many fusiform and slender bihamate scattered spicules.

FARREA ORCA, Bowerb. B. Sp. i. p. 204, ii. p. 12. f. 114, 199, 200, 277, 311 (skeletons and sponges); Owen, Trans. Linn. Soc. xxii. t. 21. f. 8, 9.

Hab. Seychelle Islands (*Mus. Dr. Farre*).

Fam. 2. APHROCALLISTIDÆ.

Sponge tubular; tubes closed with a reticulated lid; parietes formed of agglutinated siliceous spicula, with round horizontal lateral pores; inner surface strengthened with clustered longitudinal bundles of elongated spicula.

This family is intermediate between *Dactylocalycidæ* and *Euplectelladæ*; it has the distinct agglutinated netted spicula of the former lined within by the bundle of elongated spicula of the latter.

APHROCALLISTES, Gray, P. Z. S. 1858, p. 114.

Sponge tubular, closed with a lid, with smaller lateral tubular branches, which are generally open at the end.

In the description of this sponge in the 'Proceedings of the Society' above referred to, it is said by a slip of the pen to be calcareous, when it ought to have been siliceous. In all other respects I have nothing to add to the description.

APHROCALLISTES BEATRIX, Gray, P. Z. S. 1858, p. 114, *Rad.* pl. xi.

Hab. Malacca (*Belcher*).

B.M.

Order II. KERATOSPONGIA (Horny Sponges).

Sponge elastic. Skeleton formed of horny netted fibres, generally without, but sometimes more or less strengthened with, minute siliceous spicules or grains of sand.

These are the horny sponges *par excellence*, the skeleton consisting of horny fibres, more or less strengthened by siliceous spicula, which are generally of a small size.

Dictyospongia, Duchassaing & Michelotti.

Spongia keratosa, Bowerb. B. Sp.

Fam. 3. SPONGIADÆ.

Skeleton formed of one kind of reticulated horny fibres, not enclosing any spicules or sand.

Euspongia, Duchassaing & Michelotti, *l. c.* p. 25.

* *Fibres of skeleton solid, homogeneous.*

1. SPONGIA, Linn.

Sponge irregularly netted. Fibres of skeleton solid, cylindrical, without spicules, very elastic, and nearly of equal thickness.

Spongia, Nardo, Isis, 1833, p. 321; Bowerb. B. Sp. i. p. 205; O. Schmidt, Spong. Adriat. Suppl. ii. p. 9.

Euspongia, Bronn.

SPONGIA OFFICINALIS.

B.M.

Spongia officinalis, Nardo, Isis, 1833; Bowerb. B. Sp. i. p. 205, t. 37. f. 379, t. 13. f. 261.

See also—

S. quarnerensis, O. Schmidt, *l. c.* p. 22, t. 2. f. 2, t. 3. f. 1.

S. zimocca, O. Schmidt, *l. c.* p. 23, t. 2. f. 3, 4.

S. equina, O. Schmidt, *l. c.* p. 23, t. 2. f. 5.

S. mollissima, O. Schmidt, *l. c.* p. 23.

2. SPONGIONELLA.

Sponge symmetrical, very elastic, netted; the primary fibres thicker, radiating; secondary thinner, horizontal.

Spongionella, Bowerbank, B. Sp. i. p. 206; O. Schmidt, Spong. Adriat. Suppl. ii. p. 9.

SPONGIONELLA PULCHELLA, Bowerbank, B. Sp. i. p. 206, t. 37. f. 380; ii. p. 359.

B.M.

Spongia pulchella, Sow. Brit. Misc. p. 87, t. 43; Johnson, B. S. p. 167, t. 19. f. 1, 2.

Cacospongia scalaris, O. Schmidt, Spong. Adriat. p. 27, t. 2. f. 4.

Hab. British Seas.

3. CACOSPONGIA, O. Schmidt, Spong. Adriat. 27.

Skeleton composed of hard, rather elastic, homogeneous fibres of unequal thickness.

1. CACOSPONGIA MOLLIOR, O. Schmidt, p. 27. B.M.

Hab. Adriatic.

2. CACOSPONGIA CAVERNOSA, O. Schmidt, p. 28. B.M.

Hab. Adriatic.

4. SIPHONIA, Blainv. Man. Act. p. 536.

Sponge polymorphic, with a central apical aperture or cloaca, with large longitudinal and smaller transverse canals; composed of dense fibres.

SIPHONIA TYPUM, Blainv. Man. Act. p. 536, t. 95. f. 1.

Hab. Sicily.

B.M.

** *Fibres of one kind, the more solid axis being surrounded by a softer cortical substance?*

5. APLYSINA, O. Schmidt, Spong. Adriat. p. 25.

Sponge fleshy; fibres of one kind, slightly elastic, consisting of a solid axis, surrounded by a softer bark.

Aplisia, Nardo, not Linn.

1. APLYSINA AEROPHOBA, Nardo; O. Schmidt, p. 25, t. 3. f. 2.

Hab. Adriatic.

B.M.

2. APLYSINA CARNOSA, O. Schmidt, p. 26, t. 3. f. 3.

Hab. Adriatic.

*** *Fibres with a central tube.*

6. VERONGIA.

Sponge irregularly netted; the fibres with a central canal, without spinules.

Verongia, Bowerbank, Ann. & Mag. N. II. xvi. p. 400, 1845; Brit. Sp. i. p. 209; O. Schmidt, Spong. Adriat. Supp. ii. p. 10.

Aplysia, Nardo, 1854.

Aplysina, Nardo, 1844, 1862; O. Schmidt, Spong. Adriat.

1. VERONGIA FISTULARIS, Bowerb. B. Sp. i. p. 209, t. 13. f. 266.

Spongia fistularis, Lamk.

2. VERONGIA ZETLANDICA, Bowerb. B. Sp. ii. p. 280.

Hab. Zetland.

*** *Fibres with numerous blind tubes.*

7. AULISKIA.

Sponge massive, irregularly netted; fibres with a central canal, which is furnished with small blind branches radiating in all directions.

Auliskia, Bowerb. Ann. & Mag. N. H. xvi. p. 405, 1845; Brit. Sp. i. p. 210.

Auliscia, O. Schmidt, Spong. Adriat. Suppl. ii. p. 10.

AULISKIA BOWERBANKII, Bowerbank, Ann. & Mag. N. H. xvi. p. 405, t. 13. f. 1, 2; B. Sp. t. 14. f. 267, 268.

Hab. —?

Fam. 4. HIRCINIADÆ.

Skeleton formed of two kinds of horny fibres:—the one thick, and with a central line of spicules or grains of sand within, reticulated, forming the base of the skeleton; the other very slender, forming radiating spicular tufts, which do not anastomose.

Filifera, Lieberkühn; O. Schmidt.

Ircinia et *Hircinia*, Nardo.

1. HIRCINIA, O. Schmidt, p. 32.

Sponge of a lax texture; skin less dense.

1. HIRCINIA FLAVESCENS, O. Schmidt, p. 33, t. 3. f. 9, 12–14.

Hab. Adriatic.

2. HIRCINIA DENDROIDES, O. Schmidt, p. 32, t. 3. f. 10. B.M.

See also:—

Hircinia typica, O. Schmidt, p. 32. B.M.

H. panicea, O. Schmidt, p. 32, t. 3. f. 11.

H. hirsuta, O. Schmidt, p. 33, t. 3. f. 13.

H. hebes, O. Schmidt, p. 33, t. 3. f. 9, 26.

H. variabilis, O. Schmidt, p. 34, t. 3. f. 17. B.M.

H. fasciculata, O. Schmidt, p. 34. *Spongia fasciculata*, Esper, ii. t. 34.

2. SARCOTRAGUS, O. Schmidt, p. 35.

Sponge very dense, nearly fleshy; the minute fibres very abundant.

1. SARCOTRAGUS SPINULOSUS, O. Schmidt, p. 35, t. 3. f. 18.

Hab. Adriatic. B.M.

2. SARCOTRAGUS FÆTIDUS, O. Schmidt, p. 35, t. 36. f. 3, 19.

Hab. Adriatic. B.M.

3. STEMATUMENIA, Bowerb. B. Sp. i. p. 211, 1862.

Sponge massive, horny; fibres of different diameters, reticulated,

with central lines of spicula and grains of sand, and other extraneous matter, especially in the larger and thicker fibres.

Stematumenia, Bowerb. Ann. & Mag. N. II. 1845, xvi. p. 406, t. 14. f. 1, 2.

Hircinia, sp., O. Schmidt.

Sarcotragus, O. Schmidt.

STEMATUMENIA BAHAMENSIS.

Bahama sponge, Bowerb. B. Sp. i. p. 273, f. 269, f. 381.

Hab. Bahama.

Fam. 5. DYSIDEIDÆ.

Sponge massive, formed of reticulated horny fibres, with sand (or the spicula of other sponges) imbedded in the centre, and covered with a more or less thick coat of horny matter.

DYSIDEA.

Sponge massive. Skeleton irregular, netted.

Dysidea, Johnston, Brit. Sp. p. 251; Bowerb. B. Sp. 1862; O. Schmidt, Spon. Adriat. Supp. ii. p. 11.

Duseideia, Johnston, B. Sp. p. 185, 1842.

Spongelia, Nardo, 1844; O. Schmidt, 1862.

Dr. G. Johnston described a sponge under the name of *Spongia suberea* in 'Mag. Nat. Hist.' vii. p. 491, f. 60, which, in his work on Sponges, he referred to the genus *Duseideia* with a mark of doubt, observing at the same time "it is nearly allied to the *Alcyonium ocellatum* of Solander (Zooph. p. 180, t. 1. f. 6), and it is probable that the two productions are of the same nature, whatever they may be." They have proved both to be *zoanthoid polypes*.

1. *DYSIDEA FRAGILIS*, Johnston, B. Sp. p. 251; Bowerb. B. Sp. ii. p. 381, i. p. 211. f. 270-272. B.M.

Duseideia fragilis, Johnston, B. Sp. p. 186, t. 13. f. 6, t. 14. f. 4.

Halichondria areolata, Johnston, B. Sp. p. 121, t. 13. f. 4.

Spongia fragilis, Mont. Wern. Mem. ii. p. 114, t. 16. f. 1, 2.

See also :—

Spongelia elegans, Nardo; O. Schmidt, p. 28, t. 3. f. 3. B.M.

S. avara, O. Schmidt, p. 29, t. 3. f. 6. B.M.

S. incrustans, O. Schmidt, p. 29, t. 3. f. 7.

S. pallescens, O. Schmidt, p. 30, t. 3. f. 8. B.M.

2. *DYSIDEA KIRKII*, Bowerb. B. Sp. i. p. 211.

Hab. Australia (not described).

Fam. 6. CHALINIDÆ.

Skeleton formed of regular, reticulated, anastomosing, horny fibres, which have one or more series of regular small siliceous spicules in the central lines.

1. CHALINA, Bowerb. B. Sp. i. 208.

Sponge branched, palmate, or inosculated. Skeleton of solid cylindrical horny fibres, with small imbedded spicules. Spicules fusiform or needle-like, slender, and thick.

CHALINA OCLATA, Bowerb. B. Sp. p. 360. f. 262.

Spongia lavigata, Montag.

Halichondria oculata, Johnston.

B.M.

See other species described by Dr. Bowerbank (Brit. Sp. p. 361).

2. ISODICTYA.

Network of sponge symmetrical, with radiating and transverse lines of fusiform needle-like spicules. Spicules fusiform or needle-shaped. The ovisac internal, membranaceous, not spinose.

Isodictya, Bowerb. B. Sp. i. p. 197; ii. p. 9; O. Schmidt, Spon. Adriat. Supp. ii. p. 17.

Reniera, sp., Nardo; O. Schmidt.

* *Spicula fusiform, smooth.*

1. ISODICTYA CINEREA, Bowerb. B. Sp. ii. p. 27.

Halichondria cinerea, Johnston.

B.M.

See other species described by Dr. Bowerbank (B. Sp. pp. 275 and following).

** *Spicula needle-like, spinose, flexuous.*

2. ISODICTYA LURIDA, Bowerb. B. Sp. p. 336.

Hab. Northumberland.

3. HALISPONGIA.

Sponge massive, with a reticulated horny skeleton. The larger fibres with irregularly dispersed internal spicula; the small ones without spicula.

Halispongia, Bowerb. B. S. ii. p. 207; O. Schmidt, Sp. Adriat. Supp. ii. p. 9 = *Cucospongia*, sp., A. Schmidt.

HALISPONGIA CAVERNOSA.

Bahama Sponge of Commerce, Bowerbank, B. S. i. p. 207, t. 36. f. 378, ii. p. 13.

4. ACANTHELLA, O. Schmidt, p. 65.

Sponge branched, often spinose, flexuous; fibres compressed; skin sunk, very porous. Spicules cylindrical, elongate, often flexuous, placed longitudinally in the membranes.

1. ACANTHELLA ACUTA, O. Schmidt, p. 65, t. 6. f. 7; Suppl. p. 2, t. 1. f. 1.

B.M.

2. ACANTHELLA OBTUSA, O. Schmidt, p. 65, t. 6. f. 8.

5. TRAGOSIA.

Sponge funnel-shaped or fan-shaped, branches anastomosing, minutely hispid. Skeleton regularly netted.

"The spicula of the primary lines of the skeleton are needle-shaped, with their apices directed inwards; those of the secondary lines are fusiform."

Isodictya, sp., Bowerb. B. S. ii. p. 318.

Halichondria **, Johnst. = *Tragos*, Schweiger, Handb. p. 422.

* *Sponge funnel-shaped, or rarely fan-shaped.*

1. TRAGOSIA INFUNDIBULIFORMIS.

B.M.

Spongia infundibuliformis, Linn. S. N. p. 1296; Esper, Z. t. 57. f. 1, 2.

S. crateriformis, Pallas.

S. calyciformis, Lamk.

S. pocillum, Lamx.

Halichondria infundibuliformis, Flem. B. A. p. 524; Johnston, B. S. p. 105, t. 6. f. 3.

Isodictya infundibuliformis, Bowerb. B. S. ii. p. 317, f. 9.

** *Sponge branched and anastomosing in some places.*

2. TRAGOSIA DISSIMILIS.

B.M.

Isodictya dissimilis, Bowerb. B. S. ii. p. 318.

6. CLATHRIA.

Sponge branched; branches inosculating. Spicules uniform, needle-like, smooth, united in a horny matter.

Grantia, Nardo.

Clathria, O. Schmidt, 57.

1. CLATHRIA COMPRESSA, O. Schmidt, p. 58, t. 6. f. 1 (spicules).

Spongia clathrus, Esper?

B.M.

2. CLATHRIA CORALLOIDES, O. Schmidt, p. 58, t. 5. f. 10, 11.

Grantia coralloides, Nardo.

Spongia coralloides, Esper?

B.M.

7. AXINELLA, O. Schmidt, p. 60.

Sponge tree-like, branched, flexible, and rather elastic. Spicules cylindrical, long, often bent or arched, some acute, others blunt at the end.

Grantia, sp., Nardo.

1. AXINELLA CINNAMOMEA, O. Schmidt, p. 61, t. 6. f. 2.

Grantia cinnamomea, Nardo.

Spicules fusiform and needle-shaped, curved.

B.M.

2. *AXINELLA VERRUCOSA*, O. Schmidt, p. 62, t. 6. f. 3.

Spongia verrucosa, Esper, ii. t. 47.

B.M.

(1) Spicules fusiform, bent in the middle, (2) blunt at the end.

3. *AXINELLA CANNABINA*, O. Schmidt, p. 63, t. 6. f. 5. B.M.

4. *AXINELLA FOVEOLARIA*, O. Schmidt, p. 64, t. 6. f. 6. B.M.

The genera *Clathria*, *Raspalia*, and *Axinella* of Dr. O. Schmidt appear to depend chiefly on the external form of the sponge.

8. ASTROSPONGIA.

Sponge stipitate, solitary or branched; surface smooth, when moist very rough and very porous, the outer surface denser; when dry friable. Oscules concave, circular, scattered, surrounded with six or eight small circular pores forming a star; spicules small, subulate in the fibres.

ASTROSPONGIA POLYPOIDES.

B.M.

Axinella polypoides, O. Schmidt, Spong. Adriat. p. 62, t. 6. f. 4 (oscles far apart).

Hab. Adriatic.

9. ASTROSTOMA.

Sponge solitary, branched; fibres horny, flexible. Oscules? circular, scattered and concave, sunk in the surface, with eight or ten rays, which are covered with spicules. Spicules small, subulate, in corneous fibres.

Astrostoma, Gray, P. Z. S. 1867, p. 239.

ASTROSTOMA BOWERBANKII, (sponge) Bowerb. B. S. p. 278, t. 20. f. 307 *a*, *b*, 308.

Hab. East Indies.

The oscules are often very close, with two or three in a line nearly united.

I have been enabled, through Mr. Tyler, to examine the original specimens from which Dr. Bowerbank described this species, which is probably a parasite like the genus *Bergia* of Michelotti.

Fam. 7. OPHISTOSPONGIADÆ.

Skeleton horny, reticulated; fibres cylindrical, or more or less flattened and expanded, scattered with external diverging spicules.

* *Spicula diverging from skeleton.*

1. OPHISTOSPONGIA.

Sponge massive. Skeleton with reticulated cylindrical horny

fibres, with single or groups of spicules radiating from its outer surface. Spicules uniform, fusiform or needle-shaped.

Ophistospongia, Bowerb. B. S. ii. p. 378.

OPHISTOSPONGIA AUSTRALIS.

Australian sponge, Bowerb. B. S. i. p. 275, t. 17. f. 288.

See also—

Ophistospongia papilla, Bowerb. B. S. ii. p. 378.

Hab. Guernsey.

2. SERIATULA.

Sponge massive. Skeleton of solid, cylindrical, horny, thick and slender fibres, with small imbedded spicules. Spicules smooth, of three forms—(1) broad needle-shaped, (2) pin-shaped, and (3) fusiform, slender, angularly bent.

SERIATULA SERIATA.

Spongia seriata, Grant.

Chalina seriata, Bowerb. B. S. ii. p. 376, f. 287 (outer surface); O. Schmidt, Supp. ii. t. 167.

3. ECTYON.

Sponge massive, reticulated, of cylindrical horny fibres, with single scattered or groups of diverging spicules. Spicules fusiform, verticillated, spined.

1. ECTYON SPARSUS.

West-India sponge, Bowerb. B. S. i. p. 275, t. 17. f. 289.

Spicules scattered, or in pairs or threes.

Hab. West Indies.

2. ECTYON FASCICULARIS.

West-India sponge, Bowerb. B. S. i. p. 276, t. 17. f. 290.

Spicules grouped together in fascicles.

Hab. West Indies.

3. ECTYON CARPENTERI.

Halichondria?, Carpenter, Microscope, p. 538, f. 267.

Hab. Madagascar.

See *Diplodemia*, Bowerb. B. S. f. 377; but it has armed *orisaes*.

4. ACARNIA.

Sponge parasitic, membranaceous, with erect and recumbent clavate spinose spicules. Spicules subcylindrical or subclavate; ends blunt, covered with spines.

ACARNIA CLIFTONI.

Hymeniacidon cliftoni, Bowerb. B. S. i. p. 276, f. 70, 83, 291.

Hab. Freemantle, West Australia (*G. Clifton*).

5. NÆNIA.

Sponge thin, with expanded spreading spicules. Spicules dispersed over the membrane:—1. Fusiform, with a series of rounded distant belts forming ovate knots. 2. Fusiform, blunt, with regular whorls of small spines. 3. Cylindrical, with a large central longitudinal slit on each end.

NÆNIA VERTICILLATA.

Hymeraphia verticillata, Bowerb. B. S. i. p. 268, f. 238–240.

6. RAPHYRUS.

Sponge massive. Skeleton reticulated; fibres formed of numerous fusiform or needle-like spicules, irregularly crowded together without order, and united by a very small quantity of horny matter.

Raphyrus, Bowerb. B. S. i. p. 207, ii. p. 354; O. Schmidt, Spon. Adriat. Supp. ii. p. 18 = *Papillina*, O. Schmidt.

1. RAPHYRUS CELATUS.

Halichondria celata, var. *a*, Johnst. B. S. p. 125.

2. RAPHYRUS GRIFFITHSII, Bowerb. B. S. i. p. 207, t. 13. f. 265, ii. p. 354.

Papillina subera, O. Schmidt, Sp. Adriat. 69, iii. 18. B.M.
Hab. England.

Fam. 8. PHAKELLIADÆ.

Sponge expanded, cup-shaped or flabellate; spicula in bundles, cylindrical, numerous, with a closely netted horny skeleton, forming branched and rebranched lines, which do not inosculate.

The structure was well described by Dr. Grant (Edin. New Phil. Journ. i. p. 349).

PHAKELLIA. (Sea Fan-Sponge.)

Sponge fan- or funnel-shaped, with numerous cylindrical bundles of spicules, which branch and rebranch, radiating to the surface. Spicules fusiform or needle-shaped, often flexuous.

Phakellia, Bowerb. B. S. i. p. 186, ii. p. 7; O. Schmidt, Spong. Adriat. Supp. ii. p. 15.

PHAKELLIA VENTILABRUM, Bowerb. B. S. i. p. 186, t. 33. f. 367, ii. p. 122 (cyathiform); O. Schmidt, Supp. ii. t. 1. f. 16. B.M.

Spongia ventilabrum, Linn. S. N.; Grant, Edinb. N. P. J. i. p. 349, ii. p. 122, t. 2. f. 5.

S. zellandica, Jameson.

S. ventilabriformis, Gray, B. P. p. 359.

Halichondria ventilabrum, Johnst. B. S. p. 107, t. 7.

H. ventilabra, Flem. B. A. p. 523.

Halispongia ventilabra, Blainv.

Spongia xerampelina, Grant.

Var. *Spongia scypha*, Mont. W. Th. ii. p. 107, t. 15. f. 1.
S. foliaceus, Gray.

See also—

Phakellia robusta, Bowerb. B. S. ii. p. 126, f. 367 (fan-shaped).

Subsection 2. Spicular Sponges (SPICULOSPONGIÆ). *Sponge fleshy, more or less strengthened by fasciculated or scattered siliceous spicules, the fascicules being sometimes slightly covered with a thin layer of horny matter. Sarcode generally abundant, granular or fleshy; sometimes it is mucilaginous and early deciduous, as in Euplectella.*

Oxyospongiæ, Duchass. & Michelotti, Spon. Mer Caraïbe.

The three principal families of this group are distinguished by the absence or the presence of certain kinds of spicules; thus the *Esperiadæ* have bihamate "defensive" spicules, whilst the *Tethyadæ* have three-pronged or three-hooked and stellate spicules, and all the kinds are absent in the *Halichondriadæ*.

The *Euplectelladæ* and *Polymastidæ* are distinguished by the textile structure of their tubular body; the former has several kinds of defensive spicula, which are absent in the latter family.

Order III. LEIOSPONGIA, or Unarmed Sponges.

Sponge with all the spicules of the same kind, often varying more or less in size and form, but they are always modifications of the most simple kind of spicules.

The spicules are not all uniform in shape; but, if varying in shape, they all belong to one type of form. Thus they may be either cylindrical, fusiform, needle-shaped or pin-shaped, or any of the intermediate modifications of these shapes, which sometimes insensibly pass into each other. In some of these sponges all the spicules are of one or the other of these modifications; others contain two, and others again all three, of these forms combined together. They are easily known from the sponges of the next order by the entire absence (except in some very rare instances) of any of the spicules that Dr. Bowerbank has called defensive and retentive spicules—that is to say, bihamate, anchorate, birotulate, stellate, or three-pronged spicules.

The fusiform, needle-like, pin-shaped, and cylindrical spicules belong to a series, and these forms gradually pass into each other; that is to say, there are all intermediate forms; sometimes the spicules of one sponge, or even specimen, present more than one form. These spicules are smooth, or partially or entirely spiculated or tuberculated, or they are furnished with smooth or rugose or spinous rings. They are rarely angularly bent in the middle, or curved at each end and bent in the form of an S. I have never seen the two ends bent up on one side, such double-hooked spines belong to the bihamate series, and are generally undeveloped spicules of that form. With

these variations the forms of the spicules afford good specific characters, each species having a single form or a series of variations peculiar to itself.

Fam. 1. HALICHONDRIADÆ.

Sponge massive. Skeleton composed of cylindrical, fusiform, or pin-shaped spicules, often varying in form in the same sponge, variously fasciculated together, or rarely single, and united by a small quantity of horny matter. Sarcode fleshy or granular.

* *Spicules fusiform or needle-like.*

1. RENIERA.

Sponge massive, rugose. Skeleton reticulated, strengthened with spicules. Spicules of one shape, fusiform or needle-like (varying in size).

Reniera, O. Schmidt, Sp. Adriat. p. 72.

Hymeniacidon, Bowerb. Brit. Sp.

RENIERA THOMASII.

Hymeniacidon thomasi, Bowerb. B. Sp. p. 155.

See also—

H. coccinea, Bowerb. ib. p. 156.

H. brettii, Bowerb. ib. p. 158.

H. fragilis, Bowerb. ib. p. 159.

H. reticulatus, Bowerb. ib. p. 159.

H. fallaciosus, Bowerb. ib. p. 160.

H. albens, Bowerb. ib. p. 161.

H. lactea, Bowerb. ib. p. 163.

H. membrana, Bowerb. ib. p. 165.

H. caruncula, Bowerb. ib. p. 166, t. 7. f. 372.

H. sanguinea, Bowerb. ib. p. 168. *Spongia sanguinea*, Grant.

H. mammeata, Bowerb. ib. p. 170.

H. consimilis, Bowerb. ib. p. 172.

H. fallax, Bowerb. ib. p. 177.

H. viridans, Bowerb. ib. p. 178.

H. perlevis, Bowerb. ib. p. 179. *Spongia perlevis*, Mont. (spicules subpin-shaped).

H. aurea, Bowerb. ib. p. 181. *Spongia aurea*, Mont.

H. armatura, Bowerb. ib. p. 183.

H. pachyderma, Bowerb. ib. p. 184.

H. crustula, Bowerb. ib. p. 185 (spicules subpin-shaped).

H. virgultosa, Bowerb. ib. p. 193.

Reniera aqueductus, O. Schmidt, Sp. Adriat. p. 73, t. 7. f. 6. B.M.

R. cratera, O. Schmidt, ib. f. 7. B.M.

R. alba, O. Schmidt, ib. f. 8.

R. nigrescens, O. Schmidt, ib. p. 74. B.M.

R. palmata, O. Schmidt, ib. p. 74. ? *Spongia palmata*, Solander & Ellis. B.M.

- R. semitubulosa*, O. Schmidt, ib. p. 75. ? *Spongia semitubulosa*,
Lamk. B.M.
R. luxurians, O. Schmidt, ib. p. 76. B.M.

2. HALICHONDRIA.

Skeleton irregularly netted, scattered, or reticulated. Spicules uniform, fusiform.

HALICHONDRIA PANICEA, Johnston ; Bowerb. Brit. Sp. p. 229, f. 300, 303.

See also —

H. servosa, Johnston.

H. glabra, Bowerb. ib. p. 232.

H. caduca, Bowerb. ib. p. 234.

H. inconspicua, Bowerb. ib. p. 236.

H. incerta, Bowerb. ib. p. 237.

H. coalita, Johnst. t. 12. f. 1 ; Bowerb. ib. p. 238.

H. simplex, Bowerb. ib. p. 246.

H. subdola, Bowerb. ib. p. 247.

H. farinaria, Bowerb. ib. p. 269 (spicules spined).

H. distorta, Bowerb. ib. p. 240 (spicules fusiform and needle-like).

3. DICTYOCYLINDRUS.

Sponge arborescent ; branches large, forked, rather hispid ; skin without spicules. Skeleton of fasciculated spicules. Spicules :—
1. Needle-shaped or fusiform, long, slender. 2. Needle-like or sub-pin-like, spinose.

Dictyocylindrus, Bowerb. B. S. i. p. 185.

1. DICTYOCYLINDRUS HISPIDUS, Bower. B. S. i. p. 185, ii. p. 108.
Spongia hispida, Mont.

2. D. VENTILABRUM, Bowerb. ib. ii. p. 100, f. 66.

3. D. RAMOSUS, Bowerb. ib. ii. p. 103, f. 366.

4. D. PUMILUS, Bowerb. ib. ii. p. 114.

5. D. RUGOSUS, Bowerb. ib. ii. p. 119, f. 369.

And other species described by Dr. Bowerbank.

4. AAPTOS.

Sponge fleshy, internally spiculose. Spicules all needle-shaped, elongate, smooth (no anchorate spines, or globules, or stars).

AAPTOS ADRIATICA.

B.M.

Ancorina aaptos, O. Schmidt, Supp. i. p. 33, t. 4. f. 4.

Hab. Adriatic.

5. HALISARCA.

Sponge expanded, smooth, gelatinous. Spicules of two kinds:—
1. Cylindrical, very slender, flexuous. 2. Slender, needle-like, spinose.

HALISARCA DUJARDINII, Johnston.

B.M.

Hymeniacidon dujardinii, Bowerb. B. S. ii. p. 224.

6. LIEBERKUHNIA.

Sponge funnel-shaped, turbinate or globose. Texture entirely reticulated. Spicules small, slightly arched, pointed at each end, placed in series forming the fibres.

Lieberkuhnia, Balsamo-Crivelli, 1863; O. Schmidt, Supp. i. p. 43.

LIEBERKUHNIA AGAGROPHLA, Balsamo, l. c.

B.M.

Lieberkuhnia calix, O. Schmidt, Supp. ii. p. 43.

Espera calix, Nardo.

Reniera calix, O. Schmidt, i. p. 76, t. 7. f. 12.

7. TEDANIA.

Sponge lobed, crested, with a lateral tube ending in an open mouth. Spicules of three kinds:—1. Clavate, needle-shaped. 2. Fusiform, very slender, elongate, sometimes flexuous. 3. Cylindrical, with rather thicker, blunt ends.

1. TEDANIA DIGITATA.

B.M.

Reniera digitata, O. Schmidt, p. 75, t. 7. f. 11.

2. TEDANIA AMBIGUA.

Reniera ambigua, O. Schmidt, Supp. ii. t. 4. f. 8.

8. OROIDEA.

Sponge massive. Spicules cylindrical, with regular whorls of spines, truncated and torn at one end, and attenuated and pointed at the other.

OROIDEA ADRIATICA.

B.M.

Clathria oroides, O. Schmidt, Sp. Adriat. Supp. i. t. 4. f. 2.

9. PRIANOS.

Sponge massive. Spicules of two forms:—1. Cylindrical, blunt and rounded at each end. 2. Cylindrical, slender, angularly bent in the middle.

PRIANOS AMORPHUS.

B.M.

Reniera amorpha, O. Schmidt, Supp. i. t. 4. f. 7.

10. SCHMIDTIA.

Sponge tuberoso, or tuberoso-elongate, more or less pedunculate, single, or two or three coalesced, with a central tube internally hollow. Parenchyma more or less netted. Spicules of five forms, all smooth:—1. Thick, needle-shaped. 2. Fusiform. 3. Slender fusiform, thick. 4. Subcylindrical, curved, blunt. 5. Longer, pointed, angularly bent at the end.

Schmidtia, Balsamo-Crivelli; O. Schmidt, Suppl. i. p. 42.

SCHMIDTIA FICIFORMIS.

Schmidtia ficiformis, *S. clavata*, et *S. dura*, Balsamo-Crivelli, Mem. Soc. Italiana, 1863, vol. v.; O. Schmidt, Suppl. i. p. 42.

Reniera ? dura, O. Schmidt, i. p. 76, t. 7. f. 13. B.M.

11 CRELLA.

Sponge crustaceous, tubercular; pores confined in wedge-shaped areas. Spicules of two kinds:—1. Fusiform. 2. Club-shaped, nodose.

Cribrella, O. Schmidt, p. 70 (not Agassiz).

CRELLA ELEGANS.

Cribrella elegans, O. Schmidt, p. 70, t. 7. f. 1.

12. SOPHAX.

Sponge-coating rough; oscules minute, dispersed. Skin spinulose. Spicules:—1. Needle-like, long, slender, flexuous. 2. Needle-like, minutely spined.

SOPHAX FALLAX.

Microciona fallax, Bowerb. B. S. ii. p. 128.

13. EPICLES.

Sponge-coating thin, smooth. Skin pellucid, without spicules. Spicules of two forms:—1. Needle-like, slender, in widely radiating groups. 2. Subclavate, smooth or covered with minute spines.

EPICLES RADIATUS.

Hymedesmia radiata, Bowerb. B. S. ii. p. 149.

14. EURYPON.

Sponge-coating hispid. Skin spiculated. Spicules of two kinds:—1. Needle-like, long, slender, smooth. 2. Subclavate, spinulated all over.

EURYPON CLAVATUM.

Hymenaphia clavata, Bowerb. B. S. ii. p. 143.

15. BUBARIS.

Sponge-coating cavernous, hispid. Skin spiculose. Spicules of two

kinds:—1. Needle-like, elongate. 2. Cylindrical or subfusiform, vermiculoid, varying in the manner in which they are twisted.

BUBARIS VERMICULARIS.

Hymeraphia vermicularis, Bowerb. B. S. ii. p. 141, f. 5.

16. CIOCALYPTA.

Sponge cylindrical, massive, with numerous attenuated branches, sometimes forked at the tips. Skeleton of compact interlaced spicules, which divide into fascicles near the surface of the branches; the fascicles dilated at the end supporting the outer surface, and having a series of small cavities below the outer coat. Spicules fusiform or needle-like, stout, variable in size.

Ciocalypta, Bowerb. B. S. i. p. 179, ii. p. 81, t. 30. f. 360, 361.

CIOCALYPTA PENICILLUS, Bowerb. B. S. i. p. 188, ii. p. 81.

17. RASALIA.

Sponge incrusting or arborescent, branched. Spicules of two kinds, united by a horny matter:—1. Needle-shaped, thick, tubercular. 2. Pin-shaped, smooth.

RASALIA VIMINALIS.

Raspalia viminalis, O. Schmidt, p. 59, t. 5. f. 12.

B.M.

18. ADOCIA.

Sponge sessile or branching and inosculating, smooth; oscules on the sides of the branches. Skin without spicules. Skeleton rather irregularly netted. Spicules fusiform, stout, short.

ADOCIA SIMULANS.

Isodictya simulans, Bowerb. B. S. p. 308, f. 299.

19. PHILOTIA.

Sponge incrusting, smooth; oscules minute. Skin regularly netted, spiculous. Spicules isolated, forming a network:—1. Fusiform, slender. 2. Cylindrical or needle-shaped.

PHILOTIA VARIANS.

Isodictya varians, Bowerb. B. S. ii. p. 281, f. 309.

**** *Spicules pin-shaped.***

20. ABILA.

Sponge branched, flexible. Spicules united with horny matter, of three kinds:—1. Pin-shaped, smooth; head rather marked, large. 2. Pin-shaped, nodulous, small. 3. Fusiform, very slender, arched or doubly arched.

ABILA FREYERII.

Raspalia freyerii, O. Schmidt, p. 60, t. 5. f. 13. B.M.

21. SUBERITES, Nardo; O. Schmidt, p. 65.

Sponge massive, compact, fleshy, smooth, sometimes with projecting spicules. Skin with or without spicules. Spicules pin-shaped, fasciculated; fascicles often expanding near the surface.

† *Skin without spicules.*

1. SUBERITES SUBERIA.

B.M.

Spongia suberia, Montag.

Halichondria suberica, Fleming.

H. suberea, Johnston.

Hymeniacion suberea, Bowerb. B. S. p. 200, f. 23.

2. SUBERITES CARNOSEA.

B.M.

Halichondria carnosa, Johnst.

Hymeniacion carnosa, Bowerb. B. S. p. 203.

3. SUBERITES GELATINOSA.

Hymeniacion gelatinosa, Bowerb. B. S. ii. p. 222.

†† *Skin with spicules like the flesh.*

4. SUBERITES SULPHUREA.

Hymeniacion sulphurea, Bowerb. B. S. ii. p. 208.

††† *Spicules in skin and flesh spinose.* Flacius.

5. SUBERITES CLAVIGERA.

Hymeniacion clavigera, Bowerb. B. S. p. 211, f. 83.

22. FICULINA.

Sponge massive; surface even; oscules few, large. Skin thin, granular, spiculose. Spicules of three kinds:—1. Pin-shaped. 2. Fusiform. 3. Cylindrical, with central knobs, straight or rather angularly bent.

FICULINA FICUS.

B.M.

Halichondria ficus, Johnston.

Hymeniacion ficus, Bowerb. B. S. ii. p. 206, f. 95.

See *Isodictya anomala*, Bowerb. B. S. ii. p. 293, f. 4.

23. RASPALIA.

Sponge —? Spicules short, thick, pin-shaped, nodulous.

Raspalia, Nardo; O. Schmidt, Sp. Ad. p. 59 (part.).

RASPALIA TYPICA, Nardo; O. Schmidt, p. 59, t. 4. f. 1. B.M.

24. RAPHIOPHORA, Gray, B. M. 1840.

Sponge cup-shaped, friable, with a harder external case; pores minute. Spicules pin-shaped, fasciculated.

RAPHIOPHORA PATERA.

B.M.

Spongia patera, Hardwicke, Asiatic Researches, xi. p. 180, 1822; Férussac, Bull. Sci. Nat. viii. p. 165, 1826.

Alcyonium poculum (*Neptune's cup*), "Everard Home, MSS.;" Stutchbury, British Institution, on a plate by W. H. Bailly.

Hab. Sumatra (*Raffles*); Singapore (*Hardwicke*).

25. SPINULARIA.

Sponge massive, depressed, minutely hispid. Oscules terminal, slightly raised. Spicules of two kinds:—1. Fusiform, sometimes curved. 2. Pin-shaped; head ovate.

SPINULARIA TETHEOIDES.

Tethea spinularia, Bowerb. B. S. ii. p. 94, f. 25.

26. ANTHO.

Sponge massive. Spicules of three forms:—1. Thick, pin-shaped, rugulose. 2. Thick, cylindrical, torn at the apices. 3. Elongate, needle-shaped, smooth.

ANTHO INVOLVENS.

B.M.

Myxilla involvens, O. Schmidt, Supp. i. p. 37, t. 4. f. 6.

27. PITALIA.

Sponge amorphous. Spicules:—1. Pin-shaped or subclavate, stout, tubercular. 2. Pin-shaped, slender, slightly curved. 3. Cylindrical, slender, clavate, and rounded at each end.

PITALIA FRONDICULATA.

B.M.

Reniera frondiculata, O. Schmidt, Sp. Ad. Supp. t. 4. f. 10.

Fam. 2. CLIONIADÆ.

"Forming excavations in shells and limestone. Cavity multilocular, united by a small tube, forming a dichotomous or anastomosing line of cells, and the inner surface shagreened or punctured. The sponge fills the entire cavity and ramifications, and the oscules and papillæ correspond in size, number, and position with the external orifices on the surface of the shell or stone enclosing the sponge."—*Hancock*.

The oscules and pores contractile. The pores when expanded prominent, above the surface of the shell, top flat, with a radiated opening. The oscules conical, tubular, with an open mouth.

Cliona, Grant; Leidy, Proc. Acad. N. S. Philad. viii. p. 162, 1856; Hancock, Ann. N. H. iii. p. 321 (1849), iv. p. 355 (1849);

Morris, Ann. N. H. iv. p. 239; Bianconi, Nuov. Ann. Sci. Nat. Bologna, vi. p. 455, 1841.

Vioa, H. Michelin, Revue Zoolog. 1841, p. 56 (not 1833); O. Schmidt; Duchass. & Michel. Sp. Caraïb. p. 112.

Spongia terebrans, Duvernoy, Compt. Rend. A. S. Paris, ii. 1841, pp. 683 & 1021; Lereboullet, Instit. ix. 1841, p. 131.

Hymeniacidon, sp., Bowerb. B. Sp.

Oxyspongiæ perforantes, Duchass. & Michelot. Sp. Mer Caraïbe, p. 112.

Not *Vioa* of Nardo, Isis, 1833, p. 523, who cites *Alcyonium asbestinum*, Linn., as the type, which is a zoanthoid coral.

1. CLIONA.

Spicules uniform, pin-shaped, smooth.

CLIONA CELATA, Hancock, Ann. & Mag. N. H. 1867, xix. p. 237, t. 7. f. 7. B.M.

Hymeniacidon celata, Bowerb. B. S.

Hab. Europe.

See also—

Cliona gorgonoides, Hancock, l. c. p. 237.

C. globulifera, Hancock, l. c. p. 240, t. 8. f. 3.

Vioa viridis, O. Schmidt, p. 77, t. 7. f. 14. B.M.

2. PIONE.

Spicules of three forms:—1. Pin-shaped, smooth. 2. Fusiform, spinulose. 3. Cylindrical, sinuous, smooth, slightly or strongly spinulose.

PIONE NORTHUMBRICA.

Cliona northumbrica, Hancock, l. c. p. 237, t. 7. f. 1.

Hab. Scotland and Northumberland.

See also—

Cliona vastifica, Hancock, l. c. p. 237, t. 7. f. 2.

C. corallinoides, Hancock, l. c. p. 238, t. 7. f. 3.

C. gracilis, Hancock, l. c. f. 4.

C. howsei, Hancock, f. 5.

C. mazatlanensis, Hancock, p. 240, t. 8. f. 1.

3. MYLE.

Spicules of three kinds:—1. Pin-shaped, smooth, head globular, terminal. 2. Fusiform, thick, smooth, sometimes angularly bent, with a swollen belt at the angle. 3. Oblong, fusiform, small, spinulose.

MYLE CARPENTERI.

Cliona carpenteri, Hancock, l. c. t. 8. f. 4.

Hab. Mazatlan.

4. SAPLINE.

Spicules of two kinds:—1. Pin-shaped, elongate, smooth. 2. Fusiform, smooth.

SAPLINE GRANTII.

B.M.

Vioa grantii, O. Schmidt, p. 78, t. 7. f. 15.

Hab. Adriatic.

5. IDOMON.

Spicules of two kinds, angularly bent in the centre:—1. Pin-shaped, head small. 2. Needle-shaped, one end truncate.

IDOMON ALDERI.

Cliona alderi, Hancock, *l. c.*

6. JASPIS.

Spicules of two kinds:—1. Fusiform. 2. Stellate.

JASPIS JOHNSTONII.

Vioa johnstonii, O. Schmidt, p. 78, t. 7. f. 17.

B.M.

Hab. Adriatic Sea.

7. PRONAX.

Spicules of two kinds:—1. Pin-shaped, head subterminal. 2. Cylindrical, bent or sinuous, smooth or spinose.

PRONAX LOBATA.

Cliona lobata, Hancock, *l. c.* p. 239, t. 7. f. 6 (bent spicules spinose).

Hab. Newcastle-on-Tyne.

See also, with bent spicules smooth—

Cliona vermifera, Hancock, *l. c.* t. 8. f. 2.

C. alderi, Hancock, p. 239.

8. SAMUS.

Spicules of one kind, thick, stellate, many-rayed; rays in several series.

SAMUS ANONYMA, Bowerb. B. S. p. 234, t. 2. f. 41, 42.

See *Axus cliffoni* (Bowerb. B. S. f. 197) in *Tethyidæ*.

See also—

Vioa duvernoyii, Duchass. Anim. Radiat. p. 27; Spong. Mer Caräibe, p. 117, t. 25. f. 4.

V. dissociata, Duchass. ib. p. 27; Sp. Mer Car. p. 117, "t. 22. f. 5, 6" (t. 25. f. 5, 6?).

V. strombi, Duchass. Sp. Mer Car. p. 113.

Also the genus *Euryphyllæ*, which perforates the substance of madrepores, forms irregular galleries with granules and spicules.

Euryphylle latens, Duchass. Sp. Mer Car. p. 114, t. 25. f. 7, 8.
E. dubia, Duchass. ib. t. 25. f. 5, 6.

Fam. 3. POLYMASTIADÆ.

Sponge massive, with numerous open-mouthed erect tubes. Skeleton of the base of divergent fascicules of spinules; of the tubes formed of longitudinal and transverse fascicules of slender cylindrical elongated spicules.

Polymastica, Bowerb. B. S. i. p. 371.

1. PENCILLARIA.

Spicules of the mass pin-shaped. The transverse fibres separate.

PENCILLARIA MAMMILLARIS.

Polymastica mammillaris, Bowerb. B. S. i. p. 178, ii. p. 571; O. Schmidt, Sp. Adriat. Supp. ii. t. 1. f. 12.

Spongia mammillaris, Müller, Z. D. t. 158. f. 3, 4. B.M.

S. pencillus, Montag W. Trans. p. 93, t. 13. f. 7.

2. POLYMASTICA, sp., Bowerb. B. S.

Spicules needle-shaped. The transverse fibres fasciculated.

POLYMASTICA ROBUSTA, Bowerb. B. S. i. p. 178, t. 29. f. 358, ii. p. 63.

Alcyoncellum robustum, Bowerb. ib. i. p. 172, f. 257, 258.

See also—

P. ornata, *P. bulbosa*, *P. brevis*, and *P. radiosa*, Bowerb. ib. ii. pp. 59, 61, 64, 68.

Order IV. ACANTHOSPONGIA (Armed or Hooked Sponges).

Sponge strengthened with various-shaped spicules, besides the usual simple fusiform or needle-like spicules of the preceding order.

These sponges, besides having the cylindrical fusiform needle-like or pin-shaped spicules found in the preceding order, are provided with various shaped spicules, which are usually armed with some form of hook or extended prickles that form a means of defence. These defensive spicules vary considerably in shape, being either bihamate, anchorate, three-pronged, or star-like; and the various modifications of these forms are present in the different genera.

Fam. 1. EUPLECTELLADÆ*.

Sponge tubular, isolated, with the tubes closed at the top with a netted lid. The skeleton of the tubes formed of bundles of elon-

* Professor Wyville Thompson, to whom I am indebted for the photographs of the species of this family in the Paris Museum here copied, in a letter, dated 22nd of May, 1867, observes, "As to the *Euplectella*, the two species (two species

gated cylindrical thread-like spicules placed in a longitudinal, transverse, and oblique direction, crossing each other, and forming a more or less regular network. Sarcode scattered with stellate spicules, with the rays more or less divided.

- A. *Tube formed of longitudinal and transverse bundles of filiform spicules, intersected with more slender oblique series of spicules, and strengthened externally with transverse or oblique raised ridges, the upper ridge forming a fringe between the end of the tubes and the irregularly netted lid; the base of the tubes surrounded with free filiform spicules, barbed at the end.*

1. EUPLECTELLA.

The tubes regular, gradually wider above, formed of regular longitudinal and transverse bundles of filiform spicules, which are crossed in an oblique direction with more slender fascicles or separate filiform spicules, and strengthened externally with transverse or oblique elevated ridges; the upper ridge forming a fringe at the top of the tubes, between the edge of the tubes and the irregularly netted lid. Sarcode thin, studded with many-rayed stellate spicules, with long simple or trifid rays, or with short rays divided at the end into several converging rays, forming a bell-shaped series.

The fringe on the end of the tube, between it and the lid, is only found in the perfectly grown sponges; it is very small in the specimens of *E. aspergillum* that are not quite of the normal form—that is,

I certainly believe them to be) of the Jardin des Plantes are very closely allied. It is not easy at first to catch a good microscopic character. Still there is a difference in the form of the small spicules especially. These two species are, however, utterly different from our *Euplectella aspergillum*. It would be impossible to put the three even in the same genus. In the French species the network of the wall is formed entirely of perfectly free spicules, very long, simply interwoven, never anastomosing, held together by sarcodic substance alone, and perfectly easily shaken separate by a needle or a hair-pencil in a drop of water. The spicules are exactly of the same type as those of *Hyalonema*, and are netted together precisely in the same way; in fact the French species would fit much better into the genus *Hyalonema* than into *Euplectella*. They will not go into either genus, however, and either you or I must concoct a special generic name for them.

“*Eup. aspergillum*, again, reminds one strongly of the work you must have often seen—ships, baskets, &c., made of spun-glass, by heating and netting it in and out in all directions, attaching constantly the various points of contact. Thus, while *aspergillum* is made quite rigid, the French species are absolutely flexible, only firm enough to maintain their form.

“It seems to me that we have now a series forming a very remarkable group, graduating through *Aphrocallistes*?, *Hyalonema*, the French genus, *Euplectella* (*aspergillum* and *cucumer*), into *Iphiteon* and *Dactylocalyx*. In these the form is very different certainly; but the general plan of the small free spicules is the same, and the interlacing siliceous tubing is very much as in *Eup. aspergillum*.

“Schultze’s proposed group ‘Lophospongiæ’ cannot stand. It is founded upon the long free spicules merely, and would only contain *Hyalonema* and *Euplectella*, excluding *Aphrocallistes* and the French genus, which seem to me most characteristic members of the series.

“By-the-by could you give me a shred of *Aphrocallistes*, I should like to compare the small spicules.”

to say, in those that have an irregular edge to the upper part of the tube, or other deformities of growth.

Euplectella, Owen, Trans. Zool. Soc. iii. p. 203, 1841.

Alcyoncellum, Bowerb. B. Sp. i. p. 176 (not Blainville, nor Quoy and Gaimard).

The texture of *Euplectella* has been compared to woven lace. The threads of the *Euplectella* were not first spun and then interwoven as in the case of human manufacture, but were formed as interwoven, the two processes going on simultaneously, or *pari passu*; and this is further shown by the fact that, in a specimen that had been pierced, the hole is filled up with interwoven fibres like a darn. It is to be recollected that the beautiful object which we have in our cabinet is but the skeleton of the sponge; and in its living state this exquisite flinty framework is veiled by a delicate gelatinous enveloping organic tissue (see Owen, Trans. Linn. Soc. xxii. p. 121).

1. EUPLECTELLA ASPERGILLUM, Owen, Trans. Zool. Soc. iii. p. 203, t. 13 (upside down). B.M.

Euplectella speciosa, Gray, Ann. & Mag. N. H. 1866, xviii. p. 487.

Alcyoncellum aspergillum, Bowerb. B. S. i. p. 177, f. 174, 175, to p. 184, f. 186, 189, 193, 194, 198, 253, 356, 357.

Hab. Philippine Islands (*Cuming*).

This species is liable to several variations; its form is sometimes short, ovate, and straight like the following; the regular longitudinal and transverse bundles of spicules are distinctly marked, indeed more so in the young specimens only a few inches long than in the adult.

There is a good series of varieties of different ages in the British Museum.

2. EUPLECTELLA CUCUMER, Owen, Trans. Linn. Soc. xxii. p. 117, t. 21; Bowerb. B. S. i. p. 237. f. 59.

Hab. Seychelle Islands (*Capt. Etheridge*).

Only known from the single specimen in the collection of Dr. Farre. The absence of the fringe and the small size of the transverse ridges may be dependent on the age or imperfect development of the specimen, for that is the peculiarity of the younger specimen from the Philippines.

I have not seen the specimen; but Dr. Bowerbank, who has examined it and its spicules, informs me that he regards it as only a variety of *E. aspergillum*; but the difference in the locality and the peculiar form leads me to believe that it is a distinct species; and I hope Dr. Perceval Wright, who has gone to the Seychelles to study the natural history of those little-known islands, will bring home specimens that may determine this and other interesting zoological questions.

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- B. *Tube formed of fascicules of filiform spicules placed in various directions, forming an irregular network like the lid of the tube, and not strengthened with any raised transverse or oblique ridges or fringe at the edge of the aperture, and without any free barbed filament at the base.*

2. CORBITELLA.

The tube clavate, rather irregular, rounded at the end, formed of slender fascicules of open elongate filiform spicules, placed in longitudinal, transverse, and oblique directions, forming an irregular network.

Alcyoncellum, Quoy & Gaim. (not De Blainville).

Euplectella, sp., Gray, Ann. & Mag. N. H. 1866.

This genus chiefly differs from *Euplectella* in the want of the well-marked longitudinal and transverse bundles of spicules, which are to be observed in all the specimens of different ages of *E. aspergillum* that have come under my observation.

CORBITELLA SPECIOSA. (Pl. XXVIII. fig. 1.)

Alcyoncellum speciosum, Quoy & Gaim. Voy. Astrol. p. 302, Zoophytes, t. 26. f. 3, 1833 (very bad); Lamk. An. s. Vert. ed. 2, ii. p. 589; Bowerb. B. S. f. 185, 187, 188, 195?

Hab. Molucca (*M. Merkus*; *Mus. Paris*).

Quoy and Gaimard thus describe the only specimen of this sponge yet known in Europe:—"Cette singulière production représente un cylindre creux, de sept à huit pouces d'étendue, en forme de *Phallus*, arrondi et un peu dilaté à une extrémité, ouvert à l'autre, à parois minces, formée de filets très déliés, lâchement accolés les uns aux autres, entrecroisés dans tous les sens, de manière à former de nombreuses mailles arrondies, presque régulières comme celles de la dentelle ou bien des sièges tissés en rotang."—*Zoophytes*, ii. p. 303.

Professor Wyville Thompson has most kindly sent me a photograph of this specimen, which is here copied (Pl. XXVIII. fig. 1), and which shows that it is quite distinct from the Philippine Sponge.

MM. Quoy and Gaimard's figure is very imperfect, and probably misled Prof. Owen; for he observes, when describing *Euplectella aspergillum*, that "If the basal aperture of the cone were open, the resemblance to some of the known Alcyonoid sponges would be very close, especially to that called *Alcyonellum gelatinosum* by M. De Blainville (*Alcyonellum speciosum*, Quoy & Gaim.); its closure by the reticulate convex frilled cap in the present instance establishes the generic distinction."—*Trans. Zool. Soc.* iii. p. 205.

But the specimen figured by MM. Quoy and Gaimard has a "reticulate convex cap." And this is not the only mistake in this paragraph; the "basal aperture" is the apex of the sponge. *Alcyonellum gelatinosum* (which should be *Alcyoncellum gelatinosum*, Blainville) has no affinity to *Alcyoncellum speciosum* of Quoy and

Gaimard, one being a large conical siliceous sponge, and the other a small branched calcareous one. And why are these sponges called Alcyonoid? They have no affinity to *Alcyonium*, which are true zoophytes.

3. HETEROTELLA.

The tube short, rather irregular, conical, truncated, irregularly netted. Skeleton formed of thick bundles of very numerous slender spicules, placed in all directions, and forming an irregular network, similar to the network of the lid of *Euplectella*.

HETEROTELLA CORBICULA. (Pl. XXVIII. fig. 2.)

Alcyoncellum corbicula, Valenc. Mus. Paris; Bowerb. B. Sp. i. p. 176.

Hab. Isle De Bourbon.

I am indebted to Prof. Wyville Thompson for having first drawn my attention to the want of the regular longitudinal fascicle of spicules in these two genera, and also for most kindly presenting me with the photographs of the two sponges taken from the specimens in the Paris Museum, which are here copied.

Fam. 2. ESPERIADÆ.

Skeleton composed of fusiform and linear spicules, interspersed with anchorate, bihamate, or birotulate spicules, which are either attached to the membranes or scattered in the sarcode, and form a defence to the sponge.

The *bihamate* and *anchorate* spicula exist in large numbers on the surface of the interstitial membrane. The *bihamate* are fusiform spicula, bent at each end into the form of a hook, the curves being in the same plane or at right angles to each other, the tips are tapering and acute, or sometimes solid and club-shaped; and rarely they are expanded into circular plates.

The *anchorate* spicula always have their two terminations in the same position as those of the bow of an ordinary ship anchor. In some sponges they are tolerably uniform in shape and proportion; while in others they vary exceedingly, not only while in course of development, but even when in their adult condition. They glide so insensibly from one form into another that it is difficult to draw a distinction between them, even when there are a sufficient number of fully developed ones to exhibit the normal form.

In most cases, besides the large and fully developed anchorate spicules, there is found accompanying them a secondary series, which are very much smaller in size, and vary exceedingly both in symmetry and amount of development; they appear to be simply abortive developments of the larger and more perfect of the normal spicula. The *anchorate* spicula are gradually and progressively developed. They are to be found at both sides of the membranaceous skeleton, and are often very minute (see Bowerb. Phil. Trans. 1858, pp. 205, 300, 303).

When the two ends are equally developed they are *equianchorate*, when unequal *inequianchorate*, and the ends are distinguished as bidentate, tridentate, and palmate.

Simple forms of spicula have the same shape from the beginning to the termination of their growth.

Synopsis of sections of family.

- I. Defensive spicules unilateral, inequianchorate, attached to the skeleton.
 - * Flukes entire, with central ridge (Genera nos. 1-4).
 - ** Flukes palmate (Genus no. 5).
 - II. Defensive spicules unilateral, bi- or triplicated, free in the sarcode (Genera nos. 6 & 7).
 - III. Defensive spicules unilateral, equianchorate, free in the sarcode.
 - * Flukes divided into two or three spines at each end (Genera nos. 8-19).
 - ** Flukes oblong, concave, with a central apical tubercle (Genus no. 20).
 - *** Flukes cup-shaped, acute at each side (Genus no. 21).
 - **** Spicules boat-shaped, with marginal sides (Genus no. 22).
 - IV. Defensive spicules compressed, bihamate, hooked at each end (Genus no. 23).
 - V. Defensive spicules bihamate or contorted only (Genera nos. 24-30).
 - VI. Defensive spicules regular, with rotate rays at each end (Genus no. 31).
- I. *Defensive spicules unilateral, inequianchorate, attached to the skeleton.*

* *Flukes entire, with a single central ridge, with a spine at its base.*

1. *ESPERIA*, Nardo (part.), O. Schmidt, p. 54.

Sponge branched, flexible, netted. Spicules of three kinds, united in the horny matter:—1. Pin-shaped. 2. Bihamate—that is, slender, cylindrical, bent up at each end, regular or tortose. 3. Equianchorate, minute; flukes ovate, with a central ridge ending in a spine below.

ESPERIA TYPICA, Nardo.

Espesia contavenii, O. Schmidt, p. 54, t. 5. f. 2 (pin-shaped spicules, double-headed, with a subbasal cross bar). B.M.

Hab. Adriatic.

<i>Esperia foraminosa</i> , O. Schmidt, p. 54, t. 5. f. 3.	B.M.
? <i>E. bauriana</i> , O. Schmidt, p. 55.	B.M.
<i>E. tunicata</i> , O. Schmidt, p. 55, t. 5. f. 4.	B.M.
<i>E. bowerbankii</i> , O. Schmidt, p. 55.	
<i>E. anceps</i> , O. Schmidt, t. 5. f. 5.	
<i>E. syrinx</i> , O. Schmidt, p. 56, t. 5. f. 6.	B.M.
<i>E. lorenzi</i> , O. Schmidt, p. 56, t. 5. f. 7.	B.M.
<i>E. massa</i> , O. Schmidt, p. 56, t. 5. f. 8.	B.M.
<i>E. modesta</i> , O. Schmidt, p. 57, t. 5. f. 9 (called <i>Clathria coral-</i> <i>loides</i> in explanation of plates).	B.M.
<i>E. volutata</i> , O. Schmidt, p. 57.	
<i>E. nodosa</i> , O. Schmidt, Supp. i. p. 33, t. 3. f. 10.	B.M.
<i>E. basillaris</i> , O. Schmidt, Suppl. i. p. 34. t. 3. f. 12.	B.M.

2. MYCALE.

Sponge massive, sessile. Oscules dispersed. Skin spiculose. Spicules of three kinds:—1. Inequianchorate, of two sizes; larger in radiating groups, flukes cordate, with a central ridge, sides of flukes dilated, curled up on the sides and produced below; smaller dispersed. 2. Fusiform, needle-like. 3. Bihamate, simple and contorted, minute.

MYCALE LINGUA.

B.M.

Hymeniacidon lingula, Bowerb. B. S. ii. p. 187, f. 147, 148, 297.

See also—

Mycale grandis, O. Schmidt, Supp. t. 3. f. 11.

Hab. India. Flukes triangular, hastate.

3. ÆGOGROPILA.

Sponge massive or coating, rugose. Oscules large, dispersed. Skin spiculose. Skeleton reticulated; fibres formed of bungled spicules. Spicules of four kinds:—1. Fusiform, needle-like, or subclavate. 2. Contorted and reversed, bihamate. 3. Inequianchorate, bidentate. 4. Fusiform, tricurvate.

ÆGOGROPILA VARIANS.

Halichondria ægogropila, Johnston.

Desmacidon ægogropila, Bowerb. B. S. ii. p. 352, f. 264.

4. MENYLLUS.

Sponge sessile, closely latticed by round inosculating branches, minutely hispid. Skin with slender fusiform spicules, fasciculated and forming a coarse irregular network. Spicules of three kinds:—1. Slender, needle-like or fusiform, partially spined. 2. Inequianchorate, angulated. 3. Bihamate, malformed.

MENYLLUS INGALLI.

Halichondria ingalli, Bowerb. B. S. ii. p. 258, f. 29, 30.

** *Flukes divided into several palmate hooks.*

5. GRAPELIA.

Sponge —? Spicules inequianchorate, in circular groups; the flukes divided into several unilateral palmate hooks.

GRAPELIA AUSTRALIS, Bowerb. B. S. f. 135.

Hab. West Australia.

II. *Defensive spicules unilateral biplicated and inequianchorate, free in the sarcode.*

6. ALEBION.

Sponge branching, anastomosing; branches compressed, corymbose, rather hispid or parasitic. Spicules:—1. Inequianchorate, bidentate. 2. Needle-like, spined. 3. Cylindrical, slender, flexuous. 4. Equianchorate, biplicated.

ALEBION HYNDMANI.

Halichondria hyndmani, Bowerb. B. S. p. 264, f. 123–127.

See also—

?*Alebion australis*, Bowerb. ib. f. 131–134.

Hab. West Australia. With triplicated unilateral spines.

7. IOPHON.

Sponge parasitic, smooth. Oscules dispersed. Skin spiculose. Spicules:—1. Fusiform, cylindrical, spined. 2. Simple, biplicated, anchorate. 3. Inequianchorate, dentate, palmate, and bidentate.

1. IOPHON SCANDENS.

Halichondria scandens, Bowerb. B. S. ii. p. 259.

2. IOPHON NIGRICANS.

Halichondria nigricans, Bowerb. ib. p. 266, f. 282.

III. *Defensive spicules unilateral, equianchorate, free in the sarcode.*

* *Flukes divided into two or three spines at each end.*

8. ISODICTYA, sp., Bowerb. B. S. i. p. 197.

Sponge sessile, minutely hispid, regularly reticulated. Spicules of three kinds:—1. Needle-shaped, fusiform. 2. Bihamate, bicalcarate (Bowerb. f. 121). 3. Equianchorate or palmate.

ISODICTYA NORMANI, Bowerb. ib. ii. p. 320, f. 121, 376 (type).

See also—

Isodictya edwardsii, Bowerb. ib. p. 325.

I. paupera, Bowerb. ib. p. 328.

I. palmata, Bowerb. ib. p. 311.

9. EMPLOCUS.

Sponge incrusting, parasitic on *Sertularia*. Spicules of four kinds:—1. Cylindrical, pin-shaped, both ends truncated, torn, smooth. 2. Cylindrical, slightly tubercular, with one or three diverging conical points at one end, and irregularly truncated at the other. 3. Cylindrical, curved, rather swollen, rounded at the ends, with two elongate spines at each side of ends. 4. Equibianchorate, two-pointed at each end.

EMPLOCUS TRIDENS.

Myxilla tridens, O. Schmidt, Supp. t. 4. f. 5.

B.M.

10. ANCHINOË.

Sponge-coating thin, smooth. Oscules slightly elevated. Skin spiculose. Spicules:—1. Fusiform, large, long. 2. Clavate, slender, entirely spined, of various sizes. 3. Equianchorate, bi- or tridentate.

ANCHINOË PERARMATUS.

Hymeniacidon perarmatus, Bowerb. B. S. p. 164.

11. MICROCIONA, part., Bowerb. ib. i. p. 188, ii. p. 124.

Sponge thin; coating with columns of spicules that radiate from the axis in every direction. Spicules of three kinds:—1. Subclavate. 2. Needle-shaped, spined. 3. Equianchorate, bidentate (or dentato-palmate).

Scopalina, O. Schmidt.

MICROCIONA SPINULENTA, Bowerb. B. S. p. 132.

See also—

M. armata, Bowerb. ib. p. 129.

M. fictitia, Bowerb. ib. p. 124.

M. carnosus, Bowerb. ib. p. 133.

M. atrosanguinea, Bowerb. ib. p. 138. *Scopalina lophyropoda*,
O. Schmidt. B.M.

? *M. ambigua*, Bowerb. ib. p. 136 (end of anchorate spicules sometimes dentato-palmate).

12. DENDORYX.

Sponge massive, irregularly reticulated. Spicules of four kinds:—1. Fusiform or cylindrical, pointed at each end, smooth. 2. Needle-like, spinulose all over. 3. Equibianchorate, three-spined at each end. 4. Bihamate.

DENDORYX INCRUSTANS.

Halichondria incrustans, Bowerb. ib. p. 249, f. 28, 92, 110, 111, 373; O. Schmidt, Supp. ii. t. 1. f. 17.

See also—

H. thompsoni, Bowerb. B. S. p. 243.

- H. albula*, Bowerb. ib. p. 268.
H. irregularis, Bowerb. ib. p. 252.
H. dickiei, Bowerb. ib. p. 253.
H. pattersoni, Bowerb. ib. p. 255.
H. batei, Bowerb. ib. p. 261.
H. granulata, Bowerb. ib. p. 262.

13. PRONAX.

Sponge sessile, rugose, and mammillated. Skin irregularly spiculate. Spicules of four kinds:—1. Fusiform, large. 2. Equianchorate, ending in three more or less unequal angulated spines, arranged in circular groups or dispersed. 3. Needle-like, stout, spined, rarely spineless. 4. Fusiform, spined.

PRONAX PLUMOSA.

B.M.

Spongia plumosa, Montag.

Hymeniacion plumosa, Bowerb. B. S. ii. p. 195, f. 141–143.

14. EUTHYMUS.

Sponge —? Spicules equianchorate, each end ending in three nearly equal-sized attenuated acute lobes or teeth.

1. EUTHYMUS SHADBOLTH.

Sponge, Bowerb. ib. i. pp. 47, 250, f. 140.

2. EUTHYMUS? MINOR.

Sponge, Bowerb. ib. ii. p. 250, f. 149.

15. DESMACIDON, part., Bowerb. ib. i. p. 200, ii. p. 345 (type).

Sponge massive, hispid, irregularly netted, with large tubular cloaca; filaments with imbedded longitudinal spicules. Spicules of three kinds:—1. Needle-like. 2. Bihamate, simple, and contorted. 3. Equianchorate, bidentate.

DESMACIDON FRUCTICOSUS, Bowerb. ib. i. p. 200, ii. p. 345; O. Schmidt, Supp. ii. t. 1. f. 19.

16. HAMIGERA.

Sponge thick, subglobose. Pores in sunken oscule-like spaces. Spicules of two kinds:—1. Simple. 2. Equibianchorate, with three spines at each end.

HAMIGERA RUBENS.

B.M.

Cribrella hamigera, O. Schmidt, S. A. p. 70, t. 6. f. 13.

17. HYMEDESMIA, part., Bowerb. B. S.

Sponge-coating very thin, smooth, with fascicules of spicules. Spicules of four kinds:—1. Cylindrical, slender, subclavate at each

end. 2. Needle-shaped, conical, strongly spined all over. 3. Equianchorate, bi- or tridentate. 4. Bihamate.

HYMEDESMIA ZETLANDICA, Bowerb. B. S. i. p. 190, ii. p. 152, f. 296, 371.

18. TEREUS.

Sponge massive, sessile, smooth, regularly reticulated, with a square mesh. Skin spiculose. Spicules of two kinds:—1. Needle-shaped, thick, spinulate all over. 2. Equibianchorate, two-spined, two-fringed, of various sizes.

TEREUS FIMBRIATUS.

Isodictya fimbriata, Bowerb. ib. ii. p. 337, f. 150; O. Schmidt, Supp. ii. t. 1. f. 18.

19. CARMIA.

Sponge-coating thin, smooth. Oscules dispersed. Skin spiculose. Spicules of four kinds:—1. Subclavate, needle-like, and very slender. 2. Fusiform, tricurvate. 3. Inequianchorate, bidentate, or subpalamate. 4. Bihamate, contorted.

1. CARMIA MACILENTA.

Hymeniacidon macilenta, Bowerb. B. S. ii. p. 176.

2. CARMIA FLOREA.

Hymeniacidon florea, Bowerb. ib. ii. p. 190.

** *Flukes oblong, concave, of rather unequal length, with a single central apical tubercle at each end.*

20. CORYBAS.

Sponge-coating lobate or branched, regularly reticulated externally. Skin spiculose. Oscules dispersed. Spicules:—1. Needle-shaped, short, and stout. 2. Needle-shaped, subcylindrical, slender. 3. Bihamate, extra-umbonate. 4. Equianchorate; flukes oblong, concave, with a single central apical tubercle at each end (Bowerb. f. 139).

CORYBAS LOBATA.

Isodictya lobata, Bowerb. B. S. ii. p. 326, f. 139.

*** *Flukes cup-shaped, acute on each side.*

21. INGALLIA.

Sponge —? Spicules:—1. Equianchorate, with a hemispinal cup at each end, abundant, recumbent on the membranes.

INGALLIA CUPULIFERA.

Desmacidon, sp., Bowerb. B. S. i. p. 252, f. 151.

Hab. —?

**** *Defensive spicules oblong, boat-shaped, concave on the sides.*

22. NAVICULINA.

Sponge —? Spicules:—1. Equibianchorate, unilateral, oblong, concave, with a marginal rib on each side, and sometimes a central keel-like one, abundant on membrane near fascicules of slender spicules. 2. —?

NAVICULINA CLIFTONI.

Hymedesmia, sp., Bowerb. B. S. i. p. 252, f. 152.

Hab. West Australia, Freemantle (*Clifton*).

IV. *Defensive spicules equibihamate, compressed, with a sharp edge, hooked at each end, free in sarcod.*

23. HAMACANTHA.

Sponge —? Spicules of two kinds:—1. Needle-shaped, slender. 2. Equibihamate; hooks and inner edge of shaft sharp-edged.

HAMACANTHA JOHNSONI.

Halichondria johnsoni, Bowerb. B. S. i. pp. 35, 127, f. 112, 293.

Hab. Madeira.

V. *Defensive spicules bihamate, simple, or contorted, without any bianchorate ones intermixed.*

24. GELLIUS.

Sponge massive, minutely hispid. Skeleton regularly netted. Spicules of two kinds:—1. Fusiform. 2. Bihamate, simple, and contorted.

1. GELLIUS JUGOSUS.

Isodictya jugosa, Bowerb. B. S. ii. p. 296.

2. GELLIUS ROBUSTUS.

Isodictya robusta, Bowerb. ii. p. 304.

25. BIEMNA.

Sponge massive. Skin rough, spiculose. Skeleton irregularly netted; fibres composed of longitudinal dispersed spicules, covered with a thin coat of horny matter. Spicules:—1. Fusiform. 2. Bihamate, simple, or contorted and reversed.

BIEMNA PEACHII.

Desmacidon peachii, Bowerb. B. S. p. 349.

See also—

Desmacidon constrictus.

D. jeffreysii, Bowerb. ib. pp. 347-350.

Halichondria corrugata, Bowerb. ib. ii. p. 242.

H. candida, Bowerb. ib. p. 251.

H. pulchella, Bowerb. ib. p. 256.

H. inornata, Bowerb. ib. p. 27.

26. ASYCHIS.

Sponge —? Spicules of two forms:—1. Fusiform, large.
2. Fusiform, slender, bihamate, simple (and contorted), large, and small.

1. ASYCHIS FIBULATA.

Reniera fibulata, O. Schmidt, p. 73, t. 7. f. 9.

2. ASYCHIS VARIANTIA.

Halichondria variantia, Bowerb. B. S. f. 11, 409.

Hymeniacion varantia, Bowerb. ib. p. 174.

27. DYMNUM.

Sponge —? Spicules:—1. Simple, bihamate, with an umbo on the inner or outer, or on the inner and outer sides of the middle of the shaft.

DYMNUM SICULUS.

Sponge from Sicily, Bowerb. B. S. i. p. 247, f. 115-117.

28. DAMO.

Sponge —? Spicules bihamate, each of the ends clavate, rounded, blunt (see Bowerb. B. S. f. 118, 119, 120).

DAMO BICLAVATA.

Sponge, Bowerb. ib. i. pp. 44, 247, f. 118-120.

29. ABILA.

Sponge-coating smooth. Oscules minute, dispersed. Skin spiculate. Spicules of three kinds:—1. Fusiform, long, slender, smooth. 2. Fusiform, tricurvate, stout. 3. Fusiform, stout, broad, spined.

ABILA LÆVIS.

Microciona lævis, Bowerb. ib. ii. p. 127.

30. ORINA.

Sponge massive, smooth. Outer skin with a network of spicules. Spicules of two kinds:—1. Fusiform slender. 2. Fusiform truncate.

ORINA ANGULATA.

Halichondria angulata, Bowerb. ib. ii. p. 233.

VI. *Defensive spicules regular, birotulate, with many rays at each end, free in sarcode.*

31. CARTERIA.

Sponge massive, irregularly reticulated, shallow, formed of abundant agglutinated filiform needle-like spicules, with four- and six-rayed stellate, cruciform, and birotulate spicules.

Hyalonema, part., Bowerb. ; Schultze ; Brandt (not Gray).

CARTERIA JAPONICA.

Hyalonema mirabilis, Bowerb. B. S. i. p. 237, f. 60-65 ; p. 276, f. 294, 295 ; Schultze, t. 3 & 4 (not Gray). B.M.

Hab. Japan.

Bowerbank's figures (Br. Sp. 153-157) represent the spicules of the corium that surround the filaments of *Hyalonema mirabilis*, Gray, and have nothing to do with the smooth stellate or radiate spicula of this sponge. They have been called *Spongia octancyræ*, Brandt, Hyal. p. 14 ; *Spongia spinicruces*, Brandt, Hyal. p. 23, t. 3. f. 15, 16. They are also figured in Schultze's '*Hyalonema*,' t. 3. f. 9-14.

Fam. 3. TETHYADÆ.

Sponge massive, suborbicular or subramose, fleshy. Skeleton consisting of simple fusiform and of fusiform spicules with three prongs or three diverging hooks at the distal or outer extremity, and with more or less globular many-rayed stellate spicules, or of either of the two kinds.

The stellate spicules are composed of few or many radii, emanating from a centre in all directions. Their simplest form is when the bases of the radii all proceed from a common point ; in others the radii spring separately and distinctly from a common central spherical or oval base.—*Bowerb. Phil. Trans.* 1858, p. 307, 309.

Dr. Bowerbank calls the elongate spicules which are peculiar to *Geodiadæ* and *Tethyadæ* connecting spicula. These spicula have a long, stout, cylindrical, or attenuated shaft, terminating either acutely or hemispherically at the base ; while the apex is divided into three stout equiangular radii, which assume in different species a considerable variety as regards form and direction. The triradiate apices are usually cemented firmly to the inner surface of the crustated coat of the sponge ; while the stout and elongated shaft is intermingled with and firmly cemented by keratode to the general mass of the skeleton. The triradiate apices also serve to construct areas in which are situated the proximal orifices of the intermarginal cavities, which are imbedded in the crustated surface of the sponge.—*Bowerb. Phil. Trans.* 1858, p. 289.

I. *Sponge subglobose, with tricurvate internal spicules supporting the outer surface.*

* *Sponge with stellate spicules on the skin or sarcode.*

1. DONATIA (part.), Nardo, Isis, 1833, p. 522.

Sponge fleshy, subglobose, warty. Spicules of three kinds:—

1. Stellate. 2. Subulate or fusiform, simple. 3. Club-shaped; club conical, truncated, with a conical process on one of the sides.

Tethya, Schmidt, Suppl. p. 43.

DONATIA AURANTIUM, Nardo, Isis, 1833, p. 522.

B.M.

Alcyonium aurantium, Pallas; Esper, t. 19. f. 4-8.

A. lyncurium, Gmelin, S. N. p. 1295.

Spongia verrucosa, Mont. W. Tr. ii. p. 117, t. 13. f. 45.

Tethea lyncurium, Lamk. A. s. V. ii. p. 592; Blainv. M. A. p. 544, t. 91. f. 3?; Johnst. B. Sp. p. 85, f. 13; Bowerb. B. S. ii. p. 92, f. 342; O. Schmidt, S. A. p. 44, t. 4. f. 1-9; Suppl. ii. t. 1. f. 15.

Tethya verrucosa, Gray, B. P. i. p. 362.

T. sphærica, Fleming, B. A. p. 520.

Hab. Coast of England.

See also—

Tetheya lacunosa, Lamk., Schw. Beob. t. 2. f. 17, 18.

Tetheum pulvinatum, Blainv. Man. d'Actinol. p. 544.

Tethia cavernosa, Lamk. Ann. du Mus. i. p. 71.

Tethya aspestella, Lamk. Ann. du Mus. i. p. 71.

Tethya hispida, Bowerb. Canadian Naturalist, p. 304.

Tethia globosa, Duchass. & Michelot. Sp. Caraïbe, p. 104. Gaudeloupe.

2. COLLINGSIA.

Sponge massive, depressed, uneven, rugged. Spicules:—1. Fusiform. 2. Stellate (attenuato- and cylindrico-stellate). 3. Fusiform, ternate, recurved at the tips.

1. COLLINGSIA SARNIENSIS.

Tethea collingsii, Bowerb. B. S. p. 87, f. 48.

2. COLLINGSIA SCHMIDTII.

Tethea schmidtii, Bowerb. ib. p. 89.

3. THENEA.

Sponge massive. Spicules:—1. Simple, not protruded beyond the surface. 2. Large, furcate, ternate, with expanded long acute rays. 3. Elongate, stellate, projecting beyond the outer surface.

THENEA MURICATA.

Tethea muricata, Bowerb. ib. i. pp. 25, 108, f. 35, 304, 305.

Hab. Norway, Vigten Island.

4. AMNISCOS.

Sponge subglobose. Spicules:—1. Fusiform. 2. Stellate; stars subglobose; rays many, short, conical, broad at the base.

AMNISCOS MORUM.

Tethya morum, O. Schmidt, Sp. Ad. p. 44, t. 3. f. 26.

Hab. Corfu.

5. STELLETTA, O. Schmidt, Sp. Ad. p. 46; Suppl. i.

Sponge globular or subglobular. Spicules of three kinds:—1. Stellate; rays three to seven, slender. 2. Simple, fusiform. 3. Filiform, two- or three-hooked.

1. STELLETTA GRUBII, O. Schmidt, p. 46, t. 4. f. 2. B.M.

2. STELLETTA WAGLERI, O. Schmidt, p. 46, t. 4. f. 3. B.M.

3. STELLETTA BOGLICII, O. Schmidt, p. 47, t. 4. f. 4. B.M.

4. STELLETTA DORSIGERA, O. Schmidt, Supp. t. 3. f. 6, 7. B.M.

6. PENARES.

Sponge subglobular. Spicules:—1. Fusiform, smooth. 2. Stellate; rays few, slender. 3. Elongate, end three-rayed; rays elongate, bifid, diverging. Like *Irate*, but without any siliceous ovisacs.

PENARES HELLERI.

Stelletta helleri, O. Schmidt, Supp. i. t. 3. f. 8.

Hab. Adriatic.

7. ECIOMEMIA, Bowerb. B. S. i. p. 173.

Sponge branched. Spicules:—1. Elongate, filiform, two- or three-hooked at the distal end. 2. Stars very small, two- or four-rayed; rays cylindrical, blunt.

ECIOMEMIA ACERVUS, Bowerb. ib. i. p. 173, f. 355; O. Schmidt, Supp. ii. t. 1. f. 10 (stars).

See also—

? *Eciomemia compressa*, Bowerb. ib. ii. p. 57.

Eciomemia ponderosa, Bowerb. ib. p. 56.

8. DERCITUS.

Sponge massive, minutely hispid, flesh-like, dark purple. Spicules of three kinds:—1. Cylindrical, spined above, minute. 2. Stellate, three- or four-rayed; rays thick, diverging. 3. Tricurved, few in number.

DERCITUS BUCKLANDI.

Hymeniacidon bucklandi, Bowerb. ib. ii. p. 226, f. 43, 44.

Hab. British Channel.

** *Sponge without star-like spicules.*

9. ANCORINA, O. Schmidt, p. 51.

Sponge subglobose or lobed, without any star-like spicules. Spicules elongate, outer end two- or three-rayed, hooked, sometimes bifid.

1. ANCORINA CREBRA, O. Schmidt, p. 51, t. 3. f. 28.

2. ANCORINA VIRESCENS, O. Schmidt, p. 52, t. 3. f. 29.

II. *Sponge subglobose, with groups of triforked or tricurvate spicules extended beyond the surface, without any internal tricurvate or stellate spicules.*

10. TETHYA.

Sponge oval, hispid. Skin thin. Spicules of four kinds:—
1. Fusiform, elongate. 2. Fusiform, three-pronged, projecting beyond the surface. 3. Bihamate. 4. Clavate, with a short conical flat head, with a conical process on one side.

Tethea, § 1, Bowerb. B. S. p. 83.

Ancorina, Schmidt.

1. TETHYA CRANIUM, Lamk.

Tethya cranium, Johnston, B. S. p. 85, t. 1. f. 1–8; Bowerb. B. S. i. p. 183, ii. p. 83, f. 77–82, 247, 251, 252, 343, 344, 362; O. Schmidt, Supp. ii. t. 1. f. 14.

Alcyonium cranium, Müller, Z. D.

Spongia pilosa, Montag. B. S. p. 119, t. 13. f. 12.

B.M.

Hab. North Sea.

2. TETHYA SIMILLIMA, Bowerb. B. S. p. 725.

Hab. Arctic Regions.

III. *Sponge expanded; coating marine bodies with external spreading spicules with stellate tips.*

11. MESAPOS.

Sponge-coating hispid. Spicules:—1. Clavate, attenuated, large, slender. 2. Clavate, cylindrical, smooth; apex spinose, stellate.

MESAPOS STELLIFERA.

Hymeraphia stellifera, Bowerb. ib. ii. p. 146, f. 370.

12. LAOTHOË.

Sponge —? Spicules of three forms:—1. Fusiform, vertically spined. 2. Clavate, elongate, slender, smooth. 3. Needle-shaped, inflated, smooth; apex divided, substellate.

LAOTHOË VERTICILLATA.

Hymeraphia verticillata, Bowerb. ib. p. 145, f. 240.

13. TIMEA.

Sponge-coating thin, hispid. Skin spiculose. Spicules of four forms:—1. Cylindro-stellate, very minute in the skin. 2. Pin-shaped, large, long, fasciculated. 3. Needle-shaped. 4. Very slender, pin-shaped.

TIMEA STELLATA.

Hymedesmia stellata, Bowerb. B. S. ii. p. 150.

14. ACARNUS.

Sponge reticulate. Spicules:—1. Cylindrical, fasciculated. 2. Cylindrical, forming radiating groups, with stellate four-rayed ends; rays short, recurved.

ACARNUS INNOMINATUS.

Sponge, Bowerb. B. S. i. pp. 23, 33, 122, f. 292.

Hab. —?

15. FONTEIA.

Sponge —? Spicules of four kinds:—1. Subcylindrical, rather clavate at each end. 2. Cylindrical, with a pin-like head at each end. 3. Cylindrical, with a pin-like head at one end, and four short recurved hooks at the other. 4. Cylindrical, clavate at one end, and with four recurved hooks at the other.

FONTEIA ANOMALA, Bowerb. ib. f. 73–76.

Hab. —?

IV. *Sponge with stellate spicules in the skin or sarcode, without any internal or external tricurvate spicules.*

* *Sponge massive.*

16. PUMEX.

Sponge massive, subglobose, fleshy. Spicules:—1. Fusiform, slender, smooth. 2. Subulate, spinulose, tapering from the flat head. 3. Stellate, rays many, slender.

PUMEX ADRIATICUS.

B.M.

Tethya pumex, Nardo.

Stelletta pumex, O. Schmidt, Supp. i. t. 3. f. 9.

17. CORTICIUM, O. Schmidt, Sp. Ad. p. 42.

Sponge oblong, globose, smooth. Outer surface dense, fibrous; inner gelatinous, both spiculose. Spicules of two kinds:—1. Stellate, three- or four-rayed; rays slender. 2. Many-rayed, like a candelabrum.

CORTICIUM CANDELABRUM, O. Schmidt, p. 42, t. 3. f. 25; Supp. ii. t. 1. f. 2.

B.M.

18. **CHONDRILLA**, O. Schmidt, S. A. p. 39; Suppl. i. p. 36.

Sponge oblong or lobed. Outer surface formed of very closely compacted fibres. Spicules stellate.

CHONDRILLA EMBOLOPHORA, O. Schmidt, p. 39, t. 3. f. 23, 23a.

B.M.

CHONDRILLA NUCULA, O. Schmidt, p. 39, t. 3. f. 22, 22a. B.M.

**** Sponge branched.**

19. **STELLIGERA.**

Sponge branched, forked, flexible; surface stellate. Spicules united by a horny substance, netted, of four shapes:—1. Pin-shaped, smooth. 2. Needle-shaped, smooth. 3. Cylindrical, elongate, blunt at each end. 4. Spherical, stellate, with many acute rays (on surface).

STELLIGERA FURCATA.

Raspailia stelligera, O. Schmidt, p. 60, t. 5. f. 11.

20. **VIBULINUS.**

Sponge arborescent, branched, forked and reformed; surface spiculate. Spicules:—1. Fusiform, needle-shaped, long, slender, often fasciculated. 2. Stellate, spherical, or rather elongate, with numerous acute rays, minute.

VIBULINUS STUPOSUS.

B.M.

Spongia rigida, Montag.

S. stuposa, var. *damicenus*, Mont.

Halichondria rigida et *H. cervicornis*, Johnst.

Dictyocylindrus stuposus, Bowerb. B. S. i. p. 109, ii. p. 116, f. 208.

Hab. England.

See also—

V. aculeatus = *D. aculeatus*, Bowerb. ib. ii. p. 109.

21. **ADREUS.**

Sponge arborescent, branched; branches forked, smooth. Spicules abundant:—1. Needle-shaped, slender, often flexuous. 2. Needle-shaped, stout, in radiating bundles. 3. Stellate, minute in the sarcode.

ADREUS FASCICULARIS.

B.M.

Dictyocylindrus fascicularis, Bowerb. B. S. ii. p. 111.

Hab. English coast.

22. **AXOS.**

Sponge branching, reticulated. Spicules stellate, nearly uniform in size, formed of two flat three-rayed stars placed one on the other

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so that the rays alternate; the rays flat, short, broad, truncated, with two, three, four, or rarely five subequal acute lobes at the ends.

AXOS CLIFTONII.

Sponge, Bowerb. B. S. i. p. 260, f. 197.

Hab. Australia, Nichol's Bay (*G. Clifton*).

See *Samus anonyma*, Bowerb. B. S. f. 41, 42, in *Clionidæ*.

23. ACHINOË.

Sponge —? Spicules stellate, three-rayed; rays much larger than the small central body, with one or more whorls of acute conical tubercles.

ACHINOË AUSTRALIS, Bowerb. B. S. i. p. 268, f. 235, 236.

Hab. West Australia, Freemantle.

See also Bowerbank's Brit. Sponges, f. 166. South Seas.

24. CYAMON.

Sponge —?, spiculose. Spicules stellate, three- or four-rayed; rays from a central point, cylindrical, blunt, minutely spined all over.

CYAMON VICKERSII.

Dictyocylindrus vickersii, Bowerb. B. S. i. p. 267, f. 234.

Hab. West Indies.

See also a parasitic sponge, Bowerb. ib. p. 242, f. 88.

25. SOLINA.

Sponge —? Spicules stellate, three-rayed; rays from a central point, elongate, cylindrical, blunt, with regular whorls of many small spines.

SOLINA ELEGANS, Bowerb. B. S. i. p. 241, f. 84.

Hab. Indian Ocean?

26. ?EURYADES, Duchass. & Michelotti, Sp. Caraïbe, p. 106.

Sponge subglobose, lobed, horny, reticulated, with large concave central oscules. Spicules large, tricuspid, rays acute.

EURYADES NOTABILIS, Duchass. & Michel. ib. p. 206, t. 25. f. 3.

Hab. West Indies, St. Thomas's.

Order V. ARENOSPONGIA.

Sponge consisting of a disk of agglutinated sand, with a series of diverging spicules on the circumference of the disk, and a pencil of similar spicules at the mouth of the oscules on the upper surface of the disk.

Fam. XENOSPONGIADÆ.

XENOSPONGIA, Gray, P. Z. S. 1858, p. 230.

XENOSPONGIA PATELLIFORMIS, Gray, ib. Rad. pl. XII. B.M.

Hab. Torres Straits.

The genus *Halicnemia* (Bowerb. B. S. i. p. 184, t. 32. f. 363, 364, ii. t. 96) has the same form as the former. It has a small pebble imbedded in the centre; but, from the description and the figures, I have little doubt that it is distinct from the above, though it may belong to the same family. It contains many imbedded short pin-shaped spicules, and some oblong tubercular bodies like ovisacs (see f. 364). But there are many differences in detail that show it must be a very distinct genus; for example, the oscules are numerous on the lower, concave surface, the upper surface is covered with extraneous matter, and the lower one clear of such impurities.

Section II. CHLAMYDOSPORÆ. *Reproduction chiefly by ova contained in defined ova-cells or "ovaria," strengthened with siliceous spicules, sometimes at length becoming solid spheres formed of siliceous spicules radiating from a central point.*

Order VI. SPHÆROSPONGIA.

The ovisac cells composed of closely packed fusiform spicules diverging from the centre, which, when the ova are emitted, extend internally and fill up the cavity, forming the ova-cells into nearly solid balls, formed of spicules diverging from the centre to the circumference, which are congregated together, and form a hard external coat to the sponge.

Fam. I. GEODIADÆ.

Sponge massive, fleshy, cellular within; pores with a regular constrictive valve. Ovisacs subglobose or oblong, with a thick coat formed of spicules in lines, radiating from the axis to the circumference, and at length becoming solid, congregated on the outer surface, or scattered in the flesh. Spicules elongate; the larger ones with two or three expanded or recurved branches on the outer ends; smaller ones simple, often extending beyond the surface.

I. *The ovisacs forming a thick external covering to the sponge.*

1. PACHYMATISMA, Bowerb. B. S. i. p. 171, ii. p. 51.

Sponge massive, irregular. Ovisacs forming a continuous external covering to the sponge. Spicules uniform, very slender; outer ends with two or three diverging branches.

PACHYMATISMA JOHNSTONIA, Bowerb. ib. ii. pp. 51, 172, f. 15, 16, 17, 20, 21, 45, 46, 93, 158, 159, 330, 331, 332, 353.

Halichondria johnstonii, Bowerb.

B.M.

2. *GEODIA*, Lamk. Ann. Mus. i. p. 334; Schweigger, Beob.

Sponge massive, with a central cavity covered with a netted or perforated lid. Spicules elongate, with two or three recurved branches at the outer end.

1. *GEODIA GIBBEROSA*, Lamk. Ann. Mus. p. 334; Blainv. Man. Act. p. 535, t. 91. f. 4; Duchass. & Michel. Sp. Car. p. 105, t. 26. f. 1.

G. tuberosa, Schweig. Beob. t. 11. f. 18, 19. B.M.
Hab. West Indies.

2. *GEODIA CARIBEAE*, Duchass. & Michel. Sp. Car. p. 105, t. 25. f. 8.

Hab. West Indies.

3. *CYDONIUM*, Fleming, Brit. p. 516.

Geodia, sp., Johnst. B. S. p. 195; Bowerb. B. S. i. p. 168, ii. p. 45; O. Schmidt, S. A. Supp. ii. p. 11.

Sponge massive, without any central cavity, permeated by sinuous canals. Ovisacs forming an interrupted external covering to the sponge. Spicules of three forms:—1. Elongate, with two or three diverging branches at the outer end. 2. Stellate, minute. 3. Fusiform, subulate, slender, sometimes extending beyond the surface.

1. *CYDONIUM BARRETTI*.

Geodia baretti (*C. barretti*), Bowerb. B. S. i. pp. 171, 236, f. 54–58, 162, 250, 301, 302, 354.

Hab. Atlantic (*MacAndrew*). B.M.

2. *CYDONIUM MUELLERI*?, Fleming, B. A. p. 516.

Alcyonium mülleri?, Jameson, Wern. Mem. i. p. 363.

Geodia zetlandica, Johnston, B. S. p. 193, t. 3. f. 3, 4; Bowerb. B. S. ii. p. 45.

Hab. North Sea. B.M.

See also—

Geodia macandrewii, Bowerb. ib. i. p. 235, f. 47, 254, 325–329; O. Schmidt, Supp. ii. t. 1. f. 9.

G. ?carinata, Bowerb. ib. i. p. 239, f. 71, 163; Phil. Trans. 1858, p. 314, t. 36. f. 42.

G. placenta, O. Schmidt, p. 49, t. 4. f. 7.

G. gigas, O. Schmidt, p. 50, t. 4. f. 8, 9; Supp. ii. t. 1. f. 3. B.M.

G. tuberosa, O. Schmidt, p. 50, t. 4. f. 10.

G. conchilega, O. Schmidt, p. 51, t. 4. f. 11.

See also—

1. *TETHEA ROBUSTA*, Bowerb. B. Sp. i. pp. 51, 52, 231, f. 18, 160, 165, 167.

Hab. Australia (*Brit. Mus.*; *S. Stutchbury*).

Spicules:—1. Fusiform, with blunt ends. 2. Stellate, with small centre and long cylindrical blunt rays. 3. Stellate, spherical; body large; rays numerous, short, broad, conical; the rays often show a central line.

2. *TETHEA INGALLI*, Bowerb. ib. i. pp. 51, 52, f. 161, 164.

Hab. —.

Spicules stellate:—1. Rays few (seven or eight), cylindrical, blunt, larger than the small central body. 2. Rays far apart (eight or nine), conical, acute, about as long as the diameter of the central body.

II. *Ovisacs scattered in the flesh and outer surface of the sponge.*

4. *ERYLUS*.

Sponge expanded, mammillated, ending in an oscule. Spicules of three kinds:—1. stellate; 2. ternate, rays forked; 3. subcylindrical, waved. With oblong ovisacs, formed of claviform spines.

ERYLUS MAMMILLARIS.

Stelletta mammillaris, O. Schmidt, p. 48, t. 5. f. 1.

B.M.

5. *TRIATE*.

Sponge irregular, tuberoso. Spicules of two kinds:—1. stellate; 2. ternate, with rays forked. Ovisacs roundish or elliptical, formed of claviform spines.

TRIATE DISCOPHORA.

Stelletta discophora, O. Schmidt, p. 47, t. 4. f. 5.

B.M.

(See also Bowerb. B. S. f. 50, 51.)

6. *CAMINUS*.

Sponge globose, with a large single subcentral cavity. Bark netted. Spicules cylindrical, filiform, blunt at the end. Ovisacs oblong, elliptical.

CAMINUS VULCANI, O. Schmidt, p. 48, t. 3. f. 27, t. 4. f. 6.

Hab. Adriatic Sea.

B.M.

Fam. 2. *PLACOSPONGIADÆ*.

Sponge branched, coral-like, with a central axis and a hard outer coat entirely formed of solidified ova. The axis and outer lamina separated from each other by a layer of sarcode, strengthened with bundles of spicules.

PLACOSPONGIA, Gray, P. Z. S. 1867.

PLACOSPONGIA MELOBESIOIDES, Gray, P. Z. S. 1867, p. 128 (cum fig.).

Hab. Borneo.

Order VII. POTAMOSPONGIA.

Ovisacs coriaceous, scattered in the tissue of the sponge, especially near the base. The cells coriaceous, with a permanent central cavity, strengthened externally with superficial spicules.

Fam. SPONGILLADÆ.

Sponge massive or branched. Skeleton formed of a network of spicula, more or less united together by horny matter; network symmetrical, four-sided.

Living in fresh water.—*Green*.

Spongilla, Lamk. A. s. Vert. ii. p. 98; Carter, Journ. Roy. Asiat. Soc. 1849, xii. p. 1.

Ephydatia, Lamx.; Gray, Brit. Plants, i. p. 353.

Tupha, Oken.

Badagia, Buxbaum in Sprengel, Syst. Veg. iv. p. 374.

- I. *The ovisacs thick, smooth, armed with birotate spicules, united by a central shaft, placed at right angles to and extending from the outer to the inner surface of the sac.*

1. EPHYDATIA.

Sponge-spicules fusiform, smooth. The disk of the ovisac-spicules entire or divided into lobes.

* *Disk of ovisac-spicules divided into lobes.*

1. EPHYDATIA FLUVIATILIS, Bowerb. B. S. f. 217, 218; P. Z. S. 1863, p. 7, t. 38. f. 1.

Hab. Europe.

B.M.

2. EPHYDATIA MEYENII, Carter, Asiatic. Soc. Journ. xii. p. 4, t. 1. f. 1; Bowerb. B. S. f. 219; P. Z. S. 1863, p. 10, t. 38. f. 4.

Hab. Bombay.

B.M.

** *Disk of ovisac-spicules entire.*

3. EPHYDATIA LEIDYI.

Spongilla leidy, Bowerb. P. Z. S. 1863, t. 38. f. 2 (disk of ovisac-spicules entire, smooth).

4. EPHYDATIA CAPEWELLI.

Spongilla capewelli, Bowerb. P. Z. S. 1863, t. 38. f. 2 (disk of spicules of ovisacs tubercular).

2. DOSILIA.

Sponge-spicules of two forms:—1. Fusiform, smooth. 2. Cylindrical, nodulose; central nodules extending beyond the stellate, and some spherical stellates with a group of recurved hooks at the ends of

the rays. Spicules of ovisacs birotate; rotulæ crenated; shaft spinose, often rudimentary.

1. *DOSILIA PLUMOSA.*

B.M.

Spongilla plumosa, Carter, *l. c.* xii. p. 5, t. 1. f. 2; Bowerb. B. S. f. 168-171, 208-212; P. Z. S. 1863, t. 38. f. 5.

Hab. Bombay.

2. *DOSILIA BAILEYI.*

Spongilla baileyi, Bowerb. P. Z. S. 1863, t. 38. f. 6.

Hab. United States, North America.

See also Bowerb. B. S. f. 241.

- II. *The ovisacs tessellated on the surface, armed with fusiform spicules arranged parallel to and beneath the outer surface of the sac; disk with a central boss or imperfectly developed irregular subbirotate spicules on the inner surface of the sac.*

3. *METANIA.*

Sponge —? Spicules fusiform, smooth, curved. Outer spicules of ovisac like those of the skeleton, smooth or spinulose. Spicules of parietes birotate; shaft short, smooth, or spinose, stout; rotulæ equal, subequal, or very unequal.

* *Shaft of birotate spicula smooth.*

1. *METANIA GREGARIA.*

Spongilla gregaria, Bowerb. B. S. f. 206, 213-216; P. Z. S. 1863, t. 38. f. 7 (disk of ovisac-spines equal).

Hab. River Amazons.

2. *METANIA PAULATA.*

Spongilla paulata, Bowerb. B. S. f. 221, 222.

Hab. Brazil.

** *Shaft of birotate spicula spinose.*

3. *METANIA RETICULATA.*

Spongilla reticulata, Bowerb. ib. i. p. 38, f. 223, 322, 323; P. Z. S. 1863, t. 38. f. 9.

Hab. Brazil.

4. *ACALLE.*

Sponge-spicules fusiform, smooth. Ovisac-spicules of outer surface equibihamate, hooks four or five, recurved, large; of wall birotate, rotulæ very unequal, inner one rudimentary, shaft very slender.

ACALLE RECURVATA.

Spongilla recurvata, Bowerb. B. S. f. 129, 224, 225; P. Z. S. 1863, t. 38. f. 10.

Hab. River Amazons.

5. DRULIA.

Sponge-spicules fusiform, smooth. Ovisac-spicules of outer surface fusiform, smooth or spiculate; of inner surface discoidal, with an internal central umbo.

1. DRULIA BROWNII.

Spongilla brownii, Bowerb. B. S. i. p. 136, f. 202, 226, 227, 301a, b; P. Z. S. 1863, t. 38. f. 11.

Hab. River Amazons.

2. DRULIA BATESII.

Spongilla batesii, Bowerb. B. S. f. 204; P. Z. S. 1863, t. 38. f. 12.

3. DRULIA CORALLOIDES.

Spongia coralloides, Bowerb. B. S. f. 13.

Spongilla coralloides, Bowerb. P. Z. S. 1863, t. 38. f. 13.

III. *The ovisac covered externally with fusiform or cylindrical spicules, placed at right angles with the surface, and with spicules in lines radiating from the centre to the circumference of the ovisac, without any birotiform or discoidal rays.*

6. EUNAPIUS.

Sponge-spicules smooth. Ovisac with outer surface reticulated, areolated. Spicules fusiform, smooth.

1. EUNAPIUS CARTERI.

B.M.

Spongilla friatilis?, Carter, Journ. R. A. Soc. Bombay, 1849, p. 3, t. 1. f. 3.

Spongilla carteri, Bowerb. B. S. f. 201, 284.

Hab. Bombay.

2. EUNAPIUS PAUPERCULA.

Spongilla paupercula, Bowerb. P. Z. S. 1863, t. 38. f. 21.

7. SPONGILLA.

Sponge-spicules fusiform, smooth. Ovisacs externally spiculate, spicules fusiform, spinose or tubercular.

1. *SPONGILLA LACUSTRIS*, Bower. B. S. f. 90, 203, 249, 320; P. Z. S. 1863, t. 38. f. 14.

B.M.

Hab. Europe.

2. SPONGILLA CINEREA, Carter, *l. c.* p. 2, t. 1. f. 5; Bowerb. B. S. f. 205; P. Z. S. 1863, t. 38. f. 19. B.M.

Hab. India, Bombay.

3. SPONGILLA CEREBELLATA, Bowerb. P. Z. S. 1863, t. 38. f. 16.

Hab. East Indies.

4. SPONGILLA LORDII, Bowerb. P. Z. S. 1863, t. 38. f. 17.

Hab. Columbia River.

5. SPONGILLA ALBA, Carter, *l. c.* p. 4, t. 1. f. 4; Bowerb. B. S. f. 91, 207; P. Z. S. 1863, t. 38. f. 15. B.M.

Hab. Bombay.

6. SPONGILLA DAWSONI, Bowerb. P. Z. S. 1863, t. 38. f. 18.

Hab. Canada.

Mr. Carter has most kindly presented to the British Museum a series of the typical specimens of all the freshwater sponges of Bombay he described and figured.

8. DIPLODEMIA, Bowerb. B. S. i. p. 201, ii. p. 357; O. Schmidt, S. Ad. Supp. ii. p. 18.

Sponge massive. Skeleton irregularly netted; filaments compact, horny, solid, scattered, with single or groups of spicules diverging from the outer surface. Ovisacs ovoid, membranaceous; outer surface covered with dispersed and subfasciculate fusiform spicula.

- DIPLODEMIA VESICULA, Bowerb. B. S. i. p. 201, ii. pp. 11, 357, f. 273, 324, 377.

Hab. Shetland. Perhaps a peculiar family.

Subclass 2. PORIFERA CALCAREA.

Skeleton composed of calcareous spicules, which are generally three-rayed, stellate.

Calcispongia, Blainv. Man. Act. p. 536.

Porifera leuconida, "Grant, Tabular View, 1861;" Bowerb. B. Sp. i. p. 154.

P. calcarea, Bowerb. ib. i. pp. 155, 160, 162.

Calcispongiæ, O. Schmidt, S. Ad.

Grantia, Fleming, Brit. An. p. 524; Johnston, B. Sp. (not Nardo).

Leucalia, Grant, Edin. Encyc. xviii. p. 844.

Oxyspongiæ imperforantes, Duchass. & Michel. Sp. Car. p. 110.

Nardo has a section of calcareous sponges; but it must not be confounded with this group. It is founded to contain two corals, allied to *Alcyonium* and *Gorgonia*, having no alliance with sponges.

Nardo gave the name of *Grantia* to a dendroid genus of fibrous sponges, of which *Spongia canabrina* of Esper is the type (see Isis, 1833, p. 522).

SYNOPSIS OF FAMILIES.

1. GRANTIADÆ. Sponge tubular or massive. Outer surface hispid, covered with three-rayed spicules.
2. ALCYONCELLIDÆ. Sponge tubular, simple or branched. Outer surface even, tessellated.
3. APHROCERASIDÆ. Sponge tubular, branched. Outer surface covered with fusiform spicules, arranged longitudinally, and internally reticulated.

Fam. 1. GRANTIADÆ.

Sponge tubular or massive, pierced with a tubular cloaca. Outer surface strengthened with three-rayed spicules.

* *Sponge tubular, isolated, or clustered.*

1. GRANTIA, Bowerb. B. Sp. i. p. 162.

Sponge tubular, fusiform, globular or bag-like, hispid. Oscules terminal, surrounded by a single series of cilia. Spicules triradiate; rays equiangular, elongate.

Grantia, sp., Fleming, B. A. (not Nardo).

Sycon, Lieberkühn, Arch. für Anat. 1860; O. Schmidt, S. Ad. p. 13; Supp. i. p. 22, 1862.

GRANTIA CILIATA, Fleming, B. A.; Johnston; Bowerb. B. S. p. 176, t. 20. f. 45, t. 21. f. 6, 7, 345, 346 a. B.M.

Spongia ciliata, Fab.

S. panicea, Esper, t. 18.

Grantia pulverulenta, Johnston, B. S. p. 180. B.M.

Spongia coronata, Ellis & Solander, Zooph. t. 58. f. 9.

Calcispongia ciliata et *C. pulverulenta*, Blainv. Man. Act.

Scypha coronata et *S. ovata*, Gray, B. Plants, i. p. 357.

Spongia inflata, Delle Chiaje, iii. t. 37. f. 16, 17.

Sycon ciliata, O. Schmidt, Sp. Ad. p. 14, t. 1. f. 1 a.

Lieberkuhnea ciliata, O. Schmidt.

See also—

Grantia asperum (*Sycon asperum*), O. Schmidt, Sp. Ad. p. 15, t. 1. f. 4, 4 a; Supp. ii. t. 1. f. 5. B.M.

G. humboldtii (*Sycon humboldtii*), O. Schmidt.

G. raphanus (*S. raphanus*), O. Schmidt.

G. setosa (*S. setosus*), O. Schmidt.

2. UTE, O. Schmidt, S. A. p. 16; Supp. p. 23.

Sponge tubular, solitary, sac-shaped or fusiform, more or less pendunculated. Oscules terminal, not crowned with a series of cilia.

1. UTE CAPILLOSA, O. Schmidt, S. Ad. p. 17, t. 1. f. 6.

Ute glabra, O. Schmidt, Supp. i. p. 23, t. 3. f. 1.

2. UTE ENSATA.

Grantia ensata, Bowerb. B. S. i. pp. 29, 241, t. 4. f. 85, ii. p. 25.

See also—

Ute chrysalis, O. Schmidt, Supp. i. p. 23, t. 3. f. 2.

Sycon (Ute) papillosum, O. Schmidt.

** *Sponge tubular, with one or many terminal oscules.*

3. ARTYNES.

Sponge tubular, compressed, simple or lobed above, with an oscule terminating each lobe. Surface even. Mouth of oscule without cilia. Spicules of outer surface clavate, bent. Skeleton three-rayed.

ARTYNES COMPRESSA.

B.M.

Grantia compressa, Johnston, B. S. p. 174, t. 20. f. 1; Bowerb. B. S. i. p. 162, ii. p. 17, f. 38, 39, f. 312–314, f. 346b.

Calcispongia compressa, Blainv.

Spongia foliacea, et *S. compressa*, Mont. Trans. Wern. Soc. p. 2, t. 12.

Scypha foliacea, Gray, Br. Plants, i. p. 358.

*** *Sponge massive, with a tubular cloaca.*

4. LEUCOSOLENIA, Bowerb. B. S. i. p. 164; O. Schmidt, S. A. Supp. ii. p. 8.

Sponge tubular, formed of a single layer of triradiate and other spicula.

Nardoa, et *Grantia*, O. Schmidt, p. 41.

† *Arborescent.*

1. LEUCOSOLENIA BOTRYOIDES, Bowerb. B. S. i. p. 164. B.M.

Spongia botryoides, Ellis & Solander.

Grantia botryoides, Fleming; Johnst. B. S. p. 178, t. 21. f. 1–5.

G. lieberkuhnii, O. Schmidt.

Calcispongia botryoides, Blainv.

Spongia complicata, Mont.

Scypha botryoides, Gray.

S. confervicola, Templeton.

See also—

Grantia clathrus, O. Schmidt, Supp. p. 24, t. 3.

†† *Massive.* *Nardoa*.

2. LEUCOSOLENIA CONTORTA, Bowerb. B. S. ii. p. 29.

3. LEUCOSOLENIA LACUNOSA, Bowerb. ib. ii. p. 32.

Grantia lacunosa, Johnston, B. S. p. 176, t. 20. f. 23.

Nardoa lacunosa, O. Schmidt, Supp. p. 41.

††† *Incrusting spicula minute.*

4. LEUCOSOLENIA CORIACEA, Bowerb. B. S. ii. p. 34.

Spongia coriacea, Mont.*Grantia coriacea*, Johnston, B. S. p. 183, t. 21. f. 9.*G. multicava*, Bean.

See also—

Leucosolenia pulchra, O. Schmidt.*Grantia striatula*, Bowerb. B. S. i. p. 233, f. 38, 39.*G.* —?, Bowerb. ib. i. p. 245, f. 100.*Hab.* Australia (*Harvey*). Sponge minute, $\frac{1}{8}$ inch only.*G.* —?, Bowerb. ib. i. p. 245, f. 101.*Hab.* Algoa Bay. Size of a large pea.*G.* —?, Bowerb. ib. i. p. 268, f. 237.*Hab.* West Australia, Freemantle.

5. LEUCONIA, Grant.

Sponge massive, permeated by sinuous canals, strengthened with irregularly placed triradiate and other spicula.

Leuconia, Bowerb. B. S. i. p. 164, ii. p. 32; O. Schmidt, S. Ad. Supp. ii. p. 3.

Medon, Duchass. & Michel. S. Car. iii. p. 186.

1. LEUCONIA NIVEA, Bowerb. B. S. ii. p. 36.

B.M.

Spongia nivea, Grant, New Edin. Phil. Journ. i. p. 168, t. 2. f. 14–16.

Gantia nivea, Fleming; Johnston, B. S. p. 182, t. 21. f. 8.*Calcispongia nivea*, Blainv.*Grantia solida*, O. Schmidt, S. Ad.*Hab.* Coast of England.

2. LEUCONIA FISTULOSA, Bowerb. B. S. ii. p. 39.

Grantia fistulosa, Johnston, B. S. p. 191, t. 20. f. 7.*Hab.* South coast of England.

3. LEUCONIA PUMILA, Bowerb. B. S. ii. p. 41.

Hab. Guernsey (*Norman*).

See—

Medon imberbis, Duchass. & Michel. S. Car. p. 111, t. 25. f. 2.*Hab.* West Indies.*Medon*, sp., Duchass. & Michel. S. Car. p. 111, t. 25. f. 9, 10.*Hab.* West Indies.6. LEUCOGYPSIA, Bowerb. B. S. i. p. 165, ii. p. 2; O. Schmidt,
l. c. p. 8.

Sponge massive, with oscules on outer surface and no cloaca, formed of irregularly disposed membranes and spicula.

1. *LEUCOGYPSIA GOSSEI*, Bowerb. ib. ii. p. 12.*Hab.* South coast of England.2. *LEUCOGYPSIA ALGOENSIS*, Bowerb. ib. ii. p. 166, t. 26. f. 345, 350 (spicula).*Hab.* Algoa Bay.7. *CLATHRINA*.

Sponge branched; branches slightly compressed, variously and irregularly anastomosing. Oscules at the end of the smaller branches. Spicules triradiate, rays blunt.

CLATHRINA SULPHUREA.

B.M.

Grantia clathrus, O. Schmidt, S. A. Supp. i. p. 24, t. 3. f. 3.8. *LELAPIA*.

Sponge —? Spicules calcareous, elongate, fusiform, with two more or less elongated nearly parallel branches at one end.

LELAPIA AUSTRALIS.*A new calcareous sponge*, Bowerb. B. S. i. f. 237.*Hab.* West Australia, Freemantle.Fam. 2. *ALCYONCELLIDÆ*.

Sponge tubular, simple or branched. Outer surface tessellated, formed of square perforated cells. Oscules terminal.

1. *ALCYONCELLUM*.

Sponge soft, subgelatinous, slightly branched.

Alcyoncellum et *Alcyoncella*, Blainville, Man. d'Actin. p. 529, 1832 (not Milne-Edwards, 1835; Bowerbank, nor Owen, Nardo, nor O. Schmidt).

ALCYONCELLUM GELATINOSUM, Blainv. Man. d'Actin. p. 529, t. 92. f. 5.

Hab. —.

B.M.?

2. *DUNSTERVILLIA*, Bowerb.; O. Schmidt, S. Ad. p. 6.

Sponge tubular, fusiform or globose, hispid. Surface even, tessellated. Oscules single, terminal, surrounded with two series of cilia—one vertical, and the other expanded horizontally. Spicules of skeleton three-rayed, rays equal; of fringe rigid, fusiform.

1. *DUNSTERVILLIA TESSELLATA*.

Grantia tessellata, Bowerb. B. S. i. pp. 29, 275, t. 4. f. 86, 286, ii. p. 26.

With the internal defensive spicules (clavate) curved towards the mouth of the cloaca.

2. *DUNSTERVILLIA CORCYNENSIS*, O. Schmidt, S. Ad. p. 16, t. 1. f. 5; Supp. ii. t. 1. f. 6.

Fam. 3. *APHROCERASIDÆ*.

Sponge tubular, branched, formed of two coats; outer coat of simple fusiform spicula, placed side by side in the longitudinal axis of the stem and branches. Inner coat and network of interlaced fibres, placed in all directions. Branches simple, attenuated and open at the tip.

APHROCERAS, Gray, P. Z. S. 1858, p. 113.

APHROCERAS ALCICORNIS, Gray, ib. p. 114, Rad. pl. x. f. 1, 2.
Hab. Hong Kong (*Dr. Harland*). B.M.

DESCRIPTION OF PLATES XXVII. & XXVIII.

PLATE XXVII.

- Fig. 1. *Dactylocalyx subglobosa* (p. 506), of the natural size. From a specimen in the British Museum.
 2. *Dactylocalyx pumicea* (p. 506), one-eighth of the natural size. From a specimen in the British Museum.

PLATE XXVIII.

- Fig. 1. *Corbitella speciosa*, p. 530.
 2. *Heterotella corbicula*, p. 531.
 (Both from photographs of specimens in the Museum of Paris.)

7. On some New or imperfectly known Fishes of Madras.
 By FRANCIS DAY, F.Z.S., F.L.S., Madras Army.

The following descriptions refer to seven species of fish personally obtained in the Madras Presidency during the last few months. The freshwater ones are from the Toomboodra at Kurnool, the saltwater ones from Madras. They appear to be either new to science or imperfectly known, as none find a place in Dr. Günther's elaborate 'Catalogue of Fishes,' except where they are mentioned in notes without a description, and with the synonymy only, as "species either insufficiently described, or founded on characters so slight that it is doubtful if they will stand as species." Sykes's *Pimelodus gogra* seems to form the type of a new genus, which I have designated *Gogrius*.

LETHRINUS KARWA, Cuv. & Val.

B. vi. D. 10/9. P. 13. V. 1/5. A. 3/8. C. 17. L. 1. 46.
 L. tr. 5/16.

Length of specimen 15 inches.

Length of head $\frac{4}{15}$, of pectoral above $\frac{1}{4}$, of caudal $\frac{1}{6}$, of base of dorsal nearly $\frac{1}{5}$, of base of anal $\frac{1}{6}$ of the total length. Height of

head $\frac{1}{5}$, of body $\frac{1}{3}$, of hard dorsal $\frac{1}{10}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{12}$ of the total length.

Eyes circular; diameter $\frac{2}{9}$ of length of head, $1\frac{1}{4}$ diameter apart, $2\frac{1}{4}$ diameters from end of snout.

Jaws of equal length. Cleft of mouth extends two-thirds the distance to beneath the anterior margin of the orbit. Preopercle entire; posterior limb nearly vertical and slightly emarginate, angle rounded. Opercle with two very dull points. Sub- and interopercles entire. Five rows of scales on the opercle, none on the cheeks.

Teeth. Anteriorly in both jaws some canines, with several rows of conical ones posterior to them, and molars with rounded crowns in the posterior part of the jaws. No teeth on vomer or palate.

Fins. Dorsal spines moderately strong, extending over three-fifths of the base of the fin; third and fourth spines the longest; a fleshy sheath, thickest posteriorly, runs along the base of the fin. Third anal spine the longest. Caudal lunated.

Colours. Olivaceous brown, becoming lighter on the abdomen; the centre of each scale having a cerulean-blue spot, which, reaching almost across it, forms blue lines in the direction taken by the rows of the scales. Pectoral flesh-coloured, with the base of the second, a wide undivided ray, of bright blue. Ventral bluish slate-colour. Dorsal and anal slate-coloured, margined with orange. Caudal bluish. Eyes golden. The whole of the inside of the mouth and fauces bright orange.

Hab. Madras.

SERIOICHTHYS LINEOLATUS, sp. nov.

B. vii. D. $6\frac{1}{24}$ | II. P. 21. V. $1\frac{1}{5}$. A. $\frac{1}{16}$ | II. C. 16. L. 1.
96. L. tr. $16\frac{1}{28}$.

Length of specimens $11\frac{5}{10}$ inches.

Length of head $\frac{1}{5}$, of base of first dorsal $\frac{1}{11}$, of base of second dorsal $\frac{1}{3}$, of pectoral $\frac{1}{3}$, of base of anal $\frac{2}{11}$, of caudal $\frac{1}{4}$ of the total length. Height of head $\frac{1}{7}$, of body $\frac{1}{5}$, of dorsal spines $\frac{1}{33}$, of dorsal rays $\frac{1}{33}$, of ventral $\frac{1}{6}$, of anal rays $\frac{1}{7}$ of the total length.

Eyes. Transverse diameter slightly the longest, upper margin close to the profile; a narrow adipose lid along either side of the eye. Diameter $\frac{1}{4}$ of length of head, 1 diameter apart, $1\frac{1}{4}$ diameter from end of snout.

Body elongated and compressed, its greatest height being opposite the origin of the soft dorsal.

Head compressed; snout rather produced. Gape of mouth slightly narrow; posterior margin of upper jaw reaches to below the anterior margin of the orbit, and is partially hidden by the preorbital, which has some elevated stellated ridges along its upper portion. A rather high central longitudinal crest along the summit of the head, and a smaller one passing backwards and slightly inwards from before the anterior margin of the orbit. Nostrils midway between orbit and end of the snout. Vertical limb of præoperculum entire and directed

slightly backwards; angle rounded; horizontal limb *entire*. Gill-opening cleft to beneath the anterior margin of the orbit.

Fins. Pectoral commences opposite to the summit of the suboperculum; ventral under the lower insertion of the root of the pectoral; first dorsal over the posterior third of the pectoral, and terminating close to the second dorsal. Anal, which has *no free spines anterior to it*, commences under about the thirteenth dorsal ray. Dorsal spines low, not strong, membrane deeply emarginate; spine of second dorsal weak, the anterior portion of the fin the highest, its posterior two-thirds being low and parallel to the back, divided by a short interspace from two free rays, which are placed close together, the last being elongated and reaching the root of the caudal. Pectoral longest superiorly. Ventral pointed, and without any groove along its base. Form of anal and the free rays posterior to it of the same character as the dorsal. Caudal deeply lobed in its posterior three-fourths.

Scales over body, upper surface of opercles, and cheeks; a slight groove along the second dorsal and anal fins.

Lateral line passes straight to opposite the commencement of the second dorsal, then slightly descends, and from opposite the origin of the anal proceeds direct to the centre of the caudal, on which it is continued without any elevation to its end.

Colours. Back deep slate-colour; abdomen white. A deep-blue line runs from the eye to the posterior margin of the dorsal fin above the tail, a second from the inferior margin of the orbit to the centre of the caudal fin. Between these lines the colour is of a dull yellow; below the inferior blue line at first yellowish, then gradually shaded from bluish to white. Caudal yellowish green. Anal yellowish. Pectoral slate-coloured, tipped with yellow. Dorsal darkish. Eyes golden. Lips blue.

Two specimens were captured in March 1867, both of which differed from the *S. bipinnulatus*, more especially in having one ray less in the dorsal fin, in there being no free spines before the anal, and in the præoperculum being entire.

Hab. Madras, where it is said to attain 2 feet in length.

COSSYPHUS NEILLI, sp. nov.

B. vi. D. 12/10. P. 16. V. 1/5. A. 3/12. C. 14. L. 1. 34. L. tr. 5/12.

Length of specimens $7\frac{5}{10}$ inches.

Length of head $\frac{3}{7}$, of pectoral $\frac{1}{6}$, of base of hard dorsal a little above $\frac{1}{3}$, of base of soft dorsal $\frac{1}{8}$, of base of anal $\frac{1}{6}$, of caudal $\frac{1}{8}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{2}{7}$, of hard dorsal $\frac{1}{11}$, of soft dorsal $\frac{1}{11}$, of ventral, including prolonged rays, $\frac{1}{6}$, of anal spines $\frac{1}{9}$, of anal rays $\frac{1}{8}$ of the total length.

Eyes. Upper margin not far from the profile. Diameter $\frac{2}{3}$ of length of head, 1 diameter apart, $1\frac{1}{3}$ diameter from end of snout.

Body rather elongated; snout produced; the dorsal profile slightly more convex than that of the abdomen.

Mouth anterior, the posterior extremity of the upper jaw reaching to under the anterior margin of the orbit, but almost concealed by the preorbital and thick fleshy upper lip, which has a broad fold anteriorly. Posterior limb of the præoperculum nearly vertical, but becoming slightly oblique towards its angle, and the whole very finely serrated; lower limb horizontal, entire. Operculum spineless, rather higher than wide; sub- and interopercula entire.

Teeth. Four strong canines in the anterior part of either jaw, the outer ones in the upper jaw curved outwards, as are also those of the lower jaw, but to a less extent; a single row of pointed teeth along the side of either jaw, and a posterior canine.

Fins. The dorsal spines anteriorly weak, the last being longest and strongest and equal in length to the rays; the interspinous membrane extended beyond the spines and deeply notched. Pectoral rather pointed. Ventral with its first ray prolonged; its spine weak and nearly equal in length to the last dorsal one. First anal spine weak, half the length of the second, which is about equal in strength to, but not so long as, the third. Caudal with a broad base, and slightly emarginate.

Scales cycloid, placed in horizontal rows along the body; those on the head smaller, and covering the interorbital space, the cheeks, and opercula, but not the preorbital; also forming a sheath to the dorsal and anal fins, and extended over the base of the caudal.

Lateral line composed of scales smaller than those contiguous, consisting of a single tube on each scale branching posteriorly. It is continuous in upper third of the body from the head to the centre of the caudal fin.

Colours. Scarlet, extended over the whole of the body without any dark markings. Anal yellow, its central rays scarlet; the dorsal red, with its last few rays yellow, its sheath also yellowish. Caudal red. Pectoral flesh-coloured. Lips reddish. Eyes golden, with red markings.

I have named this species after my esteemed correspondent A. G. Brisbane Neill, Esq., F.Z.S.

Hab. Madras.

PLAGUSIA POTOUS, Cuv.; Russell, pl. 73.

B. vi. D. 107. V. 6. A. 87. C. 12. L. 1. 87.

Length of head $\frac{2}{3}$ of the total length. Height of body $\frac{1}{4}$ of the total length.

Eyes on the left or coloured side, half of the superior being in advance of the inferior, and the posterior margin of the lower orbit being in the centre of the length of the head; diameter $\frac{1}{11}$ of length of head; 1 diameter apart.

Body elongated and lanceolate. Mouth cleft to slightly beyond the posterior extremity of the lower orbit, its angle midway between snout and gill-opening. The elongated hook of the snout ends below a vertical line from the anterior extremity of the upper orbit.

Fins. Dorsal commences the length of two diameters of the orbit

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before the superior one, the eighth ray being over the centre of the upper orbit. The anal arises under the posterior extremity of the opercle; both fins are joined to, but not amalgamated with, a pointed caudal, the points of the rays project slightly beyond the membrane.

Scales ctenoid, decreasing in size from the centre to the side of the body. Those on the right side of the body larger than those on the left.

Lateral line commences just above the opening of the mouth, and skirts the snout, becoming divided into three; the superior is continued along the upper seventh of the body to its termination at the base of the caudal; the central one, passing above the eyes, goes straight along the centre of the body to the middle of the base of the caudal, whilst the inferior passes to between the orbits. The middle line gives a second branch over the nape to join the superior one, and slightly anterior to it another short descending one. Another line passes along the lower jaw, and ends at the extremity of the operculum, becoming convex *en route*. The central lateral line is on scales smaller than those around it.

Colours. Darkish brown on the coloured side, yellowish white on the blind side. Dorsal, anal, and caudal fins with a white edging.

Hab. Common in Madras.

SYNAPTURA JERREUS, Cuv.

Jerre potoo, B. Russell, pl. 71.

B. vi. D. 65-68. P. 10. V. 6. A. 56. C. 16. L. 1. 96.
L. tr. 25/31.

Length of specimens from 4 to $5\frac{6}{10}$ inches.

Length of head $\frac{1}{7}$ of the total length. Height of head $\frac{1}{5}$, of body $\frac{1}{3}$ of the total length.

Eyes close together, the anterior third of the superior one being in front of the inferior one, whilst the distance from the end of the snout equals its diameter.

Cleft of mouth narrow, twisted round to the left side. Nostrils on the coloured or right side tubular, but not so on the left.

Teeth in jaws minute on the blind side.

Fins. Dorsal commences opposite the anterior extremity of the upper orbit; it is continuous with the caudal, and also with the anal. Occasionally the first dorsal ray is thickened and prolonged. Pectoral short, close to the gill-opening, and of equal length on both sides, equal to about the diameter of the orbit.

Scales strongly ctenoid.

Lateral line passes direct from the posterior border of the opercle to the centre of the caudal.

Colours. Of a greyish brown, with rich reddish-brown vertical bands, commencing at the summit of the dorsal and extending to the inferior margin of the anal fin-rays, on which they become nearly black. From ten to eleven exist on the body, and two pass down the head. Pectoral on the coloured side black. Caudal black, with some irregular white markings towards its side and extremity. In

some specimens there are three bands on the head, and those in the anterior part of the body divide into two at their lower halves.

Hab. Madras.

Genus GOGRIUS.

Branchiostegals seven. Opercular bones with moveable articulations. Bones on summit of head granulated and covered with thin skin. Mouth wide, anterior; upper jaw mostly the longest. Two pairs of cirri, the maxillary thin, the mandibular wide apart. Nostrils approximating, the posterior provided with a valve. Eyes not covered by skin. Teeth in jaws slightly villiform anteriorly, but posteriorly molars with more or less large rounded crowns; on the palate also molars with globular crowns, placed in two widely separated patches, converging anteriorly. Two dorsals: the first with a strong serrated spine and seven rays, and placed before the ventral; second dorsal adipose and small. Pectoral spine strong, serrated on both edges. Caudal forked. Air-bladder present.

GOGRIUS SYKESII.

Pimelodus gogra, Sykes.

B. viii. D. $\frac{1}{6}$ | 0. P. 1/9. V. 6. A. 12. C. 17.

Length of head $\frac{1}{4}$, of pectoral $\frac{1}{5}$, of base of first dorsal $\frac{1}{9}$, of base of adipose dorsal $\frac{1}{9}$, of base of anal $\frac{1}{12}$, of caudal $\frac{1}{6}$ of the total length. Height of head $\frac{1}{7}$, of body $\frac{1}{5}$, of first dorsal $\frac{1}{5}$, of adipose dorsal $\frac{1}{14}$, of ventral $\frac{1}{7}$, of anal $\frac{1}{7}$ of the total length.

Eye. Situated slightly above the level of the cleft of the mouth, directed rather upwards and outwards, transversely oval, and its transverse diameter $\frac{2}{3}$ of length of head; eyes $1\frac{1}{2}$ transverse diameter apart, $1\frac{1}{3}$ from end of snout.

Body stout; cheeks puffed out. The dorsal profile more convex than that of the abdomen, which last is almost straight. There is a considerable rise from the snout to the commencement of the dorsal fin.

Summit of head rather compressed, whilst the snout appears to be slightly produced, and the upper jaw the longest. Gape of mouth wide, and equal to twice the extent of the cleft, which last does not reach to beneath the anterior margin of the orbit. Snout rather pointed. The intermaxillaries do not extend the whole width of the gape. A shallow longitudinal groove exists between the orbits, only extending one-third of the distance to the base of the occipital process, which is roughened and of equal width, which is scarcely equal to half its length, whilst it embraces the basal bone of the dorsal fin, which is roughened and of a V-shape. Nostrils midway between orbits and end of snout; they approximate, and are not furnished with a cirrus. Maxillary cirrus thin and extending to the base of the pectoral fin. Mandibular cirrus wide apart from that on the opposite side, commencing under the vertical from the anterior margin of the orbit, and reaching to beneath the root of the pectoral fin. Branchial membranes of the two sides coalesce in a wide band of skin, which is not confluent with that of the isthmus.

Teeth. In intermaxillaries villiform; in lower jaw also villiform, anteriorly in several rows, having posterior to them some with globular crowns, whilst all along the sides of the jaws are of this last description, increasing in size posteriorly, where they play against those of the palate, which are in one large patch converging anteriorly, whilst all have globular crowns.

Fins. The whole of the dorsal is placed anterior to the ventral, which last does not extend to the commencement of the anal, over which last is the adipose dorsal. Dorsal fin rather highest anteriorly, its spine two-thirds of length of head, and ending in a soft point; it is strong, smooth, excepting posteriorly, where it is slightly serrated. The pectoral, which commences under the opercle, has a very strong, flat spine, a little longer than that of the dorsal; it is armed with strong denticulations on both sides, which are largest internally, where they are directed anteriorly, whilst the external ones are directed posteriorly; it has a soft termination. Anal highest in its centre, and its rays weak. Caudal lobed in its last half, both of which are pointed.

Lateral line at first curves slightly downwards, then makes a curve upwards opposite the ventral, and from the centre of the body proceeds direct to the caudal.

Colours. When first captured, of a canary-colour with dusky fins; having been some time out of the water it becomes of a dull brownish yellow, and after soaking some time in spirits almost all the yellow disappears; it seems due to mucus with which the fish is covered.

Hab. Kurnool and the Deccan.

EUTROPIUS TAAKREE, Sykes.

B. vi. D. $\frac{1}{6-7}$ | 0. P. $\frac{1}{8}$. V. 6. A. $\frac{3}{43}$. C. 18.

Length of head $\frac{1}{6}$, of pectoral $\frac{1}{6}$, of caudal $\frac{2}{11}$, of base of dorsal $\frac{1}{20}$, of base of anal $\frac{1}{3}$ of the total length. Height of head $\frac{1}{3}$, of body $\frac{2}{11}$, of dorsal $\frac{1}{7}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{12}$ of the entire length.

Eye. Diameter $\frac{1}{4}$ of length of head, nearly 2 diameters apart, $1\frac{1}{3}$ diameter from end of snout. They are so situated that more of the eye is to be seen from the under than the upper surface of the head, being directed outwards and partly downwards.

Body elongated and compressed, highest opposite the dorsal fin. Profile of upper surface of the head a little concave, owing to a slight elevation of the snout and another rise at the occiput. Abdominal profile more convex than that of the back.

Gape of mouth moderately wide, its cleft rather concave, owing to there being an elevation at the symphysis. Lower jaw slightly the longest in adults. Occipital process long and slender, having an intermediate bone between it and the basal bone of the dorsal fin, the two forming the occipital process being five times as long as wide. Central longitudinal groove shallow, commencing rather behind the posterior extremity of the orbits, and continued, though but little apparent, to the base of the occipital process. Nostrils transversely oval, situated at a short distance (equal to their diameter) apart;

the anterior one on the front surface of the snout just internal to the root of the maxillary cirrus, divided from the posterior by the nasal cirrus; the posterior nostril rather more than one diameter from the median line of the skull. Nasal cirri thin, extending to opposite the posterior margin of the orbit; the maxillary reaching to the commencement of the base of the anal fin; the two pairs of labial cirri arise close together, the root of the internal one slightly in front of that of the external one, and both nearly under the symphysis, whilst they reach to the first third of the pectoral fin.

Teeth in both jaws in numerous fine rows; those in the vomer and palatine bones separated by a very short interspace in the central line, and each of these again divided into two separate patches of an almost oval form, so that their inner margin has three emarginations.

Fins. Dorsal commences opposite the centre of the pectoral. Ventral under the posterior third of the dorsal. Adipose dorsal over about the thirty-second anal ray. First dorsal pointed; its spine sharp, strong, rugose anteriorly, and serrated posteriorly in its upper two-thirds, whilst it has a soft termination. Pectoral spine strong, finely serrated internally, whilst it is one-fourth longer than the dorsal spine. Ventral small, and extending as far as the anus. Caudal deeply forked, with pointed lobes.

Lateral line nearly straight, dividing into two at the root of the caudal fin.

Air-bladder large, simple.

Colours. Silvery, with a gloss of green along the back and head. Caudal stained rather darkish. All the other fins diaphanous.

Grows to upwards of $1\frac{1}{2}$ foot in length, and is good eating.

Hab. Kurnool and the rivers of the Deccan.

May 23, 1867.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

Mr. E. Blyth, C.M.Z.S., exhibited a series of drawings of the horns of various Indo-Chinese species of Deer (*Cervus duvauceli*, *C. schomburgki*, &c.).

Mr. Blyth also exhibited two specimens of Crows from a collection of skins sent from Australia, evidently of two different species, one being considerably larger than the other, and differing in some other particulars. The smaller kind was stated to be that figured in Mr. Gould's 'Birds of Australia,' vol. iv. pl. 18, as *C. coronoides*, Gould, where the figure is stated to be of the natural size; but the specimen exhibited had a longer wing, measuring 12 inches from the carpus, and the lanceolate feathers of the front of the neck were considerably less strongly developed than in Mr. Gould's representation of the species.

The White-eyed Australian Crow at present in the Society's Gardens, the manners of which were exceedingly like those of the British Jackdaw, was identical with this smaller kind. Length from bill to gape $2\frac{1}{4}$ inches, of tail $7\frac{1}{2}$ inches, tarsus $2\frac{1}{4}$ inches, and middle toe with claw 2 inches. The larger species was probably that noticed by Mr. Ramsay in the 'Ibis' for 1865, p. 303, as being distinguished by having a dark-coloured iris. The lanceolate feathers in front of the neck were considerably more developed than in the other; and the throat was bare of feathers to a much greater extent, having merely a narrow central strip of them. Length of wing from carpus $14\frac{3}{4}$ inches, tail 9 inches, bill from point to gape $2\frac{3}{4}$ inches, tarsus $2\frac{1}{2}$ inches, and middle toe and claw $2\frac{3}{8}$ inches. In the smaller species the bill was more distinctly angulated than in the other; but in other respects the two bore a near resemblance.

The following papers were read:—

1. List of Birds collected by Mr. Wallace on the Lower Amazons and Rio Negro. By P. L. SCLATER, M.A., F.R.S., and OSBERT SALVIN, M.A., F.Z.S.

(Plates XXIX. & XXX.)

Mr. Wallace having kindly placed in our hands the collection of birds remaining in his possession from his former travels on the Lower Amazons and Rio Negro, we have had great pleasure in determining the species and in compiling the subjoined list of them. As regards the vicinity of Pará and the Lower Amazons Mr. Wallace believes the series now remaining in his hands to contain specimens of nearly all the species collected, with the exception of the water-birds, some of which have been altogether parted with. But a large part of the collections made on the Rio Negro, as likewise nearly all those from the Upper Amazons above Barra, were most unfortunately lost in the manner mentioned by Mr. Wallace in the Preface to his 'Travels on the Amazon and Rio Negro' (Preface, p. 4). Some few specimens of Upper-Amazons species still remain in Mr. Wallace's possession; but we have not included their names in the present list, as the country in which they were collected belongs to a different zoological province.

Many naturalists have at different times passed up and down the Lower Amazon and Rio Negro, and collected at various points on their banks; but we are still without anything like a detailed or connected account of the ornithology of the regions through which they travelled. It is in fact only within the last few years that the importance of giving exact localities to objects of natural history has met with the appreciation it deserves. Coming as it does from ground so repeatedly traversed, it was not to be expected that Mr. Wallace's collection would contain many novelties; and it is therefore chiefly with the object of elucidating the avifauna of this region, and fixing to exact localities species of which the precise *patria*

was hitherto unknown, that this catalogue has been prepared. Mr. Wallace has rendered it more valuable by adding notes on the habits and range of certain species, which have his initials affixed to them.

The principal localities wherein the present collection was formed were:—

1. *Mexiana*. An island situated in the main stream of the Amazons, between the great Island of Marajo and the northern shore. Mr. Wallace has given an account of his sojourn in this island in his 'Travels,' p. 86, where he speaks of it as follows:—

"The Island of *Mexiana* is about twenty-five miles long by twelve broad, of a regular oval shape, and is situated exactly on the Equator. It is quite flat, and is all *campo*, or open ground, but dotted with scattered trees and bushes, and with a little forest at the water's edge. It is celebrated for its birds, alligators, and onças, and is used as a cattle estate by the proprietor."

2. *Island of Marajo*. A few specimens were collected at Jungcal, on the northern side of this island (see 'Travels,' p. 107).

3. *Para*. The species marked "Para" were all collected within ten miles of the city. The forest commences within two miles of the town. The whole aspect of the country is fully described in the second chapter of Mr. Wallace's interesting narrative.

4. *Rio Tocantins*. The species marked thus were collected between the mouth of the river and the first falls, during the excursion spoken of in Mr. Wallace's 'Travels,' Chap. III. Some interesting remarks on the same subject will also be found in Mr. Bates's well-known 'Naturalist on the Amazons,' Chap. IV.

5. *Rio Capim*. This is a small river issuing into the *Rio Para*, near the city of *Para*. Mr. Wallace gives an account of his excursion up this river in Chap. V. of his 'Travels.'

6. *Rio Negro*. A full account of Mr. Wallace's journey on this river and its affluents will be found in Chap. VII. and four following chapters of his narrative. It is much to be regretted that the species from this district recorded in the present list form but a very small portion of the number actually collected—the series reserved by Mr. Wallace for his own use having been lost in the manner already mentioned, and that transmitted to England dispersed without any record having been kept of it.

Besides the specimens obtained at these localities, a few others were procured at various points of the main stream on the voyage up to Barra, chiefly at Montalegre and Santarem.

The following list gives the names of all the species remaining in Mr. Wallace's hands from the above-mentioned localities. A few well-known species, identifiable without any chance of error from Mr. Wallace's notes, have been added to it—and a few others, of which examples collected by Mr. Wallace are in Selater's collection or in the British Museum.

The nomenclature adopted for the Passeres, Picariæ, and Psittaci is that of Selater's 'American Catalogue,' unless the contrary is stated. The species described as new are three in number, namely *Hylophilus rubrifrons*, *Hylophilus semicinctus*, and *Heteropelma*

wallacii. Mr. Wallace has kindly furnished us with notes upon some of the species, which are indicated by his initials.

Fam. TURDIDÆ.

1. *TURDUS PHÆOPYGUS*, Cab. (Pl. XXIX.)

Cobati, Rio Negro, 1851, two examples, "eyes olive." In Sclater's collection from Para.

The young of this species has a good deal of black colouring on the edges of the breast-feathers, which wear off in the adult, and leave the breast pure grey. One of Mr. Wallace's skins is a bird of the year and exhibits this plumage, which, however, is still more strikingly shown in a still younger specimen in Sclater's collection, shot by Mr. C. Bartlett on the Maroni River, Surinam, in the spring of 1866, and represented in Plate XXIX.

2. *TURDUS ALBIVENTRIS*, Spix, Av. Bras. i. p. 70, t. 69; Cab. Mus. Hein. i. p. 4; Cab. in Schomb. Guian. iii. p. 666.

Turdus ephippialis, Scl. P. Z. S. 1862, p. 109; Cat. A. B. App. p. 358. Mexiana, Dec. 1848, one example.

In reviewing the American Turdi for our proposed 'Index Avium Americanarum' we have clearly made out that Sclater's *Turdus ephippialis* is the true *T. albiventris* of Spix, as determined by Cabanis, *l. s. c.* The bird hitherto called *T. albiventris* by Sclater is *T. amaurochalinus*, Cab. Mus. Hein. i. p. 5.

3. *TURDUS FUMIGATUS*, Licht.

Mexiana, Dec. 1848, one example.

4. *DONACOBIVS ATRICAPILLUS* (Linn.).

Para, one example; also obtained on the Upper Amazons, June 1850, one example.

"This species frequents the reed-beds and low trees on the banks of the Amazons, and has a very fine song."—A. W.

Fam. TROGLODYTIDÆ.

5. *THRYOPHILUS LEUCOTIS* (Lafr.).

Thryothorus leucotis, Lafr. R. Z. 1845, p. 338.

T. albipectus, Cab. in Schomb. Guian. iii. p. 673, et Sclater, Cat. A. B. p. 20.

T. galbraithi, Lawrence; Baird, Rev. A. B. p. 131.

Island of Marajo, Feb. 1849, one example.

This example agrees with Cayenne skins of the species hitherto called *T. albipectus* in Sclater's collection. But Lafresnaye's name is the oldest and must be adopted. As to the distribution of this species, see our note, P. Z. S. 1864, p. 345.

6. *TROGLODYTES FURVUS* (Gm.).

Para, August 1848, one example.

Fam. MOTACILLIDÆ.

7. ANTHUS CHII, Vieill.

Mexiana, Dec. 1848.

"Tolerably plentiful in the open dry plains of Mexiana."—A. W.

Fam. MNIOTILTIDÆ.

8. GEOTHYLPIS ÆQUINOCTIALIS (Gm.).

Mexiana, Dec. 1848 and Jan. 1849.

Represented in the Brazilian fauna by the closely allied *G. velata*.

Fam. HIRUNDINIDÆ.

9. PROGNE LEUCOGASTRA, Baird, Rev. A. B. i. p. 280.

Mexiana and Para, three examples.

These specimens do not differ from the Central American *P. leucogastra*, which Prof. Baird has correctly separated from the Antillean *P. dominicensis*.

10. PROGNE TAPERA (Linn.).

Rio Tocantins.

11. HIRUNDO ERYTHROGASTRA, Bodd.

Mexiana, one example, juv.

12. HIRUNDO ALBIVENTRIS, Bodd.

Para.

13. ATTICORA FASCIATA (Gm.).

Rio Negro.

"Common on the banks of the lower and middle Rio Negro."—A. W.

Fam. VIREONIDÆ.

14. VIREOSYLVA AGILIS (Licht.).

Para.

15. CYCLORHIS GUIANENSIS (Gm.).

Para, March and June 1849.

Agrees with Cayenne examples; represented by *C. ochrocephala* in the Brazilian fauna.

—16. HYLOPHILUS RUBRIFRONS, sp. nov. (Pl. XXX. fig. 1.)

Cinerascenti-olivaceus, dorso imo virescentiore: fronte angusta, distincte rubra: secundariis extus flavescente rufo tinctis: cauda rufa unicolore: subtus ochraceus, abdomine cinerascens, lateribus virescente perfusus: subalaribus pallide flavis: rostro superiore corylino, inferiore cum pedibus pallidis.

Long. tota 4·3, alæ 2·1, alæ rem. prim. 1·3, caudæ 1·5, tarsi 0·6, rostri ab ang. oris 0·7 poll. Angl.

Hab. River Amazons (1850).

Obs. Species fronte rubra et cauda rufa insignis.

Of this apparently new *Hylophilus*, Mr. Wallace's collection contains unfortunately but one specimen. It is easily distinguishable by its red front and rufous tail from every other species of the genus known to us. *H. ochraceiceps* has also a rufous tail, but of a much more ochraceous tinge, and in other respects does not much resemble the present bird.

The fourth, fifth, and sixth primaries of *H. rubrifrons* are nearly equal and longest; the third slightly exceeds the seventh; the second just equals in length the longest secondary. The exposed portion of the first primary measures 0·7 inch.

— 17. *HYLOPHILUS SEMICINEREUS*, sp. nov. (Pl. XXX. fig. 2.)

Supra viridi-olivaceus, nucha vix cinerascens: subtus pallide cinereus, ventre medio albicante, crisso flavo tincto: subalaribus flavis: rostro late corneo, pedibus pallidis.

Long. tota 4·5, alæ 2·1, alæ rem. prim. 1·2, caudæ 1·7, tarsi 0·7, rostri ab ang. oris 0·6.

Hab. Para (Wallace).

One example only of this *Hylophilus* also is in Mr. Wallace's collection, obtained at Para in May 1849. It is likewise a distinct species of the genus, readily recognizable by its uniform pale cinereous colour below. The first primary measures 0·75 inch from the insertion. The second is 0·25 inch shorter than the third, fourth, fifth, and sixth, which are nearly equal and longest.

Fam. CÆREBIDÆ.

18. *DACNIS CAYANA* (Linn.).

Para.

19. *CÆREBA CÆRULEA* (Linn.).

Upper Rio Negro.

20. *CÆREBA CYANEA* (Linn.).

Para, Feb. 1849, and Upper Rio Negro, Feb. 1850.

21. *CERTHIOLA CHLOROPYGA*, Cab.

Three Mexiana specimens of this variable bird do not seem to differ from the Brazilian *C. chloropyga*. A fourth skin from Cobati, Rio Negro, shows a small white wing-spot, but does not otherwise differ. The last may be correctly referable to *C. guianensis*; but we are at present unable to appreciate the differences between the local races of this variable bird.

Fam. TANAGRIDÆ.

22. *EUPHONIA CAYANA* (Linn.).

Para.

23. *CALLISTE FLAVIVENTRIS* (Vieill.).

In Sclater's collection from Barra (*Wallace*).

24. *CALLISTE BOLIVIANA*, Bp.

In Sclater's collection from the Capim River (*Wallace*).

25. *TANAGRA EPISCOPUS*, Linn.

Para, Aug. 1848.

26. *TANAGRA PALMARUM*, Max.

Mexiana, Dec. 1848.

27. *RAMPHOCÆLUS NIGRIGULARIS* (Spix).

Middle Amazons, 1850. In Sclater's collection from Barra (*Wallace*).

"This Tanager is found only on the right bank of the Rio Negro, and is never known to cross the river to the Cayenne side. It is found on both banks of the Upper Amazons above Barra."—A. W.

28. *RAMPHOCÆLUS JACAPA* (Linn.).

Mexiana and Para.

"One of the commonest birds in gardens at Para, and generally in the Lower-Amazons district."—A. W.

29. *EUCOMETIS PENICILLATA* (Spix).

Mexiana, Dec. 1848.

Sclater's specimens referred to *E. albicollis* are not different from the present bird, whatever *Pyranga albicollis*, Lafr. et D'Orb., may be. It occurs also on the Ucayali (*Bartlett*) and Napo (Mus. P. L. S.), and may therefore probably extend into the wood-region of Bolivia.

30. *TACHYPHONUS MELALEUCUS* (Sparrm.).

Para, and Tocantins River.

31. *TACHYPHONUS SURINAMUS* (Linn.).

Para, March and May 1849. In Sclater's collection from Guia, Rio Negro, but here slightly different, and probably the same as Mr. Lawrence's *T. napensis*, Ann. L. N. Y. vii. (June 1864).

32. *TACHYPHONUS CRISTATUS* (Gm.).

Para, May 1849. Agrees with Brazilian specimens.

33. *TACHYPHONUS CRISTATELLUS*, Sclater.

One skin from Guia, Rio Negro, agrees nearly with the type of this species from Bogota, except in rather smaller size. We have not been able to compare it with Cayenne skins; but the probability is that the latter also belong to this form.

34. *NEMOSIA PILEATA* (Bodd.).

Para, Jan. 1849.

35. ARREMON SILENS (Bodd.).

Capim River, June 1849.

36. SALTATOR MAGNUS (Gm.).

Para, February and May 1849.

37. SALTATOR MUTUS, Licht.

Mexiana, Nov. 1848 and Jan. 1849.

A young specimen has a strong olivaceous tinge on the back, wing-edgings, and breast. *Tanagra superciliaris*, Spix, is probably the same bird, though very indifferently figured.

38. PITYLUS ERYTHROMELAS (Gm.).

Capim River, June 1849.

39. PITYLUS VIRIDIS (Vieill.).

Para.

Represented in the Brazilian wood-region by *P. brasiliensis*.

Fam. FRINGILLIDÆ.

40. ORYZOBORUS TORRIDUS (Gm.).

Para, Oct. 1848.

41. SPERMOPHILA LINEATA (Gm.).

Para, Oct. 1848; Mexiana, Jan. 1849; Amazons (north side).

42. SPERMOPHILA LINEOLA (Linn.).

Mexiana, Tocantins, and Amazons (north side).

The male shows less white on the rump than a Cayenne skin in Sclater's collection, and *no white crown-spot*. In this stage it more resembles *S. bouvronides* (Less.) in Sclater's collection, which, however, is probably merely a variety of the same species.

43. SPERMOPHILA GUTTURALIS, Licht.

Para, Oct. 1848.

44. VOLATINIA JACARINA (Linn.).

Barra and Guia.

45. PAROARIA GULARIS (Linn.).

Mexiana.

"Very common all about Para, on the banks of the rivers."—A.W.

46. COTURNICULUS MANIMBE (Licht.).

Mexiana.

47. EMBERIZOIDES MACROURUS (Gm.).

Mexiana, Dec. 1848.

Rather larger than the Cayenne bird, and wings more olivaceous,

also the uropygium lighter and less spotted ; intermediate between it and the Brazilian *E. sphenurus*.

"Found among the grass on the campos near the ground."—A.W.

48. *SYCALIS BRASILIENSIS* (Gm.).

North side of the Amazons.

Smaller than *S. brasiliensis* from Brazil, but not otherwise different.

49. *SYCALIS HILARII*, Bp.

Mexiana, Dec. 1848.

Fam. ICTERIDÆ.

50. *OSTINOPS VIRIDIS* (Vieill.).

Para.

51. *CACICUS PERSICUS* (Linn.).

Para.

"One of the commonest and most conspicuous birds in the Para district. Lives in colonies, building beautiful long nests, generally hanging over the water."—A. W.

52. *CACICUS HÆMORRHOUS* (Linn.).

Para.

"The same in habits as *C. persicus*, but much more scarce."—A. W.

53. *ICTERUS CAYANENSIS* (Linn.).

Island of Marajo.

"This bird is called the 'Rossignol' or Nightingale at Para, and is often kept in cages."—A. W.

54. *MOLOTHRUS SERICEUS* (Licht.).

Mexiana.

55. *XANTHOSOMUS ICTEROCEPHALUS* (Linn.).

Amazons, north side.

56. *LEISTES GUIANENSIS* (Linn.).

Amazons (north side) and Mexiana.

"Found only in open grounds, amongst grass."—A. W.

57. *CASSIDIX ORYZIVORA* (Gm.).

Para.

Fam. DENDROCOLAPTIDÆ.

—58. *SCLERURUS CAUDACUTUS*.

Thamnophilus caudacutus, Vieill. Nouv. Dict. iii. p. 310, et Enc. Méth. p. 742.

Sclerurus brunneus, Sclater, P. Z. S. 1857, p. 17, et 1858, p. 62. Capim River.

One example, fully agreeing with Sclater's specimens from Bogota and Cayenne, upon which he has founded his *S. brunneus*. On revising the synonymy of this group, however, it appears that the species indicated by Vieillot as *Thamnophilus caudacutus* was from Guiana; and it is, therefore, this Guianan species (and not the South-east-Brazilian form) which ought to bear his name. The bird of the Brazilian wood-region must therefore take the next earliest name applicable to it, and stand as *Sclerurus umbretta* (Licht.).

† 59. *SCLERURUS MEXICANUS*, Sclater, P. Z. S. 1856, p. 290, & Am. Cat. p. 149.

Capim River.

A single specimen of Mr. Wallace's agrees in every respect with a considerable series of skins of this species in our collections from Mexico and Central America. They are from the following localities:—Mexico, Cordova (*Sallé*), Jalapa (*De Oca*); Guatemala, Chocutum and Pacific slope (*Salvin*); Veragua (*Arcé*). We have been unable to refer to Swainson's *S. ruficollis*, stated to be figured in his 'Birds of Brazil.' In all copies of this work to which we have had access, this plate (t. 79) and also t. 78, where *S. albigularis* of the same author is figured, are deficient. It is possible that this bird may be the species figured in the first of these two plates, in which case it should bear Swainson's name.

60. *SYNALLAXIS RUTILANS* (Temm.).

An immature specimen, collected at Para in May 1849, of this species.

61. *LEPTOXYURA CINNAMOMEA* (Gm.).

Mexiana and Tocantins.

62. *PHILYDOR ERYTHROCERCUS*, Pelzeln.

Para, March and May 1849, three examples.

One of these skins (marked ♂) agrees very nearly with Sclater's Cayenne specimen of this species, and with a typical specimen of Natterer's from Barra, also in his collection. Two others are larger and stronger, clearer white below, and with a more rufous tinge on the wings. The superciliary stripes are absent, and the tail is longer and more rounded. We are in some doubt whether these latter specimens do not belong to a distinct species.

† 63. *GLYPHORHYNCHUS CUNEATUS*, Licht.

Para and Capim River.

64. *DENDROCINCLA FUMIGATA* (Licht.); Burm. Syst. Ueb. iii. p. 8.

Three specimens from Para, referable, as far as we can make out, to this species.

65. *DENDROCOLAPTES CAYENNENSIS* (Gm.); Buff. Pl. Enl. 621.

Para, two examples, April and May 1849.

Agreeing with Cayenne specimens of this species, but different from the bird so named in Sclater's collection, which is from the Upper Amazons, and is probably undescribed.

66. *DENDROORNIS OCELLATA* (Spix).

Dendrocolaptes ocellatus, Spix, Av. Bras. i. p. 88; *D. guttatus*, ejusd. tab. 91. fig. 1.

One example, obtained at Para, agrees with a specimen in Sclater's collection, also from Para, collected by Natterer, and determined by H. v. Pelzeln to be of this species.

67. *DENDROORNIS EYTONI*, Sclater.

Para, agreeing with the type obtained by Mr. Wallace, on the Rio Capim, in Sclater's collection. This species is closely allied to *D. rostripallens*, Lafr.

68. *DENDROPLEX PICUS* (Gm.).

Para.

69. *XIPHORHYNCHUS TROCHILIROSTRIS*, Licht.

"River Amazons, north bank: ♀, eyes dark blue."

"Obtained near Montalegre in a dry forest."—A. W.

Fam. FORMICARIIDÆ.

70. *THAMNOPHILUS MAJOR*, Vieill.

Para, examples of both sexes, Oct. 1848.

71. *THAMNOPHILUS LUCTUOSUS*, Licht., Doubl. p. 47.

One example, from the Rio Tocantins, Sept. 1848.

72. *THAMNOPHILUS*, sp.?

One example from the Amazons (1849), agreeing with a skin of Natterer's in Sclater's collection from the Rio Negro, marked "female" (no. 928). We do not know the male of this species.

73. *THAMNOPHILUS NIGRO-CINEREUS*, Sclater.

Two males, from the Rio Tocantins and Mexiana, agreeing perfectly with Sclater's type specimen, which is also evidently one of Mr. Wallace's skins.

74. *THAMNOPHILUS AMAZONICUS*, Sclater.

Specimens of both sexes from Para and Capim River.

†75. *THAMNOPHILUS DOLIATUS* (Linn.).

Island of Marajo.

76. *THAMNOPHILUS RADIATUS*, Spix, Av. Bras. ii. p. 24, t. 35. f. 2.

Amazons. Perhaps different from the *T. radiatus* of Vieillot (ex Azara), as pointed out by Sclater (P. Z. S. 1858, p. 218), but evidently the bird figured by Spix.

77. *THAMNOPHILUS PALLIATUS*, Licht.

Para.

78. *DYSITHAMNUS PLUMBEUS* (Max.).

Amazons, examples of both sexes.

79. *MYRMOTHERULA AXILLARIS*, Vieill.

Capim River, examples of both sexes.

80. *MYRMOTHERULA BREVICAUDA* (Sw.).

Capim River.

81. *MYRMOTHERULA HAWXWELLI*, Sclater.

Capim River. A female of this species.

82. *FORMICIVORA GRISEA* (Bodd.).

Rio Tocantins, Sept. 1848. A single female of this species.

- + 83. *RAMPHOCÆNUS MELANURUS*, Vieill.

Capim River, July 1849.

84. *PYRIGLENA ATRA* (Sw.).

Para.

85. *HYPOCNEMIS MELANOPOGON*, Sclater.

Examples of both sexes of this species from Mexiana, Dec. 1848, agreeing with specimens from Cayenne.

86. *PITHYS ALBIFRONS* (Gm.).

Cobati, Rio Negro.

87. *PITHYS LEUCASPIS*, Sclater.

Cobati. A specimen, marked *male*, wanting the concealed dorsal patch, which is probably only found in the female.

88. *PHLOGOPSIS NIGROMACULATA* (Lafr. et D'Orb.).

Para, May 1849.

89. *FORMICARIUS CRISSALIS*, Cab. Journ. f. Orn. 1851, p. 96.

One example, from Para (Oct. 1848), agreeing in every respect with Cabanis's description. A skin in Sclater's collection from Trinidad (or Venezuela) is much darker below, and has the black throat

not so clearly defined. It is perhaps different. The present bird is grey below, medially paler, just as described by Cabanis.

90. *CORYTHOPIS ANTHOIDES*, Sclater.

Para, May 1849. Easily distinguishable from its Brazilian representative *C. calcarata*.

Fam. TYRANNIDÆ.

91. *ATTILA THAMNOPHILOIDES* (Spix).

Mexiana.

92. *TÆNIOPTERA VELATA* (Licht.).

Mexiana, Dec. 1848.

93. *FLUVICOLA ALBIVENTRIS*, Spix.

Mexiana, Dec. 1848.

94. *CNIOLEGUS UNICOLOR*, Kaup, Journ. f. Orn. 185, p. 29 (?).

One example without exact locality attached. Resembles Kaup's description in having the entire plumage black, without any white inside the wings; but is of much smaller dimensions than those given by Heine (Journ. f. Orn. 1859, p. 337) for Kaup's species. Kaup does not trouble himself with dimensions.

95. *COLOPTERUS GALEATUS* (Bodd.).

Capim River, June 1849.

96. *MIONECTES OLEAGINEUS* (Licht.).

Para and Guia.

97. *PHYLLOSCARTES VENTRALIS* (Temm.); Cab. et Heine, Mus. Hein. ii. p. 52.

Mexiana. Sclater has examples of this species from New Granada and Ecuador.

98. *PHYLLOMYIAS SEMIFUSCA*, Sclater.

Mexiana, Jan. 1849.

+ 99. *CAMPTOSTOMA FLAVIVENTRE*, Sclat. & Salv. P. Z. S. 1864, p. 358.

Mexiana.

+ 100. *LEGATUS ALBICOLLIS* (Vieill.).

Para, Aug. 1848.

+ 101. *MYIOZETETES CAYENNENSIS* (Linn.).

Para, Aug. 1848.

†102. *RHYNCHOCYCLUS SULPHURESCENS* (Spix).

Para, Aug. 1848. Much smaller in dimensions than either Brazilian or northern specimens of this species, but not otherwise different.

103. *RHYNCHOCYCLUS RUFICAUDA* (Spix).

Para, May 1849.

104. *PITANGUS SULPHURATUS* (Linn.).

Para.

†105. *PITANGUS LICTOR* (Licht.).

Mexiana, Dec. 1848.

†106. *MYIODYNASTES AUDAX* (Gm.).

Para, Aug. 1848.

†107. *MEGARHYNCHUS PITANGUA* (Linn.).

Mexiana, Dec. 1848.

108. *MYIOBIUS ERYTHRURUS*, Cab.

Capim River.

109. *EMPIDOCHANES OLIVUS* (Bodd.).

Muscicapa oliva, Bodd. ex Buff. Pl. Enl. 574. f. 2 (fig. pess.).

Mexiana. Distinct from the allied *E. fuscatus* (*Muscipeta fuscata*, Max.), with which Cabanis and Heine unite it. The latter has much more strongly marked wing-edgings.

†110. *CONTOPUS BRACHYTARSUS*, Selater.

Mexiana. Agrees with skins in Selater's collection from Mexico and Bogota, so probably a widely distributed species.

†111. *MYIARCHUS FEROX* (Gm.).

Mexiana, Dec. 1848.

112. *MYIARCHUS*, sp.

Rio Tocantins. A species allied to *M. nigriceps*, Selater, and apparently identical with an unnamed skin in his collection from Bogota (Cat. Am. B. p. 234. no. 1439).

113. *TYRANNUS MELANCHOLICUS*, Vieill.

Para.

†114. *MILVULUS TYRANNUS* (Linn.).

Guia, Rio Negro.

FAM. COTINGIDÆ.

115. *TITYRA CAYANA* (Linn.).

Examples of both sexes from Para.

†116. *HADROSTOMUS MINOR* (Less.).

Examples of both sexes from Para.

†117. *PACHYRHAMPHUS CINEREUS* (Bodd.).

Island of Mexiana and Para.

†118. *PACHYRHAMPHUS POLYCHROPTERUS* (Vieill.).

Mexiana.

119. *LIPAUGUS CINERACEUS* (Vieill.).

Para. Agreeing with Cayenne skins. One skin has light rufous edgings on the wings, and is probably immature.

†120. *HETEROPELMA WALLACII*, sp. nov.

Pallide olivaceo-virens, fere unicolor, alis caudaque extus brunnescentibus: subtus dilutior, pectore rufescente vix tincto, subalaribus cinerascanti-fuscis: rostro nigricanti-corneo, ad basin pallescente: pedibus pallide fuscis.

Long. tota 6·3, alæ 3·5, caudæ 2·6.

Hab. in vic. urbis Para (*Wallace*, May 1849).

Obs. Aff. *H. amazonum* ex fl. Amazonum superiore et ejusdem formæ et staturæ, sed corpore supra magis virescente, nec rufo tincto, et gula et abdomine pallidioribus et magis cinerascantibus diversa.

This bird appears to belong to a species different from any of the four previously known members of this peculiar genus, concerning which Selater has written (*P. Z. S.* 1860, p. 467). It may possibly also occur in Cayenne, but we have not yet met with any species of the group from that country.

121. *IODOPLEURA ISABELLÆ*, Parz.

Rio Tocantins. We should rather have expected to meet with *I. laplaci* of Cayenne here. M. Parzudaki states that his type of *I. isabellæ* was procured on the Venezuelan Rio Negro; and the species also occurs in the Upper Amazonian district.

122. *PIPRA FILICAUDA*, Spix.

“Found in the wooded islands of the lower Rio Negro, on the lower boughs of the forest-trees.”—A. W.

123. *PIPRA FLAVICOLLIS*, Selater.

Mexiana and north side of the Amazons. This form, which is hardly separable from *P. aureola* of Cayenne, was originally described by Selater from specimens of Mr. Wallace’s said to have been from Barra, but more probably from the same locality as the present skins.

124. *PIPRA FASCIATA*, Lafr. et D’Orb.

Rio Tocantins. Another *Peruvian* form.

† 125. *PIPPA LEUCOCILLA*, Linn.

Para.

"This and *P. auricapilla* are the two commonest Manakins about Para."—A. W.

† 126. *PIPPA AURICAPILLA*, Licht.

Para and Barra do Rio Negro.

127. *PIPPA CYANEOCAPILLA*, Hahn.

"Obtained in abundance on the Upper Rio Negro, on the right bank. Iris red; bill and feet black; lower mandible lead-colour."
—A. W.

128. *CHIROXIPHIA PAREOLA* (Linn.).

Para, Feb. 1849.

129. *CHIROMACHÆRIS MANACUS* (Linn.).

"Common near Para."—A. W.

130. *PHENICOCERCUS CARNIFEX* (Linn.).

Para and Guia, examples of both sexes.

"Found in the tops of the forest-trees, feeding on fruit."—A. W.

131. *RUPICOLA CROCEA*, Vieill.

Serra de Cobati, near Guia, Oct. 1850. See Mr. Wallace's notes in his 'Travels,' p. 221.

132. *COTINGA CÆRULEA* (Vieill.).

Para.

"Tolerably abundant in the forests near Para."—A. W.

133. *COTINGA CAYANA* (Linn.).

Abundant on the Rio Negro.

134. *XIPHOLENA POMPADORA* (Linn.).

Guia.

135. *XIPHOLENA LAMELLIPENNIS*, Lafr.

Para.

"Shot in the forests within ten miles of Para."—A. W.

† 136. *QUERULA CRUENTA* (Bodd.).

Capim River.

137. *HÆMATODERUS MILITARIS* (Lath.).

"Obtained by Mr. Bates at Cameta, at the mouth of the Tocantins."—A. W.

138. *CHASMORHYNCHUS NIVEUS* (Bodd.).

"Obtained on the Lower Rio Negro, about twenty miles above

Barra. Very difficult to shoot, from its sitting at the top of very high trees. Also seen near Para (see Travels, p. 132).”—A. W.

139. *GYMNODERUS FÆTIDUS* (Linn.).

“Met with on the right bank of the Lower Rio Negro; rather plentiful on low trees on the banks of the river. Naked skin of the neck dark ultramarine blue.”—A. W.

140. *GYMNOCEPHALUS CALVUS* (Gm.).

“One specimen of this bird was obtained at Guia, on the Upper Rio Negro. The iris is blue black; the bare part of the head and also the feet dusky lead-colour. Skin of the neck loose; trachea dilated, and the voice very loud and remarkable.”—A. W.

141. *CEPHALOPTERUS ORNATUS*, Geoffr.

“Met with by me only in the wooded islands of Lower Rio Negro, between Barra and the mouth of the Rio Branco. Occurs again on the banks of the River Uaupes, above the cataracts. It is also found on the Upper Amazon near Ega (see Bates, Nat. on the Amazon, ii. p. 283). I have described its habits in an article published in the Society’s ‘Proceedings’ for 1850, p. 206.”—A. W.

Fam. MOMOTIDÆ.

142. *MOMOTUS BRASILIENSIS*, Lath.

Para.

Fam. ALCEDINIDÆ.

+ 143. *CERYLE TORQUATA*, Linn.

Tocantins: Mexiana.

+ 144. *CERYLE AMAZONIA* (Lath.).

Tocantins.

+ 145. *CERYLE INDA* (Linn.).

Mexiana.

146. *CERYLE AMERICANA* (Gm.).

Para; Tocantins; South bank of the Amazons.

+ 147. *CERYLE SUPERCILIOSA* (L.).

Mexiana.

Fam. GALBULIDÆ.

148. *GALBULA VIRIDIS* (Linn.).

Amazons, north bank, 1850.

149. *GALBULA RUFO-VIRIDIS*, Cab.

Rio Tocantins.

150. *GALBULA ALBIROSTRIS*, Lath.

Guia, Rio Negro.

151. *GALBULA CYANEICOLLIS*, Cassin.

Capim River.

152. *GALBULA LEUCOGASTRA*, Vieill.

Guia.

153. *UROGALBA PARADISEA* (Linn.).

North bank of the Amazons.

154. *UROGALBA AMAZONUM*, Sclater, P. Z. S. 1855, p. 14.

Para.

After some consideration we feel bound to resuscitate this species, which Sclater, after having described it, was persuaded by Von Pelzeln to reunite to the preceding. It is certainly readily distinguishable by its much larger size, the hoary terminations of the head-feathers, the less amount of black on the chin, and the greater extent of white on the throat below, and requires a name.

155. *BRACHYGALBA INORNATA*, Sclater.

Baiao, Rio Tocantins.

† 156. *JACAMEROPS GRANDIS* (Gm.).

Capim River and vicinity of Barra, examples of both sexes.

"This bird has more the habits of the Trogons than of the true *Galbulæ*. While the latter are always found on the outskirts of the forest, the *Jacamerops* keeps rather to the gloom, where it sits on boughs hanging over the forest and captures insects."—A. W.

Fam. BUCCONIDÆ.

157. *BUCCO COLLARIS*, Lath.

Lower Amazons.

158. *BUCCO HYPERRHYNCHUS*, Bp.

Para. Above Barra, on the south bank of the Amazons, Mr. Wallace obtained the Peruvian species (*B. napensis*, Sclater). The locality of "Upper Amazons," commonly attributed to this species, is very probably erroneous.

159. *BUCCO TAMATIA*, Gm.

Three examples, without exact localities, agree with the Cayenne bird. A fourth, from the Capim River, has the spots on the belly crowded as in *B. pulmentum* of the Upper Amazons; but the throat is as dark as in the Cayenne bird, not pale as in *B. pulmentum*.

160. *BUCCO TECTUS*, Bodd.

Para. Agrees with Cayenne specimens.

161. *MALACOPTILA FUSCA* (Gm.).

Upper Rio Negro.

162. *MALACOPTILA RUFA* (Spix).

Para.

163. *MONASA NIGRIFRONS* (Spix).

Rio Tocantins.

164. *CHELIDOPTERA TENEBROSA* (Pall.).

Para.

"Abundant on the Lower Amásons and Rio Negro."—A. W.

Fam. TROGONIDÆ.

+165. *TROGON VIRIDIS*, Linn.

Capim River.

+166. *TROGON MELANURUS*, Sw.

Para.

167. *PHAROMACRUS PAVONINUS* (Spix).

Trogon pavoninus, Spix, Av. Bras. i. p. 47, t. 35.

Barra do Rio Negro.

"Found at Barra, on the left bank of the river."—A. W.

Fam. CAPRIMULGIDÆ.

168. *PODAGER NACUNDA* (Vieill.).

Capim River.

169. *CHORDEILES RUPESTRIS* (Spix).

"Found sitting on sand and rocks in an island on the Upper Rio Negro."—A. W.

170. *LUROCALIS NATTERERI* (Temm.).

Para. Intermediate in size between some skins of this species and *L. gouldi*. Long. tota 8·3, alæ 7·4, caudæ 3·4.

171. *ANTROSTOMUS NIGRESCENS* (Cab.).

Para.

172. *HYDROPSALIS TRIFURCATA* (Natt.); Sclater, P. Z. S. 1866, p. 141.

Rio Tocantins.

Fam. TROCHILIDÆ.

173. *EUPETOMENA MACRURA* (Gm.).

Island of Mexiana.

174. *CAMPYLOPTERUS LARGIPENNIS* (Bodd.).

Rio Negro. Agrees with Cayenne specimens.

175. *CAMPYLOPTERUS OBSCURUS*, Gould, Mon. Troch. ii. t. 49.

Para, three examples, showing that this is the Lower-Amazonian representative of the preceding species.

176. *TOPAZA PYRA*.

"Occurs on the Upper Rio Negro, where it is shot by the Indians, and its feathers are used in making feather ornaments."—A. W.

† 177. *LAMPORNIS MANGO* (Linn.).

Mexiana; and Cobati, Rio Negro.

178. *LAMPORNIS GRAMINEUS* (Gm.).

Mexiana.

179. *THALURANIA FURCATOIDES*, Gould, Intr. Mon. Troch. p. 77.

Para.

Mr. Gould separates this bird from the *T. furcata* of Cayenne; but the distinctive characters are not very appreciable.

† 180. *FLORISUGA MELLIVORA* (Linn.).

Para; and Cobati, Rio Negro.

181. *HELIOTHRIX AURITUS* (Gm.).

Guia, Rio Negro.

182. *POLYTMUS LEUCORRHOUS*, Gould, MS.

A skin of this undescribed species in Mr. Gould's collection was obtained by Mr. Wallace at Cobati, Rio Negro. The bird very nearly resembles *P. viridissimus*, of Cayenne, but has the crissum *white*.

183. *AGYRTRIA MILLERI* (Bourc.).

Cobati, Rio Negro.

184. *AGYRTRIA MACULATA* (Vieill.).

Mexiana.

185. *HYLOCHARIS SAPPHIRINA* (Gm.).

Para.

186. *EUCEPHALA CÆRULEA* (Vieill.).

Para.

187. *EUCEPHALA HYPOCYANEA*, Gould, P. Z. S. 1860, p. 306; Mon. Troch. v. t. 334.

Cobati, Rio Negro.

A female, apparently of this species, and, if such be the case, of

great interest as indicating the correct locality of this Humming-bird, which was unknown to Mr. Gould. The under surface of the present specimen is sordid white, with slight marginations of bluish green in some of the feathers. The upper tail-coverts retain the characteristic bronzy colouring of the male bird.

Fam. CUCULIDÆ.

†188. *CROTOPHAGA ANI*, Linn.

Mexiana.

189. *CROTOPHAGA MAJOR*, Linn.

Capim River.

190. *GUIRA PIRIRIGUA* (Vieill.).

Mexiana.

†191. *DIPLOPTERUS NÆVIUS* (Linn.).

Mexiana.

192. *PIAYA CAYANA* (Linn.).

Para.

†193. *PIAYA MINUTA* (Vieill.).

Para.

Fam. OPISTHOCOMIDÆ.

194. *OPISTHOCOMUS CRISTATUS*.

Para.

"This bird abounds on the low shores of the river between Para and the Tocantins. It is found in small flocks of from ten to twenty individuals, and feeds on the leaves of the *Arum arboreum*, with which its stomach is generally loaded. This gives it a very disagreeable odour. Notwithstanding its large wings, its flight is slow and laboured. It is never seen on the ground or in high trees, but principally sitting upon the *Arum*. When alarmed it throws up its crest exactly in the same manner as the *Guira*."—A. W.

Fam. RAMPHASTIDÆ.

195. *RAMPHASTOS TOCO*.

"Obtained in Mexiana, but not known at Para."—A. W.

196. *RAMPHASTOS ERYTHORHYNCHUS*, Gm.

Para.

197. *RAMPHASTOS OSCULANS*, Gould.

Upper Rio Negro.

198. *RAMPHASTOS ARIEL*, Vig.

Para.

This is one of the few types of the Brazilian forest-region that intrude into the district of Para. On the north bank of the Amazons it is replaced by the following species:—

199. *RAMPHASTOS VITELLINUS*, Licht.

North bank of the Lower Amazons.

200. *PTEROGLOSSUS ARAÇARI* (Linn.).

Capim River.

201. *PTEROGLOSSUS INSCRIPTUS*, Sw.

Para.

202. *PTEROGLOSSUS BITORQUATUS*, Vig.

Para.

203. *SELENIDERA GOULDI*, Natt.

Para, August, 1848.

204. *SELENIDERA NATTERERI*, Gould.

Upper Rio Negro. See Gould's 'Monograph,' ed. 2. t. 34.

Fam. CAPITONIDÆ.

205. *CAPITO AMAZONICUS*, Deville et Des Murs; Sclater, Ibis, 1861, p. 186.

Guia, Rio Negro.

Fam. PICIDÆ.

206. *CAMPEPHILUS ALBIROSTRIS* (Spix).

Rio Tocantins.

207. *CAMPEPHILUS TRACHELOPYRUS*, Malh.

Capim River.

208. *DRYOCOPUS LINEATUS* (Linn.).

Para.

209. *CELEUS JUMANA*, Spix.

Picus jumana, Spix, Av. Bras. i. p. 57, t. 47.

Para.

Specimens of both sexes of this species, which is very distinct from *Celeus citreopygius* (Bp. MS.) of the Upper Amazons, the latter being darker in colouring, particularly on the flanks, and having *no cross bands* on the primaries or secondaries. Malherbe considers them local varieties; but they are in fact well-marked species. The nearest ally of *Celeus jumana* is *C. cinnamomeus* of Cayenne. Sclater's bird referred to *C. jumana* (Cat. A. B. p. 336) is *C. citreopygius*, Bp.

210. *CELEUS MULTIFASCIATUS*.

Celepicus multifasciatus, Malh. Mon. Pic. ii. p. 16, t. 50. f. 4, 5.

One example from the "Amazons," probably the lower part of the river, appears to be a male of this species, as determined by Malherbe. It is a close ally of *C. rufus* of Cayenne, but recognizable by the dark rufous cap, and the black longitudinal lines on the nape, sides of head, and throat: in *Celeus rufus* the markings are transverse.

211. *CHLORONERPES TEPHRODOPS* (Wagl.).

Island of Mexiana.

212. *CHLORONERPES HÆMATOSTIGMA*, Malh.

River Tocantins.

213. *CHLORONERPES FLAVIGULARIS* (Bodd.).

Para.

214. *MELANERPES CRUENTATUS*, Bodd.

Barra do Rio Negro.

Fam. PSITTACIDÆ.

215. *ARA ARARAUNA* (Linn.).

Mexiana.

†216. *ARA MACAO* (Linn.).

Mexiana.

217. *ARA HYACINTHINA*.

This species is not found in the Amazons valley proper, and appears to be restricted to the slightly elevated plateau south of the Lower Amazons. It was seen about 100 miles up the Tocantins*, and again about the same distance up the Tapajos†, where specimens were procured by Mr. Bates.

218. *ARA NOBILIS* (Linn.).

Para.

219. *CONURUS LUTEUS*, Bodd.

Para.

Very rare in the neighbourhood of Para, where it appears once a year, when a particular fruit is ripe. I only saw one flock in one particular tree, and obtained four or five specimens out of it.

220. *CONURUS AUREUS* (Gm.).

Island of Mexiana.

221. *CONURUS ÆRUGINOSUS* (Linn.).

Conurus chrysogenys, Mass. et Souanc. Rev. Zool. 1854, p. 72.

A skin of a *Conurus*, collected by Mr. Wallace at S^{ta} Isabel on the

* See Bates's Amazons, vol. i. p. 133: Wallace's Travels, p. 74.

† Bates, *l. c.* p. 139.

Rio Negro, exactly agrees with Selater's specimen, also from the Rio Negro, called *C. chrysogenys* in his 'Catalogue,' and with the description of Souancé. We are not yet prepared to follow M. Finsch in uniting under *C. pertinax* the species named *C. æruginosus*, *C. chrysogenys*,[†] *C. xantholæmus*,[†] *C. ocularis*, and *C. chrysophrys*; but his remarks on this subject (Papageien, i. p. 506) are eminently worthy of attention. *Conurus xantholæmus* and *C. æruginosus* (so labelled), now living side by side in the Society's Gardens, are very distinct species, and certainly not to be confounded together.

222. *CONURUS PERLATUS*.

Aratinga perlata, Spix, Av. Bras. i. p. 35, t. 20. f. 1.

Sittace lepida, Wagl.

Conurus lepidus, Finsch, Pap. i. p. 543.

Capim River.

We see no reason for rejecting Spix's name for this species in favour of Illiger's MS. term subsequently adopted by Wagler.

223. *BROTOGERYS VIRESCENS* (Gm.).

Conurus virescens, Scl. Cat. A. B. p. 351.

Mexiana.

"Excessively abundant in the island, in flocks of several hundreds."

—A. W.

224. *BROTOGERYS NOTATUS* (Bodd.); Pl. Enl. 456. f. 2.

Brotogerys tuipara et *B. notatus*, Selater, Cat. A. B. p. 352.

Para.

"Almost as abundant at Para as the latter species in Mexiana, and also found in flocks."—A. W.

225. *CHRYSTOTIS FARINOSA* (Bodd.).

Rio Tocantins.

+ 226. *PIONUS MENSTRUUS* (Linn.).

Rio Tocantins.

227. *PIONUS VIOLACEUS* (Bodd.).

Para.

228. *CAICA MELANOCEPHALA* (Linn.).

Upper Rio Negro.

"Found abundantly up the Rio Uaupes."—A. W.

229. *CAICA VULTURINA*, Kuhl.

Para.

"Very rare in the neighbourhood of Para. I only procured one specimen."—A. W.

230. *DEROPTYUS ACCIPITRINUS*.

Rio Uaupes; Upper Rio Negro.

231. *UROCHROMA PURPURATA* (Gm.).

Capim River.

Fam. VULTURIDÆ.

+ 232. *GYPARCHUS PAPA* (Linn.).

The King-Vulture is found in the forests all along the Lower Amazons.

+ 233. *CATHARTES AURA*.+ 234. *CATHARTES ATRATUS*.

Mr. Wallace states that both these species are found at Para. From the Upper Amazons Mr. Wallace has a specimen of what appears to be *C. urubitinga*, Natt. (v. Pelzeln, Sitz. Ak. Wien, xlv. p. 7), obtained on the south bank about 100 miles above the Rio Negro.

Fam. FALCONIDÆ.

+ 235. *IBYCTER AMERICANUS* (Bodd.).

Para.

236. *IBYCTER ATER* (Vieill.).

Para.

237. *POLYBORUS BRASILIENSIS* (Gm.).

Mexiana.

+ 238. *MILVAGO CHIMACHIMA* (Vieill.).

Mexiana and Barra.

+ 239. *URUBITINGA ZONURA* (Shaw).

Mexiana.

+ 240. *URUBITINGA MERIDIONALIS* (Lath.).

Mexiana.

+ 241. *URUBITINGA NIGRICOLLIS* (Lath.).

Mexiana.

+ 242. *ASTURINA NITIDA* (Lath.).

North side of the Amazons.

243. *ASTURINA MAGNIROSTRIS* (Gm.).

Mexiana.

244. *LEUCOPTERNIS SUPERCILIARIS*.

Leucopternis kuhli, Bp. Consp. i. p. 19 (1850).

Buteo kaupi, G. R. Gray in Mus. Brit., unde *Lecopternis kaupi*, Bp. Rev. Zool. 1850, p. 533.

Leucopternis superciliaris, Pelzeln, Sitz. Ak. Wien, xlv. p. 10.

Para, one example, killed in December 1849.

The only description of this well-marked species is that given by Von Pelzeln; and we feel bound, therefore, to adopt his name for it, in preference to either of Bonaparte's, which have no sufficient diagnosis attached to them. We have compared Mr. Wallace's specimen with *Buteo kaupi* of the British Museum (of which there are two specimens in the collection) and find them identical.

+ 245. *SPIZAËTUS TYRANNUS* (Max.).

Capim River.

+ 246. *HERPETOTHERES CACHINNANS* (Linn.).

Mexiana.

247. *MICRASTUR GILVICOLLIS* (Vieill.).

Para.

+ 248. *HYPOTRIORCHIS FEMORALIS* (Temm.).

Mexiana.

+ 249. *HYPOTRIORCHIS RUFIGULARIS* (Daud.).

Rio Tocantins.

+ 250. *CYMINDIS CAYANENSIS* (Gm.).

Amazons.

+ 251. *ICTINIA PLUMBEA* (Gm.).

Para.

Fam. STRIGIDÆ.

+ 252. *SYRNIUM PERSPICILLATUM* (Lath.).

Amazons, north side.

+ 253. *SYRNIUM ZONOCERCUM*, G. R. Gray, MS.

Para, May 1849. Agreeing with the Venezuelan birds thus designated in the British Museum, but not with any described species that we are acquainted with.

254. *LOPHOSTRIX CRISTATA* (Daud.).

Para.

+ 255. *SCOPS CHOLIBA* (Vieill.).

Mexiana.

Fam. COLUMBIDÆ.

256. *COLUMBA SPECIOSA* (Gm.).

Para.

257. *COLUMBA VINACEA* (Temm.).

Capim River.

† 258. *COLUMBA RUFINA* (Temm.).

Mexiana.

259. *ZENAIIDA MACULATA* (Vieill.); Bp. Consp. ii. p. 82.

Mexiana.

† 260. *CHAMÆPELIA PASSERINA* (Linn.).

Para.

261. *CHAMÆPELIA TALPACOTI* (Temm.); Burm. S. U. iii. p. 297.

Rio Tocantins.

† 262. *GEOTRYGON MONTANA* (Linn.); Bp. Consp. ii. p. 72.

Upper Rio Negro and Para.

263. *LEPTOPTILA RUFAXILLA*, Bp. Consp. ii. p. 73.

Mexiana.

Fam. TETRAONIDÆ.

264. *ODONTOPHORUS GUIANENSIS* (Gm.).In Salvin's collection, from the Capim River (*Wallace*, June 1849).

Fam. CHARADRIIDÆ.

† 265. *HOPLOPTERUS CAYANUS* (Lath.).

South bank of the Amazons.

266. *VANELLUS CAYENNENSIS*, Gm.

Mexiana.

267. *ÆGIALITES SEMIPALMATUS*, Bp.; Baird, B. of N. A. p. 694; Schlegel, Mus. des P.-B. *Cursores*, p. 30.*Charadrius brevirostris*, Max. Beitr. iv. p. 769; Schomb. Guian. iii. p. 750; Burm. S. U. iii. p. 359.

Mexiana.

† 268. *ÆGIALITES COLLARIS* (Vieill.).*Charadrius azaræ*, Burm. S. U. iii. p. 360.

Mexiana and Rio Tocantins.

Fam. SCOLOPACIDÆ.

† 269. *HIMANTOPUS NIGRICOLLIS* (Vieill.).

Mexiana.

270. *TRINGA MINUTILLA* (Vieill.); Schlegel, Mus. des P.-B. *Scolopaces*, p. 48.

Mexiana.

271. *TRINGA BONAPARTII*, Schlegel.

Rio Tocantins.

272. *EREUNETES PETRIFICATUS*, Ill. ; Baird, B. N. A. p. 724.
Mexiana.

273. *GAMBETTA FLAVIPES*, Gm.
Mexiana.

274. *RHYACOPHILUS SOLITARIUS* (Wils.).
Mexiana.

275. *TRINGOIDES MACULARIUS* (Linn.).
Mexiana.

Fam. RALLIDÆ.

276. *PORZANA CAYENNENSIS* (Linn.).
Para.

277. *PORPHYRIO PARVUS* (Bodd.).
Amazons.

278. *PORPHYRIO MARTINICUS* (Linn.).
Amazons.

Fam. PSOPHIIDÆ.

279. *PSOPHIA OCHROPTERA*, Pelzeln.
Rio Negro (*Wallace in Mus. Brit.*).

Mr. Wallace has given some interesting remarks on the geographical distribution of the different species of Trumpeter in his 'Travels' (p. 473); but, from his specimens having been lost, he has perhaps not quite accurately laid down the boundaries between them. Von Pelzeln's paper on the birds of this group collected by Natterer* gives further details upon the subject, and enables us to indicate what we believe to be the probable ranges of the known species, which appear to be separated by rivers.

a. *Species dorso cinereo aut albo.*

(1) *Ps. crepitans* (Linn.). British Guiana, extending inwards as far as the Rio Negro.

(2) *Ps. ochroptera*, Pelzeln, *l. c.* p. 371. Upper Rio Negro, probably only on the right bank. Barcellos (*Natt.*).

(3) *Ps. leucoptera*, Spix. South or right bank of the Amazons above the Madeira. Ega, Coari, and San Paolo (*Wallace*).

b. *Species dorso viridi.*

(4) *Ps. viridis* (Spix). South or right bank of the Amazons below the Madeira, and extending up the right bank of the Madeira to the Rio Mamoré (*Natterer*). Villa Nova (*Spix*).

(5) *Ps. obscura*, Pelzeln. Right bank of the Amazon near Para. The dividing river between this and the preceding species is not known; it may be the Tocantins, the Xingu, or the Tapajos.

* Sitz. Ak. Wien. xxiv. p. 371 *et seq.* (1857).

Fam. LARIDÆ.

280. STERNA MAGNIROSTRIS, Licht.

Mexiana.

281. STERNA SUPERCILIARIS (Vieill.).

Rio Tocantins.

† 282. RHYNCOPUS MELANURA, Sw.

Mexiana.

Having thus concluded our list of species, we proceed to consider what conclusions can be drawn from it as to the general character of the avifauna of the localities whence they are derived. Of the whole number of 282 species, 48 are from the Rio Negro, and, as far as our information goes, are not found in the Lower Amazons district. From this part of the series, presenting us as it does with such an insignificant portion of the whole ornis, it would be useless to attempt to draw any further conclusion than that the large majority of the species recorded from this region are Guianan forms. Of the 48 Rio Negro species, 37 are certainly likewise found in Guiana. The remaining 11 are believed to be either peculiar to the Rio Negro or intruders from the Upper Amazonian district. These are—

- | | |
|-------------------------------------|---------------------------------|
| 1. <i>Ramphocelus nigrigularis.</i> | 7. <i>Chordeiles rupestris.</i> |
| 2. <i>Pithys leucaspis.</i> | 8. <i>Topaza pyra.</i> |
| 3. <i>Pipra filicauda.</i> | 9. <i>Eucephala hypocyanea.</i> |
| 4. — <i>cyaneocapilla.</i> | 10. <i>Capito amazonicus.</i> |
| 5. <i>Cephalopterus ornatus.</i> | 11. <i>Psophia ochroptera.</i> |
| 6. <i>Pharomacrus pavoninus.</i> | |

But these exceptions weigh little in the balance when we consider the presence on the Rio Negro of such marked Cayenne types as *Gymnoderus fœtidus*, *Gymnocephalus calvus*, *Rupicola crocea*, *Xipholena pompadora*, &c.

Let us now, therefore, turn to the portion of the collection from the vicinity of Para and the Lower Amazons, and see what results can be derived from its examination. The whole number of species obtained in these localities was 242, two of which cannot be satisfactorily determined at present. The remaining 240 may be analyzed as follows:—

1. Species of wide range, belonging to Cayenne, Para, and South-east Brazil	96
2. Species common to Para and Cayenne only, 40 (16 per cent. of whole number); and species ranging west and north-west into the Upper Amazons, Venezuela, New Granada, and Central America, 48; together ...	88 (about 61 per cent.)
3. Species common to Para and South-east Brazil	15 (about 10 per cent.)
4. Species common to Para and Upper Amazons...	18 (about 12 per cent.)
5. Species found in Para alone	23 (about 17 per cent.)
	240

The 96 wide-ranging species, which amount to about 40 per cent. of the whole, comprise members of all orders, but are mostly

Accipitres, Grallæ, &c., which are mainly birds of wide distribution, many of them extending over the whole neotropical region. Having deducted these 96 we have left a residuum of 144 of more local character as regards their range, an examination of which will at once solve the question to which of the great zoological divisions of South America the district of the Lower Amazons pertains.

Of these 144 species not less than 88 (or 61 per cent.) are identical with species found in Cayenne, either belonging to forms peculiar to the Guianan province, or, if occupants of a more extended area, ranging westward and north-westward into the Upper Amazons or Venezuela, New Granada, and Central America, but not extending southward into the wood-region of South-eastern Brazil. Not only is this Guianan element noticeable for its numerical extent in species, but also as exhibiting such well-marked forms as *Pithys*, *Phœnicocercus*, *Hæmatoderus*, *Querula*, *Urogalba*, *Jacamerops*, *Opisthocomus*, and *Psophia*, all of which are quite foreign to the wood-region of South-eastern Brazil. The Guianan facies of the Para district is further shown by an examination of the instances in which the two provinces of Guiana and South-eastern Brazil are occupied by corresponding representative forms. In almost every case the Para form, when ascertained, is found to belong to the Guianan and not to the Brazilian species. In the subjoined table, of fourteen instances of this sort, it will be noted that there is only one positive exception to this rule. In two other cases both Guianan and Brazilian species occur within the Para district, and the River Amazons appears to form the boundary between them, the Guianan species being found on the north bank and the Brazilian on the south*.

CAYENNE.	PARA DISTRICT.	BRAZIL.
1. <i>G. æquinoctialis</i> ..	<i>Geothlypis æquinoctialis</i>	<i>G. velata</i> .
2. <i>C. guianensis</i>	<i>Cyclorhis guianensis</i>	<i>C. ochrocephala</i> .
3. <i>T. episcopus</i>	<i>Tanagra episcopus</i>	<i>T. cyanoptera</i> .
4. <i>P. viridis</i>	<i>Pitylus viridis</i>	<i>P. brasiliensis</i> .
5. <i>E. macrurus</i>	<i>Emberizoides macrurus</i> , <i>var.</i> ..	<i>E. sphenurus</i> .
6. <i>I. cayanaensis</i>	<i>Icterus cayanaensis</i>	<i>I. tibialis</i> .
7. <i>C. anthoides</i>	<i>Corythopsis anthoides</i>	<i>C. calcarata</i> .
8. <i>F. pica</i>	<i>Fluvicola albiventris</i>	<i>F. albiventris</i> .
9. <i>E. olivus</i>	<i>Empidonchus olivus</i>	<i>E. fuscatus</i> .
10. <i>G. viridis</i>	{ <i>Galbula viridis</i>	<i>G. rufo-viridis</i> .
	{ — <i>rufo-viridis</i>	
11. <i>C. tenebrosa</i>	<i>Chelidoptera tenebrosa</i>	<i>C. brasiliensis</i> .
12. <i>P. araçari</i>	<i>Pteroglossus araçari</i>	<i>P. wiedi</i> .
13. <i>R. vitellinus</i>	{ <i>Ramphastos ariel</i>	<i>R. ariel</i> .
	{ — <i>vitellinus</i>	
14. <i>C. flavigularis</i>	<i>Chloronerpes flavigularis</i>	<i>C. erythropis</i> .

* The River Amazon probably divides the range of the following species:—

Pipra flaricollis from *P. aureola*.
Xipholeuca lamellipennis from *X. pompadora*.
Galbula rufo-viridis from *G. viridis*.
Urogalba amazonum from *U. paradisea*.
Bucco hyperhynchus from *B. macrorhynchus*.
Thalurania furcataoides from *T. furcata*.
Campylopterus obscurus from *C. largipennis*.
Ramphastos vitellinus from *R. ariel*.
Psophia obscura from *P. crepitans*.

The purely Brazilian forms which occur in the Para district and are not known in Guiana are only 15 in number, or less than 10 per cent. of the whole. A similar foreign element appears to have intruded itself from the Upper Amazons, 18 or about 12 per cent. of species hitherto only known as inhabitants of the Upper Amazonian district occurring near Para. It is worth noticing, however, that about half these were procured on the Capim River or Tocantins, where the Peruvian element would appear to be stronger than in the vicinity of Para*.

There remain only to be considered the species peculiar to the Para district as far as hitherto known, which amount to about 23, or 17 per cent. of the whole, after excluding the species of wide range. As shown by the subjoined table, these Para species are not unfrequently representatives of allied forms in Cayenne, in some cases so closely allied as to be hardly distinguishable (e. g. *Urogalba amazonum*, *Thalurania furcataoides*), in others so well marked as to allow no question as to their specific validity, such as *Xipholena lamellipennis* and *Celeus jumana*.

Species peculiar to the district of Para.

- | | |
|--------------------------------------|---|
| 1. <i>Hylophilus rubrifrons</i> . | 13. <i>Bucco hyperrhynchus</i> . |
| 2. — <i>semicinereus</i> . | 14. <i>Campylopterus obscurus</i> . |
| 3. <i>Saltator mutus</i> . | 15. <i>Thalurania furcataoides</i> . |
| 4. <i>Dendroornis eytoni</i> . | 16. <i>Pteroglossus bitorquatus</i> . |
| 5. <i>Thamnophilus luctuosus</i> . | 17. <i>Celeus jumana</i> . |
| 6. — <i>nigrocinereus</i> . | 18. — <i>multifasciatus</i> . |
| 7. <i>Myrmotherula brevicauda</i> . | 19. <i>Ara hyacinthina</i> . |
| 8. <i>Heteropelma wallacii</i> . | 20. <i>Conurus perlatus</i> . |
| 9. <i>Pipra flavicollis</i> . | 21. <i>Brotoperys virescens</i> . |
| 10. <i>Xipholena lamellipennis</i> . | 22. <i>Caica vulturina</i> . |
| 11. <i>Galbula cyaneicollis</i> . | 23. <i>Leucopternis superciliaris</i> . |
| 12. <i>Urogalba amazonum</i> . | |

* In the subjoined list of species, registered from the Capim River and Tocantins, the Upper Amazonian forms are printed in italics:—

CAPIM RIVER.

Calliste boliviana.
Arremon silens.
Pitylus erythromelas.
Glyphorhynchus cuneatus.
Thamnophilus amazonicus.
Myrmotherula axillaris.
 — *brevicauda*.
 — *huxwelli*.
Ramphocenus melanurus.
Myiobius erythrurus.
Querula cruenta.
Galbula cyaneicollis.
Bucco tamatia, var.
Podager naumia.
Pteroglossus wiedi.
Campephilus trachelopyrus.
Urochroma purpurata.

TOCANTINS.

Progne tapera.
Tachyphonus melaleucus.
 + *Spermophila lineola*.
Leptoxura cinamomea.
Thamnophilus luctuosus.
 — *nigrocinereus*.
Formicivora grisea.
Iodopleura isabelle.
Pipra fasciata.
Galbula rufo-viridis.
Brachygalla inornata.
Monasa nigrifrons.
Hydropsalis trifurcata.
Campephilus albirostris.
Chloronerpes leucostigma.
Chrysotis farinosa.
Pionus menstruus.

It seems therefore, from what has been above stated, to be manifest that the mighty Amazons, though it may in some cases, as shown by Mr. Wallace and as noted above, separate allied species, does not constitute the true southern boundary of the Guianan avifauna, which is so remarkably distinct from that of the wood-region of South-eastern Brazil. To arrive at this boundary we must proceed further southwards nearly to the banks of the River Parnaíba, where the Amazonian wood-region terminates, and the high open country which forms the *campos* of Inner Brazil debouches upon the Atlantic. It is obvious that the wood-inhabiting species which form so large a proportion of the neotropical avifauna could never pass a barrier of this character, which offers as complete a physical obstacle to their passage as would a tract of sea of similar extent. We can therefore fully agree with the conclusions corresponding to those arrived at by Mr. Bates in his elaborate "Memoir on the Diurnal Lepidoptera of the Amazon-valley"* , namely :—

(1) That the Para district belongs to the same zoological province as the Guianas, and has received its bird-population mainly from that quarter.

(2) That in certain cases (amounting to about 17 per cent. of the whole number of species after excluding those of general distribution) variation has taken place, which has resulted in the production of new specific forms of greater or less degrees of distinctness.

(3) That in some of these cases the River Amazons has operated as a physical barrier, and has isolated these derivative forms from their Guianan allies, thereby leading to an accumulation of variations, which have ultimately resulted in the specific differences now observable.

2. Note on a New Species or Variety of Lemur in the Society's Gardens. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

(Plate XXXI.)

PROSIMIA FLAVIFRONS, sp. nov.

Fur soft, silky, bright pale red brown; hinder part of the back rather darker. Nose and feet dark red brown. Circumference of the face, side of the chin, the throat, and chest pale reddish yellow. Iris of eyes grey. Male.

Hab. Madagascar; Zoological Society's Gardens, May 15, 1867.

This is one of the Lemurs which differs from the other described species only in a variation in the shade and disposition of the colours. Whether these are varieties or distinct species must be left to be decided by those who can study them in their native haunts. The one here described is a full-grown male. The end of the tail in the living specimen is imperfect.

* Trans. Entom. Soc. n. s. vol. v. pp. 223, 335.

3. Notes on the Variegated or Yellow-tailed Rats of Australasia. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

At the Meeting of this Society for May 8, 1866, I described a large Rat with a black and yellow tail from North Australia, under the name of *Mus macropus**. We have since received another specimen of this Rat from Cape York; and Mr. Gerard Krefft has informed me in a note that it is, evidently the animal which he has proposed to call *Hapalotis caudimaculata* in a paper on Australian animals recently sent to this Society†.

I may add to the former description that the cutting-teeth are bright orange-yellow in front; the front side of the upper one is broad, flat, and smooth, with a narrow, slightly shelving margin on the outer side of each tooth,—and of the lower one narrower, convex, with a single, subcentral, longitudinal, slightly impressed groove.

The fur of this Rat is moderately soft, like that of *Mus rattus*, the longer hairs being rather rigid and bristle-like.

The British Museum has lately received an adult and a young specimen of this Rat in spirits from Cape York. The feet of the young specimen are as white, and, in proportion to the size of the specimen, as thick and fleshy as those of the adult.

The groove in the front of the lower cutting-teeth, the large size and pale colouring of the feet, and the nakedness of the scaly tail seem to indicate a peculiar section in the Rats, which may be called *Gymnomys*.

In the description above quoted I observed that there were two other species of Rat in the British Museum, which had the tails more or less varied with yellow, and that one of them was from North Australia, but that it differed from *M. macropus* in having smaller feet. I might have added that it also differed from *M. macropus* from Cape York in being a spiny-furred Rat.

This Rat also belongs to the section *Gymnomys*. It differs from *M. macropus* in the small size of the cutting-teeth and the feet, and there is also a difference in the colouring of the fur. It was brought from Menado, North Celebes, by Mr. Wallace in 1859.

This specimen might at first be regarded as the young of *M. macropus*; but the size and colour of the feet, as well as the great difference in the fur, at once set at rest such a theory. The hair of the Celebes Rat is much softer and uniform in kind than that of the Rat from North Australia, which is much more rigid, with abundance of elongate black cylindrical hairs; and the shorter fur is made up of soft slender crisp hairs, intermixed with a number of very narrow, slender, linear, rigid, white, flat, channelled hairs.

* P. Z. S. 1866, p. 221.

† [See Mr. Krefft's paper, P. Z. S. 1867, p. 316. The same animal has been more recently described and figured by our Foreign Member Dr. W. Peters under the name *Uromys macropus* (Monatsb. Ac. Berlin, June 1867).—P. L. S.]

MUS (GYMNOMYS) CELEBENSIS.

Grey brown, with rather rigid blackish longer hairs, most abundant on the middle of the back and rump; sides of the nose, cheeks, chin, middle of the throat, chest, underside of the body, and legs pure white, divided from the dark colour of the upper part of the body by a well-marked line; tail elongate, basal third blackish, the rest yellow; feet slender, brown, covered with short soft hair above; ears rather broad, naked. Length 10 inches, of tail 11 inches, of hind foot about 1 inch 10 lines. (Female.)

Hab. Menado (North Celebes), 1859 (*Wallace*).

Mr. Wallace obtained at Sadong, in Borneo, in 1855, a female Rat similar to the above in size, but varied with yellow and black hairs above, whitish yellow below, and with an entirely black tail. The cutting-teeth are yellow and smooth; the lower one without any indication of a longitudinal groove.

MUS XANTHURA. (Yellow-tailed Forest-Rat.)

Fur above yellow grey brown, yellow- and black-washed, especially on the hinder part of the back; sides of nose, cheeks, chin, throat, chest, underside of body, and limbs white; the longer hairs of the back black, rather rigid, those of the hinder part of the back much longer, blacker, and projecting beyond the base of the tail; the hair of the sides of the vent longer, yellow, with some stiffer longer black hairs intermixed; feet dark brown, hairy above; tail elongate, nearly naked, only with a few short hairs near the tip, black at the base for about one-third of its length, the rest yellow; upper cutting-teeth flat and yellow in front; the lower very narrow, rather compressed, white, smooth, without any indication of a central longitudinal groove.

Hab. North Celebes; Tondano (*Wallace*), 1859, female.

Mr. Wallace observes, "This is a forest-rat, eats rice; was taken at an elevation of 3600 feet." The long black hair over the rump has an inclination to form two dark streaks, each ending in a black point on the sides of the base of the tail.

ACANTHOMYS LEUCOPUS.

Grey brown above; sides of nose, cheeks, chin, underside of body, and legs white; feet thick, large, white, slightly covered with short close-pressed white hairs; tail elongate, naked, black, with two or more yellow rings. The fur of the back with abundant flat, channelled, spinous hairs, and with a few scattered, elongate, black, cylindrical bristles. The fur of the underside with similar spinous hairs, those on the sides and back being often dark-tipped. The cutting-teeth are yellow and quite smooth in front; the upper ones are flat; the lower ones rather narrow and rounded in front. The ears are nearly naked. The whiskers moderate, slender, flexible, weak. Eyes small.

Hab. North Australia; Cape York (*Mr. Damen*).

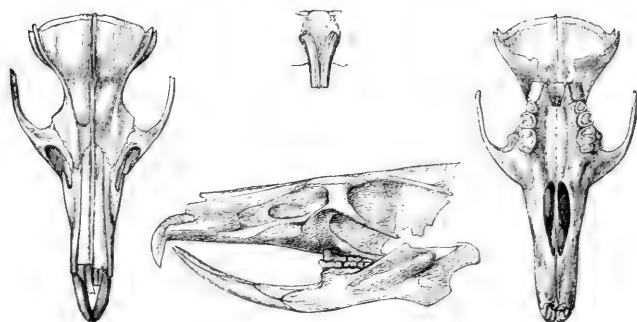
There is an adult female of this species, with four lateral ventral

and two pectoral teats well developed, and a young female in the Museum Collection.

ECHIOTHRIX.

Head elongate. Nose elongate, compressed, concave on the sides; apex produced, acute; underside with short close bristles and a small central groove; nostrils apical, lateral. Fur soft, crisp, with abundance of bristles, flat and channelled at the base, cylindrical and tapering at the tip; those of the under part of the body being white and more slender. Ears nakedish. Feet covered with short adpressed hairs. Tail elongate, cylindrical, nearly bald, with rings of square scales. Skull elongate; face very much produced, elongate, compressed; palate rounded in front, flat behind, with an elongated aperture in the middle of its length, more than twice as long as broad; the hinder part of palate with three equally long longitudinal grooves; nose flat above; nasal bones very long, slender. Cutting-teeth white; upper short, with two well-marked subcentral longitudinal grooves; lower elongated, arched, rather compressed, rounded and smooth in front. Grinders $\frac{3-3}{3-3}$, moderate-sized; the front much the largest; the hinder smallest and subcircular; the front upper rounded on the inner, and with two folds on the outer side; the second upper with one fold on the outer side, the lower front with a slight subcentral fold on the inner side. Crowns of the teeth flat; the front upper with two and the others with a single cross ridge, less distinctly marked in the hinder teeth.

Hab. Australia.



Echiothrix leucura.

The skull is very much longer and more slender than in any species of *Mus* or of *Muridæ* in the Museum Collection. The face is very slender, compressed, flat on the sides and above. The fissure on the side of the nose from the base of the infraorbital foramen is short and small, compared with those in the typical *Muridæ*. The grinders are nearly erect; the crowns of the grinders are worn and concave between the ridges of the enamel.

ECHIOTHRIX LEUCURA.

Fur dark grey brown, varied with black-tipped hairs on the back and sides; sides of nose, cheeks, throat, chest, and underside of limbs white; feet moderate, covered above with dark-brown hair; tail yellow, black at the base; cutting-teeth white; whiskers long, black, rather rigid. Length of body and head $9\frac{1}{2}$ inches; tail imperfect; hind feet about 2 inches.

Hab. Australia; British Museum, male? Tail imperfect.

4. Note on the Eggs of the Australian Stilt-Plover (*Himantopus leucocephalus*). By E. P. RAMSAY, C.M.Z.S.

As nothing seems to have been published upon the nidification of this fine species, I beg leave to offer a few remarks upon the subject. The Stilted Plover must be considered rather a scarce than a rare bird in New South Wales, its visits being few and far between. When it does come, however, which is usually in some very dry or remarkably wet season, it appears in great numbers and in all stages of plumage. In 1865 large flocks arrived, in company with the Straw-necked and White Ibises (*Geronticus spinicollis* and *Threskiornis strictipennis*), and took up their abode in the lagoons and swamps in the neighbourhood of Grafton, on the Clarence River, where, on my visit to that district in September last (1866) all three species were still enjoying themselves.

A few days previously to my arrival in Grafton, a black in the employ of Mr. J. Macgillivray, and a very intelligent collector, discovered a nest of this species containing four eggs, which have been secured for our collection. The nest was a slight structure, consisting merely of a few short pieces of rushes and grass, placed in and around a depression at the foot of a clump of rushes growing near the water's edge of a lagoon in the neighbourhood of South Grafton. The eggs vary slightly in form, two being pyriform, the other two rather long. The ground-colour is of a yellowish olive or light yellowish brown, lighter when freshly taken—in some sparingly, in others thickly blotched and spotted with umber and black, the black spots running together and forming large patches on the thick ends. Length from $1\frac{3}{20}$ inch to $1\frac{7}{10}$ inch; breadth $1\frac{1}{4}$ inch to $1\frac{1}{5}$ inch.

The immature birds have the top and back of the head, back of the neck, and shoulders grey, which parts become black, interspersed with white feathers, before finally reaching the plumage of the adult.

5. On some Points connected with the Anatomy of the Hippopotamus (*Hippopotamus amphibius*). By EDWARDS CRISP, M.D., F.Z.S. &c.

The animal, a part of the anatomy of which I am about to describe, is the only one that has been dissected in this country. In France one or two young Hippopotami at birth have been examined; but the only record I have met with is in the 'Annales des Sciences Naturelles,' 1860, p. 376, "Recherches sur le système sanguin de l'Hippopotame," by the late Professor Gratiolet, a paper I shall have to refer to hereafter. It is probable that other accounts of the anatomy of this animal may exist; but I have not taken much trouble to find them, as I prefer working the matter out in my own way. On a recent visit to Paris I was told by Professor Milne-Edwards, to whom I pointed out the presence of skin-glands and the colic-gland, to be hereafter described, "that the anatomy of the Paris specimen had not been completed." I saw casts of the external muscles of this young animal and of the injected abdominal vessels at the Museum of Comparative Anatomy at the Jardin des Plantes, the latter made, probably, for the purpose of illustrating Gratiolet's paper.

The Hippopotamus I have dissected was burnt to death at the Crystal Palace at the end of last year; its age was fourteen months and a few days, and it weighed about seven or eight cwt. The length from nose to anus was 68 inches; the circumference in the largest part of the body 82 inches, that of the neck behind the ear 44 inches. In consequence of the thickness of its skin, its interior parts were for the most part intact and uninjured. I purchased the dead animal, and had the advantage of dissecting it in my own garden, where I took casts and drawings of all the important parts of its anatomy. The skeleton is also in my possession. One side of the animal was well roasted. I supplied some of my friends with the meat cooked gipsy fashion, and I partook of it several times myself. Its flavour was excellent, and the colour of the flesh was whiter than any veal I have ever seen. In Knight's 'English Cyclopædia of Natural History,' under the article Hippopotamus, is the following:—"With regard to minor details, the flesh of the Wasser-ochs is much esteemed as an article of food." In the first catalogue of the African Museum we read that it is much in request both among the natives and the colonists, and that the epicures of Cape Town do not disdain to use their influence with the country farmers to obtain a preference in the matter of Sea-cow's speck (as the fat which lies immediately under the skin is called when salted and dried). In the animal in question this fat was about $1\frac{1}{2}$ inch in thickness. And let me here make another digression. It has been said that elephants examined in this country are free from fat; but on the last I inspected, a female that died in the Society's Gardens, the fat (of an

oily, liquid nature) was very abundant, but not deposited under the skin as in the Hippopotamus, in the Hogs (*Suidæ*), and in some other animals. Gordon Cumming speaks of the abundance of fat in the inside of many elephants that he killed; and the same remark is made by other travellers. I purposely introduce these questions of food and fat, as some of my hearers (who may not be anatomists) may think a digression of this kind a relief among dry anatomical details.

For the better understanding of the subject, I have placed before the Society drawings, of nearly the natural size, of the organs of all the thoracic and abdominal viscera, as well as casts and preparations by way of illustration.

Time will not allow me to describe all the anatomy of this animal; indeed the stomach alone, if properly studied, might form the subject of a long paper. I shall therefore on the present occasion confine myself to the visceral anatomy, or to such parts of it as I was able to investigate, and to the skin-glands. In my next paper I will remark on the peculiarities of the viscera of the Hippopotamus as compared with those of the other pachyderms.

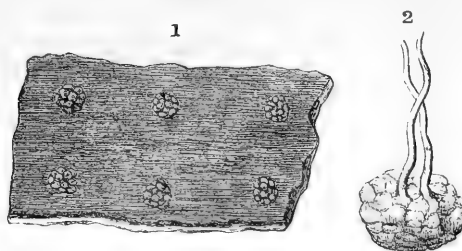
First, of the skin-glands. Mr. Tomes in 1850, soon after the arrival of the first Hippopotamus at the Gardens, read a paper* "On the Blood-coloured Exudation from the Skin of the Hippopotamus." He says, "We have, however, sufficient evidence to warrant the conclusion that the thick tenacious exudation, whether coloured or otherwise, is poured out only during the time the skin is immersed in water, and that it has an especial reference to the aquatic habits of the animal. It appears for the time to convert the surface of the body into a mucous membrane, and then, on the animal leaving the water, to furnish by its inspissation an epidermis. The examination of the structure of the skin will become a subject of great physiological interest."

When I discovered the glands I am about to mention I did not know of Mr. Tomes's paper, my attention having being subsequently directed to it by Mr. Bartlett. Under the skin, about an inch or more below the surface, are numerous small glands of a somewhat rounded form, about 2 lines in diameter and $\frac{1}{2}$ line in thickness; they are generally seated about $\frac{1}{3}$ inch from each other, but in some parts of the body they are further apart. From each generally proceeds two ducts, of a somewhat spiral form; in other instances I have been able to discover only one duct. In the preparation before the Society some of these ducts are visible to the naked eye. The condition of the skin from the application of heat has not enabled me to make so satisfactory a microscopic examination of these organs as I otherwise could have done.

The subjoined sketch which I have made gives a tolerable indication of the character of these glands and their ducts. Figure 1 represents the glands of their natural size, and figure 2 shows the ducts magnified about 10 diameters.

* Proc. Zool. Soc. 1850, p. 160.

Figs. 1 & 2.



Skin-glands of the Hippopotamus.

The following are my notes of the dissection of the viscera:—

On opening the abdomen the mesentery is seen moderately covered with fat; but the large stomach, which is full of food, occupies the chief part of the abdominal space. The length of the intestinal canal, which is not furnished with a cæcum, is as follows:—

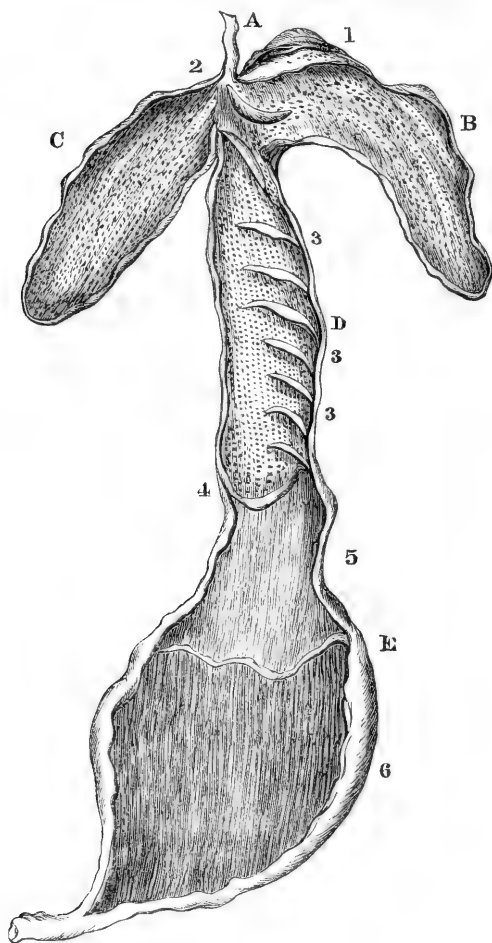
	ft.	in.
Œsophagus	2	10
Stomachs	5	10
Small intestines	99	8
Large intestines	10	2
Total	118	6

The commencement of the large intestines is indicated by a sudden enlargement of the tube, and by the gland to be hereafter noticed.

The stomach (fig. 3, p. 604) has a very peculiar form, and differs materially from that of any other pachyderm, indeed from that of any other animal. The œsophagus (A), the lining membrane of which is smooth, but arranged in slight longitudinal folds, terminates between the first and second stomachs (B, C). These cavities are of about equal size, of a somewhat cylindrical form when distended. The right cavity (B) measures 19 inches in length and 6 at its widest part; it will contain about three quarts of water. The left cavity (C) is 21 inches in length and $4\frac{1}{2}$ at its widest part; in capacity it is about the same as the last, as it is thinner and more distensible. Proceeding from between these cavities is the third stomach (D), of a cylindrical form, 20 inches in length and 5 at its widest part; it holds about three quarts. The fourth and last stomach (E) is of a rounded form, 14 inches in length and 10 at its widest part; its capacity is about six quarts. The interior of these viscera present a remarkable appearance. The œsophagus (A) appears to enter equally into both the first cavities; but in the right cavity is a strong muscular slip (1) of a somewhat crescentic shape, extending for about 6 inches along its upper part, the object of which appears to be to direct the food into the left stomach; but other observers may take a different view of this question. The left cavity is furnished with about sixty-five longitudinal rows of detached papillæ of a rounded form, elevated about a line above the surface, giving somewhat the appearance of

the rumen of a ruminant. The coats of the right stomach are much thicker than those of the left, especially where the before described slip originates. The lining membrane is covered with papillæ, as in the left cavity ; but they are thicker set, especially towards the œso-

Fig. 3.



Stomach.

phageal end. In addition to the thick muscular slip before named there is a large valvular projection below (2) serving to direct the food into the third stomach. At the commencement of the third stomach is a crescentic-shaped muscular valve occupying the right

side only, forming a rounded orifice, which measures about 2 inches in diameter. The third stomach is also lined with small papillæ, some of which, near to the œsophageal extremity, are pointed and resemble those of some of the smaller ruminants. This cavity is furnished with seven valvular slips (3, 3, 3), varying in length from 2 to 4 inches, so as to leave pouch-like projections between; but these, when the stomach is inflated, are seen to be of small size, although in the adult animal their dimensions may be considerable. A long crescentic-shaped valve (4) projects into the large opening between the third and fourth stomachs. The fourth and last stomach (E), like the fourth stomach of a ruminant, is quite smooth; but it possesses no longitudinal folds as seen in the digestive stomach of ruminants; the pyloric valve is of moderate thickness. At the commencement of the fourth stomach, for the space of about 10 square inches, the lining membrane is smooth and white; beyond this it is red and more elevated, so that these portions of the stomach evidently perform a different function.

In the third stomach I found the large round solid mass of hay and straw which I exhibit; it is about 5 inches in diameter when dried, but when first examined it was of much larger size. The valvular slips and pouch-like divisions in this cavity, which I have already described, would lead to the belief that the food might assume a globular shape in this viscus. But such an accumulation as I have mentioned must, I think, be abnormal; it will, however, be interesting to examine carefully the contents of this cavity in an adult animal. I believe that the food passes from the third to the fourth stomach in the form of pellets, and that the dry and unnatural food (hay and straw) occasioned the enlargement met with.

I have made the subjoined sketch of the stomachs when laid open, the letters and figures already given indicate the various parts.

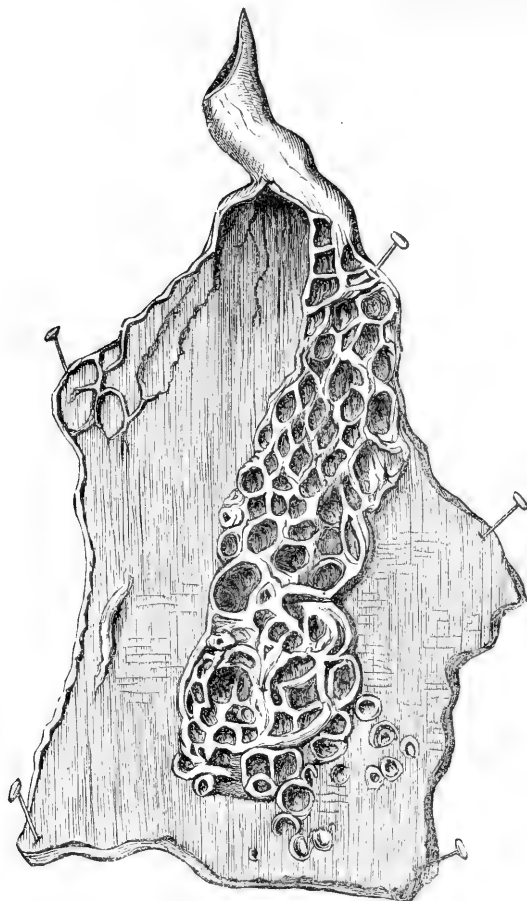
The microscopical appearances of the intestinal tube I reserve for another paper.

The intestinal tube below the stomach is of moderate calibre; the small intestines when distended measure from $1\frac{1}{4}$ to $1\frac{3}{4}$ inch in diameter. The large intestines when inflated are 3 inches in diameter, the capacity of this part of the canal amounting to about thirty-three quarts; this added to the capacity of the stomach and œsophagus makes the total capacity of the intestinal tube about forty-nine quarts. I do not speak with perfect accuracy, but the figures are not far from correct. I scarcely need remark that the capacity after death, and when the muscles are relaxed and viscera are unconfined by the abdominal walls, greatly exceeds that during life.

As I have said, there is no cæcum; but the intestine enlarges about 10 feet from the anus; and at this part is seated a large gland similar in appearance to that in the Giraffe, but of greater extent, as the drawing now exhibited (see p. 606) shows. The preparation of this gland in spirits before the Society is much contracted since its immersion, so that it gives but a very imperfect notion of its original appearance. It covers a space of about 6 square inches, and it is about 6 inches in length. The crypts or sacculi amount to about

sixty, and these are divided into smaller compartments by slight elevations of the mucous membrane; a few detached semilunar crypts are also present, as seen in the accompanying sketch.

Fig. 4.



Colic gland

The duodenum and upper part of the mucous membrane of the jejunum are covered with very small villi, giving the surface a velvety appearance. In addition to the intestinal gland already named, there are several aggregate glands in the jejunum and ilium; these are of an oblong form, and vary in length from 1 inch to $1\frac{1}{2}$ inch; those in the latter intestine are to some extent miniatures of the colic gland.

In other parts of the small intestine the surface is studded with small sieve-like patches, presenting a more regular appearance as to the size of the crypts than those above described. The lining membrane of the large intestine, with the exception of the colic gland, presents nothing worthy of notice. There are no longitudinal bands externally, and the tube is of nearly uniform calibre.

Pancreas.—The pancreas weighs about 18 oz. ; it consists of three principal lobes, one of which terminates near to the pylorus ; and probably, as in many quadrupeds, a duct enters at this part, but I omitted to make the inspection. The main duct enters the duodenum with the biliary duct 8 inches from the pylorus, by a large canal which passes obliquely through the duodenal coats for about $\frac{3}{4}$ inch before it enters the intestine. The structure of the pancreas affords no peculiarity worthy of note.

Spleen.—The spleen is long and narrow, like that of the Hogs (*Suidæ*), Peccaries (*Dicoteles*), Tapirs (*Tapiridæ*), and Elephants (*Elephantidæ*). It measures 17 inches in length and 3 in breadth ; its weight is $9\frac{1}{4}$ oz. The vein makes its exit near to the abdominal end. I cannot speak with certainty as to the presence of valves in the veins, as the parts were left for some days, and were nearly decomposed when I examined them.

Liver.—The liver is unilobular ; its length is 17 inches and its greatest width 10 inches ; its weight 7 lb. 6 oz. Although I have called the liver unilobular, there is a large notch on the anterior part that may be said to make it bilobular, although the division is not very apparent. Assuming the bilobular character to be the more correct term, that which may be called the right lobe occupies about three-fourths of the weight of the organ. Between the lobes is an elevated portion that may be said to represent the lobulus Spigelii and a large anterior elevated quadrilateral portion that corresponds to the lobus quadratus in Man ; the caudate lobe and the pons hepatis can scarcely be said to exist. According to the usual division of the human liver into five lobes, the liver of the Hippopotamus may be said to have four lobes ; but I think the sooner these elevations on the under surface of the liver are disconnected with the lobes the better ; the depression on the right of the Spigelian promontory is well marked, but there is no fissure for the inferior cava. There is no gall-bladder ; but the duct dilates into a large sac at the edge of the liver, which diminishes in size before it enters the intestine. The ligaments are strong and well marked ; the portal veins large. As regards the structure of the liver I observe nothing worthy of note.

Kidneys.—The left kidney is of an irregular shape, the form somewhat triangular with the base below ; the right is more cylindrical and regular in form ; each externally consists of about twenty-six lobes of unequal size. The lobular character is confined to the external surface, and probably in the adult animal it is much less marked. About seven mammary processes are present ; the pelvis is rather small. In the left renal vein, close to its exit from the gland, there are two valves, and one of larger size in the same situa-

tion in the right vein. A valve also exists in the vein of the left renal body, near to its exit. The renal bodies (not suprarenal capsules, as they are erroneously called) are of a triangular shape, with a notch at the base of each; the left is placed 2 inches above the kidney; the right is above, but closer to the gland. Each weighs about 240 grains. The weight of the left kidney is $8\frac{1}{4}$ oz., that of the right 7 oz.

Urinary Bladder.—The urinary bladder is very capacious; it will contain about four quarts of water, and, with the exception of that of the Wart-Hog (*Phacochærus æliani*), is proportionately larger than that of any of the pachyderms I have examined.

Organs of Generation.—The testicles small, and within the abdominal cavity; the vesiculæ seminales also small. The penis measured $12\frac{1}{2}$ inches; the extremity is large and globular, like that of the Boars. Its diameter at the end is $2\frac{1}{2}$ inches, whilst in the middle it is only $\frac{3}{4}$ inch. A large retractor muscle arises from the os pubis and ischium (as in the ruminants), and is inserted into the left side of the body of the penis 7 inches from its extremity, as seen in the wax cast. The penis and other parts of the organs of generation were removed by mistake, and therefore I am unable to give a more minute description of them.

Tongue.—The tongue is very thick at its base, the anterior end broad and round, the surface smooth and velvety; among the small villi are numerous round light-coloured papillæ about the size of a pin's head. The base of the tongue is closely set with long-pointed pear-shaped papillæ about $\frac{1}{4}$ inch in length and 2 lines in width in the centre, differing from those of the Hogs and other pachyderms in their more pointed form.

Larynx, Trachea, and Os Hyoides.—The opening of the glottis is somewhat like that of the Dolphin and Porpoise, the parts below the glottis being of an irregular-shaped pyramidal form; the thyroid cartilage, however, is placed much higher than in these animals. The laryngeal muscles are very powerful, especially the crico-arytenoidei postici. The os hyoides consists of nine bones—a central nearly circular bone about 1 inch in diameter, and eight separate cylindrical bones (six above and two below) articulated superiorly to the styloid process of the temporal bone, and below to the thyroid cartilage. The united length of the four lateral bones is 9 inches. As might be supposed from the age of the animal, none of these bones are complete; and the same remark will apply to the laryngeal cartilages. The thyroid cartilage is of shield-like form, and possesses two cornua above and below. The inferior are about 1 inch in length; the superior about $\frac{3}{4}$ inch. The length of the cartilage at its anterior part is $4\frac{1}{2}$ inches.

The cricoid cartilage has two large oblong articulating surfaces upon its upper and lateral surface, for the arytenoid cartilages. This cartilage is very thick posteriorly; its anterior part passes obliquely under the thyroid, forming a pointed ridge in front. It is narrow anteriorly, and about 2 inches deep at its posterior face. The arytenoid cartilages are thick and of an irregular triangular form, the

posterior edges flattened and measuring $\frac{2}{3}$ inch in width. The anterior edges, which form the glottis, are thin; and by their apposition the glottideal slit is entirely closed. The vocal ligaments are very slightly developed. The state of the larynx and of the surrounding parts prevented my making a careful inspection of the laryngeal muscles, an investigation that will fully repay future inquirers.

The trachea consists of twenty-three rings; it is of moderate calibre (1 inch), less capacious than in many young non-aquatic animals; its size is nearly uniform; and, as in most quadrupeds, it has three terminal branches, the two on the right side being nearer together than usual. I have placed the larynx and trachea of the Porpoise and Dolphin on the table to show the resemblance of the upper part of these tubes to that of the Hippopotamus.

The heart is of a rounded form; it weighs 21 oz.; its length from the root of the aorta to the apex 6 inches, and its width at the base the same. The external course of the coronary arteries is well marked, their mouths large and in the usual situation. The pulmonary artery of very large calibre. The aorta also of large size, its coats one-third thicker than those of the last-named vessel. The first large primitive branch (innominata) is $1\frac{1}{2}$ inch from the semilunar valves, the second (subclavian), about one-half its calibre, close to it. The coats of the first-named arterial branch are of unusual thickness. The aortic and pulmonary semilunar valves present nothing worthy of notice, except that they have no corpora Arantii.

The ventricles are nearly of equal size, the left being rather more capacious. The sides of the right ventricle are generally smooth, whilst those of the left are reticulated; numerous cross bands are present at the apex of this ventricle, all passing in the lateral direction of the cavity. The parietes of the left ventricle measure about 1 inch in thickness, whilst those of the right are only $\frac{1}{6}$ inch. The septum is very thick, measuring at its upper part $1\frac{1}{4}$ inch in thickness.

The tendons of the mitral valve, fifteen in number, arise from two fleshy columns, the posterior being much larger than the anterior, although less prominent.

The tendons of the tricuspid valve, seventeen in number, spring from three columns (so called), one prominent and nipple-like, the others but little raised above the surface.

The cavities of the auricles are of about the same capacity; but the appendix of the right auricle is larger, and its parietes thinner and more distensible. In both appendices the muscoli pectinati are very numerous, those in the right forming a double reticulated layer of bands, and presenting a very beautiful appearance. The foramen ovale is deep and about the size of a shilling; it is perfectly closed, and a small nipple-like process projects from its centre. The projection at the upper part of the circle (isthmus Vieusseni) is well marked. The Eustachian valve is but imperfectly developed; indeed, with the exception of a slight semicircular elevation, it can scarcely be said to exist; there is no tubercle of Lower so-called. The openings of the two coronary veins are seen an inch below the foramen

ovale; they are about $\frac{1}{2}$ inch apart, and are unfurnished with valves. There is only one superior cava; this vessel is short, thin, and very capacious, measuring $1\frac{1}{4}$ inch in diameter. The inferior cava is also very capacious; I had not read the essay of Gratiolet, before alluded to, and unfortunately did not examine its structure. The careful inspection of the muscular band in the cava described by Gratiolet will be very important in the adult animal.

The thyroid glands, of an oblong form, are in their usual situation; they are not connected by an isthmus. Their weight is 325 grains.

Lungs.—The lungs, which weigh 8 lb. 14 oz., present some features of great interest; they are nearly unilobular, each having only a small pointed slip at the upper extremity near to the apex.

In considering the structure of the lungs it is necessary to take into account the mode of death by burning, for it is possible that the appearances I am about to describe arose from that cause. On inflating the lungs with air I was surprised to find that towards the apices large air-cells existed that would hold a common-sized horse-bean, as seen in the preparation before the Society. They presented no appearance of recent rupture; but whether they are natural, or whether it is an emphysematous condition produced by the mode of death, future examinations will determine.

Another peculiarity in the lungs is their lobular division in many parts, as shown in the preparations. The lung-tissue is subdivided into lobules of a somewhat irregular form, about the size of large Barcelona nuts. I have seen a somewhat similar appearance in the lungs of the Dolphin, Porpoise, and Seal.

The bronchial tubes are thick and capacious, their parietes consisting chiefly of unstriped circular muscular fibres.

The brain was removed from the skull piecemeal; it weighed $10\frac{1}{4}$ oz.

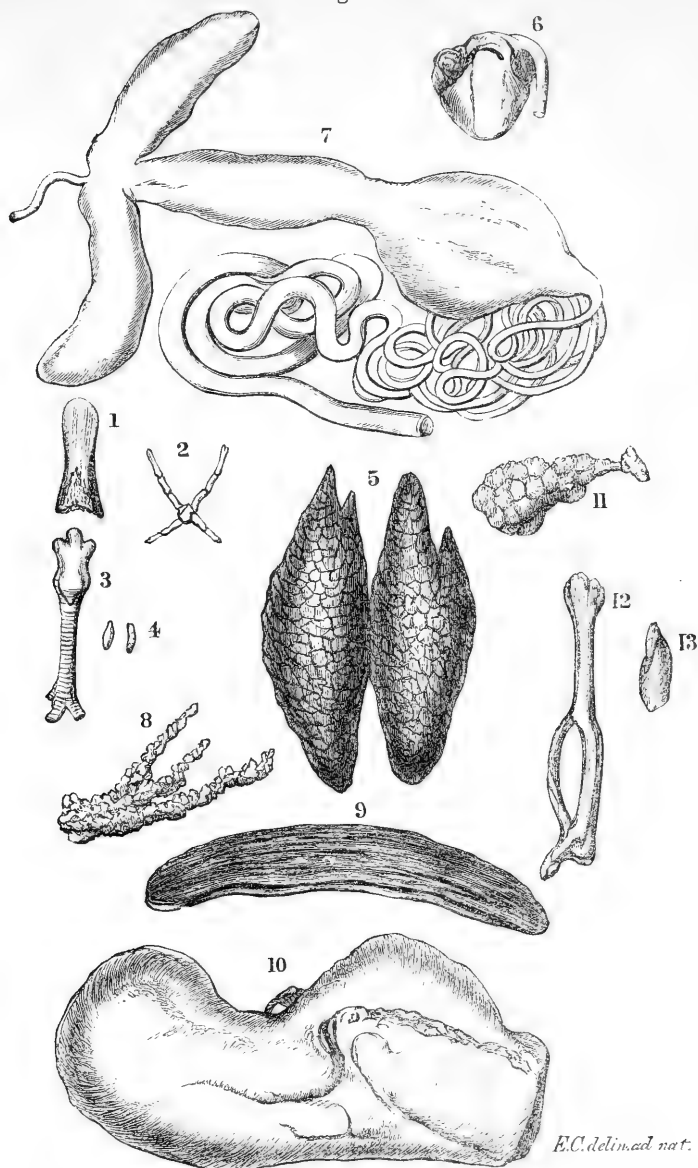
The eye, on the side towards the earth, was but little injured; it weighed about 200 grains.

In my next paper I will compare the form, size, and structure of the viscera of the Hippopotamus with those of the members of the pachyderm family and of some other animals.

The drawings which I have made of the viscera of the Hippopotamus (see fig. 5, p. 611) will better explain the form and relative size of the various organs.

P.S. After the above paper was read, my attention was directed to a short communication by Dr. Peters (in his *Naturwissenschaftliche Reise nach Mossambique*, Berlin, 1852, p. 180) "on the Visceral Anatomy of the Hippopotamus." The animal examined by Dr. Peters was an adult. The four divisions of the stomach are briefly described: the right first stomach was found to be double the length of the left. In a large full-grown animal the estimated length of the intestines is 138 feet. A gall-bladder was found long and flat placed across the pancreas. I refer the reader to this communication. The part of greatest interest, I think, in Dr. Peters's account is the large size of the first stomach. As is well known, the rumen of the ruminant is

Fig. 5.



Description of the figures:—1. The tongue. 2. Os hyoides. 3. Larynx and trachea. 4. Thyroid glands. 5. Lungs. 6. Heart. 7. Œsophagus, stomachs, and intestines. 8. Pancreas. 9. Spleen. 10. Underside of liver. 11. Kidney and renal body. 12. Penis and retractor muscle. 13. Testicle.

comparatively small whilst the animal is fed upon milk; the young Hippopotamus I dissected took a large quantity of this fluid, and hence probably the small size of the first gastric cavity. Judging from the form of the stomachs and the character of the villi, one would almost infer that a certain amount of rumination takes place in this animal.

6. On the Lepidopterous Insects of Bengal.

By FREDERIC MOORE.

[Concluded from Proc. Zool. Soc. 1867, p. 98.]

(Plates XXXII. & XXXIII.)

Tribe GEOMETRES.

Fam. URAPTERYDÆ, Guen.

Genus URAPTERYX, Leach.

URAPTERYX EBULEATA, Guen. Phal. i. p. 32.

U. MULTISTRIGARIA, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1535.

U. SCITICAUDARIA, Walk. ib. xxvi. Geom. p. 1480.

Darjeeling.

U. PODALIRIATA, Guen. Phal. i. p. 32.

U. MARGARITATA, n. sp.

Female pearly white; costa slightly convex; apex acute; exterior margin of fore wing obliquely straight; exterior margin of hind wing acutely angular and lobed in the middle: fore wing with two medial transverse widely separated straight reddish lines, the inner line crossing the hind wing and terminating upward on the abdominal margin; cilia and lobe-spot on hind wing reddish. Band on the head and antennæ reddish.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell.

U. TRIANGULARIA, n. sp.

Male and *female* white, diaphanous; costa convex, exterior margin of both wings obliquely straight: hind wing much produced, extending to twice the length of the abdomen. Both wings with five transverse cinereous lines, the four inner lines straight, the outer line wavy, all proceeding to the anal angle. Cilia cinereous brown; a black exterior spot at anal angle.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

U. CROCOPTERATA, Kollar, H \ddot{u} gel's Reis. Kasch. iv. p. 483.

U. RUFIVINCTATA, Walk. Cat. Lep. Het. B. M. xxvi. Geom. p. 1747.

Darjeeling.

U. QUADRIPUNCTATA, n. sp.

Female sulphur-yellow. Both wings with numerous short transverse irregular cinereous streaks; an oblique transverse line, and a reddish discal spot; costa at the base and exterior margins reddish. Palpi, band on head, antennæ, and dorsal streak on abdomen reddish.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. F. Moore.

U.? FALCATARIA, n. sp.

Male and *female* very pale greenish white with a silky gloss. Both wings with a cinereous discal spot and four transverse rather indistinct bands, the first and second being medial, the others submarginal; the third band joined to the second before reaching the posterior margin: hind wing produced anteriorly, and falcated. Underside paler. Legs blackish above; a black apical spot on hind tibiæ.

Expanse 2 inches.

Darjeeling. In Coll. A. E. Russell; F. Moore.

Genus EUCHERA, Hübner.

Syn. *Cyclidia*, Guen.

EUCHERA SUBSTIGMARIA, Hübner. Zutr. Exot. Schmett. f. 519.

Cyclidia substigmatica, Guen. Phal. i. p. 63.

Abraas capitata, Walk. Catal. Lep. Het. B. M. xxiv. Geom. p. 1121.

Genus CHORODNA, Walk.

CHORODNA EREBUSARIA, Walk. ib. xxi. Geom. p. 314, ♂.

Darjeeling.

C. METAPHÆARIA.

Cyclidia metaphæaria, Walk. ib. xxvi. Geom. p. 1482, ♂.

Erebomorpha semiclusaria, Walk. ib. p. 1552, ♂.

Darjeeling.

C. PALLIDULARIA, n. sp.

Male yellowish testaceous, thinly and minutely speckled with dark brown; a blackish-speckled line from abdominal margin before a large black discoidal spot, terminating in a curved series of brown lunules near the middle of the costa, before which latter is an inner similar series of lunules; an irregular submarginal blackish-testaceous line, wavy and bordered inwardly by a dusky band on the fore wing,

and angulated in the middle on the hind wing, where there is a medial series of black dots bordered without by a slight pale-brownish suffused band; costa with a speckled spot to near the base and another near the apex.

Female whitish testaceous, with the markings as in the male, but paler.

Expanse, ♂ $3\frac{1}{4}$, ♀ 4 inches.

Darjeeling. In Coll. A. E. Russell; F. Moore.

C. VULPINARIA, n. sp.

Female ferruginous, palest on the fore wing from the base; with numerous short transverse black strigæ, which near the base of the hind wing are thickly disposed. Both wings with an inner transverse blackish line, which on the fore wing is anterior to an oval discoidal black spot, but on the hind wing the spot touches the line; a transverse row of black pale-pointed discal spots, the series on the fore wing being recurved and terminating in a lunulated line on the hind margin, the discal space to the pale submarginal line being dark tawny, the margin on the fore wing being paler hindward; on the costa contiguous to the discoidal spot is a short black streak, and a short ascending streak near the base of the hind margin. Head and thorax pale, and abdomen dark ferruginous.

Expanse $3\frac{1}{2}$ inches.

Darjeeling. In Coll. W. S. Atkinson.

C. MURICOLARIA.

Cyclidia muricolaria, Walk. Cat. Lep. Het. B. M. xxvi. Geom. p. 1483, ♀.

Darjeeling.

C. PLAGIDOTATA.

Cyclidia plagidotata, Walk. ib. p. 1483, ♀.

Darjeeling.

C. RECTATA.

Cyclidia rectata, Walk. ib. xxxv. Suppl. v. p. 1536.

Darjeeling.

C. PATULATA.

Cyclidia patulata, Walk. ib. p. 1537.

Darjeeling.

DALIMA, n. g., Moore.

Male. Palpi small, compressed, pilose; second joint broadly pyriform; third joint very short, hardly visible. Antennæ bipectinated; pectinations formed of short pencils of delicate vibrissæ. Legs slender, smooth; hind tibiæ armed with two pairs of apical spurs. Body moderate. Abdomen slender, extending to near angle of hind wing. Wings ample, elongated. Fore wings falcated; costa nearly straight at the base, very convex to the apex; apex acutely

angled; exterior margin very oblique, slightly concave; posterior margin straight. Hind wings produced; anterior margin extending beyond angle of fore wing; apex truncated, excavated; exterior margin nearly straight; anal angle somewhat acute.

DALIMA APICATA, n. sp. (Pl. XXXII. fig. 4.)

Male yellow; blackish-speckled, those at the base of fore wing disposed close together, others on the exterior border forming a submarginal and marginal banded series: fore wing with a broad elongated testaceous patch occupying the apex from the middle of the costa to below the angle; a blackish streak along base of the costa, three costal spots, a series of three or four triangular spots with whitish outer border, and a large round discal spot, all slightly white-speckled; a broad lunular black spot bordered with white on the middle of posterior margin; costa and posterior border slightly suffused with testaceous: hind wing with a blackish round discal spot, and two or three decreasing blotches from the anterior and posterior angles, all whitish-speckled. Underside brighter-coloured; markings as above, but more defined.

Expanse 3 inches.

Bengal (*Sherwit*). In Coll. F. Moore.

D. SCHISTACEARIA, n. sp.

Male dark ashy brown: fore wing with a transverse wavy subbasal ashy-white line, and a white line proceeding from the costa, one-third from the apex, curving obliquely towards the exterior margin, and then retracting in a straight line to the middle of posterior margin, where it has a small inner contiguous black spot; a similar line passes straight across the hind wing; middle of fore wing and base of hind wing suffused with greyish white; exterior margin of fore wing with a white line. Underside reddish, with numerous blackish speckles thickly disposed on the fore wing, less so on the hind wing; both wings with a submarginal blackish-speckled lunulated band.

Expanse $2\frac{3}{4}$ inches.

Bengal. In Coll. A. E. Russell.

Genus *CHÆRODES*, Guen.

CHÆRODES TESTACEATA, n. sp.

Male pale testaceous, covered with numerous minute black speckles, which are thickly disposed on the middle of exterior margin of fore wing. Both wings with an inner transverse line, which on the hind wing is blackish and passes through a discoidal spot, the line on the fore wing being cinereous and exterior to a small black spot; a broad marginal suffused greyish-testaceous band retracted to the anterior margin before the apex of both wings. Underside marked as above, but all the markings are considerably more defined.

Expanse $3\frac{1}{2}$ inches.

Bengal. In Coll. A. E. Russell.

Genus *LAGYRA*, Walk.Syn. *Chizala*, Walk.*LAGYRA MEGASPILA*, n. sp.

Male silvery grey: fore wing with two brown basal transverse lunular lines; a third outer oblique line passing through a large dark brown discal spot, the spot being marked with two white transverse lunules: hind wing with two medial transverse brown lunular lines, and a submarginal pale dusky band, which is apparent also on the fore wing near posterior angle; both wings with a transverse discal row of brown dots. Underside paler, with the markings less apparent. Exterior margin of fore wing produced in the middle; hind wing sinuous.

Expanse $1\frac{1}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

L. RIGUSARIA, Walk. Catal. Lep. Het. B. M. xxvi. Geom. p. 1485.

Larva feeds on the rose.—*A. Grote, Esq.*

Genus *CIMICODES*, Guen.*CIMICODES CASTANEARIA*, n. sp. (Pl. XXXII. fig. 1.)

Female bright chestnut-red, minutely black-speckled; a narrow white-outer-bordered black line from below the middle of abdominal margin to near apex of fore wing, where it retracts to the costa one-fourth from the apex: fore wing with a similar oblique subbasal white-inner-bordered line; a blackish discal spot. Both wings with a submarginal row of black dots. Cilia edged with white.

Expanse 2 inches.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

C. COSTALIS, n. sp.

Female purplish red, minutely black-fleckled: fore wing with an oblique subbasal narrow blackish line; a pale red streak beyond the middle; costal margin and two large dentate medial spots yellow: hind wing with a transverse medial blackish line; anterior margin yellowish.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell.

C. CRUENTARIA, n. sp.

Female yellow; apex of fore wing produced to a point; a narrow cinereous band from middle of abdominal margin to apex of fore wing: fore wing blotched at the base, and spotted beyond with pink; posterior and exterior margin and contiguous to the oblique band also blotched and spotted with pink; a small discal spot and an apical streak dark red, the latter white-marked; a marginal row of brown dots: hind wing blotched and spotted with pink exteriorly, a

few pink dots also at the base; a submarginal curved series of small dark red spots. Head, thorax, and abdomen pink.

Expanse $2\frac{1}{4}$ inches.

Bengal. In Coll. A. E. Russell.

Genus AUZEA, Walk.

AUZEA APICATA, n. sp.

Male dark greyish chestnut-colour, palest hindward; minutely black-speckled: fore wing with an oblique pale line from the apex to middle of posterior margin; costa before the pale line with two outwardly oblique short dark streaks: hind wing with a medial pale line, which is blackish, wavy, blotched, and white-lunulated by the abdominal margin: both wings with a black discal dot, and fore wing with a short transverse black lunule below the cell.

Female much paler, somewhat testaceous, less black-speckled, but with the markings more apparent. Antennæ in male slightly pectinated, in female setose.

Expanse, ♂ $1\frac{3}{8}$, ♀ $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

A. TORRIDARIA, n. sp.

Female pale testaceous, transversely fleckled with brownish-testaceous exteriorly; a narrow brown line from near base of abdominal margin to costa before the apex, where there is a short oblique black streak. Underside brighter-coloured exteriorly, the oblique transverse line more apparent. Antennæ slightly pectinated.

Expanse $1\frac{7}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Fam. ENNOMIDÆ.

Genus LUXIARIA, Walk.

LUXIARIA PHYLLOSARIA.

Drepanodes phyllosaria, Walk. Cat. Lep. Het. B. M. xx. Geom. p. 82.

Genus DREPANODES, Guen.

DREPANODES CIRCULITARIA, Walk. ib. xxvi. Geom. p. 1489.

D. ARGENTILINEA, n. sp.

Male pale testaceous yellow: fore wing with a narrow silvery-white band (which is brownish on its inner margin) obliquely from apex to middle of hind margin, bordered exteriorly by one and interiorly by two parallel pale brown bands, each of which cross the hind wing: fore wing with a blackish discal dot. Underside paler yellow; both wings with a blackish discal dot, and numerous short transverse brown strigæ. Antennæ minutely pectinated.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

D. TRILINEARIA, n. sp.

Male and *female* whitish cinereous; three brown-bordered white lines obliquely from the apex to abdominal margin: fore wing brownish from the costa and across the disk, and with a slight discal dot. Underside paler, yellowish apically: fore wing dusky basally; the transverse lines slightly apparent.

Expanse $1\frac{1}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; F. Moore.

D. QUINARIA, n. sp.

Male white, minutely speckled with cinereous; five cinereous lunular lines crossing both wings, the first and second contiguous and disposed obliquely across the middle of the wing, the others submarginal, the outer two being very narrow and also contiguous; a cinereous marginal line with white points. Palpi, front of head, and antennæ brownish yellow.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. A. E. Russell.

D. FENESTRARIA, n. sp.

Male whitish cinereous; two widely separated wavy brown lines from abdominal margin to costa before the apex, between which on the fore wing is a diaphanous spot crossed by two veins; a submarginal and marginal row of white lunules, the former being concave exteriorly, the latter interiorly and bordered by a brown marginal line.

Expanse $1\frac{4}{5}$ inch.

Bengal. In Coll. F. Moore.

Genus DECETIA, Walk.

DECETIA CAPETUSARIA, Walk. Cat. Lep. Het. B. M. xx. Geom. p. 233.

Silhet.

Genus AGNIDRA, n. g., Moore.

Fascellina, part., Walk. Cat. Suppl. p. 1553.

Male. Palpi small, erect, pilose beneath; second joint long; third joint small, conical. Head broad. Antennæ rather broadly bipedately to within one-fourth of the tip. Legs moderate; femora slightly pilose beneath, and tibiæ at the side; fore tibiæ thickly pilose; mid tibiæ with a pair and hind tibiæ with two pairs of apical spurs. Wings broad: fore wing falcated; costa slightly arched before the apex, posterior angle rather acute: apex and anal angle of hind wing slightly pointed; exterior margin convex; abdominal margin elongated. Abdomen rather short, extending to within one-third of the hind wing, tufted at the apex.

AGNIDRA SPECULARIA. (Pl. XXXII. fig. 2.)

Fascellina specularia, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1553.

A. MUSCULARIA.

Fascellina muscularia, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1554.

A. DISCIPILARIA, n. sp.

Male greyish ferruginous; both wings with a large blackish grey-speckled discal spot; several transverse indistinct cinereous lunular lines, and a submarginal row of dots; two small indistinct cinereous spots before the discal spot within cell. Underside pale luteous; discal spot and spots before it less distinct.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

Note.—The species subsequently described by Mr. Walker under *Fascellina* do not belong to that genus, nor to *Agnidra*. The type of the genus *Fascellina* (*F. chromataria*, Walk.) belongs to the tribe of Noctuelites, where I have placed it, in the family *Thermesidæ*.

Genus HYPERYTHRA, Guen.

HYPERYTHRA LUTEATA.

Phalæna-Geom. lutea, Cram. Pap. Exot. iv. pl. 370. f. C, D.

♀. *Hyperythra limbolaria*, Guen. Phal. i. p. 101, pl. 3. f. 3, 4.

Aspilates susceptaria, Walk. Catal. Lep. Het. B. M. xxxv. Suppl. v. p. 1664.

♂. *Hyperythra penicillaria*, Guen. Phal. i. p. 101.

H. NIGUZARIA, Walk. *l. c.* xx. p. 129.

Silhet.

H. VITTICOSTATA, Walk. *l. c.* xxvi. Geom. p. 1497.

Darjeeling.

H. SPURCATARIA, Walk. *l. c.* p. 1498.

Darjeeling.

H. CALCEARIA, Walk. *l. c.* xx. Geom. p. 132.

H. TRILINEATA, n. sp.

Female pale yellowish cinereous, palest on the hind wing, covered with numerous minute red speckles: fore wing with three oblique transverse equidistant reddish lines, the exterior line the brightest; between first and second line is a subdued discal spot; a marginal row of blackish-red dots: hind wing with two transverse reddish lines, and a marginal row of dots. Palpi black.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell; F. Moore.

Genus CAUSTOLOMA, Lederer.

CAUSTOLOMA ENNOMOSARIA.

Hyperythra ennomosaria, Walk. *l. c.* xxvi. Geom. p. 1498.

Darjeeling.

Genus *ANGERONA*.*ANGERONA PALLICOSTARIA*, n. sp.

Male greenish grey: fore wing with the exterior margin broadly ashy black, bordered within with blackish fleckles, which are also dispersed along the posterior margin on a reddish ground; two short yellow streaks from the posterior angle; reniform mark distinct: hind wing ashy black, somewhat whitish basally, with a broad yellowish anal band. Head, thorax, and abdomen greenish grey, the latter fleckled with black. Underside paler; both wings minutely speckled with black on their basal half; each with a rather large black discal spot.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell.

Genus *OMIZA*, Walk.

OMIZA PACHIARIA, Walk. Cat. Lep. Het. B. M. xx. Geom. p. 247.

Genus *PANISALA*, n. g., Moore.

Male. Palpi small, compressed, densely pilose; third joint minute, conical. Antennæ very broadly pectinated to near the tips. Legs slender, smooth; hind tibiæ incrassated in the middle, armed with four long spurs. Body slender; abdomen extending to three-fourths the length of the hind wing. Wings broad: fore wing truncated at the apex; costa nearly straight; exterior margin very oblique, slightly convex in the middle; angle rather acute: hind wing subquadrate; exterior margin truncated and concave anteriorly to near the middle, where it is angled, thence to the anal angle nearly straight.

PANISALA TRUNCATARIA, n. sp.

Male brownish testaceous, darkest exteriorly, minutely black-fleckled: fore wing with two reddish-black transverse oblique sub-basal lines, and a double anteriorly bent discal line; a submarginal row of whitish dark-exterior-bordered lunules, before which on the posterior margin is a whitish patch: hind wing with one subbasal and a double discal reddish-black line, the former parallel with the second line on the fore wing; a submarginal row of white lunules with black exterior borders. Both wings with a small black discal spot.

Expanse $2\frac{3}{4}$ inches.

Bengal. In Coll. A. E. Russell.

Genus *EURYMENE*, Dup.*EURYMENE INUSTARIA*, n. sp.

Female yellow: both wings covered with transverse narrow partly confluent ferruginous strigæ, which are darkest on the middle of the posterior margin upward, whence there is an outwardly oblique pale-bordered streak extending towards the apex; a small blackish

spot at the apex ; cilia ferruginous ; strigæ on the underside crimson, mostly confluent before the apex and on the hind wing. Head and front of thorax blackish.

Expanse $1\frac{3}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Genus ODONTOPTERA, Steph.

ODONTOPTERA DISCOSPILATA, n. sp.

Male and *female* dark green : both wings with a transverse sub-basal and two discal whitish-bordered dark-green lunular lines, the former with the points of the lunules inward, those of the latter being opposite to each other ; each wing with a large black discal spot encircled by a narrow yellow line ; cilia dark brown, edged with white. Palpi and front of head blackish. Thorax and abdomen green, the latter with black dorsal spots. Underside testaceous, with numerous short transverse black strigæ ; both wings with a transverse black discal band ; cilia black, edged with white.

Expanse $2\frac{1}{8}$ inches.

Bengal. In Coll. A. E. Russell ; F. Moore.

Genus SELENIA, Hübn.

SELENIA DECORATA, n. sp. (Pl. XXXII. fig. 9.)

Male and *female* pinkish grey, brightest exteriorly ; with numerous minute black speckles : fore wing with a subbasal transverse curved sinuous narrow red line, bordered within by a dark green-fleckled line ; a transverse discal narrow lunular red line bordered exteriorly by red and green lunules, assuming patches below the apex and near the posterior angle : hind wing with a red basal line and transverse discal narrow sinuous line ; a lower submarginal straight white line bordered above by green lunules extending to the anterior angle, where the exterior margin is black-lunuled. A black discal spot on each wing. Underside grey, minutely black-speckled ; discal spot and transverse lines less defined.

Expanse, ♂ $1\frac{7}{10}$, ♀ 2 inches.

Bengal. In Coll. A. E. Russell ; F. Moore.

Genus ENDROPIA, Guen.

ENDROPIA BASIPUNCTA, n. sp.

Male and *female* dark testaceous red, thinly black-fleckled ; exterior margins sinuous ; a small black-marked white spot near the base of both wings : fore wing with two transverse bands of black fleckles, the first band subbasal, the other medial ; a submarginal row of distinct black dots, exterior to which beneath the apex is a black-fleckled patch ; a similar patch at the posterior angle : hind wing with an inner fleckled band and discal sinuous fleckled line.

Expanse, ♂ $1\frac{1}{4}$, ♀ $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell ; F. Moore.

Genus CROCALIS, Treit.

CROCALIS OBLIQUARIA, n. sp.

Female bright yellow: fore wing slightly blotched with reddish yellow; a black discal spot; a straight dusky pale-yellow-exterior-bordered band obliquely from posterior margin to the costa before the apex; a row of black marginal dots: hind wing yellowish white, with a blackish discal spot, and two slightly apparent outer yellowish bands. Head and thorax bright yellow. Abdomen pale yellow. Underside paler, marked as above.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell.

C. BIVITTARIA, n. sp.

Male and *female* bright yellow: fore wing with a few minute red scattered fleckles; a slightly apparent subbasal red-fleckled curved band; a brighter dark-exterior-bordered red nearly straight band from the posterior margin one-third from the angle obliquely to the costa before the apex; a blackish discal ringlet: hind wing yellowish white. Head and thorax reddish yellow. Abdomen yellow. Underside pale yellow; both wings with a small discal ringlet and slight reddish oblique band, those on the hind wing being slightly visible from the upperside.

Expanse, ♂ 2 inches, ♀ $2\frac{3}{10}$ inches.

Bengal. In Coll. A. E. Russell; F. Moore.

C. LENTIGINOSARIA, n. sp.

Female dark yellow: fore wing with numerous minute blackish speckles and cinereous blotches; two medial transverse cinereous lines, the inner line curved and but slightly apparent, the outer line oblique, between the lines is a white-centred black discal ringlet; a submarginal row of diffused cinereous lunules; a marginal row of black dots: hind wing numerously studded with cinereous speckles exteriorly, showing also a slight cinereous discal spot and two outer bands. Underside paler, marked as above.

Expanse $2\frac{2}{3}$ inches.

Bengal (*Sherwill*). In Coll. F. Moore.

C. ANGULARIA, n. sp.

Female yellow: fore wing scalloped below the apex; with numerous small dark-centred reddish blotches; two dark reddish transverse lines, the first line subbasal, much curved; the other recurved and exterior to a black discal ringlet; a marginal row of black dots: hind wing with a few reddish fleckles and a row of blackish dots along exterior margin; a black discal spot, and outer reddish wavy streak from abdominal margin. Underside paler, marked as above. Cilia of fore wing reddish.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell.

Genus ENNOMOS, Treit.

ENNOMOS VIRIDATA, n. sp.

Female pale green: fore wing with three transverse pale brown lines, the first subbasal, the second beyond a small blackish discal ringlet, the third or outer line very oblique and joining the second at its base on the middle of posterior margin; a submarginal row of blackish partly confluent spots, and marginal dots: hind wing with a transverse line passing through the discal spot, and a medial outer sinuous line; exterior margin with a row of black dots and some short transverse delicate black strigæ. Cilia blackish. Exterior margin of hind wing slightly sinuous, produced and sharply angled in the middle.

Expanse $2\frac{1}{5}$ inches.

Bengal. In Coll. A. E. Russell.

E. TESTACEARIA, n. sp.

Male and *female* testaceous, minutely black-speckled: both wings with a transverse curved subbasal ill-defined blackish sinuous line and an oblique broader discal line, beyond which is a transverse series of black dots, and an irregular submarginal row of broad diffused dusky-speckled lunules. Some white irregular speckles exterior to the discal line on fore wing. A small black discal spot on each wing. Exterior margin of hind wing scalloped.

Expanse $2\frac{1}{4}$ inches.

Darjeeling. In Coll. A. E. Russell; F. Moore.

GARÆUS, n. g., Moore.

Male. Palpi suberect, compressed, projecting beyond the front of the head, pilose; third joint cylindrical, decumbent. Antennæ bipectinated. Legs slender, smooth; hind tibiæ with four apical spurs. Body robust; thorax broad. Abdomen extending to the angle of the hind wing. Wings moderate: fore wing with the costa elongated, slightly arched at the base and apex, falcated; exterior margin oblique, rounded, scalloped; posterior margin nearly straight: hind wing rather broad, extending to the posterior angle of the fore wing; exterior margin rounded, deeply scalloped.

GARÆUS SPECULARIS, n. sp. (Pl. XXXII. fig. 3.)

Male bright ferruginous, with cinereous-black short transverse basal strigæ and exterior speckles; a diffused cinereous-black oblique discal band and a less-defined submarginal line crossing both wings; a similar-coloured narrow indistinct band near the base of the wing; middle of both wings yellowish-streaked, the fore wing having a black discal spot and two lower small white semitransparent spots contiguous to the outer band: hind wing with two white semitransparent medial spots, the upper spot being very large and enclosing a black discal spot; two smaller less-distinct whitish submarginal spots.

Cilia edged with white. Palpi, front of head, and front of thorax fringed with white.

Expanse $1\frac{3}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Genus LYCIMNA.

LYCIMNA POLYMESATA, Walk. Cat. Lep. Het. B. M. xx. Geom. p. 215.

Silhet.

Genus EREBOMORPHA, Walk.

EREBOMORPHA FULGURITA, Walk. ib. xxi. Geom. p. 495.

E. FULGURARIA, Walk. ib. p. 495.

Genus LITBADA, Walk.

LITBADA SERICEARIA, Walk. ib. xxxv. Suppl. v. p. 1571.

Silhet.

Fam. CENOCHROMIDÆ.

Genus MERGANA, Walk.

Syn. *Auxima*, Walk.

MERGANA ÆQUILINEARIA, Walk. Cat. Lep. Het. B. M. xxi. Geom. p. 292.

Auxima trilineata, Walk. ib. xxxv. Suppl. v. p. 1576.

M. RESTITUTARIA.

Auxima restitutaria, Walk. ib. xxvi. Geom. p. 1527.

M. DEBITARIA.

Auxima debitaria, Walk. ib. p. 1527.

M. BILINEATA, n. sp.

Male whitish ferruginous, with numerous short transverse cinereous strigæ; two dark ferruginous narrow oblique transverse lines crossing both the wings, the outer line with a white inner border, the space exterior to both the lines suffused with brighter ferruginous; cilia ferruginous. Underside pale pinkish-whitish ferruginous; strigæ as above; with medial transverse dark brown line, and an indistinct pale outer line, the latter with inner row of black points.

Expanse $2\frac{1}{4}$ inches.

Bengal (*Sherwill*). In Coll. F. Moore.

COROTIA, n. g., Moore.

Male and *female*. Palpi rather stout, porrect, densely pilose; second joint projecting beyond the head; third joint short, cylindrical. Antennæ—male pectinated to near the tip; female setaceous. Legs slender, smooth; hind tibiæ with four long spurs.

Body rather stout. Wings moderate: fore wing slightly falcate at the tip; costa nearly straight; exterior margin sinuous below the apex, oblique hindward; posterior margin slightly convex: hind wing rounded exteriorly; outer margin slightly sinuous anteriorly.

COROTIA CERVINARIA, n. sp. (Pl. XXXII. fig. 10.)

Male and *female* pinkish fawn-colour, thinly and minutely transversely black-fleckled: fore wing with a broad medial oblique transverse pale chestnut-brown band, the borders with a whitish dot on each vein, enclosing a large grey discal spot; two or three marginal black spots below the apex: hind wing with a dusky discal spot and outer transverse line. Underside greyish fawn-colour, black-fleckled; discal spots distinct, blackish; transverse line pale-bordered: hind wing with marginal black dots, those on the fore wing being at the apex only. Shaft of antennæ yellowish, with black spots.

Expanse $1\frac{3}{4}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Fam. AMPHIDASYDÆ.

Genus AMPHIDASYS.

AMPHIDASYS BENGALIARIA, Guen. Phal. i. p. 210.

Silhet.

Genus BUZURA, Walk.

BUZURA MULTIPUNCTARIA, Walk. Cat. Lep. Het. B. M. xxvi. p. 1531.

Larva feeds on *Citrus* and *Cinnamomum*.—*A. Grote*.

Fam. BOARMIDÆ.

Genus AMBLYCHIA, Guen.

AMBLYCHIA ANGERONARIA, Guen. Phal. i. p. 215, pl. 4. f. 9.

Genus HEMEROPHILA, Steph.

HEMEROPHILA CREATARIA, Guen. ib. p. 217.

Darjeeling.

H. STRIXARIA, Guen. ib. p. 217.

Silhet.

H. MAURARIA, Guen. ib. p. 218.

Elphos parsnathi, Walk. Catal. Lep. Het. B. M. xxvi. Geom. p. 1545.

H. OBJECTARIA.

Boarmia objectaria, Walk. ib. xxxv. Suppl. v. p. 1583.

Darjeeling.

H. CUPREARIA, n. sp.

Male greyish black, with a cupreous tinge: fore wing with transverse curved subbasal and straight discal sinuous black lines; a black discal ringlet; a coppery-yellow submarginal line, which is straight hindward and wavy to the apex, adjoining which are some broad black lunules; a black wavy marginal line: hind wing with a blackish sinuous discal line, a small spot, and wavy marginal line; a submarginal coppery-yellow line similar to that on the fore wing. Head and thorax greyish black. Antennæ brown. Underside pale greyish black, darkest along exterior margins; discal line and spot and marginal line black.

Expanse $1\frac{8}{10}$ inch.

Bengal. In Coll. A. E. Russell.

H. NIGROVITTATA, n. sp.

Male pale testaceous brown, with numerous short transverse black strigæ: both wings with a black subbasal transverse line, rather straight on the hind wing, and wavy on the fore wing, in the middle of which it is joined by a broad black longitudinal streak proceeding to the base of the posterior margin; a very oblique transverse discal sinuous black line, which is bent before the apex and broadly bordered exteriorly to near the apex by blackish brown; a submarginal white line, which is rather straight hindward and sinuous forward, where there is a short white longitudinal streak; exterior margin with a row of narrow black lunules. Head blackish; thorax and abdomen blackish-streaked. Antennæ blackish; shaft luteous, black-speckled. Underside paler, with indistinct blackish-brown subbasal line, discal spot, and broad submarginal band, the latter touching the exterior margin below the apex. Legs blackish, with yellow spots.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell.

H. BASISTRIGARIA, n. sp.

Male and *female* pale ferruginous brown, with numerous short very thin black transverse strigæ, which at the basal third of the wings are thicker, more or less confluent, forming exteriorly transverse bands; a black discal dot; beyond the middle is a transverse pale-bordered black line, irregular on the fore wing and sinuous on the hind wing, exterior to which the strigæ are more or less confluent; a submarginal irregular interrupted pale line and a black marginal lunulated line; cilia blackish, with a pale inner line.

Expanse $1\frac{7}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; F. Moore.

H. INTERRUPTARIA, n. sp.

Male and *female* greyish testaceous, palest along the costal border; with numerous black narrow short transverse strigæ; blotched with brighter testaceous: fore wing with oblique exteriorly greyish-bor-

dered diffused black submarginal wavy line; a double lunular discal line, and two short subbasal bands, their interspaces being somewhat dusky, each being equidistant and arising from the posterior margin, becoming evanescent at some distance above the middle, but reappearing, slightly in the male, prominently in the female, on the costa: hind wing with two indistinct subbasal black lines, a discal spot, and outer greyish-exteriorly-bordered transverse double lunular line; exterior margin with a row of black lunules.

Expanse $2\frac{1}{2}$ inches.

Bengal. In Coll. A. E. Russell; F. Moore.

H. RETRACTARIA, n. sp. (Pl. XXXII. fig. 7.)

Male and *female* dark greyish testaceous, with numerous closely disposed, short, very narrow black strigæ: fore wing grey at the base and along the costal border; a zigzag blackish band obliquely from base of hind margin retracting to the costa at one-third of its length, bordered exteriorly by a black line; a parallel black-inner-bordered greyish-black submarginal band, which also retracts to the costa before the apex, emitting a black streak from the retracted angle to exterior margin; a black discal spot: hind wing with a basal blackish band, discal spot, and submarginal black-inner-bordered greyish-black band, exterior to which on both wings, in the female, the space is pale or greyish; a black marginal line. Cilia broad, dark testaceous. Body greyish, with blackish waist-band.

Expanse $1\frac{7}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

H. HUMERARIA, n. sp.

Male pale whitish testaceous: hind wing with closely disposed very narrow transverse ferruginous strigæ; a black line bordered within by a parallel ferruginous line from base of hind wing, ascending the fore wing parallel with the costa to beneath a black discal spot, before and above which it twice retracts and then proceeds to the base of the wing along the costa, the space within being whitish grey: fore wing with three slightly apparent ferruginous bands obliquely from below the apex to hind margin; exterior margin with a suffused dusky-grey patch near the apex and posterior angle: hind wing with a black discal dot; a slightly apparent narrow inner and broad submarginal band, formed of partly confluent ferruginous lines, the latter bordered inwardly by a fine black sinuous line, and outwardly by a straight white line. Head and collar of thorax testaceous; thorax greyish white. Abdomen yellowish ferruginous, with blackish waist-band, and narrow segmental borders.

Expanse $2\frac{1}{8}$ inches.

Bengal. In Coll. A. E. Russell.

H. ATROSTIPATA.

Scotosia atrostipata, Walk. Catal. Lep. Het. B. M. xxv. Geom. p. 1354.

Genus CLEORA, Curtis.

CLEORA VENUSTULARIA, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1579.

Darjeeling.

C. DECUSSATA, n. sp. (Pl. XXXIII. fig. 4.)

Male and *female* white: fore wing with a broad transverse medial white band bordered on each side by a narrow black line, and containing a large upper and lower black spot, the upper one centred with a white dot, the outer line outwards anteriorly and posteriorly, the outer space to exterior margin being pale testaceous, and traversed by a wavy submarginal white line with a diffused black inner border and outer subapical and posterior black streaks; inner line of the band also bent outwards posteriorly, the space thence to a short subbasal transverse black streak pale testaceous, the extreme base of the wing being white: hind wing with indistinct dusky discal spot, transverse maculated line and streak from anal angle; a marginal lunular line. Body with blackish spots. Underside pale white; markings as above, but less defined.

Expanse $1\frac{3}{10}$ inch.

Darjeeling. In Coll. A. E. Russell; F. Moore.

C. RUFOMARGINATA, n. sp.

Male and *female* pale greyish brown, with numerous short transverse blackish strigæ: fore wing pale ferruginous along posterior and exterior borders; two transverse black lines, the inner line considerably curved, the other abruptly curved outwards below the costa and outwardly dentate near posterior margin; exterior border black-patched, traversed by a submarginal zigzag greyish-white line; discal spot black, elongate, confluent with the costa: hind wing with three ill-defined blackish partly transverse lines, and discal spot. Exterior margins with a row of black lunules. Cilia pale, with a black medial line. Underside yellowish; discal spots distinct: fore wing with broad blackish marginal band; other markings similar. Legs with black spots.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

C. FIMBRIATA, n. sp.

Male and *female* dark ferruginous: hind wing greyish at the base: fore wing blotched with black along the costa and exterior border; two oblique transverse black lines, which are rather close together, between which is a black discal spot, the outer line bordered by a row of black spots: hind wing with two transverse diffused blackish lines, enclosing the discal spot, the outer line traversed by a sinuous greyish-white line; exterior border with black strigæ; a marginal row of black lunules. Cilia black, with alternate ferruginous streaks. Underside cinereous brown, with blackish discal spot and outer transverse sinuous line.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

C. MEGASPILARIA, n. sp.

Male and *female* blackish cupreous brown, palest on the hind wing, slightly greyish across the disk; with numerous short transverse delicate black strigæ: fore wing with a black transverse subbasal and exterior pale-outer-bordered spotted lines, which curve outwards to the middle of the wing and thence obliquely descend inwards to posterior margin; discal spot very large, black, ascending to the costa; a submarginal narrow sinuous whitish line bordered on both sides by longitudinal black streaks: hind wing with a small indistinct discal spot, and transverse spotted line. A marginal row of black lunules on both wings. Underside yellowish, with blackish cinereous similar markings; the exterior border of fore wing blotched. Cilia with pale inner line.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

C. ALBIDENTATA, n. sp.

Female testaceous, with numerous short transverse black strigæ: fore wing with a black transverse subbasal irregular curved line, and outer obliquely straight sinuous line; discal spot narrow; a submarginal row of pure white marks, the middle one being a large round spot, the others dentate spots: hind wing pale greyish brown, with three short transverse sinuous blackish lines from abdominal margin. Both wings with a blackish marginal line. Underside paler, thickly studded with short transverse cinereous strigæ; transverse discal spot and outer line indistinct. Legs with blackish spots.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. F. Moore.

C. PANNOSARIA, n. sp.

Female brown: fore wing with a broad purplish brown exterior band extending by a broad longitudinal streak to a white narrow discal spot, which it encloses, the space above and beneath the streak being yellowish, the inner margin of the band and the base of the wing green; two transverse subbasal reddish contiguous lines; several short transverse red strigæ on posterior margin; exterior band traversed by a row of purplish-grey lunules: hind wing pale brown, with several short darker strigæ; a small brown discal spot, and short streaks from abdominal margin; a broad pale purplish-brown marginal band traversed by pale lunules. Exterior margins with a row of black lunules. Cilia yellowish. Underside yellow, marked as above.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

C. SEMICLARATA.

Selidosema semiclarata, Walk. Cat. Lep. Het. B. M. xxiv. p. 1029.

Scotosia quadrifera, Walk. ib. xxxv. Suppl. v. p. 1687.

Darjeeling.

Genus BOARMIA, Treit.

BOARMIA ALIENARIA, Walk. Cat. Lep. Het. B. M. xxi. Geom. p. 370.

♀. *Boarmia gelidaria*, Walk. ib. xxvi. p. 1537.

B. VICARIA, Walk. ib. xxi. Geom. p. 371.

Silhet.

B. IMPARATA, Walk. ib. p. 372.

Darjeeling.

B. ALBIDARIA, Walk. ib. xxxv. Suppl. v. p. 1582.

Darjeeling.

B. SUBLAVARIA, Guen. Phal. i. p. 256.

B. TRISPINARIA, Walk. ib. xxi. Geom. p. 378.

Silhet.

B. TRANSCISSA, Walk. ib. p. 380.

Silhet.

B. REPARATA, Walk. ib. p. 380.

B. OBLITERATA, n. sp.

Female greyish white, minutely fleckled with pale brown: fore wing brownish along the costa and from the apex to the middle of exterior margin, beneath which from the angle is a broad lunular streak; four transverse equidistant very indistinct brownish lunulated lines; a marginal row of brown lunular spots. Head and front of thorax brownish; thorax white. Abdomen pale luteous. Underside whiter; a blackish streak below the costa; a large black discal spot, and an apical and posterior patch. Cilia white. Body pale luteous; legs brownish, with pale spots.

Expanse $2\frac{1}{2}$ inches.

Bengal. In Coll. A. E. Russell; F. Moore.

B. PERSPICUATA, n. sp.

Male and *female* pale luteous brown, minutely black-fleckled, most numerous at the base.

Male. Fore wing with three obliquely transverse slightly sinuous black lines, the first line curved, the second embracing a discal ringlet, the outer line outwardly bent near each end, the interspaces being somewhat whitish: hind wing with two transverse black lines, between which is a discal spot: both wings with a submarginal medially broad black lunular band with whitish outer border; a marginal lunular line; the inner transverse line of the fore wing in the female is hardly separable from the contiguous black fleckles, the next being indicated only by a discal spot extending to the costa. Thorax with blackish collar. Abdomen with white waist-band and blackish dorsal bands; anal tuft in the male yellowish. Underside

pale yellowish; the markings less apparent, and with a large apical patch on the fore wing, are dark cinereous. Legs with cinereous spots.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell.

B. CONTIGUATA, n. sp.

Male greyish white; with two transverse subbasal blackish-cinereous sinuous lines, and four exterior broader lines, the two outer separated by a white sinuous line; a medial sinuous line enclosing a whitish discal spot; a marginal row of blackish lunules. Abdomen with cinereous bands. Underside with large blackish discal spot, and broad submarginal band, which joins the exterior margin in the middle.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

Remark.—Allied to *B. propulsaria*, Walk., from Borneo.

B. COMBUSTARIA.

Gnophos combustaria, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1598.

Darjeeling.

Genus *TEPHROSIA*, Boisd.

TEPHROSIA SCRIPTARIA, Walk. ib. p. 1590.

Darjeeling.

T. COMPARATARIA.

Boarmia comparataria, Walk. ib. p. 1582.

Darjeeling.

T. MUCIDARIA.

Boarmia mucidaria, Walk. ib. p. 1581.

Darjeeling.

T. DENTILINEATA, n. sp.

Male and *female* cinereous white, minutely brown-speckled: fore wing with a subbasal transverse oblique row of three or four small dark brown spots, and a discal partly double interrupted row of dentiform marks; a small discal spot; a submarginal pale sinuous brown-bordered line twice streaked with dark brown at the apex on the inner side: hind wing with small dark brown discal spot, adjacent line to abdominal margin, and transverse discal sinuous line; a submarginal pale line with brown borders. Both wings with an exterior marginal row of blackish lunules. Underside paler, without markings.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

Genus HYPOCHROMA, Guen.

HYPOCHROMA DISPENSATA, Walk. Catal. Lep. Het. B. M. xxi. Geom. p. 435.

Balasore.

H. BOARMARIA, Guen. Phal. i. p. 282.

Boarmia inconclusa, Walk. ib. p. 382.

Darjeeling.

H. MUSCICOLORARIA, Walk. ib. xxvi. Geom. p. 1543.

Darjeeling.

H. NYCTEMERATA, Walk. ib. xxi. Geom. p. 444, xxvi. p. 1543.

Larva feeds on *Xanthium indicum* and *Zizyphus*.—A. Grote.

H. VIRIDARIA, n. sp.

Female yellowish green, with numerous disposed short transverse darker green confluent strigæ; a slightly apparent inner and a blackish outer obliquely transverse straight sinuous line, the latter with whitish exterior border and a submarginal black-speckled reddish streak; a small blackish discal spot and wavy marginal line. Body minutely black-speckled. Underside cinereous white; a black discal spot and broad blackish-cinereous submarginal band: fore wing reddish exteriorly, where there are numerous blackish fleckles; a marginal row of black lunular spots.

Expanse $\frac{2}{3}$ inches.

Bengal. In Coll. A. E. Russell.

H. IRRORATARIA, n. sp.

Female white, covered with very numerous minute speckles, which are blackish basally and pinkish exteriorly: fore wing with a sub-basal transverse subdued blackish thrice-waved line, a waved discal streak, and outer black acutely sinuous line, the latter extending across the hind wing: both wings with a submarginal wavy white line and marginal lunules, and a narrow blackish marginal lunular line. Underside white, bright yellow at the base, an elongated blackish discal spot on fore wing, and broad blackish submarginal band to both wings, which is slightly confluent with the exterior margin on the fore wing.

Expanse 2 inches.

Bengal; Silhet. In Coll. A. E. Russell; F. Moore.

H. BASIFLAVATA, n. sp.

Male sap-green: fore wing fleckled with black; a short black obliquely descending streak at the base; a submarginal row of red lunular spots; exterior margin with short black longitudinal lines: hind wing golden-yellow, with a broad marginal blackish band, tinged with cupreous, from abdominal angle. Cilia green. Head and abdomen pale yellow, the latter with brown dorsal tufts. Thorax sap-

green. Underside—both wings bright yellow, with broad blackish outer band, palest and slightly whitish along the exterior margin. Palpi and legs black-speckled.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

H. VARICOLORARIA, n. sp.

Male dark cinereous: fore wing with numerous short transverse cinereous, pink, and yellow strigæ, those of the latter colour predominating in the middle of the wing between two pale-bordered black transverse discal lines, those of the darker colour being confluent at the base and along exterior border; beneath the apex and at the posterior angle is a pale patch; discal spot blackish: hind wing with the strigæ most thickly disposed along exterior border, and across the veins from the base; an indistinct inner transverse line and darker black outer sinuous line: both wings with a marginal blackish line lunulated with white; cilia pink, paler beneath, slightly spotted with cinereous on the fore wing. Head luteous. Thorax cinereous. Abdomen luteous, with four dorsal tufts laterally edged with black.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell.

H. TENEBROSARIA, n. sp.

Male dark cinereous brown, with numerous short transverse greyish-white strigæ, which are most thickly disposed across the middle of the fore wing: fore wing with a transverse indistinct oblique subbasal blackish sinuous line, a discal spot, and an outer more clearly defined sinuous line: hind wing with a similar outer sinuous line: both wings with a submarginal indistinct whitish wavy lunular line. Underside cinereous white; both wings with a cinereous-black discal spot, a transverse outer row of lunulated spots, and a broad marginal band with a pale spot at the apex.

Expanse $2\frac{1}{3}$ inches.

Bengal. In Coll. A. E. Russell; F. Moore.

H. COSTISTRIGARIA, n. sp.

Male greyish green: fore wing with a subbasal transverse blackish line, which is bent outward near the costa; an exterior transverse widely sinuous greenish-black line, which is medially curved outwards and bordered with greyish white; along the costa between the lines are numerous short transverse black and pale-testaceous strigæ, which also extend down the inner portion along the subbasal line; discal spot diffused brown; some transverse black spots at the base of the wing and some short blackish strigæ from the costa before the apex to the exterior margin below it: hind wing with pale-brown and testaceous strigæ at the base; a diffused blackish discal spot, and narrow blackish outer whitish-margined sinuous line: both wings with an indistinct submarginal row of whitish lunules; cilia edged with white. Front of head jet-black; top and thorax green. Ab-

domen pale luteous. Underside white, the base bright yellow; a black discal spot on fore wing; a submarginal black band confluent with the outer border below the apex on both wings.

Expanse 2 inches.

Bengal (*Sherwill*). In Coll. F. Moore.

H. LEOPARDINATA, n. sp.

Male yellow: fore wing nearly covered with short transverse black strigæ; a black streak at the base; two medial irregular transverse broad blotchy black-fleckled bands, between which is a narrow black oblique discal spot, the exterior band being bordered by reddish brown; exterior margin of the wing with black strigæ and yellow spots: hind wing with the base and a medially interrupted submarginal band blackish cinereous, the latter having similar-coloured exterior strigæ; a marginal line of black lunular spots. Head and body yellowish. Underside yellow, with large blackish-cinereous discal spot and interrupted submarginal bands.

Expanse $2\frac{1}{8}$ inches.

Bengal. In Coll. F. Moore.

Genus BARGOSA, Walk.

Petelia, H.-Schæff.

BARGOSA FASCIATA, n. sp. (Pl. XXXII. fig. 8.)

Female chocolate-brown, with numerous short transverse darker strigæ, those on the costa being blackish; four or five transverse diffused greyish fasciæ, the last two on the submargin of the fore wing crossed before reaching the costa, the others being straight; a grey-centred blackish discal spot; a marginal row of black dots. Underside pale greyish brown, with short brown strigæ, blackish discal spot, and broad marginal brown band; exterior margin with row of blackish dots.

Expanse $1\frac{6}{10}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

XANDRAMES, n. g., Moore.

Palpi small, densely pilose, porrect; third joint minute, conical, hardly visible. Antennæ rather long, pectinated in both sexes. Legs slender, smooth; hind tibiæ incrassated in the middle, with four apical spurs. Body robust. Abdomen long, extending to the length of hind wing. Wings large, broad: fore wing elongate, triangular; costa convex towards the apex, which is somewhat acute; exterior margin very oblique, nearly straight: hind wing rounded exteriorly, slightly produced in the middle.

XANDRAMES DHOLARIA, n. sp.

Male and *female* dark cupreous brown: fore wing with numerous blackish short transverse strigæ along the costa, and others of a blackish brown and narrower, disposed closely, and broadly extending

along exterior border, the inner portion of the wing and posterior border being minutely speckled; a broad irregular-margined sub-apical transverse oblique white band bordered with interrupted broad black streaks, another streak similar to that anteriorly on its inner border running obliquely from the costa near the base, its exterior border posteriorly also having a similar straight streak, which is most prominent in the female; base of the wing greenish brown, the space before the band and at the apex being dark cupreous brown; some streaks along middle of posterior margin and a short basal streak black: hind wing uniform dark bright cupreous brown, palest in the female; with an indistinct discal wavy narrow band; exterior margin white anteriorly, with numerous short transverse dark strigæ thence to the abdominal angle. Palpi, sides of head, and a narrow band on side of thorax extending beneath, and streaks on legs black. Underside uniform dull cupreous brown, the whitish transverse band and border on hind wing being more prominent.

Expanse $3\frac{3}{4}$ inches.

Darjeeling. In Coll. A. E. Russell; F. Moore.

X. ALBOFASCIATA, n. sp. (Pl. XXXII. fig. 5.)

Male dark brown: fore wing dark saffron yellowish green, with thickly disposed more or less confluent transverse black strigæ, divided by an oblique transverse subapical irregular-margined yellowish-white narrow band, which is partly yellowish green on its lower outer half: hind wing dark fuliginous brown; exterior border yellowish anteriorly, with similar-coloured strigæ extending thence to abdominal angle. Palpi, head, and thorax rufous brown, which colour extends beneath in front of the thorax; sides of thorax in front black. Abdomen fuliginous brown. Underside uniform yellowish fuliginous brown; subapical band and border on hind wing clear yellow.

Expanse $2\frac{1}{2}$ inches.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Genus *OPHTHALMODES*, Guen.

OPHTHALMODES DIURNARIA, Guen. Phal. i. p. 284.

O. INFUSARIA, Walk. Cat. Lep. Het. B. M. xxi. Geom. p. 448. Silhet.

Genus *ELPHOS*, Guen.

ELPHOS HYMENARIA, Guen. Phal. i. p. 285, pl. 16. f. 4.

E. PARDICELLATA, Walk. ib. xxvi. Geom. p. 1544.

Genus *GNOPHOS*, Treit.

GNOPHOS MUSCOSARIA, Walk. ib. xxxv. Suppl. v. p. 1596.

Darjeeling. In Coll. W. S. Atkinson.

G. OBTECTARIA, Walk. ib. p. 1597.

Darjeeling. In Coll. W. S. Atkinson.

Fam. GEOMETRIDÆ.

Genus GEOMETRA, Linn.

GEOMETRA AVICULARIA, Guen. Phal. i. p. 342.

Geometra pennisignata, Walk. Cat. Lep. Het. B. M. xxii. Geom. p. 516.

Darjeeling.

G. VIRIDILUTEATA, Walk. ib. p. 515.

Darjeeling.

G. HALIARIA, Walk. ib. p. 518.

G. decoraria, Walk. ib. xxxv. Suppl. v. p. 1601.

Darjeeling.

G. DENTISIGNATA, n. sp.

Female subdued green, with several delicate reddish fleckles basally and short transverse strigæ exteriorly; a cinereous-outer-bordered white line from the middle of abdominal margin extending across both wings obliquely to within one-third of the costa; a reddish-bordered black dentate discal spot on the fore wing; costal margin yellow; an irregular transverse subbasal narrow indistinct reddish line. Underside pale green.

Expanse $2\frac{1}{8}$ inches.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Closely allied to *G. haliaria*, Walk.

G. VITTATA, n. sp.

Male and *female* greyish green, with darker green, but not very prominent, transverse bands: fore wing with two straight subbasal bands and three oblique bands exterior to a discal spot, the second subbasal band joined posteriorly to the third, which with the outer two cross the hind wing, the three outer bands having a pale or whitish exterior border. Underside greenish yellow, with a darker discal spot and narrow outer band. Legs and antennæ yellowish.

Expanse, ♂ $1\frac{3}{8}$, ♀ $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

G. PLAGIATA, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1602.

Darjeeling. In Coll. W. S. Atkinson.

G. USTA, Walk. ib. p. 1602.

Darjeeling. In Coll. W. S. Atkinson.

G. DENTATA, Walk. ib. xxii. Geom. p. 518.

"Larva feeds on *Zizyphus* and *Ixora*, attaching pieces of leaf to itself apparently for the purpose of hiding its pupa-case; but it commences adorning itself for some days before changing."—*A. Grote, Esq.*

Genus THALASSODES, Guen.

THALASSODES INAPTARIA, Walk. Cat. Lep. Het. B. M. xxvi. Geom. p. 1560.

Silhet.

T. MACRURARIA, Walk. ib. p. 1561.

Silhet.

T. MACARIATA, Walk. ib. p. 1562.

T. CÆLATARIA, Walk. ib. xxii. Geom. p. 552.

T. DISSIMULATA, Walk. ib. p. 551.

Larva feeds on *Terminalia catappa*.—A. Grote.

T. DISTINCTARIA, Walk. ib. xxxv. Suppl. v. p. 1607.

Darjeeling.

T. URAPTERARIA, Walk. ib. p. 1608.

Silhet.

T. DISSITA.

Geometra dissita, Walk. ib. xxii. Geom. p. 519.

T. OPHTHALMICATA, n. sp.

Female dull greyish green, with a few indistinct yellowish-brown fleckles; a narrow yellowish-brown band crossing the disk of both wings, which on the fore wing is nearly straight, and on the hind wing slightly curved; a similar-coloured partly upright subbasal line; a small blackish-brown discal spot on fore wing, and a larger brown-bordered grey eye-like discal spot on the hind wing. Underside pale greenish cinereous, with indistinct transverse discal band. Front of head and second joint of palpi above blackish brown.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. F. Moore.

T. SINUATA, n. sp.

Female clear grass-green above, whitish beneath: fore wing with the costa whitish; two medial widely separated transverse sinuous purple-red lines, between which is a small blackish discal spot: hind wing with a single similar sinuous outer line and discal spot. Marginal line purple red. Cilia and antennæ pale purple red.

Expanse $1\frac{2}{3}$ inch.

Bengal. In Coll. A. Grote, Esq.

"Larva feeds on *Boswellia serratifolia*."—A. Grote, Esq.

Genus THALERA, Hübn.

THALERA BIFASCIATA.

Thalassodes bifasciata, Walk. Cat. Lep. Het. B. M. xxvi. Geom. p. 1562.

Silhet.

T. GLAUCARIA, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1613.

Darjeeling.

T. ARGUTARIA, Walk. ib. p. 1614.

Genus BERTA, Walk.

BERTA CHRYSOLINEATA, Walk. ib. xxvi. Geom. p. 1621.

Genus COMIBENA, Hübn.

COMIBENA DIVAPALA, Walk. ib. xxii. Geom. p. 575.

"Larva feeds on *Lawsonia inermis* and on *Melaleuca cajuputi*."—*A. Grote, Esq.*

C. SANGUILINEATA, n. sp.

Male green, exterior borders white: fore wing with four equidistant white spots below the costa, and a fifth spot below the basal one; from the apical penultimate spot proceeds a transverse narrow white band, which extends outward, passing downward, is again bent inward, and then curves to the posterior margin; a pale crimson submarginal line, which is bent beneath the white band, and is terminated by two blackish spots near the posterior angle: hind wing with a contorted transverse white band, anteriorly bordered by a short dark red exterior streak; a parallel submarginal narrow dark-red band diffusely terminated at the anal angle: both wings with a very narrow dark-red exterior marginal line; cilia yellow. Underside pale greenish white, with a marginal row of black dots: fore wing with an indistinct discal spot, and a short blackish streak from the posterior angle; a submarginal blackish-maculated line on hind wing.

Expanse $1\frac{4}{10}$ inch.

Bengal. In Coll. A. E. Russell.

C. HYALINATA, n. sp.

Male and *female* purplish hyaline: fore wing with an imperfect basal, and a subbasal band with a discal point, and an irregular submarginal band with an inner or reverse discal point, crossing both the wings, reddish brown, this colour also extending along the veins and outer marginal border line, dividing a row of white lunules; cilia brownish white. Body and antennæ reddish brown. Legs yellowish.

Expanse $1\frac{2}{10}$ inch.

Bengal. In Coll. A. E. Russell.

C. MACULATA, n. sp.

Pale green; costal line pale pinkish white, exterior marginal line pale brown. Cilia pale lemon-yellow. Both wings with a brown discal spot with white-speckled centre and yellow outer border; two subbasal and a transverse discal series of pale yellow spots, the latter each with a brown outer speck. Underside much paler, without

markings. Body beneath, antennæ, and legs yellowish. Front of head reddish.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

C. FENESTRARIA, n. sp.

Male very pale golden-yellow: both wings with a pale brown-bordered oblique subbasal double line, which extends by a short black streak on the costa and curves widely outward and then descends to the posterior angle, the middle of the wing being irregularly hyaline and marked only by a minute discal spot; a submarginal silvery-white line and two outwardly oblique silvery fasciæ from the costa before the apex; two small brown streaks on abdominal margin and another below the discal spot. Underside as above, but paler.

Expanse $1\frac{7}{8}$ inch.

Bengal. In Coll. A. E. Russell.

C. CHALYBEATA, n. sp.

Male pale green, with several delicate pale white short transverse strigæ: fore wing with two pale chalybeate upright transverse medial lines, which indistinctly cross the hind wing and conjoin in a slight crimson streak at the anal angle; base of fore wing and exterior border of both wings suffused with chalybeous. Costal margin and band across thorax and antennæ pale ochreous. Front of head and palpi beneath whitish. Palpi above pale pinkish ochreous. Underside pale greenish chalybeate-white.

Expanse $1\frac{1}{10}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Genus *AGATHIA*, Guen.

AGATHIA LYCÆNARIA.

Geometra lycænaria, Kollar, Hûgel's Reis. Kasch. iv. p. 486.

G. albiangularia, Herr.-Schæff. Samml. exot. Schmett. pl. 61. f. 339.

♀. *Agathia discriminata*, Walk. Cat. Lep. Het. B. M. xxii. Geom. p. 591.

"Larva feeds on *Nerium odorum* and *Strophanthus dichotomus*."

A. HEMITHEARIA, Guen. Phal. i. p. 381.

Silhet.

A. HILARATA, Guen. Phal. i. p. 381.

Silhet.

A. CATENARIA, Walk. l. c. p. 591.

Larva feeds on *Nerium oleander*.—*A. Grote*, Esq.

A. QUINARIA, n. sp.

Male bright green, white beneath; bands reddish fawn-colour:

fore wing with a transverse basal band, an outwardly oblique hindward-bent medial band, and an oblique subapical band, which includes the exterior margin to the posterior angle and extends round a green apical ovate spot: hind wing with outer marginal band running parallel with posterior angle of fore wing, its inner border straight and sinuous and ascending to the abdominal margin above the anal angle; an elongate oval upper marginal green spot, beneath which is a white streak.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell.

A. ARCUATA, n. sp.

Female bright green, whitish beneath: fore wing with fawn-coloured costa, basal streak, a narrow band from the costa before the middle which crosses to middle of posterior margin, the green space outside attenuated hindward and extending only half across the wing, its exterior border being sinuous, the outer space broadly fawn-coloured; apical green spot indented anteriorly on both sides; beneath this are two succeeding very small green spots and then a larger yellow spot: hind wing with a broad fawn-coloured margin; the green space occupying the base from the middle of its anterior margin and descending outward to the middle of the wing and then reascending to near the middle of abdominal margin, its border being sinuous; a green apical marginal patch and another above anal angle, both being partly divided; a short narrow yellow streak above the marginal angle.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

Fam. PALYADÆ.

Genus EUMELEA, Duncan.

EUMELEA ROSALIA.

Phal. Geom. rosalia, Cram. Pap. Exot. iv. pl. 368. f. F.

Eumelea rosaliata, Duncan, Jardine's Nat. Hist. Libr. Exot. Moths, pl. 29. f. 4.

E. FELICIATA, Guen. *Phal.* i. p. 393.

Silhet.

E. AURELIATA, Guen. *Phal.* i. p. 394, pl. 22. f. 6.

Fam. EPHYRIDÆ.

Genus ANISODES Guen.

ANISODES OBLIVIARIA, Walk. Cat. Lep. Het. B. M. xxii. *Geom.* p. 643.

↪ *A. PLURISTRIARIA*, Walk. ib. xxvi. *Geom.* p. 1581.

A. *PLYNUSARIA*, Walk. Cat. Lep. Het. B. M. Geom. xxvi. p. 1581. Silhet.

A. *HYRIARIA*, Walk. ib. xxxv. Suppl. v. p. 1617. Darjeeling.

A. *SANGUINARIA*, n. sp.

Male yellow: fore wing with several confluent crimson blotches and speckles at the base, and two larger submarginal blotches with contiguous confluent speckles to exterior margin; discal spot and largest blotches tinged with purple: hind wing speckled with crimson, and with larger blotches along exterior and abdominal margins; a purplish discal ringlet; a band on front of head and on thorax and base of abdomen crimson. Underside paler.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

A. *PALLIVITTATA*, n. sp.

Male and *female* pale yellowish testaceous, minutely blackish-speckled: fore wing with a testaceous discal spot and four obliquely transverse rather indistinct lunular lines, the third and fourth lines submarginal; the second, third, and fourth extending across the hind wing, the third with a parallel inner row of blackish spots; a marginal row of dark spots; cilia with a dark inner spot at the marginal angles. Palpi, front of head, and pectinations of male antennæ black. Underside paler, marked as above.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell; F. Moore.

A. *SIMILARIA*, n. sp.

Male pale brownish cinereous, minutely but densely black-speckled: fore wing with an indistinct darker discal spot and four oblique bands, the two outer bands being submarginal, which with the third extends across the hind wing; both wings with a sinuous discal testaceous line, which has two small outer testaceous patches: a dentiform discal spot with testaceous border on hind wing: both wings with a marginal row of blackish spots; cilia black-speckled, and having a black inner spot at the marginal angles. Underside paler; discal sinuous line and spot on hind wing distinct; a well-defined dark marginal line; cilia with blackish spots.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. F. Moore.

A. *DIFFUSARIA*, n. sp.

Male yellow, with thickly disposed crimson speckles and strigæ. Both wings with a diffused testaceous-grey transverse discal streak with sinuous outer border and black points, from the middle of which proceeds a similar-coloured streak, which descends inwardly across the base of hind wing and the abdomen, and outwardly to the middle of exterior margin: an oblique subbasal indistinct testaceous-grey

band and small black spots on fore wing, and a similar-coloured sub-marginal streak on both wings; a black discal spot and marginal row of dots on both wings. Underside yellowish cinereous, with darker bands as above.

Allied to *A. pluristriata*.

Expanse $2\frac{7}{8}$ inches.

Bengal. In Coll. A. E. Russell; F. Moore.

A. ? VINACEARIA, n. sp.

Male vinaceous; palest at the base: both wings with three equidistant transverse indistinct crimson wavy lines, and darker marginal line; a blackish discal spot; cilia crimson. Front of head brown. Underside as above, but darker-coloured.

Expanse $1\frac{2}{10}$ inch.

Bengal. In Coll. F. Moore.

Fam. ACIDALIDÆ.

Genus DRAPETODES, Guen.

DRAPETODES MITARIA, Guen. Phal. i. p. 424, pl. 18. f. 6.

Anisodes platycerata, Walk. Cat. Lep. Het. B. M. xxvi. Geom. p. 1586.

Genus TRYGODES, Guen.

TRYGODES DIVISARIA.

Mecaria divisaria, Walk. ib. xxiii. Geom. p. 927.

T. VAGATA.

Mecaria vagata, Walk. ib. p. 927.

Genus HYRIA, Steph.

HYRIA BICOLORATA, n. sp.

Reddish fawn-colour, with a few short black streaks on the veins: fore wing with three equidistant transverse zigzag yellow bands commencing before the apex, each having an outer border and a medial parallel line of crimson joined by upper and lower longitudinal crimson streaks; some short crimson streaks below the apex: hind wing with a narrow outer transverse sinuous yellow band with crimson borders. Underside cinereous brown; bands indistinct.

Expanse $\frac{9}{10}$ inch.

Bengal. In Coll. A. E. Russell.

H. TRILINEATA, n. sp.

Male and *female* cinnamon-brown, with a few short transverse yellow strigæ; three equidistant transverse narrow orange-yellow slightly curved bands, the two outer bands crossing the hind wing. Cilia, antennæ, and head yellow. Underside paler; bands less defined.

Expanse 1 inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

H. ORNATA, n. sp.

Male greyish fawn-colour: exterior margin of both wings excavated below the apex and produced in the middle: fore wing with three transverse bright crimson-streaked and -bordered yellow wavy bands, which are broad at the costa and attenuate to the hind margin, the first and second bands contiguous and hardly separable, each somewhat blackish-bordered: hind wing with slight crimson basal band and outer yellow-spotted crimson wavy band with blackish inner border; an indistinct discal blackish spot and contiguous line. Abdomen with a reddish waist-band. Underside cinereous brown, with ill-defined paler bands as above.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. A. E. Russell.

II. ? PLURISTRIGATA, n. sp.

Cinnamon-brown; exterior margin sinuous: fore wing with two straight transverse medial and a narrow basal pale yellow bands with short transverse similar-coloured intervening streaks: hind wing with a single medial transverse yellow band and basal streaks: both wings with some orange-yellow submarginal streaks. Cilia pale yellow. Underside paler; markings less defined and whitish.

Expanse $\frac{7}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Genus *ACIDALIA*, Treit.*ACIDALIA BICAUDATA*, n. sp. (Pl. XXXIII. fig. 12.)

Male and *female* white: a transverse discal narrow wavy blackish-margined ferruginous band, with confluent fuliginous-brown exterior margin, which is slightly blackish-streaked, and having a black medial marginal dot on hind wing; a row of small dark brown transverse subbasal spots, and a few short strigæ on base of costa of fore wing. Palpi and front of head dark brown. Cilia white, with brown patches on fore wing. Hind wing bicaudate anteriorly.

Expanse 1 inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

A. ÆRATA, n. sp.

Male and *female* brassy yellow, with broad basal and marginal cinereous-brown bands with intervening cinereous speckles. Cilia broad, yellow. Antennæ, head, and front of thorax, abdomen, and legs yellow; thorax cinereous. Underside as above.

Expanse 1 inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

A. TEPHROSARIA, n. sp.

Male very pale whitish testaceous, with numerous short transverse narrow pale brown strigæ: fore wing with three equidistant black spots on the costa, from the outer of which proceed a trans-

verse oblique series of several black dots bordered exteriorly by a slight brownish line, the inner spots having a similar series of two or three dots; a medial subdued brownish transverse line contiguous to a similar-coloured discal spot: hind wing with a small discal spot, subdued inner line, and outer transverse row of black dots: both wings with an exterior marginal row of blackish dots. Underside paler; strigæ numerous along the costa and exterior margins; a blackish discal spot and adjoining sinuous line; submarginal line double, sinuous, and on the fore wing interspaced with yellow, that of the hind wing with three outer blackish spots; a marginal row of black dots. Tip of palpi and legs above blackish.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

Remark.—This species is allied to *Acidalia contigara*, Walk., from Northern India.

A. ?GEMMIFERA, n. sp.

Male reddish brown, studded with minute brilliant silver speckles; exterior margin of hind wing very deeply scalloped: fore wing with medial transverse irregular blackish line terminating on the hind margin in a red ringlet; apex of the wing white, with brown medial streaks and outer lunules; an indistinct blackish basal streak and discal spot: hind wing with a yellowish-white base and diffused discal band, the exterior margin being pure white and with a row of brown lunules; a slight reddish discal spot. Cilia of fore wing white anteriorly, the rest brown; that of the hind wing white, except at the tip of the angles, which are brown. Abdomen yellowish white, with brown anal patch. Underside paler, similarly marked, but not speckled.

Expanse 1 inch.

Bengal. In Coll. A. E. Russell.

Genus TIMANDRA, Dup.

TIMANDRA CONVECTARIA, Walk. Cat. Lepid. Het. B. M. xxiii. Geom. p. 800.

T. AVENTIARIA, Guen. Phal. ii. p. 3.

Silhet.

T. SUBOBLIQUARIA, n. sp.

Male pale greyish fawn-colour; a straight dark cinereous-brown band, with paler outer border crossing both wings from the costa one-third from the apex to the middle of abdominal margin: fore wing with some cinnamon-brown lunules at the base, and a black discal spot: a cinnamon-coloured submarginal wavy line to both wings, and a marginal row of black dots. Underside cinereous brown, marked as above, but of a dusky colour.

Expanse 1 inch.

Bengal. In Coll. A. E. Russell.

Genus SOMATINA, Guen.

SOMATINA PLURILINEARIA, n. sp.

Male and *female* pale testaceous yellow: both wings with two medial obliquely transverse equidistant wavy brown lines; the inner line retracted to the costa, between which and bordering the outer line are three paler parallel lunular lines, and on the fore wing near the costa is a small round black discal spot; three pale lunular lines crossing the base of the wings; two darker similar submarginal lines, and an outer row of small pure-white spots, those on the upper part of fore wing with a diffused blackish border, which colour also extends in a short longitudinal medial streak to the outer transverse line; exterior marginal line dark brown. Tip of palpi, spots on head, and collar in front of thorax dark brown.

Expanse $1\frac{1}{4}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

S. ? PICTARIA, n. sp.

Male and *female* cinereous white: fore wing with a ferruginous-brown basal patch and two transverse bands, the outer band angulated before the costa, both confluent along the costal half in the female; between the bands is a small dentiform blackish discal spot; several delicate silvery-white evanescent lines crossing the wing, between which on the exterior border are two or three parallel pale cinereous-brown narrow bands, which are darkest at the apex: hind wing with two medial and two submarginal pale cinereous-brown bands, the latter with silvery-white outer margins. Palpi, head, and thorax ferruginous brown. Abdomen cinereous white. Legs cinereous brown. Underside paler: fore wing with cinereous-brown markings as above.

Expanse $1\frac{2}{10}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Genus ARGYRIS, Guen.

ARGYRIS MYSTICATA, Walk. Cat. Lep. Het. B. M. xxiii. Geom. p. 1617.

Darjeeling.

A. OCELLATA.

Caloptera ocellata, Friv. Herr.-Schæff. Samml. eur. Schmett. ii. p. 97, pl. 23. f. 125; Walk. Cat. Lep. Het. B. M. vi. Bomb. p. 1377.

Argyris ocellata, Walk. ib. xxii. Geom. p. 807.

A. ommatophoraria, Guen. Phal. ii. p. 13.

A. INSIGNATA, n. sp.

Female white; costa considerably arched from the base: fore wing with four cinereous obliquely quadrate spots on the costa, an irregular broad discal transverse band, which is traversed hindward by two short wavy streaks, and a submarginal series of small spots; the marginal line at the posterior angle blackish: hind wing suffused

with orange-yellow on the lower part of exterior border; a brownish-cinereous submarginal band, maculated anteriorly and traversed posteriorly by two parallel white lines, beneath which are three short black streaks; two similar-coloured streaks above it on the abdominal margin; on the exterior margin is a black conical white-speckled lower spot, and three smaller anterior contiguous cinereous spots, each with an outer narrow lunule. Palpi, front of head, and broad band on abdomen brownish cinereous. Cilia edged with cinereous. Underside white, with two narrow outer maculated bands, and basal patch on fore wing dark cinereous.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Fam. MICRONIDÆ.

Genus MICRONIA, Guen.

MICRONIA GANNATA, Guen. Phal. ii. p. 26.

Calcutta; Silhet.

M. ACULEATA, Guen. ib. pl. 13. f. 8.

Silhet.

M. FASCIATA.

Phal. *Geom. fasciata*, Cram. Pap. Exot. ii. pl. 104. f. D.

Phalena caudata, Fabr. Ent. Syst. iii. 2. p. 63.

Micronia caudata, Guen. Phal. ii. p. 25.

M. OBTUSATA, Guen. ib. pl. 5. f. 6.

M. SIMPLICIATA, n. sp.

Male and *female* silky white, paler beneath: fore wing with some short delicate cinereous strigæ along the costa; a cinereous discal streak and five transverse simple bands, the three outer crossing the hind wing; first and second band subbasal; third broadest, medial; the other two submarginal; a black marginal line to both wings, which at the medial angle on the hind wing has two narrow spots.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

M. SPARSARIA, Walk. Cat. Lep. Het. B. M. xxiii. Geom. p. 818.

Silhet.

M. STRIATARIA, Linn. (Clerck, Icon. pl. 55. f. 4; Walk. ib. p. 818.)

Genus MYRTETA, Walk.

MYRTETA PLANARIA, Walk. ib. p. 831.

Genus EROSIA, Guen.

EROSIA CERVINARIA, n. sp.

Male and *female* cinereous brown or fawn-colour.

Male. Fore wing dark cinereous brown, with very indistinct blackish discal spot, and transverse sinuous line with whitish border; costa and exterior marginal line reddish brown: hind wing very pale at the base; a white-speckled line at anal angle; exterior marginal line reddish brown; cilia blackish, edged with cinereous.

Female brownish fawn-colour on the fore wing: hind wing as in the male. Underside paler; costa reddish brown; a very indistinct dusky transverse discal line.

Expanse, ♂ $1\frac{2}{3}$, ♀ $1\frac{3}{8}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

Fam. CABERIDÆ.

Genus CABERA.

CABERA PLATYLEUCATA.

Acidalia platyleucata, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1628.

C. MARGARITA, n. sp.

Male and *female* pearly white, minutely speckled with cinereous. Both wings with a black discal spot and an indistinct cinereous discal band. Costal line yellow. Antennæ, front of head, and legs brownish yellow.

Expanse $1\frac{3}{8}$ inch.

Bengal. In Coll. A. E. Russell; W. S. Atkinson.

Fam. MACARIDÆ.

Genus MACARIA, Curtis.

Syn. *Evarzia*, Walk.

MACARIA METAGONARIA.

Alzelina metagonaria, Walk. Cat. Lep. Het. B. M. xxvi. Geom. p. 1518.
Darjeeling.

M. PERSPICUARIA, n. sp.

Female pale yellowish testaceous, with thinly dispersed short delicate blackish strigæ: fore wing with two subbasal oblique wavy testaceous lines, the outer line crossing the hind wing; a submarginal narrow blackish double red band crossing both wings obliquely from below the apex to above anal angle, the apical portion of the inner end abruptly retracted to the costa one-third from the apex; the marginal space on the fore wing blackish: hind wing with an exterior medial reddish spot and contiguous upper streak: both wings with a narrow black marginal line. Two dorsal rows of black spots on abdomen. Underside paler, with minute strigæ as above, and the double band broadly bordered exteriorly with bright testaceous, and on the fore wing by a diffused blackish streak ascending from near

posterior angle to below the apex. Cilia black below the apex.
Legs black-speckled.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

Remark.—Allied to *Evarzia ozararia*, Walk.

M. EMERSARIA, Walk. Cat. Lep. Het. B. M. xxiii. Geom. p. 925.

M. ELEONORA.

Phalæna eleonora, Cram. Pap. Exot. iii. pl. 288. f. E-G.

Macaria eleonorata, Guen. Phal. ii. p. 89.

Larva feeds on *Mimosa*-flowers.—*A. Grote, Esq.*

M. NORA, Walk. Cat. Lep. Het. B. M. xxiii. Geom. p. 934.

M. STRENIATARIA, Walk. ib. xxvi. Geom. p. 1646.

M. STRENUATARIA, Walk. ib. p. 1647.

M. PERMOTARIA, Walk. ib. xxiii. Geom. p. 929.

KRANANDA, n. g., Moore.

Male and female. Palpi porrect, slender, compressed, pilose; third joint small, cylindrical. Proboscis moderate. Antennæ slender, minutely serrated, set with fascicles of very fine hairs in the male, simple in the female. Legs short, rather stout, smooth; hind tibiæ incrassated and armed with four spurs. Body moderate; abdomen extending to the length of the hind wing. Wings long, broad exteriorly: fore wing with the costa nearly straight to two-thirds its length, where it is considerably arched to the end, the apex being falcate; exterior margin scalloped, produced in the middle and at the posterior angle: hind wing, anterior margin concave before the end; the apex much produced, being formed into an elongated process; exterior margin nearly straight, slightly scalloped.

KRANANDA SEMIHYALINA, n. sp.

Male and female greyish testaceous, darkest on the hind wing, with several short transverse darker strigæ: both wings hyaline to beyond the middle, with irregular exterior margin, that of the fore wing defined by a blackish line, the band with thinly dispersed transverse strigæ, and with a short darker streak medially on both the anterior and posterior margins; a submarginal row of whitish semidiaphanous lunular spots; exterior margin defined by a delicate dark line: base of fore wing partially covered with dark speckles, and bordered by a double subbasal transverse dark line; extreme base of hind wing with a dark streak. Cilia with a pale inner line. Palpi, front of head, stripe on vertex, and another on top of the thorax bright testaceous. Thorax and abdomen grey.

Expanse, ♂ $1\frac{7}{8}$, ♀ $2\frac{1}{4}$.

Bengal. In Coll. A. E. Russell.

Fam. FIDONIDÆ.

Genus STERRHA, Hübn.

STERRHA SACRARIA, Linn. (Guen. Phal. ii. p. 175).

Genus DOCIRAVA, Walk.

DOCIRAVA ÆQUILINEATA, Walk. Cat. Lep. Het. B. M. xxvi. Geom. p. 1635.

D. UVARIA.

Aspilates uvaria, Walk. ib. p. 1681.*Anaitis vastata*, Walk. ib. xxxv. Suppl. v. p. 1700.

Darjeeling.

Genus ASPILATES, Treit.

ASPILATES FALCONARIA, Walk. ib. p. 1665.

Darjeeling.

A. OBLIQUARIA, n. sp.

Male pale yellowish: fore wing minutely speckled with brown; a brown discal spot and two others obliquely beneath it; an oblique transverse straight discal dark brown paler-outer-bordered line and an interrupted parallel series of submarginal streaks: hind wing white, with two short brown streaks from abdominal margin, one medial, the other near anal angle: both wings with a marginal row of blackish dots. Underside yellowish white; closely speckled with brown along the costa and on the hind wing; both wings with two exterior reddish-brown lines and blackish discal spot and marginal dots.

Expanse $1\frac{6}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Genus CAPRILIA, Walk.

CAPRILIA VESICULARIA, Walk. ib. Suppl. xxxv. p. 1569.

Male with a colourless vitreous spot near the base of the fore wing, which is blind and smaller in the female.

Expanse 1 inch.

Cherra Poonjee; Debroughur, Assam. In Coll. A. E. Russell; W. S. Atkinson.

C. SPECULARIA, n. sp. (Pl. XXXIII. fig. 11.)

Bright yellow, blotched and fleckled with pale ferruginous yellow, some of which have a darker central speck. *Male* with a vitreous oval spot at the base of the wing, which is smaller and blind in the female. Fore wing with dark ferruginous lunular marks at the base of the costa, an oblique spot on its middle, and another before the apex; beneath the latter is a pale ferruginous-yellow patch; on the posterior margin are two dark ferruginous outwardly ascending streaks, the inner one large and concave exteriorly: hind wing with

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two small dark ferruginous streaks on the anterior margin, and a lunular exterior marginal line. Palpi, a band in front of thorax, and a spot on the base of abdomen dark ferruginous.

Expanse $1\frac{3}{10}$ inch.

Assam. In Coll. W. S. Atkinson; F. Moore.

Remark.—Differs from *C. vesicularia* in having longer wings, which are narrower in proportion. The fore wing is not falcated at the tip, and the exterior margin is much more oblique. In the hind wing the anterior margin is convex to the extreme apex, whereas in *C. vesicularia* the apex is truncated, with the angle beneath.

Genus ZOMIA, Moore.

Syn. *Omiza*, Walk.

ZOMIA INCITATA.

Omiza incitata, Walk. Cat. Lep. Het. B. M. xxiv. p. 1084.

Genus OSICERDA, Walk.

Syn. *Celesdera*, Walk.

OSICERDA ALIENATA, Walk. ib. xxiv. Geom. p. 1084, ♂ ♀.

♀. *Celesdera schistifusata*, Walk. ib. xxvi. Geom. p. 1749.

Larva feeds on *Ixora*.—A. Grote, Esq.

O. COSTIMACULATA, n. sp.

Male pale greenish grey: fore wing minutely fleckled with brown; with rather large triangular costal spots before the apex; a small brown spot on posterior margin near the angle; cilium brown, except in the middle, where it is yellow: hind wing luteous; a short obliquely ascending brown streak at the abdominal angle. Abdomen luteous. Antennæ blackish, shaft luteous.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. A. E. Russell.

O. TRINOTARIA, n. sp.

Male pale greenish luteous: fore wing with three equidistant black costal spots, the first basal and small, the others larger and triangular, the costal border between them being fleckled with black: hind wing with a transverse cinereous discal line. Underside luteous, with several short transverse black strigæ; both wings with a discal streak and transverse black line. Antennæ, tibiæ, and tarsi blackish. Cilia blackish.

Expanse $1\frac{2}{10}$ inch.

Bengal (*Sherwill*). In Coll. F. Moore.

Genus NOBILIA, Walk.

NOBILIA TURBATA, Walk. Cat. Lep. Het. B. M. xxiv. Geom. p. 1098.

Genus MARCALA, Walk.

MARCALA IGNIVORATA, Walk. Cat. Lep. Het. B. M. xxvi. Geom. p. 1764.

Fam. ZERENIDÆ.

Genus RHYPARIA, Hübn.

RHYPARIA DUCTARIA, Walk. ib. xxiv. Geom. p. 1111.

R. MACULATA, n. sp.

Male cinereous white: fore wing suffused with cinereous in the middle; a row of cinereous-brown spots along each vein from the base, a submarginal and marginal row of contiguous spots; some quadrate paler spots on the costa, and smaller spots on posterior margin: hind wing with three transverse curved rows of similar spots. Head and palpi above blackish. Antennæ brown. Thorax and abdomen black-spotted. Underside paler, marked as above. Legs blackish above.

Expanse $1\frac{7}{10}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

R. TRANSECTATA, Walk. ib. p. 1112.

Genus PERCNIA, Guen.

PERCNIA FELINARIA, Guen. Phal. ii. p. 216, pl. 19. f. 1.

Genus NELCYNDA, Walk.

NELCYNDA RECTIFICATA, Walk. l. c. xxiv. Geom. p. 1142.

Genus ABRAXAS, Leach.

ABRAXAS TIGRATA, Guen. Phal. ii. p. 202.

A. TIGRATA, var.

Female white; costa and exterior border of both wings yellowish: fore wing with numerous small confluent blackish-cinereous spots at the base and on posterior margin; a large medial spot, exterior to and above which is a large confluent discal and costal spot; a submarginal recurved series of spots, and a rather broad marginal imperfectly maculated band interspersed with yellow: hind wing with several small spots along anterior border, a large discal spot, a submarginal series and marginal row of transversely narrow contiguous spots and strigæ. Head and body yellow, black-spotted above and beneath. Palpi with black tip. Legs blackish.

Expanse 3 inches.

Bengal (*Capt. J. Lind Sherwill*). In Coll. F. Moore.

A. MARTARIA, Guen. Phal. ii. p. 205.

A. LEOPARDINATA, Kollar, Hügel's Reis. Kasch. iv. p. 490; Guen. Phal. ii. p. 206.

A. PARDARIA, n. sp.

Male white, markings pure grey, darker beneath: fore wing with a large lower basal spot, a double incomplete medial band of irregular conjoined spots, and a submarginal medially interrupted more complete band, the base of which crosses the hind wing; a broad apical patch having a costal spot, which continues interruptedly along the exterior margin of both wings; the spots on posterior border of fore wing speckled with reddish brown. Tip of palpi, head, and antennæ black. Thorax ochreous. Abdomen whitish, with four rows of black spots; tuft yellow. Legs blackish. Body beneath ochreous.

Expanse $2\frac{1}{4}$ inches.

Bengal. In Coll. A. E. Russell.

A. PICARIA, n. sp.

Male and *female* white, markings blackish: fore wing with a blackish-spotted yellow basal patch and transverse discal recurved band; a medial series of less contiguous spots, including a larger discal spot, which is somewhat yellow; some small medial submarginal spots: hind wing with a transverse discal more or less yellow double maculated band, a small discal spot and a few spots along abdominal margin: both wings with lunular marginal spots. Top of palpi and front of head black; thorax and abdomen yellow, with black spots, the latter with dorsal and two lateral rows. Legs blackish.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

A. IRRORATA, n. sp.

Male yellow: fore wing minutely irrorated with black; base of wing orange-yellow; an oblique transverse narrow orange-yellow indistinct band: hind wing white, with a small blackish discal spot and outer maculated line. Head and thorax orange-yellow, spotted with black. Abdomen pale cinereous, with dorsal row of blackish spots. Antennæ brown. Underside pale dull yellow; speckles on fore wing, discal spots, and transverse lines on both wings cinereous brown.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. A. E. Russell.

A.? *LAPSARIATA*, Walk. Cat. Lep. Het. B.M. xxiv. Geom. p. 1121.

A.? *TENEBRARIA*, n. sp.

Male and *female* pale dull green: fore wing densely fleckled with blackish brown, variously interspersed with white fleckles; four obliquely transverse equidistant medially interrupted ill-formed black-fleckled bands, the outer or submarginal band with a row of white spots: hind wing pale yellowish cinereous, with pale cinereous fleckles; a blackish-brown discal spot and two outer narrow lunular bands: exterior margins with a row of lunular spots. Cilia alter-

nate black and pale yellow. Underside pale, markings as above, but more confluent. Head and thorax greenish brown. Abdomen cinereous, with brown bands. Legs blackish, spotted.

Expanse, ♂ $2\frac{1}{4}$, ♀ $2\frac{5}{8}$ inches.

Bengal. In Coll. A. E. Russell.

VINDUSARA, n. g., Moore.

Palpi moderate, flat, porrect, hardly extending beyond the head, densely pilose beneath; third joint minute, conical. Legs smooth; hind tibiæ very long, pilose at the side, incrassated in the middle (less so in the female) with two pairs of spurs. Antennæ broadly pectinated to within one-third their length in the male, simple in the female. Body robust; abdomen extending rather beyond the hind wing in the male, and tufted. Wings large, broad; fore wing trigonal; exterior margin very oblique, posterior angle rounded: hind wing rather produced at the apex and in the middle of exterior margin, which is angled anteriorly.

VINDUSARA COMPOSITATA. (Pl. XXXII. fig. 6.)

Abraxas compositata, Guen. Phal. ii. p. 207.

V. METACHROMATA.

Abraxas metachromata, Walk. Cat. Lep. Het. B. M. xxiv. Geom. p. 1122.

Fam. LARENTIDÆ.

Genus OPORABIA, Steph.

OPORABIA MACULARIA, n. sp.

Female rufous grey, slightly brown-speckled: fore wing with four series of three or four contiguous narrow brown transverse lines, with darker brown spots along the veins; exterior margin with a line of double spots: hind wing white. Underside paler: fore wing greyish cinereous. Fore legs blackish above, with white spots.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Genus LARENTIA, Dup.

LARENTIA VARIEGATA, n. sp.

Male dull sap-green, whitish-speckled: fore wing with a broad medial obliquely transverse white sinuous-bordered band, containing several parallel blackish lunular lines, their interspaces varied blackish ochreous and green; base of wing and exterior border with several transverse whitish-bordered black lunular lines with varied-coloured interspaces; a well-defined submarginal lunular line: hind wing cinereous brown, with darker outer border, narrow white submarginal lunular lines, and dark brown marginal lunules.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

L. ÆRATA, n. sp.

Male and *female* pale glossy brassy yellow: fore wing numerous and minutely speckled with dark brown; three equidistant oblique transverse wavy brassy-yellow lines with blackish borders, the interspaces each with a transverse row of purplish-grey spots; a distinct black discal spot: hind wing cinereous brown, with a slight brassy gloss; a submarginal and marginal row of pale yellowish lunules. Cilia brassy yellow, alternated with dark brown. Underside paler; both wings minutely speckled and with greyish white spots: fore wing cinereous brown basally: hind wing with a distinct black discal spot and narrow band. Palpi, antennæ, thorax, and legs yellow, numerous black-speckled. Abdomen cinereous brown above, yellowish beneath.

Expanse $1\frac{3}{8}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Genus *EUPITHECIA*, Curtis.*EUPITHECIA SEMICIRCULATA*, n. sp.

Male and *female* fuliginous brown, somewhat fleckled: fore wing with two medial transverse black lunular whitish-margined lines, within which is a quadrate anteriorly-speckled yellowish costal patch, contiguous to which is a black discal spot; a marginal row of black lunules with testaceous borders: hind wing with a large black round evanescent spot with a semicircular white-outer-bordered line at the anal angle; a black discal dot and contiguous transverse streaks; a testaceous line with black lunular streaks along the abdominal and exterior margins. Underside paler, indistinctly marked as above. Antennæ of the female white-spotted; antennæ in the male broadly but thinly bipectinated to near the apex.

Expanse $\frac{9}{10}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

E. FERRUGINARIA, n. sp.

Male and *female* greyish ferruginous: fore wing with three bright ferruginous transverse irregular zigzag equidistant bands, the two inner bands traversed by a single and the outer band by a partly double yellow lunular line; base of wing, discal spot and adjoining streaks to the costa, and a streak on exterior margin black; a paler submarginal ferruginous and yellow band, and a marginal row of black dots: hind wing with a black discal dot and marginal row of dots; a submarginal transverse ferruginous and yellow lunular band. Head, thorax, and base of abdomen black.

Expanse $\frac{7}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

E. COSTIPANNARIA, n. sp.

Female greyish testaceous, duller beneath: fore wing with an oblique basal black patch and a triangular patch on the middle of the costa, both with pale borders; exterior margin with some small black

spots below the apex and above the posterior angle, bordered by an inner whitish line; some very indistinct whitish lines obliquely crossing the disk: hind wing pale cinereous along the anterior border; some dark streaks from abdominal margin, and a whitish line extending upward from middle of posterior margin. Cilia whitish, with blackish inner line and streaks. Palpi, head, and thorax black. Abdomen testaceous. Underside: fore wing with small black oblique discal spot and spots on the middle of the costa: hind wing with discal spot and outer transverse indistinct line of points.

Expanse $1\frac{1}{10}$ inch.

Bengal. In Coll. A. E. Russell.

Genus SAURIS, Guen.

SAURIS DECUSSATA, n. sp. (Pl. XXXIII. fig. 10.)

Female bright green: hind wing and abdomen uniform cinereous brown: fore wing with a medial transverse band of diffused black lunular lines enclosing a small discal spot; base of the wing and exterior border with narrow black less-distinct lines; two short longitudinal black streaks below the apex; a marginal row of black-pointed lunules, and an intermediate outer row of marks like the letter X, which cross the cilia; costal margin ochreous. Antennæ ochreous, black-spotted. Palpi, head, and thorax bright green. Underside cinereous brown, with indistinct blackish costal streaks, discal mark, and outer transverse wavy line. Legs black, white-spotted.

Expanse $1\frac{3}{8}$ inch.

Bengal. In Coll. A. E. Russell.

Genus MELANIPPE, Dup.

MELANIPPE CATENARIA, n. sp. (Pl. XXXIII. fig. 9.)

Male ferruginous brown: fore wing with a broad partly transverse oblique whitish medial band, containing several blackish lunular parallel lines, the middle line being chain-like; exterior border with a series of white spots below the apex, a large medial spot, and a smaller spot at the posterior angle: hind wing white, with short blackish-cinereous lunular streaks from abdominal margin; an exterior marginal lunular line. Palpi, head, and thorax ferruginous brown; two black metallic tufts on lower part of thorax. Abdomen white, with transverse cinereous streaks. Cilia alternate white and brown. Underside cinereous white: fore wing with three cinereous-brown transverse discal lines, and broad marginal band with a submarginal row of white dots: hind wing with a curved discal spot and three indistinct cinereous-brown outer sinuous lines, a submarginal line, and darker lunular marginal line.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

M. CUPREATA, n. sp.

Male glossy cupreous brown: fore wing with several basal trans-

verse white sinuous lines, exteriorly bordered by a dark brown indistinct band, their interspaces being white-speckled; exterior border of the wing varied with yellow and white lunules and speckles, and traversed by a submarginal double series of brown dots: hind wing pale cinereous brown. Underside paler; hind wing somewhat yellow exteriorly; both wings with indistinct whitish lunular submarginal lines and dots.

Expanse $1\frac{1}{4}$ inch.

Bengal. In Coll. F. Moore.

Genus ANTICLEA, Steph.

ANTICLEA CUPREARIA, n. sp.

Male and *female* pale cupreous brown: fore wing with two narrow subbasal transverse darker brown bands, the first band with an outer and the next with an inner black-bordered line, the interspace being greyish and traversed by three darker lines; across the disk is a narrow line, which is posteriorly lunular and anteriorly straight and black-bordered, and is indented before the costa; across the middle of the wing and exterior border are some indistinct pale narrow blackish-brown irregular lines: hind wing pale cupreous white, with a narrow brown marginal line and brown cilium from anal angle. Abdomen with a black waist-band.

Expanse $1\frac{4}{10}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Genus COREMIA, Guen.

COREMIA MEDIOVITTARIA, n. sp.

Male and *female* cinereous brown: fore wing with a rather broad medial transverse dark brown band, narrowest hindward, and which is traversed by two black lines with grey interspace; base and outer border of the wing with transverse pale lunular lines; a submarginal row of indistinct small whitish spots: hind wing pale cinereous, with three or four bright-brown marginal narrow lunular bands.

Expanse 1 inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Genus SCOTOSIA, Steph.

SCOTOSIA MINIOSATA, Walk. Cat. Lep. Het. B. M. xxv. Geom. p. 1354.

S. ATROSTIPATA, Walk. ib. p. 1354.

S. VITREATA, n. sp.

Male and *female* dark vitreous green, with a cupreous gloss, with numerous short transverse black strigæ: fore wing with the veins slightly yellowish and speckled; two medial transverse irregular sinuous black lines with chalybeate outer borders, between which is a black discal ringlet; the space at the base of the wing and across

the disk pale, the latter with a wavy transverse lunular chalybeate band with a glossy cupreous border: hind wing with two transverse sinuous blackish lines, and a submarginal lunular chalybeate line with cupreous border: both wings with black lunular marginal line. Underside dark cinereous, with greenish tinge; both wings with slightly apparent blackish discal spot and outer sinuous line. Fore legs black-streaked. Antennæ ferruginous, setaceous in both sexes.

Expanse, ♂ 2, ♀ $2\frac{1}{4}$ inches.

Bengal. In Coll. A. E. Russell; F. Moore.

S. LATIVITTARIA, n. sp.

Male and *female* dark cinereous brown: fore wing with a broad dark brown transversely curved medial irregularly-sinuous-margined whitish-bordered band; some diffused dark brown transverse basal lunular lines; a white-pointed submarginal sinuous dark brown line and a short apical sinuous streak; marginal line dark brown alternated with small white spots: hind wing with an indistinct brown discal line with whitish spots, a submarginal row of white spots, and brown marginal line alternated with white spots. Underside duller cinereous brown. Both wings with a transverse discal whitish-spotted lunular indistinct line and a submarginal row of white spots.

Expanse $1\frac{3}{4}$ inch.

Darjeeling. In Coll. A. E. Russell; F. Moore.

S. OBLIQUISIGNATA, n. sp.

Male cupreous brown; hind wing orange-red: fore wing with a transverse subbasal straight cinereous narrow line; a broad transverse medial blackish pale-bordered band, which contains an oblique oval discal ringlet, and is traversed within by three parallel reddish lines along the outer, which is sinuous; on each side of the band are three or four parallel lines, those of the inner side being reddish, of the outer cinereous; a submarginal cinereous line bordered exteriorly by blackish; a black lunular marginal line; veins of the wing reddish-lined throughout: hind wing with cinereous brown broadly along abdominal margin, below which are three black marginal lunules; a narrow brown discal ringlet. Underside pale orange yellow, base and apical patch on fore wing and discal streaks cinereous brown. Cilia cupreous brown.

Expanse $1\frac{3}{4}$ inch.

Darjeeling. In Coll. A. E. Russell.

S. VENIMACULATA, n. sp.

Male glossy luteous brown: fore wing with numerous blackish-brown uniform narrow transverse bands, which are somewhat sinuous anteriorly, and lunular posteriorly, those forming the usual broad medial band defined by being blackest; veins along exterior border with short luteous-white streaks, and a submarginal row of similar streaks: hind wing with several indistinct darker rather broad exterior bands; veins with short luteous-white streaks: marginal line

to both wings luteous white. Underside paler, indistinctly marked as above.

Expanse $2\frac{1}{8}$ inches.

Bengal (*Sherwill*). In Coll. F. Moore.

ARICHANNA, n. g., Moore.

Palpi small, compressed, moderately clothed with long hairs; third joint minute, conical. Antennæ—male bipectinated, the pectinations formed of fascicles of fine short hairs; female simple. Legs slender, smooth; mid tibiæ with one pair and hind tibiæ with two pairs of long spurs. Abdomen slender, tufted at the apex, not reaching to the angle of the hind wing. Fore wing elongate-trigonal; costa straight at the base, arched near the end; apex angled; exterior margin oblique, slightly convex; hind margin nearly straight. Hind wing convex exteriorly, slightly scalloped.

ARICHANNA PLAGIFERA.

Scotosia plagifera, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1686.

Darjeeling.

A. RAMOSA.

Scotosia ramosa, Walk. ib. p. 1688.

Darjeeling.

A. TRAMESATA, n. sp. (Pl. XXXIII. fig. 2.)

Male and *female* pale yellowish cinereous: fore wing with numerous short transverse blackish-brown confluent strigæ; a yellowish longitudinal medial line from the base to exterior margin, crossed by two narrow white contorted transverse inner bands, and outer submarginal lunular line; an oblique yellowish streak from the apex to the discal band; strigæ thinly disposed along the outer margin of discal band; a distinct discal spot formed of confluent black strigæ; exterior margin with a row of black lunular spots: hind wing with indistinct discal spot and outer transverse strigæ; a row of marginal lunules. Body dark-speckled. Underside paler, the dark markings of fore wing cinereous brown: hind wing thickly speckled with brown, discal spot distinct. Exterior margins with black spots. Cilia alternated with black.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

Remark.—This species is allied to both *A. ramosaria* and *A. plagifera*.

A. MACULATA, n. sp.

Female yellowish white: fore wing with several obliquely transverse bands of large white spots with some smaller spots parallel between them, the whole of the interspaces being deep black, the spots divided longitudinally into three distinct series: hind wing

cinereous white, with a small blackish discal spot, narrow transverse oblique straight subbasal, recurved discal, and irregular submarginal bands, and wavy marginal line. Cilia white, alternated with black. Base of palpi, front and top of thorax, dorsal line, and lateral bands on abdomen black. Antennæ black. Underside cinereous white; markings as above, but more subdued. Body and legs pale; legs with black spots.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell.

A. MARMORATA, n. sp. (Pl. XXXIII. fig. 3.)

Male and *female* white, with thinly dispersed short reddish strigæ: fore wing with an oblique basal, double subbasal, and submarginal transverse ferruginous bands, a streak (which also forms a discal ringlet) longitudinally from the subbasal band to exterior margin, where there are some pointed lunules of the same colour: hind wing with a subbasal oblique band and narrow wavy ferruginous discal line, the latter with lower exterior border and pointed lunules of the same colour: exterior margins with a narrow wavy ferruginous line. Body ferruginous; spot on tegulæ and dorsal streak on abdomen white. Underside pale cinereous brown, with slightly apparent blackish discal and submarginal streaks on fore wing, narrow discal spot, subbasal and outer transverse lines on the hind wing, and wavy marginal line. Antennæ and legs blackish-streaked.

Expanse $1\frac{1}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

Genus PSYRA, Walk.

PSYRA CUNEATA, Walk. Cat. Lep. Het. B. M. xxi. Geom. p. 483.

P. ANGULIFERA.

Scotosia angulifera, Walk. ib. xxxv. Suppl. v. p. 1687.

Darjeeling.

P. SIMILARIA, n. sp. (Pl. XXXIII. fig. 1.)

Male pale greenish saffron-yellow: fore wing with three submarginal jet-black spots; the first small, triangular, and near the apex; the next nearly midway beneath, elongated, bidentated exteriorly; the third the largest and near the posterior border, triangular with the angle pointing to the base, and slightly excavated exteriorly; a transverse discal series of black dots, a distinct discal spot; three subbasal transverse spots, the lowest triangular, and a single spot at the base: both wings with a marginal row of black dots, most distinct on the fore wing: hind wing pale cinereous yellow, with cinereous speckles and discal spot, and two outer curved cinereous bands, the inner band narrow, the outer distinct. Palpi and three spots on top of the thorax black.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. A. E. Russell; F. Moore.

Remark.—Allied to *P. cuneata*, but may be distinguished by the exterior margin of both wings not being angled in the middle, and by the cinereous bands of the hind wing being curved and not straight and broadly diffused as in *P. cuneata*.

GANDARITIS, n. g., Moore.

Male. Palpi ascending, pilose, compressed; third joint small, conical. Thorax moderate. Abdomen long, attenuate. Antennæ simple. Wings very large, elongated, broad: fore wing arched; apex slightly falcate; exterior margin oblique, posterior angle rounded; hind margin straight: hind wing produced, extending considerably beyond the posterior angle of fore wing; anterior margin convex, apex rounded. Legs smooth, long; hind tibiæ with four apical spurs.

GANDARITIS FLAVATA, n. sp.

Male yellow: fore wing with a ferruginous-yellow dark-brown-bordered medial transverse band, the inner border oblique and wavy, the outer border extending obliquely towards the exterior margin and then retracting to the posterior margin close to the inner border; both borders of the band with a contiguous less-distinct brown line, and near the costa is a brown discal spot; base of the wing streaked with ferruginous; a brown lunular line from the angle of the band to the apex of the wing, beneath which the exterior margin is cinereous; a submarginal pale lunular line diffused within beneath the angle of the band with yellowish ferruginous: hind wing with a ferruginous medial transverse lunular line; exterior border suffused with ferruginous. Palpi and antennæ brown. Head and body ferruginous yellow. Underside much paler: fore wing with an oblique brown streak from middle of the costa, and another below the apex: hind wing speckled with brown; a blackish patch on the middle of anterior margin, and another above the anal angle. Legs partly blackish brown.

Expanse 3 inches.

Bengal. In Coll. A. E. Russell.

Genus CIDARIA, Treit.

CIDARIA SUBSTITUTA, Walk. Cat. Lep. Het. B.M. xxxv. Suppl. v. p. 1691.

Darjeeling.

C. INTERPLAGATA, Guen. Phal. ii. p. 461.

Darjeeling.

C. INEXTRICATA, Walk. *l. c.* p. 1691.

Darjeeling.

C. ARGENTILINEATA, n. sp. (Pl. XXXIII. fig. 5.)

Male and *female* cupreous brown: fore wing with a silvery-white transverse subbasal narrow curved line, near which is a double slightly

sinuous line; three submarginal wavy lines, the two outer lines slightly diffused, and an outer imperfect series of lunules; two short lines at the apex; submedian veins slightly lined with white: hind wing and abdomen dark cinereous. Underside cinereous brown, with indistinct whitish transverse submarginal lunular lines and marginal row of spots.

Expanse $1\frac{3}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; F. Moore.

C. AURANTIARIA, n. sp. (Pl. XXXIII. fig. 8.)

Male and *female* dark brown; hind wing bright orange-colour: fore wing with two pale cinereous-yellow subbasal transverse lines; an oblique line from the costa beyond extending to below the middle, where it is indented opposite the exterior margin, returning again to the costa at one-third from the apex; a similar oval line beneath this on the posterior margin, both being outwardly bordered by a parallel line and a submarginal lunular line, the latter extending outward to the costa close to the apex; another line curving from the apex to the middle of exterior margin, beneath which to the posterior angle are some longitudinal streaks: hind wing with cinereous-brown abdominal margin and anal streaks, where also the exterior margin has a blackish line. Abdomen cinereous. Underside paler: fore wing with a transverse subapical diffused whitish band.

Expanse $1\frac{7}{12}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

C. SIGNATA, n. sp.

Male and *female* dark cinereous brown: fore wing with a broad transverse medial band, which is exteriorly constricted below the middle, and having a narrow white lunular bordered line; within the band is a black short recurved transverse discal streak; at the base of the wing and contiguous to the outer border of the band are some transverse paler white lunular lines; a straight submarginal white line, and a short longitudinal white streak below the apex; a marginal row of double dots with white borders: hind wing and underside paler cinereous brown.

Expanse $1\frac{2}{10}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

C. VIRIDATA, n. sp.

Male and *female* bright sap-green: fore wing with a broad medial transverse white-bordered cinereous black band having two inner parallel lunular black-bordered green lines, between which is a green discal spot; base of the wing and exterior border partly blackish, and with transverse blackish lunular lines: hind wing pale cinereous brown. Cilia pale ochreous, alternated on the fore wing with black. Abdomen cinereous brown.

Expanse $\frac{9}{10}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

C. RETICULATA, n. sp.

Female blackish brown: fore wing with several prominent pale chocolate-brown irregular bands, each with a yellow-bordered line, the bands disposed transversely, those at the base intersecting each other and joined to the outer by a longitudinal subcostal band, which latter and the outer band contains small dark brown spots with yellow borders, the outer band emitting a lower inner point, and outwardly narrow yellow streaks to the exterior margin of the wing: hind wing cinereous, with three indistinct narrow outer brown bands. Cilia yellow, with brown points and inner line. Body dark brown, with cinereous streaks. Underside cinereous brown, darkest at the base, with narrow blackish-brown sinuous discal band with narrow white outer border.

Expanse $1\frac{5}{8}$ inch.

Bengal. In Coll. A. E. Russell.

C. CINEREATA, n. sp.

Male and *female* cinereous white: fore wing with a dark ferruginous-brown base and apical patch, the latter somewhat blackish and crossed by a whitish lunular line, a transverse post-medial black-speckled ill-defined band with white lunular bordered line; middle of the wing minutely black-speckled; a small black discal spot; a short ferruginous streak ascending from a black streak from posterior margin near the angle: both wings with marginal brown spots. Cilia pale yellow. Palpi, head, and thorax ferruginous brown. Abdomen cinereous. Underside paler; base and apex of fore wing blackish cinereous, with oblique subapical pale band: hind wing with a discal dot and indistinct outer line.

Expanse $1\frac{1}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

Remark.—Allied to *Cidaria russata*.

C. CALAMISTRATA, n. sp. (Pl. XXXIII. fig. 6.)

Male and *female* dark ferruginous brown, slightly white-speckled: fore wing with a broad medial band with sinuous black borders, the outer border margined with white, the band being blackish at the sides and white along the middle, the colours being separated by a transverse sinuous black line with white outer margin; on the white ground is a short black discal streak and some lower ringlet marks; near the base of the wing is a narrow blackish band, and below the apex are some black patches traversed by a sinuous white line; a black exterior marginal line: hind wing pale cinereous white, with slight cinereous exterior border and darker marginal line. Cilia alternate brown and cinereous white. Underside cinereous white; exterior border of fore wing, an oblique broad subapical streak, and contiguous discal spot blackish cinereous: hind wing with a slight cinereous discal spot, outer sinuous line, and straight marginal line.

Expanse $1\frac{3}{10}$ inch.

Bengal. In Coll. W. S. Atkinson; F. Moore.

Remark.—Allied to *Cidaria russata*.

C. SUBAPICARIA, n. sp.

Male and *female* ferruginous brown: fore wing with a narrow blackish transverse subbasal band, and a broad medial band, the inner border of which is upright, the outer border irregularly extending towards the exterior margin; a short whitish oblique subapical streak and a ferruginous-white patch at the apex; a submarginal series of short black longitudinal streaks; a black marginal line; a medial band with some indistinct black markings and a discal spot: hind wing pale cinereous, with brown marginal line and discal dot. Underside—fore wing blackish cinereous, with a bent subapical whitish oblique streak: hind wing paler, with a blackish discal dot and outer sinuous indistinct line. Legs with whitish spots.

Expanse $1\frac{3}{8}$ inch.

Darjeeling. In Coll. A. E. Russell; W. S. Atkinson.

Remark.—Allied to *Cidaria russata* of Europe.

C. TRISIGNATA, n. sp.

Male dark brown: fore wing cinereous-fleckled, with several indistinct transverse sinuous black lines; a basal and a broad medial transverse bands with black-bordered sinuous line and whitish outer margin; in the middle band are three black-divisioned whitish discal spots; a cinereous streak at the apex and another at the costal end of the band indistinctly joined by a lower whitish streak; marginal line black, with some white spots: hind wing cinereous brown, with indistinct discal spot; anterior border and two submarginal lunular lines cinereous white; marginal line as on fore wing.

Expanse $2\frac{1}{8}$ inches.

Bengal. In Coll. A. E. Russell.

C. CHALYBEARIA, n. sp.

Female cinereous brown: fore wing chalybeate-speckled along the exterior border, and in patches across the disk and at the base; a broad medial transverse band formed of blackish diffused lunular lines, the middle somewhat paler and containing a black dentate discal mark, before which is a white spot; base of the wing and exterior border with indistinct blackish lunular lines; a submarginal row of white lunules with black points: hind wing paler, with a short whitish lunular streak from the anal angle. Underside uniform cinereous brown, with a submarginal row of white dots on both wings.

Expanse $1\frac{5}{8}$ inch.

Darjeeling; Cherra Poonjee. In Coll. A. E. Russell; F. Moore.

C. OBSCURATA, n. sp. (Pl. XXXIII. fig. 7.)

Male dark luteous brown: fore wing with a broad medial transverse darker band with narrow yellowish black-bordered lines, the inner line bent inward below its middle, the outer line lunular with the points extending inwardly along the veins; within the band are

two black transverse lunular lines and a medial series of circular marks; two similar transverse lines near the base of the wing, and two submarginal irregular but less distinct lines, the latter black-streaked before the apex and along the outer border; some black spots between the second and third basal lines: hind wing cinereous brown basally, partly luteous exteriorly, with submarginal lunular luteous lines. Underside paler; costa and subapical patch luteous yellow; two black spots before the apex: hind wing with a black discal spot and indistinct outer sinuous lines.

Expanse $1\frac{3}{4}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

C. CERVINARIA, n. sp.

Male blackish fawn-colour: fore wing with a dark velvety-brown transverse subbasal and a discal band, both with irregular margins and with a narrow yellow-bordered line; some similar-coloured spots between the bands posteriorly and others anteriorly on the costa; a small similar spot on the costa near the base, and three others before the apex; interspace before and exterior to the discal band diffused with ferruginous: a dark marginal line to both wings: anal tuft yellowish. Underside paler: fore wing with some blackish costal spots and pale-bordered discal transverse line: hind wing with a black discal spot and outer sinuous pale-bordered line. Cilia brown, with yellowish inner line.

Expanse $1\frac{1}{2}$ inch.

Bengal. In Coll. A. E. Russell.

C. AURATA, n. sp.

Male bright golden-yellow: fore wing with a broad basal and a posteriorly narrow medial transverse dark brown band, bordered by a pure-white sinuous line and traversed by some narrow white streaks; exterior border of the wing dark brown, with a yellow streak below the apex and a spot on middle of exterior margin; a submarginal and a marginal line of pure-white lunules: hind wing cinereous yellow, with some indistinct rows of whitish spots. Underside duller-coloured; bands on the fore wing indistinct, hind wing with several transverse white-speckled lines, and a marginal row of white spots to both wings.

Expanse $1\frac{1}{8}$ inch.

Bengal. In Coll. A. E. Russell; F. Moore.

Fam. EUBOLIDÆ.

Genus ANAITIS, Dup.

ANAITIS MEDMARIA.

Orsonoba medmaria, Walk. Catal. Lep. Het. B. M. xxvi. Geom. p. 1521.

Eubolia reciproca, Walk. ib. xxxv. Suppl. v. p. 1698.

Darjeeling.

Tribe CRAMBICES.

Fam. GALLERIDÆ.

Genus PROPACHYS, Walk.

PROPACHYS NIGRIVENA, Walk. Cat. Lep. Het. B.M. xxvii. p. 7.

P. LINEALIS, n. sp. (Pl. XXXIII. fig. 17.)

Male yellow. Labial palpi massive, broad, compressed, squamose; joints compact. Maxillary palpi slender, clavate, slightly pilose. Proboscis stout. Antennæ setulose. Body robust; abdomen extending beyond the hind wings. Legs stout; fore tibiæ fringed beneath; middle and hind legs long; hind tibiæ with four long spurs. Fore wings elongated, narrow, slightly rounded at the apex; hind wing broad, apex acute. Fore wings pale yellow, with a blackish-red narrow line between each vein: hind wings pale golden-yellow. Cilia whitish, that of the fore wing with a blackish-red inner line.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

P. FASCIALIS, n. sp.

Female. Fore wing bright chrome yellow; a narrow black line along the exterior veins, and a similar line between each vein, the black forming a suffused fascia from the middle of the outer margin; a black line from the base of the wing below the cell: hind wing and abdomen blackish purple. Palpi, head, thorax, and antennæ chrome yellow. Underside as above. Legs blackish.

Expanse 1 inch.

Bengal. In Coll. F. Moore.

Genus TOCCOLOSIDA, Walk.

TOCCOLOSIDA RUBRICEPS, Walk. Cat. Lep. B. M. xxvii. p. 14.

Silhet. In Coll. W. W. Saunders, Esq.

APSARASA, n. g., Moore.

Palpi stout, erect, projecting above the head; second joint broad, compressed, covered with dense adpressed short hair-like scales; third joint cylindrical, naked, two-thirds the length of the second. Antennæ setulose. Head broad, prominent, with a short acute conical point projecting forward from the vertex. Body stout; abdomen long, extending one-third its length beyond the hind wings; apex tufted. Legs stout, squamose; fore legs slightly pilose beneath; mid tibiæ with one pair and hind tibiæ with two pairs of stout spurs, one in each pair short; tarsi set with short bristles beneath. Fore wings elongate; costa convex at the base; apex rounded; exterior border very oblique, convex, forming a rounded margin to one-third of the hind border: hind wings short, trigonate; apex rounded, exterior border convex, excavated below the apex.

PROC. ZOOLOG. SOC.—1867, No. XLIII.

APSARASA RADIANS.

Apatela radians, Westw. Cab. Orient. Ent. pl. 28. f. 4 (1847).

Glottula radians, Walk. Catal. Lepid. Het. B. M. Noct. pt. xv. p. 1668.

Remark.—I am uncertain about the position of this genus, and place it here with doubt.

Fam. CRAMBIDÆ.

Genus ESCHATA, Walk.

Syn. *Chærecla*, Walk. Suppl. p. 634.

ESCHATA GELIDA, Walk. Cat. Lep. Het. B. M. ix. Noct. p. 133. Darjeeling.

Genus APURIMA, Walk.

APURIMA XANTHOGASTRELLA, Walk. ib. xxvii. p. 194 (1863).

Rupela degenerella, Walk. ib. xxviii. p. 524.

Lithosia cramboïdes, Walk. ib. xxxi. Suppl. i. p. 230 (1864).

Genus SCIRPOPHAGA.

SCIRPOPHAGA AURIFLUA, Zeller, Monogr. Chilo. et Cramb. p. 2 (1863).

Calcutta.

S. GILVIBERBIS, Zeller, ib. p. 2 (1863).

BRIHASPA, n. g., Moore.

Male. Labial palpi porrect, slightly recurved, slender, smooth, pointed at the apex; second joint twice the length of the third. Maxillary palpi less than half the length of the labial, fringed. Antennæ minutely pectinated; basal joint thick. Head narrow, protruding in front, conical. Thorax stout. Abdomen attenuated, compressed at the sides; apical tuft prominent. Legs smooth, slender, long; hind legs very long (the tibia and tarsus together being three-quarters of an inch); hind tibiæ with four long spurs. Wings elongate, broad: fore wing acute at the apex; costa arched at the base; exterior margin slightly convex, oblique: hind wing produced at the apex; exterior margin slightly recurved; anal angle rounded. Cilia broad.

BRIHASPA ATROSTIGMELLA, n. sp. (Pl. XXXIII. fig. 13.)

Male pure white, glossy: fore wing with a black curved bar or brand at the base of the costa, beneath which is a small black spot; two black spots at the end of the cell, and an oval spot beneath them near the posterior margin; two pale yellow maculated transverse streaks obliquely before the apex, and two similar-coloured

spots above the anal angle of the hind wing. Labial and maxillary palpi and eyes black. Fore legs blackish.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

RAMILA, n. g., Moore.

Male. Labial palpi porrect, slender; second and third joints of equal length; third joint pilose, pointed. Maxillary palpi extending beyond the head to near the tip of the labial, pilose, tufted at the apex. Proboscis small. Head large, broad, prominent, projecting considerably beyond the eyes, oval in front. Antennæ minutely serrated. Body rather stout; abdomen extending beyond the hind wings. Legs moderate; fore tibiæ incrassate, pilose beneath; hind tibiæ with four rather long spurs. Fore wings elongate; costa nearly straight; apex much produced and slightly falcate; exterior margin straight, very oblique, angle rounded; posterior margin convex in the middle: hind wings trigonate; apex produced and slightly falcate; anal angle truncate.

RAMILA MARGINELLA, n. sp. (Pl. XXXIII. fig. 16.)

Male silvery white: fore wing with numerous short transverse lunulate iridescent wrinkles; a narrow cupreous-brown marginal band along the costa; two oblique transverse narrow brown lines, the outer line submarginal and irregular, the inner line rather indistinct and terminated by two small brown discal spots, another similar spot being situated some distance within the cell. Two short transverse narrow brown lines crossing the lower part of the hind wing. Both wings with a narrow black lunular line to the exterior margin. Cilia of both wings pale ferruginous, edged with cinereous, the division being by a narrow black lunular line. Sides of head in front and palpi above brown. Fore legs partly brown; tarsi brown at the base of each joint.

Expanse $1\frac{1}{2}$ inch.

Darjeeling. In Coll. W. S. Atkinson; F. Moore.

Genus CRAMBUS.

CRAMBUS CONSOCIELLUS, Walk. Cat. Lep. Het. B. M. xxvii. p. 159.

Note.—North America is given in the 'Brit. Mus. Catalogue' as the habitat of this insect. This I have ascertained to be an error.

Genus ACARA, Walk.

ACARA MOROSELLA, Walk. ib. p. 199.

Silhet.

Genus SCHÆNOBIUS.

SCHÆNOBIUS MINUTELLUS, Zeller, Monogr. Chilo. et Cramb. p. 5 (1863).

Calcutta (*W. S. Atkinson*).

S. PUNCTELLUS, Zeller, ib. p. 4 (1863).

Calcutta (*W. S. Atkinson*).

Genus CALAMOTROPHA, Zeller.

CALAMOTROPHA ATKINSONI, Zeller, ib. p. 9 (1863).

Calcutta (*W. S. Atkinson*).

Tribe TORTRICES.

Fam. NYCTEOLIDÆ.

Genus HYLOPHILA, Hübn.

HYLOPHILA FALCATA, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1772.

Darjeeling.

H. CHLOROLEUCA.

Tyana chloroleuca, Walk. ib. p. 1777.

Darjeeling.

Genus TYANA, Walk.

TYANA CALLICHLORA. (Pl. XXXIII. fig. 14.)

Tyana callichlora, Walk. ib. p. 1776.

Darjeeling.

TYANA SUPERBA, n. sp. (Pl. XXXIII. fig. 15.)

Fore wing pearl-white; costa, a transverse subbasal band, and an oblique subapical irregular band dark saffron-yellow, the latter enclosing a white spot at each end, and both bands black-bordered, the subbasal on its outer margin, the other on its inner margin; costal margin at the apex and cilia anteriorly black; cilia posteriorly saffron-yellow, with black spots: hind wing white. Head and front of thorax saffron-yellow. Thorax white. Abdomen yellowish. Antennæ and palpi brown, with white spots. Legs white, fore and middle legs with yellow spots.

Expanse $1\frac{1}{8}$ inch.

Darjeeling. In Coll. F. Moore.

Genus APHUSIA, Walk.

? *Earias*, H.-Sch.

APHUSIA SPEIPLA, Walk. ib. xii. Noct. p. 770 (1857).

Micra partita, Walk. ib. xxxiii. Suppl. iii. p. 799 (1865).

Fam. TORTRICIDÆ.

Genus CERACE, Walk.

CERACE STIPATANA, Walk. ib. xxviii. p. 422.

C. ONUSTANA, Walk. ib. xxviii. p. 423.

Silhet; Darjeeling.

Genus *ÆMENE*, Walk.

ÆMENE TAPROBANIS, Walk. Cat. Lep. Het. B. M. ii. Bombyces, p. 542.

Calcutta (*W. S. Atkinson*).

Tribe TINEINES.

Fam. TINEIDÆ.

Genus TINEA.

TINEA LONGICORNIS, Stainton, Trans. Ent. Soc. Lond. v. n. s. p. 113.

Calcutta.

Genus *PORSICA*, Walk.

PORSICA INGENS, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1823.

Genus *ALAVONA*, Walk.

ALAVONA BARBARELLA, Walk. ib. xxviii. p. 515.

Fam. HYPONOMEUTIDÆ.

Genus *ATTEVA*, Walk.

Syn. *Amblothridia*, Wallengren; *Corinea*, Walk.

ATTEVA NIVEIGUTTA, Walk. ib. ii. Bomb. p. 526.

Corinea niveiguttella, Walk. ib. xxviii. p. 542.

Larva feeds on *Ailanthus excelsus*, residing in a common very fine web. At times a perfect pest, denuding the tree of its leaves.—*Dr. Bonavia*.

HYPONOMEUTA LINEATONOTELLA, n. sp. (Pl. XXXIII. fig. 18.)

Fore wing dark cream-white, marked with four black longitudinal subcostal lines, one basal and two subbasal black spots, a series of six subapical spots, and a row of spots along the apical and exterior margins; base of costa also black: hind wing cinereous brown. Cilia white. Head, thorax, palpi and legs cream-white, with black spots. Abdomen pale ferruginous. Antennæ white.

Expanse $1\frac{7}{8}$ inch.

Darjeeling. In Coll. F. Moore.

Fam. PLUTELLIDÆ.

Genus *CEROSTOMA*, Latr.

CEROSTOMA RUGOSELLA, Stainton, Trans. Ent. Soc. Lond. v. n. s. p. 113.

Calcutta (*W. S. Atkinson*).

C. ALBOFASCIELLA, Stainton, ib. v. n. s. p. 114.

Calcutta (*W. S. Atkinson*).

Fam. GELECHIDÆ.

Genus DEPRESSARIA, Haw.

DEPRESSARIA RICINI, Atkinson; Stainton, ib. v. n. s. p. 115.

Calcutta.

Larva feeds on the castor-oil plant (*Ricinus communis*), rolling up the edge of a leaf.—*W. S. Atkinson*.

D. ZIZYPHI, Atkinson; Stainton, ib. v. n. s. p. 115.

Calcutta.

Larva feeds on *Zizyphus jujuba*.—*W. S. Atkinson*.

D. ? RICINELLA, Atkinson; Stainton, ib. v. n. s. p. 110.

Calcutta.

Larva feeds on *Ricinus communis*, rolling up the edge of a leaf.—*W. S. Atkinson*.

Genus BINSITTA, Walk.

? *Cryptolechia*, Zell.

BINSITTA NIVIFERANA, Walk. Cat. Lep. Het. B. M. xxix. p. 832.

Genus GELECHIA, Zeller.

GELECHIA HIBISCI, Atkinson; Stainton, Trans. Ent. Soc. Lond. v. n. s. p. 117.

Calcutta.

Larva feeds on the tops of the yellow *Hibiscus*.—*W. S. Atkinson*.

G. PUBESCENTELLA, Stainton, ib. v. n. s. p. 117.

Calcutta (*W. S. Atkinson*).

G. SIMPLICIELLA, Stainton, ib. v. n. s. p. 118.

Calcutta (*W. S. Atkinson*).

Genus PARASIA, Dup.

PARASIA APICIPUNCTELLA, Stainton, ib. v. n. s. p. 119.

Calcutta (*W. S. Atkinson*).

Genus ANARSIA, Zeller.

ANARSIA CANDIDA, Stainton, ib. v. n. s. p. 114.

Calcutta (*W. S. Atkinson*).

Genus ŒCOPHORA, Zeller.

ŒCOPHORA SUBGANOMELLA, Stainton, ib. v. n. s. p. 119.

Calcutta (*W. S. Atkinson*).

Genus BUTALIS, Treit.

BUTALIS TRIOCELLATA, Stainton, ib. v. n. s. p. 120.

Calcutta (*W. S. Atkinson*).

Fam. GRACILLARIDÆ.

Genus GRACILLARIA, Zeller.

GRACILLARIA AURICILLA, Stainton, ib. v. n. s. p. 120.

Calcutta (*W. S. Atkinson*).

G. FALCATELLA, Stainton, ib. v. n. s. p. 121.

Calcutta (*W. S. Atkinson*).

G. USTULATELLA, Stainton, ib. v. n. s. p. 121.

Calcutta (*W. S. Atkinson*).

G. RESPLENDENS, Stainton, ib. i. 3rd ser. p. 294, pl. 10. f. 4.

Calcutta (*W. S. Atkinson*).

G. QUADRIFASCIATA, Stainton, ib. p. 295, pl. 10. f. 5.

Calcutta.

Larva mines the underside of the leaves of *Urena lobata*.—*W. S. Atkinson*.

G. GEMONIELLA, Stainton, ib. p. 297, pl. 10. f. 6.

Calcutta (*W. S. Atkinson*).

G. TERMINALIÆ, Stainton, ib. p. 298, pl. 10. f. 8.

Calcutta.

Larva mines the underside of the leaves of *Terminalia catappa*.—*W. S. Atkinson*.

G. NITIDULA, Stainton, ib. p. 299, pl. 10. f. 9.

Calcutta (*W. S. Atkinson*).

Genus CORISCUM, Zeller.

CORISCUM ORIENTALE, Stainton, ib. iii. n. s. p. 301.

Calcutta.

Larva feeds on the flower-buds of a species of *Bauhinia*.—*W. S. Atkinson*.

Genus ORNIX, Zeller.

ORNIX ALBIFRONS, Stainton, ib. v. n. s. p. 122.

Calcutta (*W. S. Atkinson*).

Fam. ELACHISTIDÆ.

Genus LOZOSTOMA.

LOZOSTOMA FLAVOFASCIATA, Stainton, ib. v. n. s. p. 124.

Calcutta (*W. S. Atkinson*).

L. SEMISULPHUREA, Stainton, ib. v. n. s. p. 125.

Calcutta (*W. S. Atkinson*).

Genus COSMOPTERYX, Hübn.

COSMOPTERYX ASIATICA, Stainton, ib. v. n. s. p. 122.

Calcutta (*W. S. Atkinson*).

C. SEMICOCINEA, Stainton, ib. v. n. s. p. 123.

Calcutta (*W. S. Atkinson*).

C. ÆNEELLA, Stainton, ib. v. n. s. p. 124.

Calcutta (*W. S. Atkinson*).

Genus ATKINSONIA, Stainton.

ATKINSONIA CLERODENDRELLA, Stainton, ib. v. n. s. p. 125.

Calcutta.

Larva feeds on the tops of *Clerodendron*, drawing together the leaves with a white web.—*W. S. Atkinson*.

Fam. LITHOCOLLETIDÆ.

Genus LITHOCOLLETIS, Zeller.

LITHOCOLLETIS BAUHINIÆ, Atkinson; Stainton, ib. iii. n. s. p. 303.

Calcutta.

Larva mines the upper cuticle of the leaves of *Bauhinia purpurea*.—*W. S. Atkinson*.

Fam. LYONETIDÆ.

Genus PHYLLOCNISTIS, Zeller.

PHYLLOCNISTIS CITRELLA, Atkinson; Stainton, ib. iii. n. s. p. 303.

Calcutta.

Larva feeds on a species of *Citrus*.—*W. S. Atkinson*.*Additional Species.*

Tribe PAPILIONES.

Fam. PAPILIONIDÆ.

PAPILIO ELEPHENOR, Doubleday, Ann. Nat. Hist. xvi. p. 305; Westw. Cab. Orient. Ent. pl. 31. f. 2, 3.

Silhet.

P. BOOTES, Westw. Ann. Nat. Hist. ix. p. 38; Arc. Ent. pl. 31.

P. GYAS, Westw. Arc. Ent. pl. 11. f. 1.

P. EVAN, Doubleday, Ann. Nat. Hist. xvi. p. 235; Gen. Diurn. Lep. pl. 2. f. 1; Westw. Orient. Ent. pl. 31. f. 1.

Silhet.

P. MEGARUS, Westw. Arc. Ent. pl. 52. f. 3.

Fam. PIERIDÆ.

PIERIS SETA, Moore, P. Z. S. 1857, p. 102, pl. 44. f. 3, ♀.

Fam. DANAIDÆ.

EUPLEA ALCATHOË, Godt. Enc. Méth. ix. p. 178.

Fam. NYMPHALIDÆ.

MESSARAS ALCIPE.

Papilio alcippe, Cram. iv. t. 389. f. G, H.
Silhet.

ATELLA SINHA, Kollar, Hügel's Kaschmir, iv. p. 438.

Atella egista auctorum.

NEPTIS RADHA, Moore, Cat. Lep. E. I. C. i. p. 166, pl. 4 a. f. 4.

N. SOMA, Moore, P. Z. S. 1858, p. 9, pl. 49. f. 6.

Silhet.

ATHYMA RANGA, Moore, Cat. Lep. E. I. C. i. p. 175, pl. 5 a. f. 6.

DILIPA MORGIANA, Westw. (Moore, ib. i. p. 201, pl. 6 a. f. 5).

Khasia Hills (*Dr. Jerdon*).

ADOLIAS ADIMA, Moore, ib. i. p. 194; Trans. Ent. Soc. Lond. v.
n. s. p. 76.

A. JAHNU, Moore, ib. p. 192; ib. v. n. s. p. 74.

A. EVELINA, Stoll, Cram. Suppl. v. t. 28. f. 2, 2 B.

A. SANCARA, Moore, *l. c.* i. p. 195; Trans. Ent. Soc. Lond. v.
n. s. pl. 9. f. 1.

A. IVA, Moore, *l. c.* i. p. 195; ib. v. n. s. pl. 8. f. 2.

NYMPHALIS DELPHIS, Doubleday, Ann. Soc. Ent. France, 1843,
p. 217, pl. 7.

AMATHUSIA AMYTHAON, Doubleday, Ann. Nat. Hist. xix. p. 175;
Westw. Cab. Orient. Ent. pl. 19. f. 1-3.

Silhet.

ENISPE CYCNUS, Westw. (Moore, Cat. Lep. E. I. C. i. p. 212).

THAUMANTIS NOURMAHAL, Westw. Trans. Ent. Soc. Lond. iv.
n. s. p. 178, pl. 18. f. 1, 1 a.

Fam. SATYRIDÆ.

NEORINA KRISHNA.

Cyllo krishna, Westw. & Hewits. Gen. Diurn. Lep. p. 361.

DEBIS BHAIKAVA, Moore, Cat. Lep. E. I. C. i. p. 217.

D. SCANDA, Moore, ib. i. p. 218.

D. NADA, Moore, ib. i. p. 218.

D. KANSA, Moore, ib. i. p. 219.

D. SINORIX, Hewitson, Exot. Butt. 1862, pl. 131. f. 19, 20.

MYCALESIS SANATANA, Moore, l. c. i. p. 231.

YPHTHIMA HYAGRIVA, Moore, ib. i. p. 236.

Y. NARASINGHA, Moore, ib. i. p. 236.

MELANITIS LAIS, Fabr. (Cram. ii. t. 110. f. A, B).

Fam. ERYCINIDÆ.

DODONA DIPEA, Hewits. Exot. Butt. 1865, pl. .

D. ADONIRA, Hewits. ib. pl. .

Fam. LYCENIDÆ.

Genus POLYOMMATUS, Latr.

POLYOMMATUS LAIUS, Cram. Pap. Exot. iv. t. 319. f. D, E.
Calcutta.

Larva feeds on *Zizyphus*.—*W. S. Atkinson*.

Genus CHRYSOPHANUS, Hübn.

CHRYSOPHANUS TIMÆUS.

Papilio timæus, Cram. Pap. Exot. t. 146. f. E, F, ♀.

Genus ILERDA, Doubleday.

ILERDA ANDROCLES, Doubl. Gen. Diurn. Lep. pl. 75. f. 2, ♂.
Darjeeling.

I. MOOREI, Hewitson, Ill. Diurn. Lep. Lyc. pt. 2. p. 58, ♂.

Genus APHNÆUS, Hübn.

APHNÆUS ICTIS, Hewits. ib. p. 61, pl. 25. f. 8, 9.
Calcutta.

Genus AMBLYPODIA, Horsf.

AMBLYPODIA QUERCETORUM, Boisd. (Moore, Cat. Lep. E. I. C.
i. pl. 1 a. f. 7).

Darjeeling.

A. PERIMUTA, Boisd. (Moore, ib. i. p. 42).
Silhet.

? AMBLYPODIA RAMA.

Thecla rama, Kollar, Hügel's Kaschmir, iv. p. 412, t. 4. f. 1, 2.
Darjeeling (*W. S. Atkinson*).

A. FULGIDA, Felder.

Genus MYRINA, Godart.

MYRINA AMYNTOR.

Papilio amyntor, Herbst, Pap. t. 300. f. 5, 6.
Silhet (*W. S. Atkinson*).

M. ONYX.

Thela onyx, Boisd.; Moore, Cat. Lep. E. I. C. i. p. 30.
Myrina syrix, Felder, Sitz. Akad. Wiss. Wien (1860); Hewits.
Ill. Diurn. Lep. Lyc. pt. i. p. 34, pl. 14. f. 32, 33.
Darjeeling.

Fam. SPHINGIDÆ.

CALYMNIA PANOPUS, Cram. pl. 224. f. A, B; Westw. Cab. Orient.
Ent. pl. 6. f. 2.

Silhet.

MACROSILA NYCTIPHANES, Walk. Catal. Lep. Het. B. M. viii.
p. 209.

Silhet.

PANACRA AUTOMEDON, Walk. ib. p. 154.

Silhet.

P. MYDON, Walk. ib. p. 155.

Silhet.

P. VARIOLOSA, Walk. ib. p. 156.

Silhet.

P. SCAPULARIS, Horsf. (Walk. ib. p. 157).

Thyreus elegantulus, H.-Schæff. Lep. Spec. Nov. i. f. 479 (1856).
Silhet.

P. TRUNCATA, Walk. ib. p. 160.

Silhet.

P. ASSAMENSIS, Walk. ib. p. 160.

Silhet.

PHILAMPELUS SERICEUS, Walk. ib. p. 181.

Silhet.

ELIBIA DOLICHUS, Westw. Cab. Orient. Ent. pl. 30. f. 1.

Silhet.

DARAPSA HYPOTHOÛS, Cram. pl. 285. f. F.

Calcutta.

Feeds on *Nauclea kadamba*; pupa in folds of leaves.—*A. Grote, Esq.*

PERIGONIA MACROGLOSSOIDES, Walk. Catal. Lep. Het. B. M. xxxv. Suppl. p. 1851.

Darjeeling (*W. S. Atkinson*).

CHÆROCAMPA PALLICOSTA, Boisd. (Walk. ib. viii. p. 145).

C. ELPENOR, Linn.

MACROGLOSSA TRIOPUS, Westw. Cab. Orient. Ent. pl. 6. f. 4.
Silhet.

Note.—Add the synonyms as follows to the species of *Sphingidæ* described in 'Proc. Zool. Soc.' 1865, pp. 793, 794.

BASIANA SUPERBA, Moore, P. Z. S. 1865, p. 793.

Syn. *Basiana bilineata*, Walk. l. c. Suppl. v. p. 1857 (1866).

AMBULYX SUBSTRIGILIS, Westw. (P. Z. S. 1865, p. 793).

Syn. *Ambulyx maculifera*, Walk. l. c. Suppl. v. p. 1851, ♀.

PERGESA CASTOR, Boisd. (P. Z. S. 1865, p. 794).

Syn. *Pergesa velata*, Walk. l. c. Suppl. v. p. 1853.

Tribe BOMBYCES.

Fam. ÆGERIIDÆ.

LENYRA ASTAROTH, Westw. Cab. Orient. Ent. pl. 6. f. 5.
Sikkim (*Lieut. Beavan*).

Fam. ZYGÆNIDÆ.

ZYGÆNA CASHMIRENSIS, Kollar, Hügel's Kaschmir, iv. p. 459,
pl. 19. f. 6.

Darjeeling (*A. Grote, Esq.*).

Fam. AGARISTIDÆ.

EUSEMIA AMATRIX, Westw. Cab. Orient. Ent. pl. 33. f. 4.

E. aruna, Moore, Cat. Lep. E. I. C. ii. p. 288, ♀.

E. proxima, Walk. Cat. Lep. Het. B. M. i. p. 50.

Assam.

E. basalis, Walk. ib. p. 53.

E. VETULA, Hübn. Zutr. f. 657.

Silhet.

PHÆGORISTA CATOCALINA, Walk. Cat. Lep. Het. B. M. xxxv. Suppl. v. p. 1859.

Bengal (collected by A. E. Russell).

Fam. LITHOSIIDÆ.

PERIDROME ORBICULARIS, Walk. ib. ii. p. 445.

Aganopsis subquadrata, Herr-Schæff. Lep. Spec. Nov. p. 70, f. 501.

Cherra Poonjee (Col. Buckley).

EUPLOCIA MEMBLIARIA, Walk. l. c. ii. p. 448.

NEOCHERA DOMINIA, Cram. t. 263. f. A, B.

Cherra Poonjee (Col. Buckley).

N. MARMOREA, Walk. ib. vii. p. 1674.

Silhet.

HYPSA SILVANDRA, Cram. t. 369. f. D.

Silhet.

PHILONA INOPS, Walk. l. c. ii. p. 457.

Silhet.

LITHOSIA SERVIA, Walk. ib. ii. p. 506.

L. TETRAGONA, Walk. ib. ii. p. 510.

Silhet.

L. VAGESA, Moore, Cat. Lep. E. I. C. ii. p. 304.

Darjeeling.

CYANA DETRITA, Walk. l. c. ii. p. 529.

Silhet.

DOLICHE GELIDA, Walk. ib. ii. p. 529.

Silhet.

BARSINE LINGA, Moore, Cat. Lep. E. I. C. ii. p. 301.

Darjeeling.

AGRISIUS GUTTIVITTA, Walk. l. c. iii. p. 723.

Darjeeling (W. S. Atkinson).

SESAPA EXCURRENS, Walk. ib. xxxi. Suppl. i. p. 255.

Cherra Poonjee.

S. DECURRENS, Walk. ib. p. 255.

Darjeeling.

BIZONE SIGNA, Walk. Cat. Lep. Het. B. M. xxxi. Suppl. ii. p. 550.
Silhet.

B. ARAMA, Moore, Cat. Lep. E. I. C. ii. p. 306, pl. 7a. f. 10.

NUDARIA SUBCERVINA, Walk. *l. c.* xxxi. Suppl. i. p. 274.
In Coll. W. S. Atkinson, Esq.

N. MARGARITACEA, Walk. *ib.* p. 275.
In Coll. W. S. Atkinson, Esq.

N. MARGARITARIA, Walk. *ib.* p. 275.
In Coll. W. S. Atkinson, Esq.

Fam. CHALCOSIIDÆ.

CYCLOSIA FULIGINOSA, Walk. *ib.* ii. p. 418.
Silhet.

C. VIRGINALIS, Herr.-Schæff. Lep. Exot. Spec. Nov. i. f. 4.
C. subcyanescens, Walk. *l. c.* ii. p. 417.
Silhet.

MILIONIA GLAUCA, Cram. t. 363. f. D.
Silhet.

CHALCOSIA ADALIFA, Doubleday (Walk. *l. c.* ii. p. 421).
Silhet.

C. ZEHMA, Herr.-Schff. Lep. Exot. Spec. Nov. i. f. 3.
Silhet.

LAURION CIRCE, Boisd. ; Herr.-Schff. Lep. Exot. Spec. Nov. i.
f. 2.

L. metallica, Walk. Cat. Lep. Het. B. M. ii. p. 426.
Cherra Poonjee (*Col. Buckley*).

ETERUSIA TRICOLOR, Hope, Tr. Linn. Soc. xviii. p. 445, pl. 31.
f. 4.

Darjeeling (*W. S. Atkinson, Esq.*).

E. RISA, Doubleday, Zoologist, ii. p. 468.
Silhet.

E. RAJA, Moore, Cat. Lep. E. I. C. ii. p. 320, pl. 8a. f. 2.
Darjeeling.

E. PULCHELLA, Walk. *l. c.* ii. p. 431.
Darjeeling.

SYNTOMIS OCHSENHEIMERI, Boisd. Monogr. Zyg. pl. 7. f. 4.

S. IMAON, Cram. t. 248. f. E.

Silhet.

S. DIVISA, Walk. Cat. Lep. Het. B. M. i. p. 131.

Silhet.

S. MELAS, Walk. ib. p. 133.

S. VITREA, Walk. ib. p. 1594.

Silhet.

HYPOPOLA THELEBAS, Cram. pl. 150. f. D.

PHAUDA FLAMMANS, Walk. *l. c.* i. p. 257.

SORITIA LEPTALINA, Kollar, Hügel's Kaschmir, iv. p. 462.

Silhet.

RETINA RUBRIVITTA, Walk. *l. c.* ii. p. 439.

Silhet.

HERPA VENOSA, Walk. (Moore, Cat. Lep. E. I. C. ii. pl. 8a. f. 6).

CELERENA DIVISA, Walk. Trans. Ent. Soc. Lond. 3rd ser. i. p. 72.

Silhet.

NYCTEMERA CENIS, Cram. t. 147. f. E.

N. interlecta, Walk. Cat. Lep. Het. B. M. ii. p. 400.

Cherra Poonjee.

N. PLAGIFERA, Walk. ib. p. 400.

Silhet.

EUSCHEMA FLAVESCENS, Walk. ib. p. 406.

Silhet.

DYSCHEMON NEDA, Klug, Neue Schmett. Lc. p. 6, pl. 4. f. 3.

Silhet.

Fam. LIPARIDÆ.

PANTANA DISPAR, Walk. Cat. Lep. Het. B. M. iv. p. 820.

Calcutta (*W. S. Atkinson*).

GENUSA BIGUTTA, Walk. ib. p. 818.

Calcutta (*W. S. Atkinson*).

G. DELINEATA, Walk. ib. p. 818.

Silhet.

G. COMPARATA, Walk. ib. xxxii. Suppl. ii. p. 340.

Darjeeling (*W. S. Atkinson*).

AROA SOCRUS, Geyer, Hübn. Zutr. f. 837, 838.

A. substrigosa, Walk. ib. iv. p. 794.

Silhet.

BAZISA DETECTA, Walk. Cat. Lep. Het. B. M. xxxii. Suppl. ii. p. 399.

Calcutta (*W. S. Atkinson*).

ARTAXA SUBFASCIATA, Walk. ib. p. 332.

Darjeeling (*W. S. Atkinson*).

A. DIGRAMMA, Boisd. Icon. Règ. Anim. Ins. p. 508, pl. 86. f. 4.

A. guttata, Walk. ib. iv. p. 795.

Calcutta (*W. S. Atkinson*).

A. JUSTICIÆ, Moore, Cat. Lep. E. I. C. ii. p. 352.

Calcutta.

Larva feeds on *Æschynomene sesban*, *Duranta*, *Zizyphus*, and *Justicia*.—*A. Grote, Esq.*

CHARNIDAS LITURA, Walk. Catal. Lep. Het. B. M. iv. p. 797.

PENORA SILHETICA, Walk. ib. xxxii. Suppl. ii. p. 341.

Silhet.

ODAGRA DEVESTITA, Walk. ib. p. 402.

Darjeeling (*W. S. Atkinson*).

EUPROCTIS LUNATA, Walk. ib. iv. p. 837.

Calcutta.

Larva feeds on *Combretum*.—*A. Grote, Esq.*

E. MELANOPHILA, Walk. ib. xxxii. Suppl. ii. p. 349.

Leucoma latifascia, Walk. ib. iv. p. 831.

Darjeeling (*W. S. Atkinson*).

E. METAMELANA, Walk. ib. xxxii. Suppl. ii. p. 349.

Cherra Poonjee (*W. S. Atkinson*).

E. GAMMA, Walk. ib. vii. p. 1731.

E. MADANA, Moore, Cat. Lep. E. I. C. ii. p. 348.

PSEUDOMESA QUADRIPLAGIATA, Walk. *l. c.* p. 923.

Silhet.

PIDA APICALIS, Walk. ib. xxxii. Suppl. ii. p. 400.

Darjeeling.

DASYCHIRA GROTEI, Moore, *l. c.* ii. p. 338.

D. CONVERGENS, Walk. *l. c.* iv. p. 868.

Silhet.

D. MARUTA, Moore, *l. c.* ii. p. 339.

Darjeeling.

GAZALINA VENOSATA, Walk. ib. xxxii. Suppl. p. 398.

G. APSARA.

Dasychira apsara, Moore, *l. c.* ii. p. 341.

OLENE MENDOSA, Hübn. Zutr. f. 293, 294.

Rilia lanceolata, Walk. ib. v. p. 1075.

ENOME AMPLA, Walk. (Moore, *l. c.* ii. pl. 9a. f. 4, ♂).

Calcutta. Female apterous.

LYMANTRIA LINEATA, Walk. ib. iv. p. 875.

Silhet.

L. MUNDA, Walk. ib. iv. p. 875.

Cherra Poonjee.

L. BEATRIX, Stoll, Cram. Suppl. v. pl. 40. f. 2, ♀.

L. marginata, Walk. ib. iv. p. 877.

Silhet.

L. ARYAMA, Moore, *l. c.* ii. p. 345.

DREATA HADES, Walk. ib. iv. p. 908.

Silhet.

JANA PALLIDA, Walk. ib. iv. p. 912.

Silhet.

TAGORA PATULA, Walk. ib. v. p. 1189.

Silhet.

APHA SUBDIVES, Walk. ib. v. p. 1180; Moore, Cat. Lep. E. I. C.
ii. pl. 10a. f. 4.

Silhet.

A. LANUGINOSA, Walk. Trans. Ent. Soc. Lond. 3rd ser. i. p. 83;
Cat. Lep. B. M. xxxii. Suppl. ii. p. 512.

Silhet.

Fam. ARCTIIDÆ.

GLANYCUS INSOLITUS, Walk. Cat. Lep. Het. B. M. iii. p. 635.

Silhet.

HYPERCOMPA PLAGIATA, Walk. ib. p. 655.

Silhet.

II. LONGIPENNIS, Walk. ib. iii. p. 655.

Silhet.

H. IMPLETA, Walk. Cat. Lep. Het. B. M. xxxi. Suppl. i. p. 286.
In Coll. W. S. Atkinson, Esq.

H. IMPERIALIS, Walk. ib. iii. p. 655.

ALOA LACTINEA, Cram. t. 133. f. D.

Bombyx sanguinea, Fabr. (Donovan, Ins. Ind. pl. 53).

AMERILA ASTRÆA, Drury, Ins. ii. pl. 28. f. 4.

In Coll. A. E. Russell.

SPILOSOMA SUFFUSA, Walk. l. c. iii. p. 677.

S. GOPARA, Moore, l. c. ii. p. 356, pl. 9a. f. 11.

ARCTIA IMBUTA, Walk. l. c. iii. p. 614.

ALPHEA ABDOMINALIS, n. sp.

Male and female. Differs from *A. fulvohirta* in having the spots larger and more regular in shape, and their interspaces jet-black; the hind wing being ochreous yellow, with two marginal series of black spots, which are smaller and run more or less into one another; the thorax in front is jet-black, and has three rounded white spots and an oval spot above on each side, the tegulæ or shoulder-piece having only a small black central spot; the abdomen is reddish ochreous, longer, and is not hairy, and has the tip, the anal tuft, and a dorsal and lateral row of spots jet-black.

Expanse, ♂ 2, ♀ $2\frac{5}{8}$ inches.

Darjeeling (*Sherwill*). In Coll. F. Moore.

Fam. NOTODONTIDÆ.

MENAPIA XANTHOPHILA, Walk. Cat. Lep. B. M. xxxii. Suppl. ii. p. 462.

CYPHANTA XANTHOCHLORA, Walk. ib. xxxiii. Suppl. iii. p. 856.

CETOLA DENTATA, Walk. ib. v. p. 1016.

PHALERA SANGANA, Moore, Cat. Lep. E. I. C. ii. p. 433.

P. GROTEI, Moore, ib. ii. p. 434.

Calcutta.

Larva feeds on *Cæsalpinia* and *Cassia fistula*.—*A. Grote, Esq.*

P. COSSOIDES, Walk. Trans. Ent. Soc. Lond. 3rd ser. i. p. 80.
Silhet.

ICHTHYURA FULGURITA, Walk. Cat. Lep. B. M. xxxii. Suppl. ii. p. 433.

Calcutta.

NERICE PALLIDA, Walk. ib. v. p. 1077.

APELA DIVISA, Walk. ib. v. p. 1093.

GARGETTA COSTIGERA, Walk. ib. xxxii. Suppl. ii. p. 455.
Darjeeling.

SYBRIDA INORDINATA, Walk. ib. p. 466.
Darjeeling.

Fam. BOMBYCIDÆ.

THEOPHILA BENGALENSIS.

Bombyx bengalensis, Hutton, Trans. Ent. Soc. Lond. 3rd ser. p. 322.
Neighbourhood of Calcutta.
Larva feeds on *Artocarpus lacoocha*.—*A. Grote, Esq.*

T. SHERWILLII, Moore.

Bombyx sherwillii, Moore, Trans. Ent. Soc. Lond. 3rd ser. p. 423,
pl. 22. f. 1.

BOMBYX TEXTOR, Hutton, Tr. Ent. Soc. Lond. 3rd ser. p. 309.
The Boro-pooloo Silkworm.

B. CRÆSI, Hutton, ib. p. 312.
The Nistry or Madrassee Silkworm.

B. FORTUNATUS, Hutton, ib. p. 312.
The Dasee Silkworm.

B. SINENSIS, Hutton, ib. p. 313.
The Sina or Cheena Silkworm.

B. RELIGIOSÆ, Helfer, Journ. Asiat. Soc. Beng. vi. p. 41.
The Joree or Deo-mooga Silkworm.

OCINARA LACTEA, Hutton, l. c. p. 328.

Fam. DREPANULIDÆ.

ORETA EXTENSA, Walk. (Moore, Cat. Lep. E. I. C. ii. pl. 11a.
f. 2).

O. suffusa, Walk. Cat. Lep. Het. B. M. v. p. 1167, ♀.

O. OBTUSA, Walk. ib. v. p. 1167.
Silhet.

Fam. SATURNIIDÆ.

ATTACUS GUERINI, Moore, P. Z. S. 1859, pl. 65. f. 3.

ACTIAS LETO, Doubleday, Proc. Ent. Soc. Lond. v. p. 51.
Darjeeling (*W. S. Atkinson*).

SATURNIA PYRETORUM, Westw. Cab. Orient. Ent. pl. 24. f. 2.

S. CIDOSA, Moore, Trans. Ent. Soc. Lond. 3rd ser. ii. p. 423, pl. 22. f. 2.

Darjeeling.

S. LINDIA, Moore, ib. p. 424, pl. 22. f. 3.

RINACA ZULEIKA, Hope, Trans. Linn. Soc. xix. pl. 11. f. 5.

Darjeeling (*W. S. Atkinson*).

ANTHERÆA ROYLEI, Moore, P. Z. S. 1859, p. 256, pl. 64. f. 1.

Darjeeling (*Dr. Jerdon*).

CALIGULA THIBETA, Westw. Proc. Zool. Soc. 1853, p. 166.

Darjeeling (*W. S. Atkinson*).

Note.—*Loepa miranda*, Atkins., Moore, Trans. Ent. Soc. 1865, p. 424, has been placed by mistake under the genus *Antheræa* (see P. Z. S. 1865, p. 818).

Fam. LIMACODIDÆ.

SCOPELODES VENOSA, Walk. Cat. Lep. Het. B. M. v. p. 1105.

Silhet.

MIRESA BREVILINEA, Walk. ib. xxxii. Suppl. ii. p. 475.

Darjeeling (*W. S. Atkinson*).

CHILENA SIMILIS, Walk. ib. v. p. 1071.

Lasiocampa strigilis, Walk. ib. xxxii. Suppl. ii. p. 563.

NYSSIA HERBIFERA, Walk. ib. v. p. 1136.

N. LATIFASCIA, Walk. ib. v. p. 1136.

PARASA LEPIDA, Cram. ii. pl. 130. f. E.

Limacodes graciosa, Westw. Cab. Orient. Ent. p. 24. f. 4.

Larva feeds on *Eugenia* and *Mangifera*.—*A. Grote, Esq.*

P. PUNICA, Boisdu., Herr.-Schff. Lep. exot. Spec. Nov. i. f. 177.

Silhet.

P. ISABELLA, Moore, Cat. Lep. E. I. C. ii. p. 415.

Larva feeds on the Sal (*Shorea robusta*).

P. LALEANA, Moore, ib. ii. p. 417.

Calcutta.

Larva feeds on *Amona rohitula*, *Ixora longiflora*, and *Mussenda frondosa*.—*A. Grote, Esq.*

P. NARARIA, Moore, ib. ii. p. 415.

Calcutta.

Larva feeds on a species of *Crescentia*.—A. Grote, Esq.

P. UNICOLOR, Moore, ib. ii. p. 415.

Calcutta.

Larva feeds on *Ochna squamosa*.—A. Grote, Esq.

LIMACODES APICALIS, Walk. Cat. Lep. Het. B. M. v. p. 1150.

Silhet.

Fam. LASIOCAMPIDÆ.

BRAHMÆA CERTHIA, Fabr. (Walk. ib. vi. p. 1316; Butler, P. Z. S. 1866, p. 119. f. 1).

Bombyx wallichii, Gray, Zool. Misc. p. 39.

B. spectabilis, Hope, Trans. Linn. Soc. xviii. pl. 31. f. 3.

Sikkim (*W. S. Atkinson*).

B. WHITEI, Butler, P. Z. S. 1866, p. 119. f. 2, ♂.

B. hearseyana, White, MS.

Sikkim (*W. S. Atkinson*).

LASIOCAMPA VITTATA, Walk. l. c. vi. p. 1440.

ODONESTIS BHEROBA, Moore, Cat. Lep. E. I. C. ii. p. 424, pl. 12a. f. 5, ♀.

Darjeeling.

TRABALA LÆTA, Walk. (Moore, ib. pl. 12a. f. 7, 7a, ♂ ♀).

LEBEDA NANDA, Moore, ii. p. 423, pl. 12a. f. 3, ♂.

L. UNDANS, Walk. Cat. Lep. Het. B. M. vi. p. 1458.

Silhet.

L. LATIPENNIS, Walk. ib. vi. p. 1457.

Calcutta.

Larva feeds on *Nyctanthes arbortristis* and *Lagerstrœmia indica*.

—A. Grote, Esq.

PÆCilocAMPA UNDULOSA, Walk. ib. vi. p. 1477.

Sikkim (*Lieut. Beavan*).

MURLIDA LINEOSA, Walk. ib. vi. p. 1440.

Fam. COSSIDÆ.

ZENZERA LEUCONOTA, Steph., Walk. ib. vii. p. 1537.

Dum Dum, near Calcutta (*Frith*).

Z. CONFERTA, Walk. Cat. Lep. Het. B. M. vii. p. 1536.

Silhet.

Z. PAUCIPUNCTATA, Walk. ib. vii. p. 1537.

Silhet.

Fam. HEPIALIDÆ.

HEPIALUS NIPALENSIS, Steph., Walk. ib. vii. p. 1557.

PHASSUS DAMOR, Moore, Cat. Lep. E. I. C. ii. p. 437.

P. ABOE, Moore, ib. ii. p. 437.

DESCRIPTION OF PLATES XXXII. & XXXIII.

PLATE XXXII.

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| Fig. 1. <i>Cimicodes castanearia</i> , p. 616. | Fig. 6. <i>Vindusara compositata</i> (♂), p. 653. |
| 2. <i>Agnidra specularia</i> , p. 618. | 7. <i>Hemerophila retractaria</i> , p. 627. |
| 3. <i>Garæus specularis</i> , p. 623. | 8. <i>Bargosa fasciata</i> , p. 634. |
| 4. <i>Dalima apicata</i> , p. 615. | 9. <i>Selenia decorata</i> (♀), p. 621. |
| 5. <i>Xandrames albafasciata</i> , p. 635. | 10. <i>Corotia cervinaria</i> , p. 625. |

PLATE XXXIII.

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| Fig. 1. <i>Psyra similaria</i> , p. 659. | Fig. 11. <i>Caprilia specularia</i> , p. 649. |
| 2. <i>Arichanna tramesata</i> , p. 658. | 12. <i>Acidalia bicaudata</i> , p. 643. |
| 3. — <i>marmorata</i> , p. 659. | 13. <i>Brihaspa atrostigmella</i> , p. 666. |
| 4. <i>Cleora decussata</i> , p. 628. | 14. <i>Tyana callichlora</i> , p. 668. |
| 5. <i>Cidaria argentilineata</i> , p. 660. | 15. — <i>superba</i> , p. 668. |
| 6. — <i>calamistrata</i> , p. 663. | 16. <i>Ramila marginella</i> , p. 667. |
| 7. — <i>obscurata</i> , p. 663. | 17. <i>Propachys linealis</i> , p. 665. |
| 8. — <i>aurantiaria</i> , p. 661. | 18. <i>Hyponomeuta lineatonotella</i> , p. 669. |
| 9. <i>Melanippe catenaria</i> (♀), p. 655. | |
| 10. <i>Sauris decussata</i> , p. 655. | |

June 27, 1867.

Dr. E. Hamilton, V.P.Z.S., in the Chair.

Dr. J. Murie read a memoir on the anatomy of the Pilot Whale (*Globiocephalus melas*). Dr. Murie's observations on this animal were based upon a specimen recently captured off the coast of Scotland.

This paper will be printed entire in the Society's 'Transactions.'

Mr. P. L. Sclater, Secretary to the Society, called attention to the following noticeable additions to the Society's Menagerie since the last Meeting, all of the species being novelties to the collection:—

1. Two Eyton's Tree-ducks (*Dendrocygna eytoni*), presented by

the Acclimatization Society of Sydney, New South Wales, being the specimens referred to by Dr. Bennett in his letters (P. Z. S. 1866, pp. 149, 417): received May 11th.

2. Two young Night-herons in immature plumage, purchased May 14th, being apparently the young of *Nycticorax cucullatus* (Wagl.) of Western Africa.

3. Two Yellow-rumped Parrakeets (*Platycercus flaveolus*, Gould) from Australia, purchased May 27th.

4. A young Kite, supposed to be the young of the Square-tailed Kite (*Milvus isurus*, Gould) from Australia, purchased May 27th.

5. Three Mauge's Ground-doves (*Geopelia maugei*, Temm., Bp. Consp. ii. p. 94), purchased June 4th, said to have been received from Australia, but more probably from Timor.

6. Two Brazilian Tree-ducks (*Dendrocygna fulva*, Gm.) from Brazil, received June 6th.

7. A male Rosy-billed Duck (*Anas peposaca*, Vieill.) from South America, received June 6th.

8. An Arabian Bustard (*Otis arabs*, Rüpp.) from West Africa, received June 6th.

9. A Senegal Bustard (*Otis senegalensis*, Vieill.) from West Africa, received June 6th.

Mr. P. L. Selater exhibited a specimen in spirits of a rare Snake (*Siphlopis fitzingeri*, Tsch. F. P. Rept. p. 57, t. 8), which had been transmitted alive to the Society by Prof. Nation, C.M.Z.S., of Lima, but had unfortunately died before reaching England. Prof. Nation stated the habitat of this species to be the coast of Peru, from the sea-level to about 700 feet elevation. As there was no example of this Snake in the National Collection, Mr. Selater proposed to present this specimen to the Trustees in the name of Prof. Nation.

Mr. P. L. Selater exhibited on behalf of Lord Lilford, F.Z.S., a nest and four eggs of the Nutcracker (*Nucifraga caryocatactes*), taken in the Hochanger Alp, in the north of Styria, in a pine-forest about 3500 feet elevation, and forwarded to Lord Lilford by Mr. E. Seidensacher of Cilli.

Mr. A. D. Bartlett made some remarks on the breeding of the Rufous Tinamou (*Rhynchotis rufescens*) in the Society's Aviaries, which had taken place for the first time this year.

Mr. Bartlett believed this to be the first instance recorded of any species of this genus breeding in captivity: the interesting fact of the male bird performing the office of incubation was supposed to be likewise hitherto unrecorded.

A more detailed account of the number of eggs laid, period of incubation, and particulars of other birds which have bred in the Society's Gardens during the present year was promised at a later Meeting.

The following papers were read:—

1. Notes on the Habits of the Lyre-bird in Captivity.

By A. D. BARTLETT, Superintendent of the Society's Gardens.

On the 9th of April last, the Society acquired a fine example of the Lyre-bird (*Menura superba*). It was a young bird, having been reared from the nest, and was consequently in immature plumage; we therefore were unable to determine its sex. This bird, considering its size, is perhaps the most active and quickest-moving bird known; its large and powerful legs and feet enable it to run with amazing swiftness; it also jumps or hops not only with great rapidity, but to almost incredible distances. These facts have been repeatedly stated by persons who have seen the bird in its native haunts; and its shy and wary habits have been frequently described.

Notwithstanding the well-known wildness of the species when at liberty, the individual now under consideration is most remarkable for its tameness; it will come readily to the call of the keeper and perch upon his hand or arm, and in the most gentle manner search his hand or anything he may hold in it for food. In doing this it exhibits a great amount of inquisitiveness and intelligence; if the closed hand is held near the ground the bird will grasp it with its foot, and in a very quiet way try to open it in order to obtain what may be held in the hand. The bird runs or hops upon the ground or upon the perches with equal ease; that is, it runs along the perches that are horizontal. It scratches on the ground, using the right and left foot alternately, grasping the clods of earth and pulling them over, examining the roots and underparts most minutely for the smallest seeds or insects.

The strength of the legs and feet will be better understood from the fact that the bird will drag about large clods of peat, earth, and roots upwards of 7 lb. weight. This I have ascertained by weighing the lumps of earth after the bird had so moved them. Unlike the gallinaceous birds, the Lyre-bird washes freely, and has never been seen to dust itself. It has a loud and fine voice; and, although I cannot say I have heard its song, the keepers, upon whose veracity I can place every confidence, assure me that the bird has frequently sung; and its notes are described to resemble those of a Thrush or a Blackbird in the commencement, but gradually become much louder. Its food consists of finely chopped meat mixed with a small quantity of bruised hempseed, earthworms, mealworms, ants' eggs, and grasshoppers, together with a small quantity of canary and millet seed. Like most insect-eating birds, the Lyre-bird throws up the pellets, usually called castings, of the indigestible portion of its food, such as the wing-cases and legs of beetles and other insects.

Having made myself tolerably well acquainted with the habits of this bird since its arrival in the Gardens, I feel inclined to offer an opinion with reference to its affinities; and in so doing I beg to refer to the habits as noticed in No. 45, vol. ii. of 'Land and Water,' in

which the writer describes the meeting of a number of male birds of this species, which he supposes were fighting and, as he says, making a most abominable noise.

A similar meeting of male birds is mentioned by Mr. Wallace as taking place with the great Bird of Paradise. Mr. Wallace says the male birds assemble together upon the tops of the tallest trees and utter their loud and not very pleasing notes.

This, together with what I have observed in captivity, both of the *Menura* and the smaller kind of Bird of Paradise, induced me to consider and search for other characters on which to found an opinion; I therefore take the *habits, voice, feathers*, and their arrangement (see Nitzsch's *Pterylography*, pl. 3. figs. 11-13), together with the skeleton. Having examined the skeleton of the *Menura* together with that of the Bird of Paradise and a true *Corvus*, I must say in general that the *Menura* and Bird of Paradise present a stronger likeness to each other than either of them exhibit towards the genus *Corvus*. In the breadth and form of the skull the *Menura* and Bird of Paradise resemble each other remarkably.

In conclusion, I have to remark that the strong and well-marked resemblance between these birds consists in the *voice, food, and mode of breeding*, the large size of the legs and feet, the form of the skull and skeleton, the structure of the feathers, and their arrangement on the body; and to this I may add, the bird belongs to the same geographical range as the true Paradise-bird: I regard it as an aberrant form, or rather as the terrestrial form, the true Paradise-bird being the arboreal form of the same group.

2. On the Form, Size, and Structure of the Viscera of the Hippopotamus, as compared with the same parts in the Members of the Pachyderm Family and in some other Animals. By EDWARDS CRISP, M.D., F.Z.S. &c.— Part II.

The inquiry I am about to institute is one of great interest; time, however, will only permit me to take a superficial glance at the subject. I may premise that, with the exception of the Rhinoceros and Babirussa, I have examined the visceral anatomy of all the pachyderms, weighed the various organs, and measured their size and capacity. I have also in my museum casts and drawings of the different viscera.

I will proceed with the examination as the subjects are arranged in my last paper. Of the skin-glands of the pachyderms I am unable to make a comparative estimate, either from my own investigations or from the observations of other anatomists; but in all these thick-skinned animals, especially in the Elephant, Rhinoceros, and Tapir, it is probable that large glands exist somewhat similar to those in the Hippopotamus, although I believe that none of the members

of this family have the same kind of coloured secretion from the cutaneous surface.

The description I have given of the stomach shows that it is one of the most remarkable, both in form and structure, among the terrestrial mammals. In addition to the small woodcut in my last paper I have placed a drawing before the Society representing the interior of this viscus of the natural size, so that its peculiarities can be readily seen. I also exhibit casts that I have made of the stomachs of the Porpoise and Dolphin, with other viscera, so that a comparison may be made of the gastric cavities of these animals. I likewise place before the Society a new method of teaching comparative anatomy (a plan I have shown at the present Paris Exhibition*). It consists in modelling the viscera in clay to scale, and then taking casts of the various parts, so that in a small compass (in the space of 10 or 12 square inches) the whole visceral anatomy of the animal is seen, as shown in the specimen of the viscera of the Hippopotamus before the Society. I do not apologize for this digression, as the subject is intimately connected with all anatomical and physiological inquiries, and it is one, I believe, that may be turned to great practical account.

Since my paper was brought before the Society, I have seen the following in the article "Pachydermata," in 'Todd's Cyclopædia,' vol. iii. p. 871:—"The stomach of the Hippopotamus, or, at all events of the foetal Hippopotamus, dissected by Daubenton, presents a very remarkable conformation. Externally it seems to be composed of three parts. The principal portion, extending from the cardiac extremity to the pylorus, was much elongated, resembling more a portion of intestine than an ordinary stomachal receptacle. Besides this central part, extending from the œsophagus to the pyloric valve, were two long appendages like two cæcums, one arising on the right side of the œsophagus and running along the exterior of the stomach throughout almost its entire length and then folding backwards, the other and shorter *cul de sac* issuing from the posterior aspect of the cardiac extremity of the stomach and projecting towards the right side. The construction of the interior of this stomach is still more extraordinary than its external appearance; for it is so divided by septa that food coming into this viscus through the œsophagus may pass by different channels either into the central portion, which seems properly entitled to the name of stomach, or into either of the great diverticula appended to it. The inferior walls of the central stomach have nine or ten cavities in them, something like those of the Camel and Dromedary. The lining membrane both of the stomach and diverticula is granular and wrinkled, except by the pylorus, where the parietes become smooth and folded into numerous plicæ somewhat resembling those of the third stomach of a ruminant, although there is no probability that rumination occurs in the animal under consideration."

It will be seen from my account, judging only from the specimen I have examined, that the parts described by Daubenton as appen-

* Viscera of the Gorilla, and other specimens.

dices are true and separate stomachs, that the cavities in the third stomach are not pouches like those of the Camel and Dromedary, and that there are no folds in the fourth stomach. In the new-born Hippopotamus, as in a young ruminant at birth, it is probable that the stomach would present some peculiarities not observed at a later period.

For the better understanding of this subject let me take a hasty glance at the gastric organ and parts of the intestinal apparatus in the various mammalian groups. In the quadrumana the stomach, except in the *Semnopithecii* that have three gastric cavities, is for the most part simple. The same may be said of the *Cheiroptera* and *Carnaria*. Among the Marsupialia the Kangaroos and Potoros (*Hypsiprymnus*) have two stomachs, with numerous pouch-like dilations externally. Among the rodents the stomach in most is partially divided, and the cæcum generally is very large. In the Edentata the *Bradypi* (Sloths) have a very large stomach, with four divisions. In the Pangolins (*Manis*) there is a slight division of the gastric organ. The ruminants, as is well known, have the most complicated form of stomach, not only as regards the shape of the four cavities, but more especially in relation to the numerous papillæ, villi, and folds on the mucous surface. The Cetacea present some of the most remarkable and unaccountable differences as regards the complication of the stomach. The stomach of the Porpoise and the Dolphin on the table fully exemplify this. In the former, which is 19 inches in length, there are four divisions—the two first rugous, the two last smooth. In the stomach of the Dolphin, which is narrow and 25 inches in length, there are seven divisions. The stomach of the Porpoise may be taken generally as a model for that of the larger Cetacea, four cavities being the usual number. It is very remarkable that the flesh-eating Dolphins should have a more complicated stomach than the herbivorous Cetacea, such as the Manatee, Dugongs, and Stellerines.

I now come to the Pachydermata; and it will be seen that great differences exist in the form of the stomach, as well as in the intestinal appendages, cæca, rugæ, villi, and intestinal glands. In the Pigs (*Suidæ*) the stomach is partially divided. The Peccaries (*Dicotyles*) have a sacculated stomach, with three principal divisions. The Rhinoceros has a simple stomach, as have also the Elephants and Tapirs. The stomach of the Hyrax has two compartments. In the Horses (*Equidæ*) the gastric cavity is simple. None of the pachyderms can be strictly said to have simple stomachs; for in all there is a division; but I use the term simple when there are no distinct valves or muscular folds to denote the boundaries.

On comparing the stomach of the Hippopotamus with that of the other pachyderms it will be seen that the viscus affords but little resemblance to any of them; nor does it to that of the other animals I have named with complicated stomachs. Probably, as regards external form, the stomach of the Manatee (*Manatus americanus*), from the forked appearance given by the two appendices, resembles that of the Hippopotamus more than any other animal; but the interior,

both as regards shape and the arrangement of the valves and rugæ, differs materially from the stomach of the Hippopotamus, which has a greater resemblance, in the distribution and form of the villi and in the appearance of the fourth cavity, to the villi and the stomach of a ruminant; indeed, looking to the mechanical arrangement of the muscular valves in the first three stomachs, it may naturally be asked does this animal ruminate?

Another important peculiarity in the Hippopotamus is the absence of a cæcum, the animal in this respect differing from the other pachyderms. As is well known, this cavity in the Elephant, Tapir, Horse, Zebra, Quagga, and Rhinoceros is very large, whilst in the Pigs it is of moderate size. In the little Hyrax it is very capacious, with two additional appendices towards the rectum. The villi, intestinal folds, and glands differ also materially from those of the other members of this family. The long villi and folds in the intestines of the Rhinoceros, the mucous folds in the stomach and small intestines of the Elephant, the rugous cæcum of the Tapirs, and many other peculiarities and differences might readily be pointed out.

I may here remark (and I speak from numerous and extensive examinations) that in the various orders of mammals none of them, as regards their visceral anatomy, have so great a general resemblance to each other as the ruminants.

Length of the intestinal canal.—All the pachyderms have a long alimentary tube, as will be seen by the following table of animals in which I have measured it:—

	feet.	in.
Male Asiatic Elephant*	106	0
Female Asiatic Elephant	123	0
Common Hog (<i>Sus scrofa</i>)	86	0
Wart Hog (<i>Phacochoerus æthiopicus</i>)	36	4
Ælian's Hog (<i>P. æliani</i>)	29	8
Red River-Hog (<i>Potamochoerus</i>), about the same length.		
Masked Hog (<i>Sus larvatus</i>), young	29	2
Japanese Hog (<i>S. japonensis</i>)	50	7
Barbary Hog	49	6
Peccary, Collared (<i>Dicotyles torquatus</i>)	31	0
Peccary, White-lipped (<i>D. labiatus</i>)	28	0
Hyrax (<i>Hyrax capensis</i>)	12	6
Tapir (<i>Tapirus americanus</i>)	72	0
Tapir	62	0
Dray Horse, old	108	0
Blood Mare, old	94	0
Zebra (<i>Equus zebra</i>)	67	0

According to Professor Owen the length of the alimentary canal of the Rhinoceros dissected by him was, in the female 73 feet, in the male 96 feet (Trans. 1862).

* In the article "Pachydermata," in 'Todd's Cyclopædia of Anatomy and Physiology,' p. 871, the prodigious extent of the intestinal canal of an Elephant seventeen years of age is said to be 58 feet 6 inches.

Judging from the length of the intestinal tube in this young animal, and assuming that the rate of increase would be somewhat similar to that of the Giraffe, the old Hippopotamus would possess an alimentary tube from 180 to 206 feet in length, far longer than that of any other pachyderm. Whilst upon this subject I may mention that the alimentary canal of the male Giraffe that died recently at the Gardens measured 245 feet.

The spleen, like that of the Hogs, Tapirs, Elephants, Rhinoceros, and Peccaries, is long and narrow, whilst in the Solidungula it is triangular. In the little Hyrax its shape is nearer to that of the *Equidæ*.

In the article "Pachydermata," in 'Todd's Cyclopædia,' p. 871, it is said "that the spleen in pachydermatous animals differs in no noticeable respect from that of other quadrupeds." But the spleen of the pachyderms is so peculiar as regards its form, in the situation of the vein, and in the arrangement of the venous valves, that it can scarcely be mistaken for that of any animal of a different class. Indeed this organ presents such a uniformity in shape, in the various divisions of the vertebrata, that the family to which the animal belongs may generally be told by it—a remark that will not apply to any other viscus.

The pancreas in the Hippopotamus, as might be supposed from the complicated stomach, is more branched than in the other pachyderms, and one portion of it is placed close to the pylorus, where probably a small duct enters; but, as I said in my first paper, I omitted to examine this part.

The liver in the pachydermata presents some curious differences in the number of its lobes; and in speaking of these I reckon only the main lobes that are seen on its upper surface, the elevations on the under part, as I have said before, not properly coming under the term lobe.

In the Hippopotamus, as I have stated, the organ is but slightly divided; in the Elephant it is also bilobular.

In the Rhinoceros (Owen) there are three lobes. The Hogs have a liver of four main lobes, and generally a pointed slip that may be called a fifth lobe. The liver of the Peccaries consists of four main lobes and of four smaller lobes; that of the Tapirs of three main divisions and of three supplementary lobes; whilst the liver of the little Hyrax has six main lobes. In the Horses (*Equidæ*) there are four chief lobes.

Gall-bladder.—The Hippopotamus*, Rhinoceros, Tapirs, Peccaries, Hyrax, and the *Equidæ* have no gall-bladder; but it is present in all the Pigs. In the Wart-Hog (*Phacochoerus*) it is very thick, and partly imbedded in the substance of the liver. In the Elephant, as figured in 'Todd's Cyclopædia,' it is seated between the coats of the duodenum, and has four compartments.

* Professor Owen (Trans. vol. iv. p. 44), "On the Anatomy of the Rhinoceros," attributes the absence of the gall-bladder in this animal to the small size of the stomach; but this explanation will scarcely apply to the Hippopotamus, nor will it, I think, to vertebrates generally—the Deer (*Cervidæ*) for example.

Kidney and Renal Body.—The kidney in the Elephant and Rhinoceros, like that of the Hippopotamus, is generally lobate; whilst in the Pigs, Tapirs, Peccaries, Hyrax, and members of the equine family it is entire. The renal body in the Hippopotamus is placed further from the kidney than in the other pachyderms, in which it is generally in contact with this organ. In the two Elephants that I examined (Proceedings, 1855, p. 187) the kidneys of the female were lobated, whilst those of the male were entire.

Organs of Generation.—All the animals belonging to this family have the generative organs largely developed. In the Pigs the testicles and seminal vesicles are very large. The penis is also large in all, that of the Tapir proportionately larger, I believe, than in any other of the class. The age of this animal precludes a comparative estimate as regards size; and the accidental loss of the organs, as I have said before, prevented my making an accurate dissection.

The tongue, like that of the Wart-Hog (*Phacochoerus æthiopicus*) is thin and broad at its anterior part. The white papillæ I have mentioned are seen in all the Pigs and in the Tapirs; but the form of the basal villi differs from that of the other pachyderms.

Larynx and Trachea.—One important difference in the larynx of the Hippopotamus is the pyramidal form of its summit and the great development of the laryngeal muscles. The os hyoides consists of the usual number of bones. The trachea is composed, as I have stated, of twenty-three rings, rather widely separated at the posterior part, as is seen in the dried larynx before the Society. The number of rings in the Horse and Zebra varies from 45 to 52; in the Elephant —, Rhinoceros (Owen) 30, Common Hog 28, Wart-Hog 28, Peccaries 33, Tapir (American) 32, and Hyrax 30.

So that, judging from this young animal, the Hippopotamus has the smallest number of tracheal rings of any of the pachyderm family.

The thyroid glands were perfectly distinct; whereas in some of the pachydermata, as in the Horse, there is a connecting isthmus as in Man.

The lungs consist chiefly of two lobes, as in the Seal, Dolphin, and Porpoise; in the Elephant —, Rhinoceros (Owen) 5, Tapirs 6, Hogs 6, Peccaries 7, Hyrax 6, and Horse 5. In some of these a very small lobe exists in addition.

The lobular divisions I have before described, I believe, are peculiar to the lungs of this quadruped, and are not found in the other pachyderms. In the above description both lobes are spoken of.

The heart, with the exception of that of the Elephant, is of a less rounded form in the other members of this group. The opening of the two superior cavæ into the right auricle only exists in the Elephant. There are also some important differences in the appendages to the muscular walls of the heart; but want of space prevents me from alluding to them on the present occasion. The most interesting point in connexion with the heart is its bifid character in the newly born animal, as mentioned by Gratiolet in the paper before cited; he says "C'est peut-être un indice de cette division du cœur qui a été signalé dans la *Rhytina*, les *Dugongs*, et les *Lamantins*."

In the heart of the Hippopotamus dissected, a very faint mark existed of the above-named division, but this would be entirely obliterated, I believe, in the adult animal. Dr. J. E. Gray places the Hippopotamus under *Elephantidæ*, and thinks that the form is allied to the *Halicoridæ*; but I fail to see the resemblance. The muscular band in the inferior cava described by Gratiolet is probably not found in the other pachyderms.

Brain.—All the pachyderms, with the exception of the Elephant, have small brains; that of this young Hippopotamus, as before stated, weighed $10\frac{1}{4}$ oz., and probably in the adult animal it would not exceed 20 oz. In an Elephant, weighing about 3 tons, I found the weight of the brain to be 12 lb. In a Tapir (*T. americanus*), weighing about 140 lb., the cerebral mass was 7 oz. 380 gr. In the Horse the brain weighs about 16 oz. In the Pigs it varies from 5 to 7 oz. In the Rhinoceros, as described by Professor Owen (Trans. 1862), the brain weighed 1 lb. $14\frac{1}{2}$ oz. In the other members of the Hog family, and in the Babirussa, Peccaries, Hyrax, Zebra, and Quagga, judging from the skull-cavities, the brains are of small size, indicating to a great extent the slight amount of intelligence of these animals.

From the above comparisons, as regards the visceral anatomy of the Hippopotamus, it will be seen that the animal differs in many important particulars from the other members of the pachyderm family. In my next paper I hope to investigate the microscopic anatomy of the intestinal tube, and to compare the osteology of the Hippopotamus with that of the other pachyderms.

3. On *Plethodon persimilis* of Gray.

By ST. GEORGE MIVART, F.L.S.

In the Zoological Society's 'Proceedings' for 1859* Dr. Gray described and figured a species of Newt, said to be from Siam, under the name *Plethodon persimilis*. The author justly remarked its striking similarity in size, form, colour, &c. to *Plethodon glutinosus* of North America, adding that he was at first inclined to believe that the specimens described were really American, and had been sent to Siam. From its great resemblance to the last-named species, Dr. Gray included the new one in the genus *Plethodon*.

Dr. Günther, in his 'Reptiles of British India'†, described again the typical specimens; but while noticing certain differences between them and *Plethodon glutinosus*, yet retained the species in the genus *Plethodon*.

Having recently had occasion to examine the specimens of *Urodela* preserved in the British Museum, when I came to the type specimens of *Pl. persimilis*, while struck with their similarity to specimens of *Pl. glutinosus*, I was startled by their alleged habitat.

* Proc. Zool. Soc. 1859, p. 230, pl. XIX. f. 2.

† 1864, p. 439.

That a Newt from the south-eastern coast of Asia should resemble some North-American tailed amphibian could not have been so surprising, considering the American affinities of the Japanese forms; but that a species from *Siam proper* should resemble almost completely a genus otherwise exclusively North American and possessing no representative in the Palæartic region* was a circumstance truly remarkable.

Mr. Wallace has indeed suggested an explanation (by means of certain presumed geographical mutations†) of the discrepancy existing between the ophidian and batrachian populations of Japan; but it seemed to me difficult to account in any similar way for the phenomenon under consideration.

It is true that though *Plethodon* is unrepresented in the Old World, unless by the so-called *Pl. persimilis*, yet the North-American genus *Spelerpes* has a near relative in Europe in the *Geotriton genei* of Tschudi‡, and has recently been extended to the Neotropical region by Professor Peters§; yet this hardly lessens the anomaly presented by the appearance of such a genus as *Plethodon* in the true Indian region. Accordingly I applied to Dr. Günther for any additional information I could obtain concerning the typical specimens. He at once, with great kindness, placed me in possession of facts which considerably altered the aspect of the question.

Mr. Mouhot, from whom the specimens were received, terminated his collections in the mountains of Laos, a very lofty region, to the north-east of Siam proper. The last specimens received from Mr. Mouhot were from that locality, and were without any notes, having been brought down after his death by his servants. The typical specimens of *Pl. persimilis* were received also without any notes; and Dr. Günther entertains no doubt that they formed part of his last collection, *i. e.* that they came from the Laos Mountains.

Supposing, as I have little doubt, that such was really the case, then the probability of finding American forms is largely increased, as we are, in these mountains, no longer in Siam proper, and, moreover, at an altitude such as fairly to warrant the expectation of the appearance of Palæartic animals. That Japanese forms (*i. e.* Urodela allied to certain American kinds) should here make their appearance would not then be so surprising, the more so as Dr. Günther informs me that the reptiles of the island of Formosa have considerable American affinities; and though Newts have not yet been

* Dr. Günther, in his highly interesting and instructive paper on the "Geographical Distribution of Reptiles," says, speaking of Batrachians, "Palæartic and Nearctic regions resemble each other more than any third" (P. Z. S. 1858, p. 390).

† Nat. Hist. Review, vol. iv. 1864, p. 114.

‡ Batrach. pp. 59 & 94, t. 2. f. 3.

§ Namely his *Spelerpes (Edipus) adspersus* from Bogota (Monatsberichte der k. p. Akad. der W. z. Berlin, 1863, p. 468). But as allied forms are being discovered in the tableland of Mexico (*e. g.* *Spelerpes cephalicus*, *S. osculus*, and *S. lineolus*, Cope, Proc. Acad. Nat. Sc. Philad. 1865, pp. 196, 197), it is not improbable that other species will be found to have extended into, or to be represented by modified descendants in, the mountain-regions of Northern South America.

found there, yet he fully expects that such will eventually be discovered. Nevertheless, though the appearance of some American tailed amphibians was thus rendered less unlikely, yet the appearance of such a genus as *Plethodon*, which has no representative in Japan, was somewhat startling, and I therefore examined the specimens with great interest and as carefully as I could.

Dr. Günther, as before said, has detected several differences between *Pl. glutinosus* and the species under consideration; he gives the distinctions thus:—

“Pl. glutinosus.

Limbs feeble.

The length of the fore limb is considerably less than one-half of the distance between fore and hind limbs.

The length of the hind limb is one-half of the distance between fore and hind limbs.

The third and fourth toes are much shorter than the cleft of the mouth.

Trunk with thirteen lateral cross folds.

Tail subcylindrical at the base.

Tongue large, covering the whole bottom of the mouth, its hind margin being free.

The series of palatine teeth is distinctly interrupted in the middle.

Pl. persimilis.

Limbs well developed.

The length of the fore limb is one-half the distance between the fore and hind limbs.

The length of the hind limb is considerably more than one-half of the distance between fore and hind limbs.

The length of the third and fourth hind toes equals that of the cleft of the mouth.

Trunk with twelve lateral cross folds.

Tail compressed at the base.

Tongue narrow, elliptical, not covering the whole width of the bottom of the mouth, without free posterior margin.

The series of palatine teeth is subcontinuous.

“In other respects both species are very similar, the Siamese form being black, with small scattered whitish spots.”

In addition to these differences, I find that the Asiatic species is *entirely destitute of sphenoidal teeth*, which, on the other hand, are characteristic of the genus *Plethodon*. The species which undoubtedly belongs to the latter genus have, moreover, the first digit of each extremity extremely short, which is not the case with *P. persimilis* of Gray. Finally, in the Asiatic species (*P. persimilis*) the phalanges of the manual digits (counting from the radial to the ulnar side) are 2, 2, 3, 2 respectively, and the pedal digits (counting from the tibial to the peroneal side) have 2, 2, 3, 4, 2 phalanges; while in *Plethodon glutinosus* the numbers are 1, 2, 3, 2 in the manus, and 1, 2, 3, 3, 2 in the pes.

These differences, when taken into consideration with the peculiar geographical conditions, fully warrant the generic separation of the species now under consideration from the *Plethodon glutinosus*.

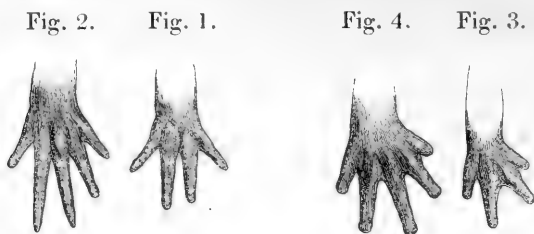


Fig. 1. Dorsum of right manus of *Pectoglossa persimilis*.
 2. Dorsum of right pes of *Pectoglossa persimilis*.
 3. Dorsum of right manus of *Plethodon glutinosus*.
 4. Dorsum of right pes of *Plethodon glutinosus*.

Indeed I believe there may be more grounds for associating it with the Japanese form *Onychodactylus* than with the last-mentioned American species, an arrangement which would harmonize well with the facts of geographical zoology. Nevertheless, as it has not nail-like processes on the digits, nor yet a precloacal fold, both of which exist in the last-mentioned genus, I think it better to place it in a genus by itself, for which I propose the name *Pectoglossa**, retaining of course the specific name chosen by Dr. Gray; so that the species will be named *Pectoglossa persimilis*.

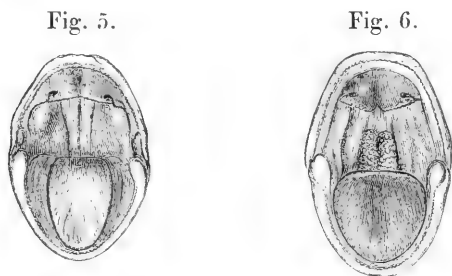


Fig. 5. Inside of mouth of *Pectoglossa persimilis*.
 6. Inside of mouth of *Plethodon glutinosus*.

In the fixed condition of the posterior part of the tongue *Pectoglossa* agrees with both *Hynobius* and *Onychodactylus*; but the transverse position of the palatine teeth causes it more to resemble the latter genus.

I am inclined to think that when the skull comes to be examined it will be found that there are two distinct premaxillary bones. The characters of the genus may perhaps be thus expressed:—

PECTOGLOSSA.

Toes 4/5, first of each manus rather long, first of each pes not very short; digits with rounded ends and no simulation of nails;

* Πηκτός, γλωσσα.

phalanges of four digits of manus 2, 2, 3, 2, of five digits of pes 2, 2, 3, 4, 2; no fold in front of the cloacal aperture; tail rather thick, yet compressed at base; no parotids; twelve costal folds on each side between axilla and groin; palatine teeth forming a transverse, slightly undulating, but subcontinuous series; no sphenoidal teeth; muzzle not projecting beyond the end of the mandible; tongue entirely fixed, behind as well as in front, and only somewhat free at each side; no postorbital arch or process (?); two premaxillæ (?); carpus and tarsus ossified (?).

Hab. Laos Mountains?

Thus, if the generic distinctness of this form is to be considered established, we shall have that degree of relationship to American forms which, under the circumstances above mentioned, is not anomalous, while we shall not have that close affinity to a peculiarly American form which was at first suspected to exist, and which would be so very anomalous if found in a species belonging to the *true* Indian region, whence *P. persimilis* was at one time supposed to have come.

4. On some New or imperfectly known Fishes of India.

By Surgeon FRANCIS DAY, F.Z.S., F.L.S., Principal Medical Storekeeper, Madras Army.

During the last month I have obtained the following species of fish, amongst many others, from the sea and fresh waters in the neighbourhood of Madras.

SERRANUS RADIATUS, sp. nov.

B. vii. D. 11/15. P. 19. V. 1/5. A. 3/8. C. 15. L. l. above 120.

Length of specimen 4 inches.

Length of head $\frac{1}{3}$, of pectoral $\frac{1}{5}$, of base of dorsal spines $\frac{2}{7}$, of base of dorsal rays $\frac{1}{7}$, of base of anal $\frac{1}{7}$, of caudal $\frac{1}{6}$ of the total length. Height of head $\frac{2}{9}$, of body $\frac{2}{7}$, of dorsal spines $\frac{2}{8}$, of dorsal rays $\frac{1}{7}$, of ventral $\frac{2}{11}$, of anal $\frac{1}{7}$ of the total length.

Eye transversely oval, its upper margin near the profile; diameter $\frac{2}{7}$ of length of head, 1 diameter from end of snout, $\frac{1}{2}$ a diameter apart.

General appearance rather elongated, and the dorsal profile slightly more convex than the abdominal.

Lower jaw the longest; the posterior extremity of the upper jaw reaches to beneath the posterior margin of the orbit. Præopercle slightly oblique posteriorly, which is serrated, three strong denticulations at its angle, its horizontal margin entire. Sub- and interopercles entire. Opercle with three flat spines, the central one of which is the longest.

Teeth in strong recurved villiform rows in both jaws, and a canine on either side of the centre of the upper. Teeth on vomer and palate in villiform bands, but much smaller than those in the jaws.

Fins. Dorsal spines moderately strong, and nearly as high as the rays, the interspinous membrane but slightly emarginate. Anal—first spine half as long as the second, which is of equal length but weaker than the third. Caudal wedge-shaped, its central rays being slightly the longest.

Scales small.

The lateral line is parallel with the back in the upper third of the body.

Colours. For the most part greenish olive, becoming dull yellow on the abdomen. An irregularly shaped, broad, whitish blue band passes from the posterior superior margin of the orbit across the occiput to meet a similar one from the opposite side. Two more pass from the lower and posterior margins of the orbit to the base of the pectoral fin. Another proceeds from the upper margin of the præopercle, at first backwards; and opposite the posterior third of the pectoral it curves upwards to the middle of the hard dorsal, on to which it is continued. A small patch of colour similar to these bands is present in front of the base of the dorsal. Another band proceeds from the posterior extremity of the pectoral to the anterior portion of the soft dorsal. Two more similar vertical bands cross the base of the tail, and several shorter marks exist over the body. Hard dorsal nearly black; soft dorsal and other fins yellow. Eye golden.

SERRANUS GRAMMICUS, sp. nov.

B. vii. D. 11/12. P. 19. V. 1/5. A. 3/8. C. 17. L. 1. 90.

Length of specimen 15 inches.

Length of head $\frac{2}{3}$, of pectoral $\frac{1}{2}$, of base of dorsal spines nearly $\frac{1}{4}$, of base of dorsal rays $\frac{1}{4}$, of base of anal $\frac{1}{6}$, of caudal $\frac{1}{7}$ of the total length. Height of head $\frac{1}{5}$, of body $\frac{2}{3}$, of dorsal spines $\frac{1}{11}$, of dorsal rays a little more than $\frac{1}{9}$, of anal spines $\frac{1}{15}$, of anal rays $\frac{1}{9}$ of the total length.

Eye. Upper margin close to the profile; diameter $\frac{1}{5}$ of length of head, 1 diameter apart, $1\frac{1}{3}$ diameter from end of snout.

Body rather elongated; dorsal and anal profiles equally convex.

Cleft of mouth rather deep; posterior extremity of upper jaw extending to beneath the posterior margin of the orbit. Vertical limb of præopercle slightly produced at its angle, finely serrated in its upper two-thirds, becoming coarser lower down, and with five moderately large denticulations at its angle; horizontal limb entire, as are also the sub- and interopercles. Operculum with three spines, the central one of which is much the strongest.

Teeth villiform in both jaws, becoming most developed in the centre, and a small canine on either side of the upper jaw. Villiform teeth on vomer and palate in size about equal to the smallest on the jaws.

Fins. Dorsal spines moderately strong, the fourth being the longest, the last being two-thirds the height of the first ray; the soft portion of the fin slightly rounded posteriorly. Pectoral rounded.

Ventral rather pointed. Anal—first spine short, second strongest, the last one-fourth the longest; soft portion rounded. Caudal cut nearly square.

Scales small, in rows passing obliquely upwards and backwards above the lateral line, and horizontally below it.

Lateral line in upper fifth of body.

Colours. Greyish, with a golden gloss about the head. A narrow black line passes from the upper margin of the orbit to the last dorsal spine. A second line passes downwards from the upper third of the orbit to the superior spine of the operculum, whence it proceeds to the base of the sixth dorsal ray. A third and similar band commences at the lower margin of the orbit, and, passing beneath the central spine of the operculum, is continued to the upper third of the caudal fin, where it takes the form of rounded blotches. Dorsal fin with a row of black spots along its centre, and a black external edging. Caudal with numerous black spots, and a black margin. Anal black-tipped. Eye golden.

This description is that of a male specimen.

MESOPRION RUSSELLI, Bleeker.

Antika doondiawah, Russell, pl. 98.

B. vii. D. 10/14. P. 16. V. 1/5. A. 3/8. C. 17. L. 1. 54. L. tr. 9/20.

The length of specimens varies up to 13 inches.

Length of head $\frac{2}{3}$, of pectoral $\frac{1}{4}$, of base of dorsal spines more than $\frac{1}{4}$, of base of dorsal rays $\frac{1}{6}$, of base of anal $\frac{1}{8}$, of caudal $\frac{1}{5}$ of the total length. Height of head rather more than $\frac{1}{4}$, of body $\frac{1}{3}$, of dorsal spines $\frac{1}{8}$, of dorsal rays $\frac{1}{10}$, of ventral $\frac{1}{6}$, of anal spines $\frac{1}{11}$, of anal rays $\frac{1}{8}$ of the total length.

Eyes rather longer than high; diameter $\frac{1}{4}$ of length of head, $1\frac{1}{4}$ diameter from end of snout, $\frac{2}{3}$ of a diameter apart.

Body ovoid, compressed. Dorsal profile rather more convex than the abdominal.

Lower jaw slightly the longest; the posterior extremity of the maxilla extends to beneath the anterior third of the orbit. Præopercle with a very shallow emargination in the lower third of its vertical limb, which has also a few small serrations upon it; horizontal limb crenulated. Scapular serrated.

Teeth. An external row of widely separated conical teeth in either jaw, those in the lower the largest, and increasing in size posteriorly. A pair of large canines in upper jaw, with a smaller one contiguous. A row of very fine villiform teeth in both jaws posterior to the conical row. Villiform teeth in vomer and palate.

Fins. Dorsal spines rather weak, the third much the longest; interspinous membrane rather deeply emarginate; last spine not so long as the first ray. Pectoral pointed. Ventral pointed, spine weak. First anal spine short and weak, two last of equal length, but the middle spine much the strongest. Caudal emarginate, its base broad.

Scales in oblique rows, passing backwards and upwards above the lateral line, and in horizontal rows below it. Some exist over dorsal and anal rays.

Lateral line follows the curve of the back in the upper fourth of its course; it is in single tubes.

Colours. Rosy, with four oblique brilliant golden lines passing from the lateral line upwards and backwards, impinging on two rows of scales, leaving two intermediate rows without such lines. Four similar golden lines are also present below the lateral line: the first proceeding from the posterior margin of the orbit to the lateral finger-mark; the second from the middle of the operculum to opposite the end of the soft dorsal, where it is lost on the lateral line; the third from beneath the orbit to the base of the caudal fin; the fourth from the lower margin of the base of the pectoral to the base of the anal. A large, deep black finger-mark exists on the lateral line opposite to the commencement of the soft dorsal. Pectoral, ventral, and anal yellowish. Dorsal and caudal pinkish. Eyes silvery, with a dark mark below the pupil.

Following the opinion of Cuvier and others, and not having seen a specimen of Russell's fish, I had previously considered this to be the *Genyoroge notata*, C. & V. Since my arrival in Madras I have had ample opportunities of investigating the species, which I find to be a *Mesoprion*, and apparently the *M. russelli* of Dr. Bleeker.

UPENEOIDES BIVITTATUS, Cuv. & Val.

This fish is very similar to the *U. vittatus*, C. & V., with which, indeed, Dr. Günther has placed it. But there are certain evident differences, which I propose adverting to.

Its barbules extend to beyond the posterior margin of the operculum; its caudal is more deeply lobed; its lateral line is more raised; and it possesses a rather thick and large air-bladder, which the *U. vittatus* is without.

The coloration likewise differs. The *Upeneoides bivittatus* is darker along the back; its golden stripes are not so well marked; and the caudal has two horizontal brown lines on either side of its centre, and three oblique bands running across the upper lobe and two across the lower lobe.

In the *Upeneoides vittatus* the caudal has six yellowish-brown bars with dark edges across the upper lobe, and a black extremity, whilst on the lower lobe there are also three oblique bars, and the extremity is white. The first dorsal is also black-edged.

URANOSCOPUS MARMORATUS, C. & V.

B. vi. D. $4\frac{1}{12}$. P. 18. V. $1\frac{1}{5}$. A. 13. C. 11.

Length of specimen $5\frac{5}{10}$ inches.

Length of head nearly $\frac{2}{7}$, of pectoral $\frac{1}{4}$, of base of first dorsal $\frac{1}{11}$, of base of second dorsal $\frac{1}{4}$, of base of anal $\frac{1}{4}$, of caudal $\frac{2}{11}$ of the total length. Height of head $\frac{1}{11}$, of first dorsal $\frac{1}{9}$, of second dorsal $\frac{1}{7}$, of anal $\frac{1}{11}$ of the total length.

Eyes directed upwards and slightly outwards, $\frac{2}{3}$ of a diameter from end of snout, and rather more than 1 diameter apart.

Body, in circumference largest anteriorly, gradually decreasing towards the tail. Head depressed. Body compressed.

Mouth oblique, closed anteriorly by the under jaw, so that it is directed upwards; the posterior margin of the upper jaw extends to beneath the centre of the orbit. There are five præopercular spines at equal distances apart, the anterior of which is directed forwards. The upper surface of the head nodulated, a moderately large suprascapular, and very large humeral spines. Præorbital roughened, large, and slightly constricted where its anterior joins its middle third.

Teeth villiform in jaws, vomer, and palate.

Fins. Ventrals jugular. Pectoral large and rounded. Caudal rounded.

Scales minute, and having raised edges.

Lateral line proceeds backwards from suprascapular spine, and, passing along parallel with the back, arrives at the upper third of the base of the caudal fin, when it bends down to its centre, but is not continued between its rays.

Colours. Chestnut-brown, becoming bluish white on the abdomen. The whole of the upper half of the head, front of lower jaw, and body covered with bluish-white spots. Fins darkish grey, edged with white. Ventral and anal lighter; the upper three-fourths of the first dorsal deep black. Eyes golden.

SCORPÆNA ROSEA, sp. nov.

B. vii. D. $11\frac{1}{10}$. P. 17. V. $1\frac{1}{5}$. A. $3\frac{1}{5}$. C. 15. L. 1. 43. L. tr. $7\frac{1}{18}$.

Length of specimen 5 inches.

Length of head $\frac{1}{3}$, of base of dorsal spines nearly $\frac{1}{3}$, of base of dorsal rays $\frac{1}{6}$, of pectoral $\frac{1}{4}$, of base of anal $\frac{1}{10}$, of caudal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{4}$, of body $\frac{1}{3}$, of dorsal spines $\frac{1}{7}$, of dorsal rays $\frac{1}{7}$, of ventral $\frac{1}{5}$, of anal spines $\frac{1}{6}$, of anal rays $\frac{1}{5}$ of the total length.

Eyes. Orbits raised, with depressions anterior and posterior to them, having also a deep concave interorbital groove, with an elevated line on either side which does not become spiny. Diameter of eye $\frac{1}{4}$ of length of head, $\frac{3}{4}$ of a diameter from eye to eye, $1\frac{3}{4}$ diameter from end of snout.

Dorsal profile more convex than the abdominal. Head compressed.

Snout rather elevated, a transverse depression between it and the orbits. Cleft of mouth oblique; posterior extremity of the maxilla extending to beneath the centre of the orbit; lower jaw the longest. Posterior nostril circular, situated in the transverse groove behind the snout, and having a short sharp spine a short distance anterior to it; the anterior nostril tubular, just anterior and external to this spine, and having a broad fleshy tentacle above it, which is

fringed externally. A short distance external to the posterior nostril is a sharp spine, leading backwards from which to above the angle of the præoperculum is a spiny ridge containing five more directed backwards. Along the angle and lower border of præoperculum are three denticulations—the superior a strong spine, the others blunted; there are also three fleshy tentacles along its border, and one on the side of the præoperculum. Interoperculum with a blunt spine and tentacle. Operculum with a bony ridge along its centre, ending in two spines. A ridge containing three spines passes from the posterior inferior margin of the orbit to the upper margin of the opercle and commencement of the lateral line, and has two minute spines below it. Another spiny ridge extends from the posterior superior margin of the orbit backwards, and one spine between it and the ridge below it. Orbit with a strong spine at its anterior superior margin, one at its posterior superior margin, and one at its superior margin, which has attached to it a long wide tentacle on a narrow base. Several fleshy tentacles exist along the edge of the snout, a large one above the angle of the mouth, and two on the extremity of the upper jaw; there are also three rather large ones on the lower jaw.

Teeth villiform, in numerous rows in both jaws, also in a V-shaped patch on the vomer, but none on the palate.

Fins. Dorsal spines moderately strong, the third the longest; interspinous membrane rather deeply cleft, and extended beyond each spine. Pectoral broad at its base, its twelve lower rays unbranched, and minute fleshy appendages attached to them. Ventral spine strong. Anal—first spine short, second and third of equal length, but the second twice as strong as any in the fish. Caudal cut square at its extremity.

Scales in rows proceeding backwards and upwards. Some on the upper part of the operculum; head otherwise scaleless.

Lateral line in twenty-three or twenty-four tubes.

Colours. Of a general rose-colour, marbled with greyish; the spines on the head are darker than the surrounding parts. One or two irregular grey bands with dark edges exist on the tail. The dorsal and anal are also banded; and the pectoral has numerous bands on it.

This species differs from the *S. venosa*, C. & V., which has no orbital tentacle, and of which the third anal spine is the longest and strongest, and the caudal fin is rounded, &c.

CARANX NIGRESCENS, sp. nov.

B. vii. D. $7\frac{1}{19}$. P. 19. V. $1\frac{1}{5}$. A. $2\frac{1}{17}$. C. 19. L. 1. 25.

Length of specimen 24 inches.

Length of head nearly $\frac{1}{5}$, of pectoral $\frac{2}{7}$, of base of first dorsal $\frac{1}{11}$, of base of second dorsal $\frac{1}{30}$, of base of anal $\frac{2}{7}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{2}{9}$, of body $\frac{2}{7}$, of first dorsal $\frac{1}{12}$, of second dorsal $\frac{1}{8}$, of ventral $\frac{1}{12}$, of anal $\frac{1}{6}$ of the total length.

Eyes with very narrow adipose lids; diameter $\frac{1}{3}$ of length of head,

$1\frac{1}{2}$ diameter from end of snout, $1\frac{1}{4}$ diameter apart, and $\frac{3}{4}$ of a diameter from the dorsal profile.

Body compressed. Dorsal and abdominal profiles equally convex.

Head compressed, and having an elevated central ridge. Præorbital wide, equal in extent to $1\frac{1}{2}$ diameter of the orbit. Præopercle—its posterior limb rather oblique; its lower margin lineated towards the edge, which is crenulated. Sub- and interopercles also crenulated.

Teeth in numerous villiform rows, of equal size in both jaws, with a slight interval at symphysis. A triangular patch of villiform teeth on the vomer; and a long narrow band of the same character on the palate.

Fins. Pectoral rather in advance of the origin of the dorsal and ventral; anal arises under about the sixth ray of the second dorsal. First dorsal nearly triangular; second dorsal highest anteriorly, its upper margin rather concave in its first portion, subsequently parallel with the back. Pectoral falciform, reaching to opposite the tenth dorsal ray. Dorsal spines weak, the first very short, the third and fourth the longest. First ray of second dorsal the longest in the fin; the last does not quite reach the base of the caudal. Anal spines weak, the second the longest.

Scales cover the body, under the eyes, and the upper portion of the opercles; there are none on the chest. There is a moderately high sheath to the dorsal and anal fins.

Lateral line with a very moderate curve to opposite the thirteenth dorsal ray, whence it becomes straight. The keel is slightly developed—in fact, being only very distinct on the last eight scales. A lateral ridge on either side of the keel on the root of the caudal.

Cæcal appendages very numerous.

Colours. Of a dusky greyish, with innumerable fine black points, and generally glossed with purple. A well-marked black spot upon the operculum. Fins nearly black, especially the dorsal.

This description is that of a male specimen.

Of the genus *Panchax*, Cuv. & Val., I have obtained two species at Madras, and one from Malabar. Before describing these, I may remark that I have not as yet met with the *Panchax* (*Esox*) *panchax*, Buch. Ham.

The *Panchax lineatum*, C. & V., is exceedingly common in Malabar; but I have not taken it as yet on the Madras side of the Western Ghawts.

The *Panchax* (*Aplocheilus*) *rubrostigma*, Jerdon, and another species which I am unable to refer to any existing description, and have therefore considered new, are both exceedingly common in all tanks, streams, and pieces of fresh water around Madras.

These two species are very dissimilar in their appearance; and I have kept a number in an aquarium, where they grow rapidly and become very tame. They are carried in water with great difficulty, and rapidly die when out of their native element. They swim very close to the surface of the water, and appear to require a large amount of oxygen.

PANCHAX ARGENTEUS, sp. nov.

B. iv. D. 6. P. 15. V. 6. A. 20. C. 13. L. l. 27. L. tr. 11.

Length of specimens from $\frac{4}{5}$ to $1\frac{2}{10}$ inch.

Length of head nearly $\frac{1}{4}$, of pectoral $\frac{1}{4}$, of base of dorsal $\frac{1}{10}$, of base of anal $\frac{2}{7}$, of caudal $\frac{1}{4}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{4}$, of dorsal fin $\frac{1}{5}$, of ventral $\frac{1}{8}$, of anal $\frac{1}{6}$ of the total length.

Eyes. Diameter $\frac{2}{5}$ of length of head, $\frac{2}{3}$ of a diameter from end of snout, nearly 1 diameter apart.

Teeth in a narrow villiform row, directed at first almost horizontally, and bent near their extremities.

Fins. Dorsal is situated over the last few rays of the anal, which last commences midway between end of snout and termination of the caudal fin, which is cut square. Ventrals, if laid forwards, just reach to the opercles; if in their natural position, they extend beyond the vent to the first anal ray.

Scales on the top of the head with smooth edges and not festooned; those on chest much smaller than those on the body.

Body very compressed; back wide and flat.

Colours. Of a dullish green along the back, becoming dirty white along the abdomen. The back and also between the rays of the anal and caudal fins finely dotted with black points; otherwise the fins are diaphanous. Eyes blue.

This species, which appears never to grow to a large size, seems allied to the *Panchax cyanophthalmus*, Blyth, which, however, is said to have 22-23 anal rays. It differs from the *Panchax (Pæcilia) latipes*, Schleg., in the length of the head, and in the number of the dorsal and anal rays, in the number of scales, and in the position of the ventral fin. It may be the *Panchax m'clellandi*, Bleeker; but as that species is only known from a drawing, it is impossible to decide the question.

PANCHAX RUBROSTIGMA, Jerdon.

B. iv. D. 8. P. 15. V. 6. A. 14-15. C. 15. L. l. 27. L. tr. 7.

Length of specimens from $1\frac{2}{10}$ to $1\frac{6}{10}$ inch.

Length of head $\frac{2}{9}$, of pectoral $\frac{1}{7}$, of base of dorsal $\frac{1}{14}$, of base of anal $\frac{1}{7}$, of caudal $\frac{2}{11}$ of the total length. Height of head $\frac{1}{7}$, of body $\frac{1}{5}$, of dorsal $\frac{1}{7}$, of ventral $\frac{1}{7}$, of anal $\frac{1}{7}$ of the total length.

Eyes oval, $\frac{2}{5}$ of length of head, $\frac{2}{3}$ of a diameter from end of snout, $1\frac{1}{4}$ diameter apart.

Body elongated; back moderately flat from the snout to the base of the dorsal fin; sides compressed.

Length of intermaxillaries in central line equal to about half the diameter of the eye. The posterior extremity of the maxilla extending to beneath the centre of the orbit. Angle of præoperculum rounded, but not produced.

Teeth in both jaws villiform, recurved, and in a narrow band.

Fins. Anal commences midway between snout and termination of caudal fin. The dorsal begins over the last four anal rays. Caudal wedge-shaped, its central rays the longest.

Scales cycloid; two rows between eye and angle of præoperculum; those on the summit of the head with their posterior border festooned.

Colours. Of a dull green on the back and sides, and dirty white along the abdomen. Numerous small and brilliant blue spots along the sides, alternating with rusty-red ones when the fish is alive and in good health, but they fade after death. A light spot on the summit of the head, which is sometimes absent. Dorsal fin white, with a large black spot along its base. Anal orange. Eye silvery.

5. Preliminary Description of a New Species of Finner Whale
(*Balenoptera bonaërensis*). By Dr. H. BURMEISTER,
F.M.Z.S., Director of the Public Museum, Buenos Ayres.

The animal which I now bring before the notice of the scientific public was found dead, floating on the river Plata, near Belgrano, about ten miles from Buenos Ayres, by a fisherman, who brought the body on shore on the 5th of February of this year, and informed me on the next day of his discovery. I was then confined by illness to my room, and was unable to go to see the body until fourteen days later. Putrefaction had already destroyed the Whale's external appearance; but as I found the body lying on the ground near the shore I was able to take a sufficiently accurate measure of it by steps. It was then 16 paces long, of which nearly 4 belonged to the head, and 12 to the trunk with the tail. Calculating my steps in moderate walking as equal to 2 feet, I made the whole body 32 feet long; and now measuring the skull alone I find it is 7 feet long, leaving 25 feet for the trunk and tail. This 25 feet is divided in the skeleton in such a manner that 1 foot is occupied by the seven vertebræ of the neck, $3\frac{1}{2}$ feet by the eleven dorsal vertebræ, $8\frac{1}{2}$ feet by the twelve lumbar, and 10 feet by the nineteen of the tail, the 4 additional feet being for the external parts of the animal—the skin, the cellular covering under it, and the intervertebral cartilages.

As the surface was already destroyed by putrefaction, I could not see distinctly the eyes, the ear-openings, or the nostrils. I only observed that the under jaw was about 4 inches longer than the tip of the skull and surrounded the upper jaw in its whole circumference.

Ten paces from the tip of the nose was a triangular falcate dorsal fin about 1 foot high and $1\frac{1}{2}$ foot long; and on the tip of the tail a large caudal fin with the usual two lobes, about $6\frac{1}{2}$ feet distant from each other at the hinder ends, and each $5\frac{1}{3}$ feet long, and $1\frac{1}{2}$ foot broad at the beginning.

The pectoral fins I could not examine very exactly—the one being already destroyed, and the other covered by the body; but they appeared to have the usual triangular form, and a length of from $3\frac{1}{2}$ to 4 feet. The rest of the skin was of a dark black-grey colour, like the old clay-slate, but lighter and nearly white-grey on the under-

side. Here I observed the usual deep furrows from the inner edge of the under jaw to the middle of the body; each furrow was $\frac{1}{2}$ inch deep, and the flattened intervals 1 inch broad.

The animal was a male, with two hinder longitudinal openings—the former (somewhat in advance of the position of the dorsal fin) being the sexual opening, and the hinder (under the same fin) the anus. On the fore side of this second opening are the two small mammarial fissures.

Of the internal organs nothing was to be seen, these being already destroyed by putrefaction and eaten by some millions of larvæ of *Musca*, which resembled living waves consuming the whole organic substance of the carcass.

Even the whalebones of the mouth had fallen out, and no trace of them was to be seen on the shore; but one month later we had the good fortune to find one side of them very well preserved in the ground of the river some miles higher up.

The fisherman told me that when he found the body the mouth was already open, and without whalebones, the tongue being very much swollen, like a balloon. This may have forced the whalebones from their position.

Since this first inspection I have visited the body from time to time to preserve the bones for the Museum. During the last week all the bones were brought to the establishment, and have been arranged in such a manner that I can give a short description of the whole skeleton.

Beginning with the skull, I will not describe its general form, which is very well shown in the figure of the skull of the European *Balænoptera rostrata* in the 'Voyage of the Erebus and Terror,' Mammalia, pt. 2, and the description given by my friend Dr. J. E. Gray in the same work.

Comparing the skull of this new species with his figure, I find that it is certainly much larger, but presenting the same relation between the two principal portions, being from the tip to the nasal bones 4' 4" long, and from these to the occipital foramen 2' 8". But there is some difference in the construction of this hinder portion, as the fore end of the vertex reaches to the hinder end of the nasal bones, covering entirely by its middle prolonged protuberance the small frontal bone from above. Much smaller also in my skull is the lateral part of the same bone, which forms the orbital cavity, and somewhat stronger the hinder lateral process of the temporal bone to which is attached the under jaw.

These differences leave no doubt that the two animals belong to different species. The transverse extent of the front part immediately before the nasal bones is 2' 10", that of the hinder angles of the frontal bones behind the orbit is 4', and that of the vertex behind across the occipital foramen 2' 6". The lower jaw is, including the curve, 7' 5" long on the outside.

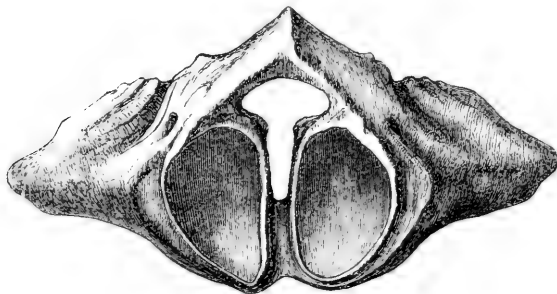
The whale-bone, which was attached to the underside of the large excavated maxillary bones, is of the usual form and construction. We have the left side nearly complete, wanting only a small portion

of the hinder end. The remaining part is composed of 192 plates; and from the form of the last it may be supposed that a series of 30 or 40 plates is lost on the hinder end, so that the whole series of plates may have been from 230 to 235. The first plates are very small, not higher than 3 inches, of which 2 inches are long bristles; but the hinder plates are 12 inches high without the bristles, and the bristles here are more than 3 inches long. These hinder plates have a base 7 inches broad and an elongated triangular figure, the side with the bristles being the largest, like the hypotenuse of the triangle, and somewhat curved to the exterior.

It is well known by the description of different authors* that there are three or even four series of plates in the internal basal margin of the larger external series. In my specimen the second series of plates is preserved, but the two or three smaller most internal series are lost. The plates of this second series are of the same triangular figure, but no higher than $\frac{1}{2}$ to 3 inches, with short bristles of $\frac{1}{2}$ inch on the inside. All these interior plates are of a white colour in my specimen; and of the same colour is also the whole inside of the large external series, every plate of that series being black on the outer margin for a space of 2 inches.

The neck is composed in the usual manner of seven small vertebræ, of which the second, third, and fourth are united together by the bodies and by ossified commissures on the central portion of the arch. The first or *atlas* (fig. 1, anterior surface) is much broader

Fig. 1.

Anterior surface of atlas of *B. bonairensis*.

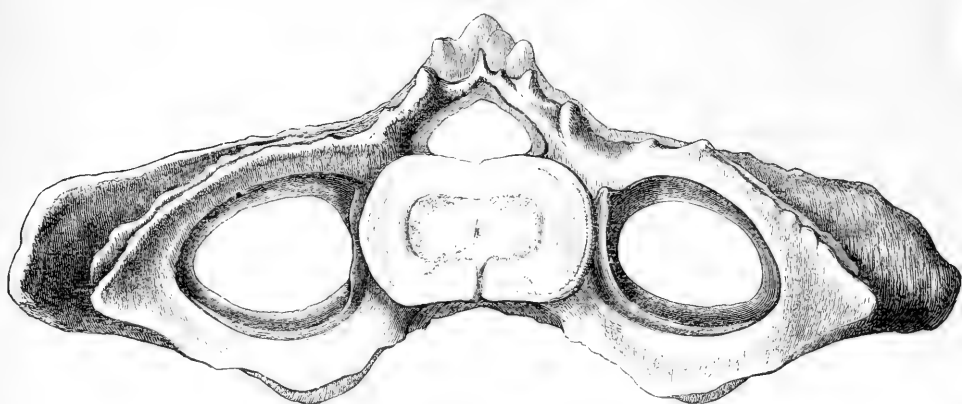
than high, the horizontal diameter between the transverse processes being $15\frac{3}{4}$ inches, and the perpendicular in the middle only $9\frac{1}{2}$ ". Projecting these diameters in lines, the transverse diameter is situate somewhat above the middle of the perpendicular. The articular surfaces for the occipital condyles are together $7\frac{1}{2}$ inches broad and each 5" high.

The three following united vertebræ are figured in fig. 2 from

* I find a very correct description of the whalebones of the European species by Ravin in the 'Annal. des Sciences Naturelles,' 2^e sér. Zool. t. v. p. 266, pl. 11.

behind. Each one has a large transverse process, which is perforated in the middle by a great elliptical opening. In the very strong second vertebra this opening is the smallest, and the horizontal diameter of the opening shorter ($4\frac{1}{2}$ inches) than the outer end of the transverse process ($5\frac{1}{4}$ inches); but in the two others the opening occupies nearly the whole process, surrounded only by a small osseous ring. The upper part, including the vertebral canal, is broader

Fig. 2.

Second, third, and fourth vertebrae of *B. bonaerensis*.

than high; and this canal is of a depressed triangular figure. The arch is very strong and thick on the second vertebrae, and, in each of the three, armed with three small upright spines, of which the middle is the *processus spinosus*. The fifth vertebra of the neck has quite the same form; its lateral process is a closed osseous ring; but the sixth differs by being open in the middle of the under part of this ring, near the enlarged point, and the seventh by having no under part to the ring, but only the upper half circumference with the enlarged point at the end.

In most of these characters the species differs from the European *B. rostrata*, as this has only in some cases the second and third cervical vertebrae united, and open rings on all, after the second, of which open ring the upper part is smaller than the under, and not provided with the enlarged point at the end, which is present in all the cervical vertebrae after the second of my new species.

The small erect spines on the vertebral arch are also wanting in the European species, and the lateral processes are much shorter in comparison with the transverse diameter of the bodies of the vertebrae. As an individual character of my specimen I must remark that the upper parts of the lateral processes of the sixth and seventh cervical vertebrae are united together on the left side in their whole extent, which seems to me a consequence of disease during the

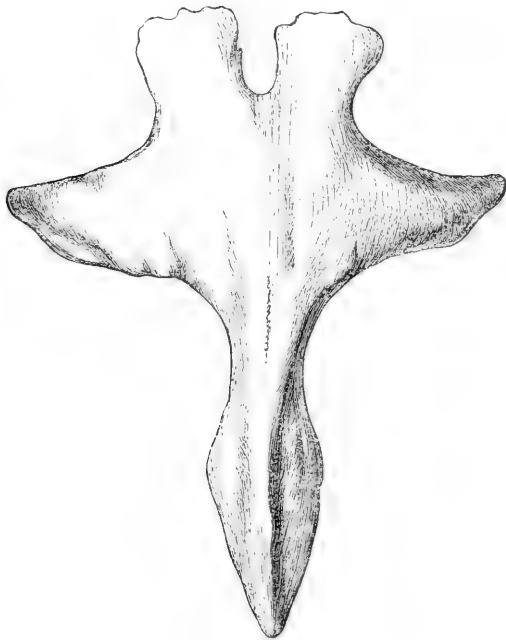
life of the animal; the same circumstance may have also united the first and second dorsal vertebræ, which are also anchylosed to each other at some points of the arch and the upper part of the body. As the animal is a very old one, having no epiphyses separated in the whole skeleton, I must believe that it was wounded when young on the left side of the neck, perhaps by the harpoon of a whaler.

The eleven dorsal vertebræ have the usual form, and increase in size from before backwards rapidly, the body of the first vertebra being only $1\frac{3}{4}$ inch, and the eleventh $5\frac{3}{4}$ inches; they have all long lateral processes, to an excavation on the hinder edge of which are attached the ribs.

The spinous processes increase gradually in height to the middle of the lumbar portion of the vertebral column.

There are eleven pairs of ribs. The first is broader than the others and 2 feet long. The longest is 4 feet in a straight line, and in the middle of the series. The first pair is attached to the sternum, which has a very peculiar form. It is (fig. 3) like a cross, resembling the

Fig. 3.



Sternum of *B. bonaërcensis*.

same bone of the European species; but the upper, short branch of the cross is, unlike that of *B. rostrata*, divided into two large parallel lobes. No bone proves more convincingly the distinctness of the

species than the sternum. As my figure gives a clear view of this bone, I will not describe it more, adding only the measurements. The length in the median line is 17 inches, and the transverse diameter in a straight line 13"; the outside is curved downwards and very rough, the inside excavated and smoother.

Of the twelve lumbar vertebræ, the first is 6 inches long, and the last 9 inches; this vertebra is the largest of all. They have higher spinous processes than the dorsals, but shorter and broader lateral processes, this process of the ninth and tenth dorsal vertebræ being the longest of all, *i. e.* 1 foot. The spinous processes of the middle lumbar vertebræ are 17" high; but the lateral processes are only 9" long and 7" broad. They have all thin sharpened outer margins, not an expanded tip for the attachment of the ribs like the dorsals. The tail is composed of nineteen vertebræ, of which the twelve anterior are very strong, but the last six in the axis of the tail-fin extremely small. To the nine anterior caudal vertebræ are attached inferior spinous processes; on the following nine they are wanting. The transverse processes of the first are not perforated. The fifth is the last vertebra with an indication of such a process. The sixth, seventh, and eighth have short spinous processes; but all the others are without either. As far as the thirteenth they have the body perforated. The six last are very small and of a peculiar triangular figure.

The skeleton of the arm-fin is of the usual construction, but has also some peculiarities. The bladebone is rather large, 32 inches broad at the upper margin in a straight line, and 18" high from the glenoid cavity to the same margin. The acromion is 7" long, compressed, and somewhat curved above, with an attenuated end, which is not enlarged as usual in Whales. The coracoid process is, on the contrary, thicker at its end, and rounded like a club, and $4\frac{1}{2}$ " long.

The very strong humerus is short, only 11" long; but the forearm-bones are tolerably long, being 23", and the radius somewhat stronger than the ulna, which has a large olecranon like a high crest, of semi-circular figure, which is surrounded by thick and strong cartilage. The carpal bones are seven on each side, all enclosed in thick cartilaginous matter, which united them with the forearm-bones and with the metacarpus of the fin. Two of these seem to be the free lower epiphyses of the radius and ulna, and the remaining five the true carpal bones.

The hand has four fingers, wanting the first or thumb, as usual in the Fin-whales. Each finger has a large metacarpal bone, and the two outer ones two other osseous phalanges; but the largest (second) finger has four phalanges, and the following three. There have been more cartilaginous articulations, but all these are lost. The first phalangeal bone of the second finger is the largest bone of the hand, being 5 inches long. They have no osseous epiphyses on either end, but have been united only by cartilaginous substance.

We have also the small bone of the pelvis, which is $7\frac{1}{2}$ inches long and $1\frac{1}{2}$ inch broad in the middle, and of a lanceolate form, being narrowed at both ends. No vestige of an attachment of another bone

to any part of its surface is visible; and it is the same with the European species, according to the observations of Eschricht and Reinhardt.

The hyoid bone is of the same form as that figured in Cuvier's 'Ossem. Foss.' vol. i. pl. 25. f. 13, being only somewhat larger in the middle, where the two cornua hyoidea are attached. The transverse diameter is 20 inches, and the longitudinal in the middle of one of the two points 7 inches. The cornua have a more curved form than that figured by Cuvier, and are 12 inches long.

Finally I should mention, what I omitted before, that in the cranium is a distinct lachrymal bone on each side in the prolongation of the orbit at the fore end, like that in Cuvier's figures (pl. 26), to which is attached the zygomatic bone, as Cuvier figures the Rorqual of the Cape of Good Hope (fig. 1 of the same plate). The tympanic bone is persistent and firmly united with the cranium; and the vomer rather short, not longer than in the same figures of Cuvier, and divided at the fore end by a longitudinal fissure into two parallel lobes $2\frac{1}{2}$ inches in length.

6. Description of a New Genus of *Spinacidae*, founded upon a Shark obtained at Madeira. By JAMES YATE JOHNSON, C.M.Z.S.

The Shark which forms the subject of the present communication is closely allied to those members of the family *Spinacidae* which constitute the genus *Centrophorus*; but since it possesses a mesial tooth in the lower jaw it cannot be assigned to that genus, and I therefore propose to found upon it a new genus named

MACHEPHILUS.

Body elongate, prismatico-triangular in section; head depressed, not distinct from the body; nostrils on the inferior side of the head; spout-holes large, furnished with valves, and situate on the upper side of the head above the eyes; a deep groove at the commissure of the lips. Scutella (scales) stalked. Two dorsal fins, each supported by a strong spine. No anal fin. The teeth of different form in the two jaws; those of the upper jaw consisting of triangular cusps on subquadrate bases; those of the lower jaw composed of cusps on subquadrate bases, the cusps being more and more inclined backwards as the teeth approach the back of the mouth, thus presenting oblique incisorial edges. A mesial tooth, consisting of an upright equilateral cusp on a quadrate base, in the lower jaw.

MACHEPHILUS DUMERILLI, ♂.

Of a uniform brownish-grey colour. Head rather broad, depressed, PROC. ZOOL. SOC.—1867, No. XLVI.

concave between the eyes and spout-holes; cheeks convex; snout short, rounded in front, flat above and below. Nostrils large, reaching to the sides of the snout. Eye-slit almond-shaped. Spout-holes transversely oval, placed above the eyes. Mouth wide; the jaws slightly but evenly convex; the upper jaw protrusile from beneath the scaly skin. The slit or groove at the commissure advances to the vertical from the middle of the eye, leaving a considerable space between the opposite grooves. The posterior part of the slit is very shallow, and does not extend beyond the vertical from the posterior edge of the spout-holes.

The teeth of the upper jaw are composed of sharp narrow upright conico-compressed cusps on subquadrate bases; and several rows of them are in use at once. In the lower jaw there are two rows of teeth, formed of broad flattened cusps on subquadrate bases, which have a ridge down the middle. The cusps, as the teeth approach the back of the mouth, become more and more inclined backwards, but their apices bend upwards and form an acute point; thus only part of one edge of the cusp presents an incisorial edge, at the middle of the lower jaw, having both its sides in front of the adjacent teeth. It is formed of an upright equilateral cusp with acute edges placed on a quadrate base.

The five branchial openings are large, and are situate in front of the pectoral fin, the hindmost embracing the anterior part of the root of that fin.

All the fins are clothed with scales. The first dorsal fin is nearer to the pectoral fin than to the ventral fins, and has in its front part a strong spine more than half as high as the fin, which is so much worn in the specimen that its shape cannot be accurately stated. The second dorsal fin is rounded in front, where it is higher than the anterior fin. It is also armed with a strong spine (which, however, is not quite so large as the spine of the first dorsal), and it is acuminate behind and prolonged in a direction nearly parallel with the tail. The ventral fins have two-thirds of the total length of the fish in front of them. Their anterior angles are rounded off, their posterior angles prolonged and pointed. The caudal fin is shaped much like that of the true *Centrophori*. The tail bends upwards inside the upper lobe, and the lower lobe is well developed. The upperside of the tail behind the dorsal fin is concave. The lateral line is high up on the side of the body and straight. The claspers are furnished with a slender spine.

The scutella or scales are stalked, and have subrotund laminae continuous with their stalks, each lamina being marked by two lateral and a median crest, which projects behind as an equilateral tooth. The hinder edge of the lamina is minutely serrulate.

The species is named in compliment to Professor Auguste Duméril of the Jardin des Plantes, Paris, the author of a valuable work describing the known genera and species of Sharks.

The dimensions of the single example obtained (which has been added to the collection of the British Museum) are given below.

	inches.
Total length	43 $\frac{1}{2}$
Height under first dorsal	7
Head, width at spout-holes	5 $\frac{3}{8}$
Eye-slit, length	2 $\frac{1}{4}$
——, distance from snout	2 $\frac{7}{8}$
Spout-holes, length	1 $\frac{1}{8}$
Mouth, width=distance from snout	3 $\frac{5}{8}$
Pectorals, width of base	2
——, distance from snout	9 $\frac{1}{4}$
First dorsal, length of base	5 $\frac{1}{4}$
——, vertical height	2 $\frac{1}{8}$
Second dorsal, length of base	3 $\frac{1}{2}$
——, vertical height	2 $\frac{1}{4}$
Ventrals, width of base	1 $\frac{5}{8}$
——, distance from snout	27
Caudal, length	9 $\frac{1}{2}$

7. Description of *Halcrosia afzelii**, a new Crocodile from Sierra Leone, West Africa. By WILHELM LILLJEBORG, Professor of Zoology in the University of Upsala, F.M.Z.S.

Length from the point of the nose to the tip of the tail about 4' (Swedish workmen's measure†, *i. e.* with 12 inches to the foot). Length of the head from the os quadratum 7 $\frac{1}{4}$ "; breadth of the head at the back part 4 $\frac{1}{4}$ "; its length from the posterior extremity of the under jaw 8", from the orbits to the point of the nose 3 $\frac{5}{8}$ "; breadth of the nose over the ninth tooth, the widest part of the upper jaw, 2 $\frac{7}{16}$ ". Length of the tail 2'. The head's length in proportion to its breadth marks it as a short broad form; the nose is, however, much narrower than in the *Halcrosia frontata* (Murray)‡, as is evident by the proportion of the breadth above the ninth tooth to the distance between the orbit and the tip of the nose, the former being but about two-thirds of the latter. According to Murray's figure this breadth amounts to three-fourths of the above-mentioned distance. With respect to the form of the nose, it appears to be intermediate between *Halcrosia frontata* and *Crocodilus vulgaris*. The fossæ supratemporales are small, and their lower openings very small, situated in front, and directed outwards and forwards. The supratemporal or sincipital plane is somewhat concave in the middle, and the forehead between the orbits destitute of keel.

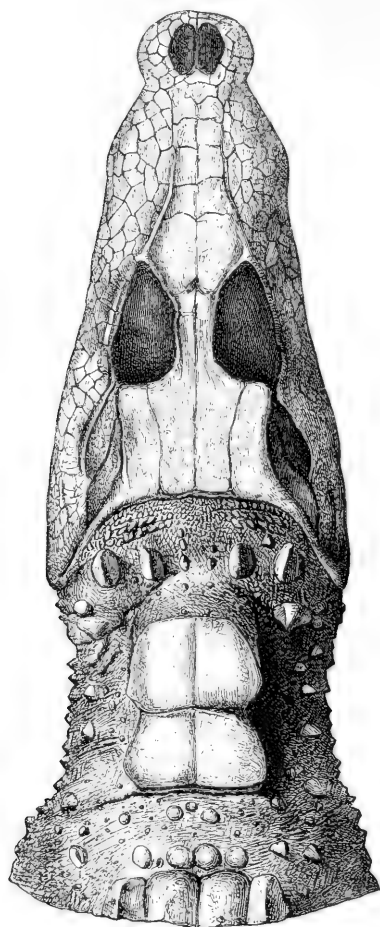
* With this name we call to remembrance the late Professor Adam Afzelius of Upsala, who brought home to Sweden from Sierra Leone this specimen, together with many other interesting specimens of animals and vegetables.

† Swedish feet and (workmen's) inches are reduced to English by multiplying by 0.9741, or dividing by 1.0266.

‡ Gray, P. Z. S. 1862, p. 213.

From the anterior angle of the orbits a tolerably highly raised ridge passes over each of the ossa lacrymalia, and extends somewhat more than a third of the nose's length; and these ridges converge as they approach the tip of the nose. The nasal bones extend so far into

Fig. 1.



Head of *Halcrosia afzelii*.

the cavity of the nostrils as almost entirely to constitute the division between them, and leave only a very small space occupied by cartilage between themselves and the back-turned processes of the intermaxillary bones. The head, when looked at in profile, exhibits almost the same strongly marked concavity over the nose as the

Halcosia frontata. The edges of the jaws are strongly sinuated; and the upper jaw has on each side a deep hollow, to receive the seventh tooth of the lower jaw, which in this instance is the largest, and its two foremost front teeth do not pass through the intermaxillary bone. The teeth are $\frac{17-17}{15-15}$. The back teeth of the under jaw do not project in between those of the upper jaw, but within them, as in the case of the Alligators.

Fig. 2.

Hind foot of *Halcosia afzelii*.

Our specimen being imperfect, we have, as regards the feet, the opportunity of examining only one of the hind feet (fig. 2). The web is well developed, but the exterior edge of the foot is not fringed. It has but one row of four somewhat large keeled scales, which do not form any prominent lobe or fringe. The remainder of the outer side of the foot is covered with keeled scales of various sizes.

With regard to the plates of the skin, this genus, as is known, is especially distinguished by the peculiar form of the upper plates of the nape. These have also in this species a characteristically broad form, with almost horizontally outstanding keels, and are particularly large; but there are but two pairs, and a considerable interval separates the posterior from the anterior dorsal plates; they have in the middle of their upper surface a shallow longitudinal groove. The cervical plates are six in number, forming a curved transversal row, and are oval and strongly keeled. The dorsal plates form four continuous longitudinal rows, of which the outermost on each side is distinctly, the inmost indistinctly, keeled; there is, moreover, on each side a couple of imperfect rows, and several scattered plates on the sides of the body. The back and loin have eighteen transversal rows of plates, including the foremost exceedingly small ones. The tail has twelve similar rows between the base and the strongly projecting serrated lobe, or crista. All these plates are as it were sculptured with fine concentric raised lines, as is also the case with the plates of the head and feet. As the end of the tail is missing I am unable to give the number of plates in its crista. The ventral plates are ossified. The colour is indistinct, but seems to have been a very dark brown.

The animal in its general habit closely resembles the Alligators, and was on this account, by the late Professor Thunberg, in the University's collection, named *Lacerta alligator*. The specimen, which is imperfect, was brought from Sierra Leone, West Africa, by the late Professor Adam Afzelius, and was, together with his other collections, presented many years ago to this University's Zoological Museum.

8. Remarks upon the Fabrician species of the Satyride Genus *Mycalesis*; with Descriptions, and Notes on the named varieties. By ARTHUR G. BUTLER, F.Z.S.

The scarcity of figures of the Fabrician insects, and the culpable carelessness noticeable in the descriptions of that author, more especially the bad habit which he had of describing the same species twice under separate names, has made the determination of his species, at all times, a work requiring much time, labour, and patience.

The existence of several types in the Banksian collection, of course, affords most important assistance to the student; but as the labels upon these types have in some cases been transposed, it is at all times necessary to compare the insects carefully with their descriptions.

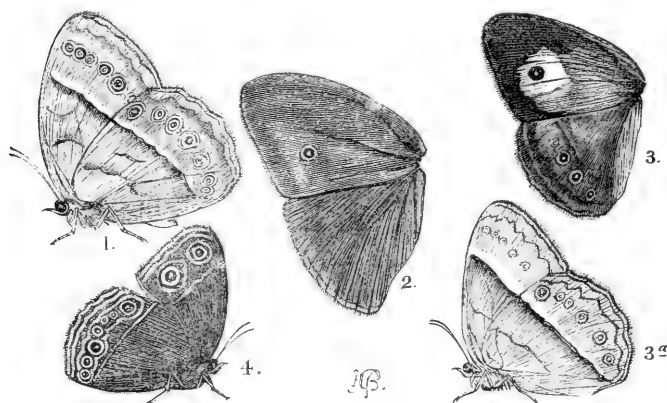


Fig. 1. *Mycalesis sirius*.
2. — *perseus*.

Figs. 3, 3a. *Mycalesis terminus*.
4. — *blasius*.

I have recently been working out the genus *Mycalesis*, and I find that little or no notice has been taken of the Fabrician specimens, the necessary consequence of which has been that several of his species have been referred to genera with which they have no connexion, whilst the insects themselves have been redescribed, and thus

the synonymy of this extensive group of Butterflies has been uselessly increased.

As, by a careful comparison of the types and typical descriptions with the specimens in our collection, I have succeeded in satisfactorily determining several of the above species, I hasten to lay the result of my investigations before the Society.

Sp. 1. MYCALESIS MELUSINA.

Papilio melusina, Fabricius, Ent. Syst. iii. pt. 1. p. 240. n. 750 (1793).

Hab. Sierra Leone.

B.M.

This has been already placed with *P. dorothea* of Cramer, with which it is doubtless identical: it in almost every point agrees with the insect from Old Calabar, described by Mr. Hewitson under the name of *M. raesaces*. I have pointed this out to Mr. Hewitson; and he agrees with me that his species can be nothing more than the Calabar form of the insect from Sierra Leone.

1^a. MYCALESIS MIRIAM.

Papilio miriam, Fabricius, Ent. Syst. iii. pt. 1. p. 242. n. 754 (1793).

Hab. Angola.

B.M.

"*Alis dentatis fuscis subtus cinereis: anticis ocellis duobus, posticis septem. Habitat in Indiis.*"—Ent. Syst.

This only differs from the preceding in being entirely brown on the upperside, and in having the markings of the underside much more distinctly visible.

Sp. 2. MYCALESIS PERSEUS. (Fig. 2, p. 718.)

**Papilio perseus*, Fabricius, Syst. Ent. p. 488. n. 199 (1775).

Papilio tabitha, Fabr. Ent. Syst. iii. pt. 1. p. 243. n. 756 (1793).

Hab. North India.

B.M.

"*Alæ anticæ fuscae, mox immaculatæ, mox ocello parvo, pupilla alba ante apicem. Posticæ fuscae, immaculatæ. Subtus omnes basi fuscae, apice dilutiores, anticis punctis tribus, posticis septem albis subocellaribus.*"—Syst. Ent.

"*Alæ supra omnes nigrae anticis ocello parvo atro, pupilla alba. Subtus pallidiores striga e punctis ocellaribus minutissimis pupilla alba.*"—Ent. Syst.

This is of course only another of the many varieties of *M. otreæ* of Cramer: the underside of the wings is represented by Donovan in his 'Insects of Asia;' but the colouring is so extravagant that the figure rather hinders than aids the determination of the species.

2^a. MYCALESIS CLERIMON.

Papilio clerimon, Fabricius, Ent. Syst. iii. pt. 1. p. 217. n. 678 (1793).

Hab. —?

* The type is in the Banksian collection.

This appears to be another variety of *otrea*, but it does not quite agree with any specimens that I have seen.

In the 'Genera of Diurnal Lepidoptera,' *M. tabitha* is placed in the genus *Satyrus* (p. 391. n. 34); *M. clerimon*, with a query, in the genus *Lasiommata* (p. 387. n. 16).

Sp. 3. MYCALESIS BLASIUS. (Fig. 4, p. 718.)

Papilio blasius, Fabr. Ent. Syst. Suppl. v. p. 426. n. 488, 489 (1798).

Hab. East Indies (*Fabr.*); Philippines. B.M.

"*Alæ omnes integerrimæ, supra fuscæ, immaculatæ: subtus vix pallidiores striga media obliqua, alba. Anticæ pone strigam ocellis tribus atris iride flavescente pupillaque alba, intermedio minuto. Ocelli annulo communi reniformi includuntur. Margo strigosus. Posticæ ocellis septem inæqualibus strigis duabus undatis utrinque coeuntibus cinereis inclusis. Margo strigosus.*"

—Ent. Syst.

This seems to be identical with the *M. samba* of Mr. Moore's 'Catalogue,' p. 233. n. 498; it differs from *lalassis*, Hew., in having smaller and less distinct ocelli, and not so many in the front wings; it is also rather smaller.

Sp. 4. MYCALESIS MEDUS.

Papilio medus, Fabricius, Syst. Ent. p. 488. n. 198 (1775).

Hab. Cape of Good Hope (*Fabricius*); Borneo. B.M.

Fabricius has made a mistake as to the locality of this species; it is evidently identical with *P. doris* of Cramer; the latter is said to be from China, and is only a variety of *M. hesione*.

Sp. 5. MYCALESIS MARTIUS*.

Papilio martius, Fabricius, Ent. Syst. iii. pt. 1. p. 219. n. 686 (1793).

Hab. Java. B.M.

"*Alæ omnes supra nigræ, immaculatæ, subtus itidem nigræ margine pallidiore et in hoc margine alæ anticæ ocelli quatuor, 2. 4. minutissimi, posticæ ocellis septem tertio majori.*"—Ent. Syst.

This species is closely allied to *M. nala* of Felder, the *mamerta* of Moore's 'Catalogue;' it is, however, slightly smaller, and differs in the width of the margin and the number and relative size of the ocelli.

Sp. 6. MYCALESIS TERMINUS. (Figs. 3, 3a, p. 718.)

†*Papilio terminus*, Fabricius, Ent. Syst. iii. pt. 1. p. 220. n. 687 (1793).

Hab. New Holland. B.M.

* Felder has recently described and figured a variety of this species, only differing in the number of the ocelli of the front wings, as *M. moorei*, Feld.

† The type is in the Banksian collection.

This species has been figured by Donovan in his 'Insects of New Holland,' pl. 28. f. 4; however, I found it in the collection as the *remulia* of Godart, and confounded with the *remulia* of Cramer, from which it is very distinct.

There are two forms of *terminus*, the one having small and nearly regular ocelli (as in the type), the latter with ocelli varying in size as in *remulia*; but in both forms the undulating marginal lines and the subbasal line of the underside are very conspicuous. We have *remulia* from North Ceram.

Sp. 7. MYCALESIS SIRIUS. (Fig. 1, p. 718.)

**Papilio sirius*, Fabricius, Syst. Ent. p. 488. n. 201 (1775).

Hab. New Holland.

B.M.

"*Alæ anticæ obscure rufæ, apice fuscescentes, ocellis duobus ferrugineis, iride fusca, annulo atro cincta pupillaque alba; subtus glaucæ, arcubus duobus strigaeque ferrugineis, apice obscuriores, ocellis sex, quinto majori. Posticæ obscure rufæ, margine fusco, strigis obscurioribus. Ante marginem ocelli quatuor, intermediis majoribus; subtus basi glaucæ arcubus duobus strigaeque, medio ferrugineis, apice obscurioribus, ocellis septem, ultimo ad angulum ani minutissimo.*"—Syst. Ent.

This is a common and very variable Australian species; the specimens chiefly differ in the number of their ocelli, though the females are sometimes remarkable for having the bands of the underside margined with yellow. *Mycalesis daidis*, Hew., from North Ceram, and *manipa* of Boisduval are varieties of this insect, differing in the number of ocelli alone.

7^a. MYCALESIS ZACHÆUS.

Papilio zachæus, Fabricius, Ent. Syst. iii. pt. 1. p. 217. n. 679 (1793).

Hab. —? (*Fabr.*); Australia.

♂ ♀, B.M.

"*Alæ omnes supra fuscae ocellis duobus pupilla alba. In posticis interdum adhuc minutus ad angulum ani, subtus itidem fuscae, anticis ocellis quatuor, posticis sex, omnibus pupilla alba.*"—Ent. Syst.

This description exactly agrees with a slight variety of the preceding, in the National Collection.

Professor Westwood has placed *M. sirius* in the genus *Cænonympha* (p. 398. n. 26); *zachæus* is placed with a query in the genus *Lasionmata* (p. 387. n. 17).

Sp. 8. MYCALESIS NARCISSUS.

Papilio narcissus, Fabricius, Ent. Syst. Suppl. v. p. 428. n. 672, 673 (1798).

Hab. Cape of Good Hope (*Fabricius*); Mauritius.

B.M.

This insect has been carefully described by Boisduval; on the upperside it is much like *M. ita* of Felder.

* In the Banksian collection.

9. On some New Species of Australian Land-Shells. By
JAMES C. COX, M.D., F.R.C.S. Edin., Secretary of the
Entomological Society of New South Wales.

Since the issue (in 1864) of a 'Catalogue of Australian Land-Shells' in my collection, in which many supposed new species were described, I have from time to time transmitted, for publication in the 'Proceedings' of the Society, descriptions of such others as appeared to me to be novelties; and I now send a further contribution to the same effect. I mention that a work which I am now preparing for the press, in which all the Australian Land-Shells known to me will be described (in English) and represented by coloured plates, will, I trust, be published before any considerable number of new shells can have come before me, even supported as I have been and still am by the contributions of collectors in all the Australian colonies. However, by next mail I hope to be able to send descriptions of some more undescribed species.

1. *HELIX LAMPROIDES*, mihi.

H. testa umbilicata, convexo-depressa, tenui, conferte et irregulariter costato-striata, supra vix nitida, infra nitidiore, corneo-rufescente, subtus pallidiore; spira parvula, convexiuscula, obtusa; anfr. 4, celeriter accrescentibus, ultimo non descendente, supra depresso, infra convexo, obtuse angulato; apertura obliqua, rotundato-lunata; peristomate simplici, tenui, marginibus conniventibus, dextro recto, antice angulato, columellari arcuato, non dilatato, nec reflexo.

Diam. maj. 0·57, min. 0·50, alt. 0·22 unc.

Hab. North-western coast of Tasmania.

Closely allied to *H. lamprea*, Pfr., but more coarsely sculptured and wanting the extreme polish of that species, besides being obtusely carinated, and having the aperture angular externally.

2. *HELIX HAMILTONI*, mihi.

H. testa umbilicata, subdiscoidea, convexo-depressa, tenui, conferte subarcuatim costulata, interstitiis tenuissime filosis, lineis minutissimis spiralibus cæteras decussantibus, faciem (sub lente) lineato-granulatam exhibente, haud nitida, pallide rufescente-cornea; spira parva, vix prominente, interdum planata, sutura impressa; anfr. 5, celeriter accrescentibus, planato-conveiusculis, ultimo subinflato, rotundo-convexo, non antice descendente, ad os supra modice planato, basi striis minoribus munito; umbilico perspectivo, fere $\frac{1}{5}$ diametri æquante; apertura diagonali, ovato-lunari; peristomate simplici, tenui, recto, marginibus conniventibus, columellari supra modice dilatato et reflexo.

Diam. maj. 0·53, min. 0·45, alt. 0·20 unc.

Hab. Mount Wellington, Macquarie Harbour, and north-eastern coast of Tasmania.

A small dark variety from the last-mentioned locality has the decussating striæ nearly obsolete. This species may be associated with *H. bombycina*, Pfr., although not very closely allied to it.

3. *HELIX DIEMENENSIS*, mihi.

H. testa umbilicata, depresso-orbiculari, discoidea, tenui, translucida, costulis perplurimis prominulis subarcuatis munita, non nitente, sordide lutescente, fasciis plurimis pallide rufis radiatim ornata; spira parva, vix prominente, sutura mediocri; anfr. 4½, lente accrescentibus, convexiusculis, ultimo regulariter rotundo-convexo, non descendente; umbilico ⅓ diametri æquante; apertura obliqua, lunata; peristomate tenui, recto.

Diam. maj. 0·37, min. 0·33, alt. 0·14 unc.

Hab. Tasmania.

The two specimens in my collection are both imperfect in the mouth, so that I cannot describe the upper part of the columella.

4. *HELIX WELLINGTONENSIS*, mihi.

H. testa umbilicata, depresso-orbiculari, subdiscoidea, tenui, costulis filosis subarcuatim radiantibus munita, sæpe usque ad umbilicum extendentibus, non nitente, vitreo-albo ad sordide luteum variante; spira parva, vix elevata; anfr. 4, lente accrescentibus, modice convexis, ultimo prominente, convexo, non descendente; umbilico perspectivo, ⅓ diametri æquante; apertura modice obliqua, lunata; peristomate simplici, tenui, recto, marginibus conniventibus, columellari non dilatato, nec reflexo.

Diam. maj. 0·27, min. 0·23, alt. 0·14 unc.

Hab. Mount Wellington, Tasmania.

Closely allied to *H. diemenensis*, but with fewer and more thread-like ribs, besides differing in other respects. This shell and *H. hamiltoni* were both presented to me while in Tasmania with the specific names now given (by whom I know not) attached; but I have no reason to suppose that descriptions of them have ever been published.

5. *HELIX ALBANENSIS*, mihi.

H. testa umbilicata, depresso-convexa, arcuatim acute flexuoso-costata, solidiuscula, haud nitida, flavescens, superne fasciis plurimis rubro-fuscis brevibus radiantibus ornata; spira modice conoidea, obtusa, sutura impressa; anfractibus 5, lente accrescentibus, subconvexis, ultimo rotundato, ad os subinflato; umbilico perspectivo, ⅓ diametri occupante; apertura rotundato-lunata, modice obliqua; peristomate tenui, simplici, marginibus conniventibus, callo tenui junctis.

Diam. maj. 0·20, min. 0·18, alt. 0·12 unc.

Hab. Port Albany, Western Australia (*Masters*).

This would come under the subgenus *Discus*, along with *H. cygnea*, Bens., and *H. sublesta*, Bens., of the same colony, but is

not very closely allied to either. The red markings are very characteristic.

6. *HELIX PENOLENSIS*, mihi.

H. testa umbilicata, subgloboso-depressa, tenuiuscula, striatula, pallide cornea, nitidiuscula; spira late et obtuse conica; anfr. 4, planato-convexis, ultimo obtuse carinato, non descendente, subtus convexiore; apertura angulato-lunari; peristomate simplici, recto, margine dextro vix curvato, ad carinam angulato, tum arcuato, fere semicirculum formante, columellari superne calloso, breviter dilatato, et paululum reflexo, umbilicum parvum semitegente.

Diam. maj. 0·15, min. 0·13, alt. 0·08 unc.

Hab. Penola, South Australia (*Rev. J. E. Terrison Woods*).

A rather dull, horny, broadly semiconical species, allied to *H. turriculata*, mihi.

7. *HELIX TURRICULATA*, mihi.

H. testa minute umbilicata, semigloboso-conoidea, pallide corneo-vitreâ, nitidiuscula, tenuissima, undique tenuiter striatula; spira conica, obtusa; anfr. 6, lente accrescentibus, convexiusculis, ultimo carinato, non descendente, basi leviter declivi, striatulo ut supra, sed nitidior; apertura modice obliqua, angulato-lunata; peristomate simplici, tenui, antice leviter angulato, margine columellari supra modice dilatato et fornicatim expanso.

Diam. maj. 0·15, min. 0·13, alt. 0·10 unc.

Hab. Miriam Vale, Port Curtis, Queensland.

A delicate, glassy, conical species, the very regular spire of which is thrice as high as the base. It may be regarded as belonging to the section *Conulus*, and is nearly allied to the less trochiform and hyaline, but more coarsely sculptured *H. umbraculorum*, Cox.

8. *HELIX AVIDORUM*, mihi.

H. testa profunde umbilicata, depresso-globosa, tenui, parum nitente, radiatim rugoso-striata, et (sub lente) subtilissime granulata, corneo-lutescente; spira parva, late depressa; apice obtusa, sutura impressa; anfr. 4½, convexis, ultimo peramplo, rotundato, tumido, basi pallidior et levior; apertura lunato-circulari, peristomate tenui, recto, reflexo, marginibus conniventibus, columellari basi modice dilatato, umbilici semissem obtegente.

Diam. maj. 0·55, min. 0·45, alt. 0·30 unc.

Hab. Clarence River, New South Wales (under logs in open iron-bark ranges, burrowing in wet weather) (*MacGillivray*); Brisbane, Queensland (*Masters*).

9. *HELIX MARCESCENS*, mihi.

H. testa anguste et profunde umbilicata, depresso-orbiculari, tenui, translucente, nitidiuscula, levissime rugoso-striata et (sub lente)

subtilissime granulata, corneo-lutescente; spira convexa, obtusa, sutura mediocri, tenuiter rufo tæniolata; anfr. 5, lente accrescentibus, convexiusculis, ultimo rotundo-convexo; apertura lunari-rotundata; peristomate recto, tenui, marginibus subconniventibus, columellari supra dilatato et fornicatim reflexo.

Diam. maj. 0·63, min. 0·57, alt. 0·30 unc.

Hab. Clarence River, about South Grafton (under bark and logs) (MacGillivray).

A thin horny semitransparent shell, like a starved miniature *H. grayi*, Pfr., and approaching next to *H. avidorum*, mihi, a much more globose shell with an impressed suture. The reddish streak along the suture is not always present.

10. *HELIX PACHYSTYLOIDES*, mihi.

H. testa umbilicata, globosa, solidula vel tenui, nitida, corneo-lutescente, striis incrementi levibus, rugatis, confertissime rugis irregularibus decussata; spira brevi, obtusa, sutura crenulata; anfr. 5, convexis, celeriter accrescentibus, ultimo permagno, inflato; apertura fere diagonali, rotundato-lunata; peristomate extus flavo, intus pallide carneo (interdum albedo), recto, tenuiter expanso, marginibus subconniventibus et callo tenui junctis, basali expansiore, columellari supra dilatato, intus subcalloso, externe umbilicum profundum semiocculante.

Diam. maj. 1·20, min. 1, alt. 0·85 unc.

Hab. Cape York (Damel).

This varies considerably in solidity, being sometimes even a delicate thin and horny shell, then most nearly allied to the very small but exumbilicated variety of *H. pachystyla*.

11. *HELIX MUCOSA*, mihi.

H. testa umbilicata, depresso-orbiculari, subdiscoidea, irregulariter et conferte rugoso-striata, solidiuscula, oleoso-micante; spira latissime conoidea, apice submersa; anfr. 4½ lente accrescentibus, convexiusculis, ultimo subito antice deflexo, obsolete carinato, basi convexo, rugoso-strigato ut supra, sed levius; umbilico perspectivo, fere ⅓ diametri æquante; apertura rotundo-lunari; peristomate simplici, recto, marginibus subconniventibus, columellari supra valde expanso et reflexo.

Diam. maj. 0·30, min. 0·25, alt. 0·14 unc.

Hab. Clarence River (MacGillivray).

Belonging to the section *Discus*, but not closely approaching any species known to me. I hope the name *mucosa* will stand, although there is already a *mucida*.

12. *HELIX PEXA*, mihi.

H. testa umbilicata, depressa, fere discoidea, tenui, translucente, regulariter et conferte arcuato-costata, costis apparentibus ut binis coalescentibus, interstitiis non (sub lente) striatis, pallide lutescenti-cornea; spira plana, sutura mediocri; anfr. 4, con-

vexis, ultimo angusto, rotundato, basi subnitido, costulis in umbilicum perspectivum et $\frac{1}{2}$ diametri æquantem descendentibus; apertura fere diagonali, lunari; peristomate simplici, tenui.

Diam. maj. 0·08, min. 0·07, alt. 0·04 unc.

Hab. Greystanes, New South Wales (Cox).

Easily distinguished from the nearly allied *H. cochlidium*, Cox, by the difference in colour, and the fineness of the minute riblets, which are also much more numerous than in its white plicately-ribbed ally.

10. Notes on the Specimens of *Calyptræidæ* in Mr. Cuming's Collection. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

Mrs. Gray having kindly undertaken to place some of the shells of the late Mr. Cuming's collection on tablets, the specimens of certain families have come under my supervision, and I have been induced to make some observations that I thought might tend to the better understanding of the species. I herewith send my notes on the shells of the family *Calyptræidæ*, and this paper may be followed by some others of a similar character.

I shall preface these notes by some observations on the collection itself.

I certainly should have considered the following observations unnecessary if most exaggerated statements had not been published respecting the collection, which are likely to mislead the public—such, for example, as that each specimen had not only its name and its special locality attached to it, but also the depth in the ocean at which it was found, and that the specimens are in all instances the actual types of the species from which the descriptions have been taken. As this is not the case, it is necessary that some account of the collection as it was received by the British Museum should be given, in order that it may be properly understood by the scientific conchologists who may hereafter consult it. I have not the least intention by the following remarks to depreciate the value of Mr. Cuming's labours as a collector, or of his collection; for every conchologist, both scientific and amateur, is very greatly indebted to him for having collected one of the largest and most perfect collections of shells ever brought together; for he not only collected extensively himself, but he excited others to collect, and he left no stone unturned to obtain from other collections in all countries such specimens as he wanted, or from which, as types, species had been described; and he also, in the most free and liberal manner, opened the collection to the use of such conchologists and iconographers as would fall into his views as to the describing and naming of species.

When I first saw the collection, fifteen or sixteen years ago, as may be seen by my report to the Trustees of the British Museum,

which is published in some of the Parliamentary Papers relative to the Museum, the collection was without any names or habitats to the species. The names have been added since Mr. Cuming's recovery, and gummed to the mouth of one of the specimens of each preserved species. These names were not affixed by the original describers and figurers of the species, but by two well-known conchologists; and as they must be considered to rest on identification by the latter and not by the original describers, this rather detracts from their authenticity as absolute types of the species described. It is to be regretted that when these names were attached the special habitats of the specimens were not also marked on them.

I am informed that as soon as any specimens were described Mr. Cuming was in the habit of destroying the habitats sent with them, as he said they could be discovered by looking at the work in which they were described. This is certainly a very inconvenient and roundabout way of arriving at the information required: if the species was procured from two or more localities, one is not able to discover which specimen belonged to each special locality.

In many of the specimens, especially those that have not yet been determined or named, the habitat, written on a small paper label, is stuffed into the mouth of the shell.

As yet I have not observed any indication of the depths in the ocean whence the specimens were obtained. Indeed it was only the specimens which Mr. Cuming or a few other collectors themselves dredged to which such an addition could be made; and I suppose that Mr. Cuming would also say that this could be obtained from the work in which the species are described. But here, again, the same uncertainty prevails; which are the specimens that were obtained at the depth indicated? Perhaps all those that were referred to when first described have been replaced by other and better specimens obtained at a very different depth; for shells vary in size and colour according to the depths at which they may have happened to live.

It was of necessity impossible that Mr. Cuming could have ascertained the depth at which the shells lived that he obtained from the various collections he selected from, or from other dealers*.

* Indeed I am not willing to pay so much regard to the depth at which species are said to have been obtained as some geologists appear to do, except when the specimens are obtained at some special dredging. My faith was shaken by the following fact:—A collection of shells was offered to me for sale, at the time that geologists were interested in the depth at which mollusca live, which I carefully examined; but as it contained many duplicates I declined it, and it was purchased by a respectable dealer. And what was my astonishment, when the collection was offered to me to select from, to find that each species was marked with the depth at which it was obtained, for which there was not the slightest authority; but the subject of depth was exciting interest at the time, and its being attached to the specimen was supposed to give them an additional value; and I regret to say I have seen these pretended depths quoted in a geological work as if they were true. Persons who have theories to propose or support are often not sufficiently alive to the great necessity of examining the authority of the statements which they receive and quote as facts, or the readiness with which persons, when money is to be made by the subject, are willing to stretch a point to suit their purpose.

Though, in the vast majority of cases, the shells more recently named are to be regarded as the type specimens of the species described and figured from Mr. Cuming's collection, unfortunately, from Mr. Cuming's habit of replacing shells in his cabinet by better specimens when they occurred, there is a certain amount of uncertainty as to these shells being the types of the species described, the accuracy of the determination resting in such cases on the accuracy of Mr. Cuming's determination of their identity with the shells replaced; but there is no doubt that in the distinction of species and varieties Mr. Cuming was very acute and is to be generally depended on.

There is also another source of uncertainty. Mr. Cuming was in the habit of sending to Dr. Pfeiffer, Reeve, Sowerby, and other describers and figurers of the species certain specimens from his duplicates marked with the same number as that attached to his own specimens; and the determination of the species depended on the accuracy with which these numbers were reported. I have observed a few undoubted mistakes arising from this system, and therefore believe that there may be others, though probably the number is not large; but these show the necessity of depending in all these cases on the shell named agreeing with the description, rather than on the fact that the specimens are so named in the collection.

A very large number of species in the collection have been separated on very slight characters, or on the slightest variation of form, state, and colour. This has greatly arisen from the description and figuring of shells lately made known chiefly falling into the hands of dealers, like Mr. Reeve and Mr. Sowerby, or of persons employed by dealers, who select for their purpose those who are ready to fall into their views and make as many new species as possible; and the dealers are ready to repay such work with specimens to increase the describer's collection, or in other ways.

A shell with a new name is much more valuable in a pecuniary point of view than one with an old and well-known name.

The value dealers attach to new names is proved by an incident that occurred to myself a few days ago, when a dealer offered me a new *Volute* for ten guineas. I said it was not new, only a slight variety of a well-known species. At length he admitted that he had nine specimens of the *Volute*, and ended by offering to present me with the best of the series if I would describe it as a new species! I am told that at length he found a person to fall into his views, and sold all his specimens at or above the price first mentioned. A short time ago a gentleman was induced to purchase a *Volute* at a high price, on the understanding that if he purchased it it would be described, figured, and named after him. This was done, though the shell is only a slight variety of a well-known not uncommon South Australian species. Fortunately the description was printed only on a flyleaf with the plate, and it is not likely to be preserved.

The paying for the description of species of animals is no new source of trade, for it is recorded that John Reinhold Foster was paid threepence a species for describing new British insects for a scientific zoologist; but dealers can now afford to pay better, as is

shown by the offer that was made to me respecting the new *Volute*; and private collections have been much enriched by such labours.

No one knew better than Mr. Cuming the value of a new name to his specimens, as shown by his enmity to any one who doubted the novelty of the species described. He would not allow me to see his collection for many years after his return from South America, because I had pointed out to him at one of the meetings of this Society that some of the shells which Messrs. Sowerby and Broderip had described as new were well-known species, and well figured by Chemnitz. Indeed I was not allowed to see any part of his collection until it was first offered to the British Museum for sale, during his illness about sixteen years ago.

Since that period Mr. Cuming refused a well-known conchologist, who had previously described several shells from his cabinet, any further use of his collection, because he refused to admit that certain specimens which he sent to him to be described were new to science, or different from species already described.

The system that Mr. Cuming adopted of selecting three specimens of each variety or species most alike tended to prevent the number of nominal or presumed species from being observed during a casual examination of the collection, as it excluded those specimens which showed the transition from one variety to another which occurs in any given species—more especially as the species were not arranged in the drawers so that the most allied or presumed species were near to each other, but, on the contrary, the two or more variations of the same species were often placed as species in distant parts of the series.

The fact of a naturalist having the power of merely adding his name after the name of an animal or plant described has been supposed to have influenced many in attempting to establish species, or in altering the names of old species on very slight grounds; but if we add to this little vanity the greater inducement of an increase in the value of the specimens themselves and the collection in which they are contained, or of increasing the sale of the book in which they are described and figured, or, further, if a naturalist is to be paid so much per species for all the species he can describe from a collection, it is not difficult to believe, under these various circumstances, that the number of the species in such a collection are very needlessly increased.

This has caused so many nominal species to be created by collectors of ferns and other plants and by nurserymen; but such names are rarely regarded as of any authority by scientific botanists.

I have had the shells of the Cumingian collection placed on tablets so that they may be arranged in the same series as the other shells in the British Museum; but each tablet is marked in such a manner that it may be at once distinguished from the rest of the collection, so that there can be no doubt about which are the types or the presumed types of the species described from the collection. I feared that, if the shells were not placed on tablets, the specimens of the same species might be separated from their allies and mixed with

those of other species, and thus the identity of the nomenclature might be destroyed or rendered doubtful.

It is to be hoped that some day this magnificent collection of shells in the British Museum may be studied scientifically, and all their nominal and dealers' species be reduced to synonyms, and eventually allowed to drop out of the catalogue, to which the greater part of them ought never to have been admitted. To attempt to do this to some extent in certain families is the one of the objects of this paper.

I have not attempted in these notes to give a general synonymy of the species; but I have only added after the name of each species a list of the names and their authors that are attached to the specimens of the species described in Mr. Cuming's collection, which are to be presumed to be the types of the species described or figured under these names by the author quoted. In some instances the state of the specimen named by the author renders the determination uncertain; then I have added a mark of doubt before the names.

At the commencement of this century shells were generally arranged according to the Linnean system, and Dillwyn's 'Species of Shells' was one of the best works published, and Wood's 'Illustrated Catalogue' was a useful and cheap collection of figures; and the system suited very well for the small number of species then known.

Some of the older collectors preferred to use Humphrey's catalogue, in which many modern genera were sketched out, rather than the heterogeneous collection of species that were crowded in the Linnean genera.

Whenever a person had a large collection to arrange he found, like Humphrey, that the shells fell into natural groups that were recognized by the public, who had given them vernacular names.

Thus Lichtenstein in Berlin, Schumacher in Copenhagen, and Lamarck in Paris, each having a large collection to arrange, proposed new groups of species, or genera, and a new arrangement of the genera.

Lamarck, who had been educated as a botanist, set to work to describe the species in the genera which he proposed; and that gave a preponderance to his system.

The use of the Lamarckian system was first introduced into England by my predecessor, Mr. Children, who arranged the shells in the British Museum on that system, and published a translation of Lamarck's 'Genera,' illustrated with a figure of each. Sowerby and Couch published similar works. And more lately the late Mr. Woodward, who seems to have been disturbed at the rapid progress that the knowledge of the animals and shells were making in this country, published his manual, which is written chiefly from a palæontologist's point of view, trying to stem the current; and the manner in which his work has been received, and is still spoken of, is a proof that he well understood the calibre of the collectors both of recent and fossil shells.

When the collection of shells was arranged in the eastern gallery of the British Museum, which had been built for the National Gallery,

then used for the mineral collections, and at length given up to the zoological collections in 1840, I arranged the species in what appeared to me natural groups, and took care to find out the names that previous writers had given to those groups, and gave the characters of the groups and genera in a 'Synopsis' which was sold in the Hall for a shilling. This proceeding at first excited the anger of the persons who had adopted the Lamarckian system, some of whom had a vested interest in works written on that system. Knowing but little of the history of the science, they persisted in believing that all the groups were creations of my own, and denounced me as the manufacturer of an immense number of useless genera. Thus in Sowerby's 'Manual of Conchology' there are numbers of genera referred to me which were formed when I was a child, or even before I was born, and which often are only quoted to be objected to. Yet that manual is a very useful work for any one commencing the study of conchology, as it contains a very good series of figures of many more genera than are to be found in any other English work on the subject.

Observing the ignorance that generally existed on the subject, I compiled a list of genera of recent shells, giving the type of each genus. This was published in the 'Proceedings' of this Society for 1847, and contained in a few pages a condensed account of the labours of most conchologists that had written before that date. This showed how many minds had been occupied with the arrangement of shells,—and also that there were 810 well established genera, many having several names, and that only a very small proportion of them had been separated or named by myself. About the same time Mrs. Gray published, for the use of students, etchings of the animals of shells which she had been collecting for my use from various sources.

The publication of these two works, and the almost simultaneous appearance of a work 'On the Synonyma of the Genera of Mollusca' by Hermannsen, gave a great impulse to this study both in this country and the continent.

Dr. Philippi, during his voyage to Chili, compiled a 'Manual of Mollusca,' chiefly based on my 'List of Genera.'

Then the Messrs. Adams commenced a work on the 'Genera of Mollusca,' based on the same list, and on the collection arranged according to it in the British Museum. And more lately, Dr. Chemnitz seems to have felt that the time had arrived when the French conchologists might be inclined to progress beyond the system proposed by Lamarck, and published a 'Manuel de Conchyliologie,' in 2 vols. 8vo, illustrated with figures of several thousand species. This work is based on my 'List of Genera,' and on the 'Genera' of Messrs. Adams, and is certainly one of the cheapest and most useful manuals for the use of the shell-collector and malacologist that have yet been compiled.

The collection of shells exhibited in the British Museum first showed to the conchologist and the palæontologist the advantage of the more scientific arrangement of the mollusca and their shells into

smaller groups, and according to the structure of the mollusca and their teeth and anatomy, the opercula, and the shells.

The dealers were at length convinced (as Humphrey had been many years before) that the use of a larger number of genera extended their trade, as it produced a crop of customers (besides those who merely bought shells for their beauty or variety) who purchased the less conspicuous shells for the purpose of obtaining one or more examples of each genus; and the general students were gradually induced to adopt the improvement.

The students of fossil shells seem inclined to lag behind the knowledge of the day. They have some excuse, as fossil shells do not afford them all the means of study to be obtained from recent species; but they might do much more than they have done, and they never can derive all the advantages in geology that the study of the fossil mollusca can afford them until they study their shells with the same attention as has been applied to the recent species, and revise the heterogeneous genera into which they are now grouped. Mr. Searles Wood, long ago, set an example of the right course to be pursued in his paper "On the Crag Fossils;" but few have followed him. I think that the faith they place in Woodward's 'Manual' is one of the causes of their want of progress.

The iconographers, such as Lovell Reeve and Mr. Sowerby, have published illustrated monographs of many genera of shells on the modern system; but unfortunately they do not seem to think it is enough to figure each species, but they figure even slight varieties under the name of species. This has rendered their works so expensive that they are only to be regarded as works of luxury for the libraries of the rich; while the number of the varieties they figure, and the want of system in the arrangement of the species, render them very difficult to use by the scientific conchologist. You may almost buy a good collection of shells for the price of these works; and every one would learn more from the shells themselves than from works on them of such an unscientific character.

Fam. CALYPTRÆIDÆ.

The shells of *Calyptræidæ* are peculiar as being spiral shells which have the edge of the mouth so expanded behind as to cover the hinder part of the foot of the animal. The front side of the last whorls of the shell, which lies on the upper surface of the foot, being protected from external injury by this extension of the margin of the mouth of the shell, is thin and polished externally, like the rest of the inner surface of the cavity of the shell, of which it seems to form a part.

When we have observed the rationale of the structure, the difference between the two families *Calyptræidæ* and *Capulidæ*, which have animals of a very similar structure, is easily understood.

In *Capulidæ* the shell is a very short cone, with a large open sub-circular mouth and an incomplete edge; it has the shell attached to the body of the animal by an adductor muscle near the hinder

edge of the aperture, like most shells of the kind with a very large open mouth—this muscle, of a very large size and extent, leaving an impression of a horseshoe-shape, as is also the case with *Patella* and other shells of the short conical form.

In the *Calyptræidæ*, on the contrary, the adductor muscle, which attaches the animal to the shell, is affixed to the inner surface of the outer lip of the shell, near the margin, as in other spiral shells—that is to say, those that are formed of an elongated shelly cone, spirally twisted round an imaginary axis.

This character is constant, though the shells in the different genera assume such different forms and are sometimes so flat as to be spiral only in name; and it is the adductor muscle that is attached in the same situation, though the outer lip may be in the form of a shelly plate or of a large cup attached to one of the sides of the simple conical cavity of the conical shell, which has only a very minute spiral nucleus, showing that the animal, which when adult forms a conical *Patella*-like shell, had a spiral shell on its back with a moderate-sized mouth when it was first hatched.

The structure of the shells is not usually understood. The front of the last whorl is rudimentary in the entire family. It is most developed and most nearly in the usual form in the genus *Trochita*, and is in a much more rudimentary condition in *Crucibulum* and *Calyptra*. In the genus *Mitrella* the pillar-lip is reflected and soldered on itself, as in most shells with an imperforated axis; but the cavity beneath the reflexed portion in the different species and groups is gradually enlarged, until the shell has what in other shells is called an umbilicated axis. In *Dispotæa* and *Crucibulum* the cup is a very largely dilated umbilicus, surrounded by a very rudimentary front of the whorl. Anomalous as the form of the Cup-and-Saucer Limpet appears, the study of the series shows that it is only an easily understood modification of the usual form of shells.

The structure of *Ergæa* is most peculiar. I cannot call to mind any shell showing the same peculiarities. The front of the whorls is as rudimentary as in *Dispotæa* and *Crypta*; as in the genus *Galerus* there is a small compressed perforation extending up to the apex of the cavity; but this perforation, instead of being on the edge of a twisted central column as in that genus, is on the surface of a transverse plate. This plate somewhat resembles the front of the whorl of the genus *Crypta*; but in that genus the aperture and the front of the whorl are as wide as the shell, and the axis of the shell is marginal, and not marked externally.

Comparing the structure of *Ergæa* with that of *Galerus*, I believe that it chiefly differs from the latter genus in that the front of the inner lip, after being reflexed over the imaginary axis of the shell as in *Galerus*, forming the perforation, is again reflexed and continued on to the other side of the cavity of the shell, where it is attached; the right side of the plate is broader and rounder, and the left side shorter and narrower. The generality of conchologists have so little estimation of this kind of comparison, that in studying the explanation of the structure of the genus I am laying myself open to the

observation that Mr. Lovell Reeve made on the remarks that I made respecting the development of the shell of *Humphreyia*, "That if the shell could speak it would be astonished at what was said respecting its structure."

When the structure of *Trochita*, *Crypta*, *Crucibulum*, and *Mitrella* are studied in a series, it is easy to understand and to trace out how the various forms gradually pass into each other; and the peculiarity by which the genera are separated is chiefly a modification of the inner lip. And from analogy one is convinced that the curved plate at the top of the cavity of *Calyptra* must be a modification of the same part of the shell. As yet we have not discovered any shells which show how the modifications have been brought about, or which show any intermediate form between the plate and the cup-like appendage of *Crucibulum*, or the spiral lamina of *Mitrella*, which is most developed in *Trochita*. It has been suggested that it is half of the internal cup of *Crucibulum*: but this is a mistake; for the adductor muscle is attached to the outer surface of the cup of *Crucibulum*, and to the front of the inner surfaces of *Calyptra*; so that, if it is any modification of that cup, it must be that the two sides of the cup are compressed together, and the cup-like concavity destroyed. We only know that the spiral shell that covers the just-hatched animal, instead of being extended in its spiral form, is developed into a nearly symmetrical conical shell without the least appearance of a spire, and that the inner lip of the nucleus is dilated into a curved subsymmetrical appendage attached to the apex of the upper part of the cavity, to the front or inner surface of which the adductor muscle which fixed the animal to the shell is affixed.

As *Trochita* is the most spiral, and indeed exhibits the most normal form of the shell of the family, so *Calyptra* is the most abnormally formed shell of the group. The simple conical form of the shell and its cavity gives it some resemblance to the shell of *Capulus*; and *Calyptra* differs from all the other genera of the family to which it is referred by the animal forming an under valve or shelly plate, as the animal of *Hipponyx* does among *Capulidæ*; but the position of the adductor muscle shows that the genus, though so abnormal, is properly referred to *Calyptræidæ*.

Tribe I. *Shell conical, circular, spiral; apex central; whorls several, regular; nucleus spiral; cavity circular, spiral, with an oblong four-sided mouth.* Trochitina.

1. TROCHITA, Schumacher; Adams.

Trochatella, Lesson.

Infundibulum, D'Orb.

Shell conical, circular, spiral. Apex central. Whorls several, well developed. Base circular, concave. Mouth moderate, oblong, four-sided, transverse. Axis central, imperforated, not exposed to view.

The shells are rarely flat when the animal has affixed itself over a cavity in stones or shells.

TROCHITA RADIANS.

Trochus radians, Desh.

Var. Dark chestnut (Chenu, Man. f. 2343).

T. spirata, Forbes.

Shell solid; whorls flat, with oblique ribs; margins of base dented.

Var. Shell distorted, nearly flat; whorls indistinctly marked.

Hab. Coast of Peru; Valparaiso; Straits of Magellan.

2. CLYPEOLA.

Shell conical, circular, spiral, thin. Apex central. Whorls several, well developed. Base concave, circular. Mouth large, oblong, four-sided. Axis central, imperforated, spiral, exposed to the apex of the cavity. Periostraca horny, thin, lamellar.

A *Trochila* with somewhat the appearance of a *Mitrella*.

* *Skull depressed, smooth.*

1. CLYPEOLA MAGELLANICA.

Trochita clypeolum, Reeve.

Shell thin, conical, depressed, smooth, covered with laminar foliaceous periostraca; base nearly flat.

Hab. Magellan Straits.

2. CLYPEOLA TENUIS, n. s.

Shell thin, conical, depressed, smooth.

Hab. New Zealand.

** *Shell high, conical; whorls costate.*

3. CLYPEOLA CORRUGATA.

Trochita corrugata, Reeve.

"*T. spirata*, var.," Reeve; Chenu, Man. f. 2347, 2348.

Calyptrea pileus, Lamk.; Deless. Icon. t. 34. f. 2.

Shell high, conical, acute; whorls flat, obliquely costate, or nearly smooth; base deeply concave.

Hab. Peru.

Var. *lavis*. Shell smooth and thin; the spire of the column of one specimen more exposed and open.

Hab. Falkland Islands.

3. TROCHELLA.

Shell obliquely conical, depressed. Apex subcentral. Whorls well developed, covered with a horny lamellar periostraca. Nucleus

spiral. Base oblong, concave. Aperture very large, oblong, four-sided, not quite so wide as the shell. Axis deeply concave on the right side of the base.

1. *TROCHELLA MACULATA*.

Calyptrea comma-notata, Sowerby (*Galerus chinensis* (!), Chenu, Man. f. 2350, 2351; *Calyptrea maculata*, Quoy).

Shell convex, oblique, conical, rather solid; inside purple.

Hab. New Zealand.

2. *TROCHELLA CALYPTRÆFORMIS*.

Trochus calyptreæformis, Lamk.

Shell thin, depressed, concentric, striated; spire purplish.

Hab. —?

I cannot find in the Museum Collection (including those received from Mr. Cuming) any shell that agrees with Mr. Sowerby's figure of *Calyptrea dilatata* (Chenu, Man. f. 2349). Some specimens of *Trochella maculata* are oblong or elongate, but they always have a deep impression on the right side of the hinder part of the cavity.

Mr. Swainson formed a genus for *C. dilatata* under the name of *Haliotoideus*, which has been adopted as a subgenus by Adams and Chenu.

Tribe II. *Shell oblong; apex posterior or subposterior, with a transverse plate on the hinder side of the cavity dividing it into two parts.* Cryptaina.

1. *CREPIPATELLA*, Lesson.

Crepidatella, sp., Adams.

Shell subcircular. Internal lamina concave below. Lip sharp, semicircular, separated from the columellar edge by a broad triangular slit.

1. *CREPIPATELLA DILATATA*.

Crepidula dilatata, Lamk.; Brod. (*C. peruviana*, Lamk.; Chenu, Man. f. 2352).

C. foliacea, Brod.

C. nautiloides, Lesson.

Hab. Valparaiso; Straits of Magellan; Peru.

Var. 1. *C. rugulosa*, Dunker.

Var. 2. Shell subcircular, flat. *C. strigata*, Brod.

Var. 3. Shell oval, thin, more convex, white. *C. pallida*, Brod.

2. *CREPIPATELLA FOLIACEA*, Brod.

Shell lamellar, rugose.

3. CREPIPATELLA LINGULATA, Brod.

The internal plate with a subcentral radiating fold, forming a notch in the margin of the lip.

4. CREPIPATELLA DORSATA, Brod.

The apex rather above the margin.

Hab. Vancouver Island.

2. CRYPTA, Humphrey.

Crepidula, Lamk.

Sandalium, Schum.

Shell oblong, elongate. Apex submarginal, subspiral. Internal lamina concave, covering about half the cavity. The lip transverse, nearly straight, or with a slight subcentral notch.

Messrs. H. and A. Adams formed the genus *Inacus* for the white flat specimen of this genus. All the specimens of the different species that take up their residence in the inside of the shell assume this form and colour. It has been suggested that, instead of being dependent on the accident of locality, their living in such places is a habit peculiar to the species, and a proof that they are of a distinct kind. This theory is set at rest by the fact that some specimens of the shell show the two states; that is to say, an animal growing on the outside of a shell has moved to the inside, and an animal that commenced life on the inside of a shell has moved to the outside. In the first case the apex of the shell is convex and brown, and the circumference white and flat; and in the other the apex is flat and white, and the circumference brown and convex. I have seen one specimen in which the animal has moved twice, and the shell has a brown lip and margin and a white flat intermediate space.

The change of form, surface, and colour of the shell of this family was described in my paper, published in the 'Philosophical Transactions' for 1838, and reprinted in Johnston's 'Letters on Conchology;' so there is less excuse for the formation of species, much less genera, on such characters.

* *Apex lateral, posterior, subspiral.* *Crepidula*.

1. CRYPTA ACULEATA.

Crepidula aculeata, Lamk. *Patella aculeata*, Gmelin.

C. echinus, Brod.

C. hystrix, Brod.

C. californica, Nuttall; Chenu, Man. f. 2355, 2356, 2359.

Surface with spiral lines of spines or small scales.

Hab. Jamaica; Rio Janeiro; Honduras; California; Australia; Sydney; Kurrachee; Natal; Japan.

2. CRYPTA COSTATA, Deshayes (Chenu, Man. f. 2353).

Shell with broad spiral ribs, sharp-edged above.

Var. 1. Shell convex, with brown spiral streaks.

Var. 2. Shell flat, pure white.

3. *CRYPTA PORCELLANA*, Adams; Lamk.

Shell smooth, often irregular, costate, tubercular, or granulated from the form of the surface of the body to which they are or were attached.

Var. 1. Shell convex, coloured, varied with stripes or spots; on the outside of shells or on rocks.

Patella porcellana, Linn.

Crepidula porcellana, Lamk.

Crepidula fornicata, *Patella fornicata*, Linn. (Chenu, Man. f. 2354?).

C. arenata, Brod.

C. excavata, Brod.

C. aplysioides, Reeve.

C. onyx, Sow.

C. marginalis, Brod.

Var. 2. Shell flat, often concave above, white; living inside of shells or in cavities.

C. nivea et *C. squama*, Brod.

C. navicelloides, Nuttall.

C. glauca, Say.

C. unguiformis, Lamk.

C. exuviata, Nuttall (see Chenu, Man. f. 2360, 2362).

Surface altered by the body to which it is attached:—

Crepidula lirata, Reeve.

C. rugosa, Nuttall.

Hab. —?

In Messrs. Adams's 'Genera of Shells,' the species here united are scattered among the three subgenera *Crypta*, *Crepidatella*, and *Inacus*, the latter being formed from the specimens that happen to take up their abode in the cavities of shells. It was this extraordinary distribution of species so nearly allied as to be regarded as derived from the same brood or set of eggs, that induced me to undertake to make notes on them. More than one species may be combined in these synonyms, which may be distinguished by some difference in the teeth or other organs of the animal, where the animals from different localities have been examined and compared; and if the specimens from different localities prove to be distinct, each doubtless will furnish the varieties in shape and surface produced by the form and surface of the body to which they may happen to be attached.

4. *CRYPTA SITCHANA*.

Shell smooth, covered with a paleaceous periostraca; inner lip flat, arched inwards.

Crepidula sitchana, Middend.

Hab. Sitcha.

5. CRYPTA LESSONI.

Shell whitish, varied with brown or white; outer surface with concentric expanded lamina.

Crepidula fimbriata, Reeve.

C. lessonii, Brod.

Hab. Monterey; Upper California; Vancouver Straits.

** *Apex of shell subcentral; portions rather produced, acute.*

6. CRYPTA INCURVA.

Shell dark brown (rarely white); apex acute, rather produced, subcentral; the outer surface with close, regular, small, spiral or longitudinal ribs.

Crepidula incurvata, Brod.

Hab. Honduras. Var. 2. —?

7. CRYPTA HEPATICA, Deshayes.

Shell dark brown, smooth, with a white ray on each side of the apex; apex acute, subcentral, produced.

Crepidula hepatica, Desh.

Hab. —?

Messrs. Adams refer the first of these species to the subgenus *Crypta*, and the second to *Crepidatella*.

3. GARNOTIA, Gray.

Shell conical, cup-shaped; apex acute, posterior, above the margin; the internal lamina flat, shelving to the level of the apex, leaving a conical cavity beneath the lip, arched inwards or subtransverse.

GARNOTIA ADUNCA, Sow.

Shell smooth or subcostate, dark brown, with a small white spot on each side of the lip; inner lip pale.

Crepidula rostrata, C. B. Adams: junior?

Hab. Vancouver's Island.

Tribe III. *Shell oblong, transverse, depressed; apex scarcely raised, posterior, submarginal; nucleus distinct; spiral cavity expanded, shallow, with a transverse plate occupying about two-thirds the width on the left or pillar side of the hinder half of the cavity, and attached by each of the sides to the inside of the shell, and with a radiating fold on the lower surface, forming a radiating thickened rib, ending in a concavity like a muscular scar near the edge; the front edge on the right side of the fold short, forming a deep notch; on the left side expanded and rounded, with a notch near the pillar or right edge of the shell.* Ergæina.

The fold in the plate is evidently analogous to the fold and

cavity in the shelly plate of *Mitrella*; but the plate is attached by each of its side edges.

The more convex species might be confounded with *Crepidatella*; but they are always known by the fold forming a subcentral ridge on the lower surface of the plate, and ending in the small shallow pit like the scar of a muscle.

This group has been regarded as a subgenus of *Crypta*; but it is more allied to *Mitrella*.

1. *ERGÆA*, Adams; Chenu.

Shell nearly flat; apex posterior, marginal; nucleus spiral; whorls rapidly enlarging.

The shells when they live in cavities are concave externally,—and when living on a rough surface, corrugated like other *Calyptræidæ*.

ERGÆA WALSHI.

Crepidula walshi, Hermannsen. (*C. plana*, Chenu, Man. f. 2364. Var. distorted and rugose, *C. plana*, Adams & Reeve.)

Hab. Ceylon; Bombay.

2. *NOICIA*.

Shell subcircular or oblong, convex, spiral; whorls one and a half or two; the apex subcentral, subposterior; nucleus spiral; cavity concave, deeper under the apex; internal plates concave, thin, with the fold forming a narrow linear cavity open to the apex of the shell.

NOICIA CHINENSIS, n. s. (in Cumings' Collection).

Shell pale brown, smooth, or slightly concentrically striated.

Hab. China.

Var. Shell very thin, convex; the internal plate thin, with the fold only slightly marked and solid.

Tribe IV. *Shell conical, spiral; spire of few rapidly enlarging whorls; cavity conical, with a well-developed oblique subspiral lamina on one side, from the tip, which has the inner or pillar-edge reflexed, forming a pit or solid rib.* Mitrellina.

1. *MITRELLA*.

Shell conical, like *Poculina*; but the internal plate is oblique and subspiral; the reflexed part of the pillar-lip is closely applied to the plate, and only forming a thickened edge to the plate, there being a small impression like the scar of a muscle at the lower part of it.

1. *MITRELLA CHINENSIS*.

Shell white or rosy; outer surface with minute tubular spines or tubercles.

Patella chinensis, Montagu.

Calyptrea chinensis, Lamk., &c.

Hab. Coasts of Europe.

2. MITRELLA SPINIFERA, n. s. (not named).

Shell depressed, pellucid, brown-spotted, rugose, with oblique radiating ridges armed with tubular spines.

Hab. Kurrachee. Internal lamina imperfect.

See *Trochita spinulosa*, Chenu, Man. f. 2344.

3. MITRELLA SUBREFLEXA.

Calyptræa subreflexa, Carpenter.

Pale brown, smooth, pellucid.

Hab. California.

4. MITRELLA PELLUCIDA.

Calyptræa pellucida, Reeve.

Shell very thin, transparent, smooth.

Hab. —?

2. TROCHILINA.

Shell like former; but the internal plate is much more oblique and spiral, and the reflexed part of the upper portion of the pillar-lip is united to the surface of the plate, forming a short deep compressed perforation near the apex of the cavity.

1. TROCHILINA CONICA.

Calyptræa conica, Brod.

Shell conical, rather thin, pale, brown-spotted, smooth.

Hab. —?

This shell varies greatly in the extent of the internal lamina: in most specimens it occupies much more than one whorl; but in another, which may have been injured, the plate does not occupy more than one-third of a whorl.

2. TROCHILINA FASTIGIATA.

Calyptræa fastigiata, Gould.

Shell conical, circular, smooth, with a smooth pale-brown peristoma.

Hab. Vancouver's Island.

3. TROCHILINA ADSPERSA.

Calyptræa adspersa, C. B. Adams.

Shell depressed, pellucid, brown-dotted.

Hab. —?

4. TROCHILINA MAMILLARIS.

Calyptræa mamillaris, Brod.

Shell solid, white, smooth, opaque, with a red or purple tip; internal plate very thin, transparent.

Hab. California.

5. TROCHILINA SOLIDA.

Calyptræa solida, Reeve.

Shell high, conical, solid, smooth, opaque, white; inner surface and apex purple brown; internal plate very oblique, white.

Hab. Conchagua (*C. A.*).

6. TROCHILINA LICHEN.

Calyptræa lichen, Brod.

Shell very depressed, white, with a few obscure reddish dots, smooth.

Hab. —?

3. POCULINA.

Shell conical; base circular, deeply concave; apex acute, central; nucleus spiral; cavity conical, with an oblique triangular subspiral lamina on one of the sides, which has the pillar bent back so as to form a large deep concavity or umbilicus extending to the apex of the cavity.

This genus is distinguished from *Mitrella* by the apex being distinctly spiral.

1. POCULINA UNGUIS.

Calyptræa unguis, Brod.*C. solida*, Brod. (Chenu, Man. f. 2340).

Shell solid, high, conical, smooth, brown.

Hab. —?

2. POCULINA POCULUM.

Calyptræa poculum, Reeve.

Shell thin, conical, smooth, white or pale brown.

Hab. —?

3. POCULINA AURITA.

Calyptræa aurita, Reeve (Chenu, Man. f. 2336).

Shell depressed, conical, broad, thin, pale brown; outer surface closely and regularly radiately striated.

Hab. —?

Tribe V. *Shell conical, subspiral; the cavity simple, conical; the internal lamina moderate, oblique, irregular, with the edge of the pillar-lip reflexed, forming a narrow elongated deep marginal cavity.*

GALERUS, Humphr. ; Adams.

Mitrella, Leach.*Mitula*, Gray.*Infundibulum*, J. Sow.

Shell circular, conical; apex acute, central; nucleus spiral, erect; cavity circular, regular, conical, with an oblique plate projecting into the cavity on the pillar side, which has a narrow, conical, compressed, cup-shaped cavity on its outer margin.

1. GALERUS EXTINGTORIUS, Adams.

Calyptræa extingtoria, Lamk.

C. morbidum, Reeve.

Shell smooth, white, with diverging brown lines; the lamina as wide as the width of the cup-shaped cavity.

Surface distorted. *C. verrucosum*, Reeve. (*C. lævigata*, Chenu, Man. f. 2337.)

Hab. Molucca; Tranquebar; China.

2. GALERUS LIVIDUS.

Calyptræa lividum, Reeve.

Shell dark brown, horn-colour, pellucid; the lamina near the cup-shaped cavity very narrow, not nearly so wide as the cavity.

Hab. —?

Tribe VI. *Shell circular, regular, conical, subspiral; apex central, acute; nucleus spiral; cavity regular, conical, with an oblique or spiral lamina from the apex, which is elongate, with a slightly reflexed edge near the apex of the cavity, or shorter, oblique, with the pillar-edge reflexed, making a more or less deep and large cup-like appendage.* Disputeana.

The passage from the small, slender, deep perforation under the reflexed portion of the pillar-lip to the large cup-like appendage of the Cup-and-Saucer Limpet (*Crucibulum*) is very gradual.

* *Cup-like cavity large, compressed, narrow, close on the inner surface of the shell.*

1. NELETA.

Shell subcircular, conical, depressed; apex acute, central; nucleus spiral, radiately costate; cavity circular, conical, with a narrow compressed deep cup-shaped concavity on the side, attached to the shell by the whole of its inner surface, open to the tip; the side next to cavity of the shell not thickened or rounded.

Very different from the young of *Crucibulum scutellatum*, and from *Catellina pectinatum*, by the compressed form of the cup, and by the cup not being callous at the tip.

NELETA SERRATA.

Calyptræa serrata, Brod.

Shell conical, depressed; cone rather thin, pellucid, strongly ra-

diately costated; the internal cavity small, compressed, open to the apex of the shell.

Hab. —?

2. TRELANIA.

Shell circular, depressed, conical; apex nearly central, acute; nucleus subspiral; cavity circular, conical, with a narrow lunate deep compressed cup-shaped cavity attached to the inner surface of the shell by the apex and one of the sides, rest free; the edge of the cavity complete and free from the inner surface of the shell.

TRELANIA RADIATA.

Calyptræa radiata, Brod.

Shell brown-rayed, with numerous narrow, close, regular, radiating striae.

Hab. California.

** *Cup-shaped appendage large, broad, triangular.*
"Cup-and-Saucer Limpets."

1. CATILLINA.

Shell oblong, conical, radiately ribbed; the apex acute, subcentral, recurved; nucleus regular, spiral, of one whorl and a half; the cavity conical, with a broad trigonal cup on the left side under, but not extending to, the apex of the cavity, filled with a callous deposit at the tip; the part of the cup next to the inner surface of the shell scarcely thickened and not raised up.

CATILLINA PECTINATA.

Shell conical, high, solid, thick; the cup large, open, triangular, with the upper part filled with a thick calcareous deposit.

Calyptræa pectinata, Carpenter.

C. concamerata, Reeve. (Chenu, Man. f. 2337, 2339.)

Hab. —?

Very like a small *Crucibulum scutellatum*. The upper part of the cup is always partly filled up by a calcareous deposit, and the edge of the cavity next to the inner surface of the shell is not thickened or raised.

2. DISPOTEA, Adams.

"Calypeopsis, Lesson."

Shell circular, conical; the apex acute, posterior, recurved considerably above the edge; nucleus subspiral, lateral; the cavity conical; apex subspiral, with a broad large trigonal cup-like cavity under the apex, attached to the cavity by one of its sides, the edge of which is not raised or thickened; the outer or right lip of the cup straight, spreading, cavity open to the tip.

This chiefly differs from the former genus in the inner lip not being reflexed over the cavity of the cup.

* *Cup conical, deep; shell striated, edge crenated.*

1. *DISPOTEA STRIATA*, Adams.

Calyptræa striata, Say; Chenu, Man. f. 2342.

Shell circular, radiately costated; costæ interrupted by the smooth lines of growth; the cup conical, deep; the right edge straight, even. See *D. cancellata*, Adams & Reeve.

** *Cup concave, shallow; shell smooth, edge even.*

2. *DISPOTEA BILOBATA*.

"*Calyptræa bilobata*, Gray."

Shell thin, oblong or ovate, white, brown-rayed, smooth, minutely rugulose, sublaminal; the cup concave, shallow, the right lip flexuous, two-lobed.

Hab. California.

2. *CRUCIBULUM*, Schumacher; Adams.

Biconia, Swainson.

Calyptropsis, Brod. (not Lesson).

Dispotea, Say.

The shell circular, depressed, conical; apex nearly central, acute; nucleus subspiral; cavity circular, conical, with a broad subtriangular cup-shaped cavity attached by the upper part of one of its sides, but with the edges free from the cavity of the shell on every side.

In the young shell the internal cup is imperfect, consisting of a narrow triangular curved subspiral cavity, without any shelly deposit on the inner side of the cup next to the surface of the shell. As the shell enlarges, the width of the side of the cup decreases, and the edge is completed and at length elevated from the inner surface of the shell.

* *The internal cup broad, rather longer than broad.*

1. *CRUCIBULUM SCUTELLATUM*.

Calyptræa scutellata, Gray.

Crucibulum imbricatum, Brod.

C. umbrella, Desh. (shell very flat).

C. lignaria, Brod.

C. corrugatum, P. Carpenter.

C. ferrugineum, Reeve.

C. trigonale, Adams & Reeve.

C. rugosum, Deshayes.

C. tenuis, Broderip.

Dispotea spectrum.

Shell solid, brown (or pale, with brown rays), with broad flat radiating and concentric ridges, or more or less smooth and closely radiately striated (Chenu, Man. f. 2332, 2335, 2338).

Hab. West Coast of America; Valparaiso; Chiloe; Gulf of California.

The smooth specimens sometimes have costated or cancellated tips, and the converse. The surfaces of the different varieties and the form of the shells are often altered by the form and surface of the body to which they are attached.

2. CRUCIBULUM AURICULATUM.

Patella auriculata, Chemn. *Dispotea auriculata*.

Shell white, brown-spotted, and varied with distant regular sharp-edged radiating ribs; inner surface white or brownish.

Hab. West Indies; St. Thomas's; Cumana.

The Atlantic form of the preceding.

3. CRUCIBULUM VIOLACEUM, Carpenter.

Shell white, brown-varied, with close regular round-topped radiating ribs; inner surface purplish.

Hab. Ceylon.

4. CRUCIBULUM MACULATUM.

Calyptrea maculata, Brod.

Shell white, solid, brown-spotted, with very close, round-topped, nearly regular radiating ribs.

Hab. —?

5. CRUCIBULUM TUBIFERUM.

Dispotea tubifera, Say.

Crucibulum spinosum, Sowerby.

C. hispidum, Brod.

Chenu, Man. f. 2333, 2334.

Shell solid, brown, or brown white-rayed; closely radiately striated, and often with more or less close radiating ribs furnished with tubular spines.

Hab. Peru; Gulf of California.

Tribe VII. *The shell conical, subcircular; apex central, acute; cavity regular, conical, with a folded plate at the top of the cavity, free from the sides; the foot of the animal secreting a lower calcareous plate.* Calyptrina.

CALYPTRA, Humphrey; Adams.

Calyptrea, Lamk.

Calyptrus, Mont.

Mitrularia, Schum.

Calyptria, *Lithedaphus*, et *Litholepas*, Owen.

* *Shell entire, without spines.*

1. CALYPTRA CORRUGATA, Adams; Chenu, Man. f. 2326, 2328.

Calyptrea corrugata, Brod.

Var. smaller. *C. layardi*, Reeve. ? *C. umbo*, Reeve.

Shell solid, with high, compressed, edged, distant radiating ribs.
Hab. —?

2. CALYPTRA ADAMSII, Reeve.

Calyptra depressa, Adams & Reeve.

Shell thin, with close, sharp-edged, regular radiating and concentric ridges, minutely striated between the ridges.

Hab. —.

3. CALYPTRA ALVEOLATA, A. Adams.

Var. 1. Small. *C. umbo*, Reeve. *C. vanikorensis*, Quoy. *C. cancellata*, Reeve.

Var. 2. Thick, flat. *C. varia*, Brod.

Shell solid, with close, radiating, sharp-edged ribs, and more or less distinct low concentric ridges.

Hab. Philippines; Galapagos Islands.

4. CALYPTRA EQUESTRIS, Chenu, Man. f. 2322, 2323.

Patella equestris, Linn.?

Calyptra papyracea, A. Adams.

? *C. radiosa*, Gould. (Bad state, with another species.)

C. scutulum, Reeve.

Shell solid, with sharp-edged radiating ribs, and small radiating lines between them.

Hab. Philippines.

5. CALYPTRA STELLA, Reeve.

Shell depressed, solid, with very close, flat-topped, radiating ribs, which are sometimes alternately smaller.

Hab. —?

6. CALYPTRA TECTUM-SINENSE, Gray, 1824.

Calyptra cepacea, Brod.

C. martiniana, *C. diaphana*, *C. scabies*, *C. domitoria*, *C. tortilis*, *C. cornea*, *C. stallonia*, *C. cicatricosa*, *C. ossea*, *C. saccharimeta*, *C. balanoides*, *C. uncinata*, *C. hipponiceformis*, *C. porosa*, *C. cyathella*, et *C. fibulata*, Reeve.

C. depressa, Adams & Reeve.

Shell thin, very finely, regularly, radiately striated.

Var. with expanding concentric lamina.

Patella tectum sinensis, Chemn.; Chenu, Man. f. 2324, 2325.

Hab. Philippine Islands.

I am by no means certain that the six species here distinguished are distinct. *C. stella* seems most distinct from the rest; but there is only one specimen, and Mr. Cuming has mated it with a small specimen of *C. equestris*. They all seem to live together at the Philippine Islands.

** *Shell with tubular spines.*

7. CALYPTRA TUBIFERA.

Shell thin, pellucid, smooth, with distant, short, tubular spines formed on the edge of the shell, and closed up below as the shell enlarges.

Hab. Honduras. A single specimen, which was not named in the cabinet.

11. Catalogue of Birds collected by Mr. E. Bartlett on the River Huallaga, Eastern Peru, with Notes and Descriptions of New Species. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A. &c.

(Plate XXXIV.)

Mr. E. T. Higgins having kindly allowed us to examine Mr. E. Bartlett's second collection of birds from Eastern Peru before its dispersal, we have the pleasure of submitting the following account of it to the Society.

The present collection was formed during the excursion spoken of in the letter of which an extract is given in the Society's 'Proceedings' for January 1867*, and was mainly amassed at three localities—Yurimaguas, Xeberos, and Chyavetas.

Yurimaguas is an Indian town on the Huallaga, about sixty miles from its embouchure into the Amazon, mentioned in Herndon and Gibbons's 'Exploration of the Amazon' (p. 171).

Xeberos is an Indian village, about fifty miles north-west of Yurimaguas, on a small river (the Aypena) which flows into the Amazon just above the Huallaga.

Chyavetas, or *Chayavetas*, is situated about seventy miles west of Yurimaguas.

All these three places are marked in the copy of the Spanish map (of 1790) attached to Herndon's volume.

The whole collection consists of nearly 1000 skins, referable to 205 species. Of these but very few are new to science, almost the only noticeable exception being the new *Chætura* described below. This may probably arise from the fact that Mr. Hauxwell collected largely at Chamicuros (a village situated upon the opposite bank of the Huallaga, but in the same neighbourhood) in 1854, and that his collections appear to have been widely dispersed in Europe. In comparing the present collection with the former collection from the Ucayali, we find only 94 species common to the two, while 112 species are in the Huallaga collection which had not been previously obtained by Mr. Bartlett.

The following is a list of the species of birds collected at the three

* See *anteà*, p. 2.



J.S.

localities above mentioned in a tabular form, the necessary notes being added subsequently*. The nomenclature employed is that of Selater's 'Catalogue of American Birds.'

	Xeberos.	Yurinaguas.	Chyavetas.
TURDIDÆ.			
†1. <i>Turdus phæopygus</i>	*
2. — <i>amaurochalinus</i>	*		
TROGLODYTIDÆ.			
3. <i>Cyphorhinus modulator</i>	*
†4. <i>Troglodytes tessellatus</i>	*	..	*
SYLVICOLIDÆ.			
†5. <i>Basileuterus uropygialis</i>	*
HIRUNDINIDÆ.			
6. <i>Progne tapera</i>	*		
†7. — <i>leucogastra</i>	*		
8. <i>Atticora fasciata</i>	*	
9. — <i>cyanoleuca</i>	*
10. <i>Stelgidopteryx ruficollis</i>	*	
VIREONIDÆ.			
11. <i>Vireosylvia agilis</i>	*
CEREBIDÆ.			
12. <i>Hemidaenis albiventris</i>	*		
13. <i>Dacnis cayana</i>	*		
14. — <i>melanotis</i>	*		
15. <i>Cœreba cœrulea</i>	*		
16. — <i>cyanea</i>	*		
17. — <i>nitida</i>	*		
18. <i>Chlorophanes atricapilla</i>	*		
TANAGRIDÆ.			
19. <i>Procnias occidentalis</i>	*		
20. <i>Euphonia minuta</i>	*		
21. — <i>rufiventris</i>	*		
22. <i>Calliste yeni</i>	*	..	*
23. — <i>schranksi</i>	*	..	*
24. — <i>gyroloides</i>	*
25. <i>Tanagra cœlestis</i>	*		
26. — <i>melanoptera</i>	*		
27. <i>Ramphocœlus jacapa</i>	*		
28. <i>Phœnicotheraupis rubica</i>	*	*
†29. <i>Tachyphonus phæniceus</i>	*		
30. — <i>rufiventris</i>	*	*
†31. — <i>surinamus</i>	*	..	*

* The collection contained also thirteen skins from Nauta, amongst which were *Ocyalus latirostris*, Waterh., *Psittacula passerina* (Linn.), *Buteogallus nigricollis* (Lath.), *Herodias egretta* (Gm.), and *Nycticorax pileatus* (Lath.), not before mentioned from this locality.

	Xeberos.	Yurinaguas.	Chyvetas.
32. <i>Nemosia auricollis</i>	*	..	*
33. <i>Chlorospingus flavigularis</i>	*	..	*
34. <i>Cissopsis media</i>	*	*	..
35. <i>Saltator magnus</i>	*	*	..
FRINGILLIDÆ.			
+ 36. <i>Guiraca cyanooides</i>	*
37. <i>Oryzoborus crassirostris</i>	*
38. — <i>torridus</i>	*
39. <i>Spermophila luctuosa</i>	*	..	*
40. <i>Volatinia jacarina</i>	*
41. <i>Coturniculus peruanus</i>	*
ICTERIDÆ.			
+ 42. <i>Clypicterus oseryi</i>	*
43. <i>Ostinops cristatus</i>	*
44. — <i>viridis</i>	*
45. <i>Leistes guianensis</i>	*
CORVIDÆ.			
46. <i>Cyanocorax violaceus</i>	*
DENDROCOLAPTIDÆ.			
+ 47. <i>Sclerurus mexicanus</i>	*	..
48. — <i>caudacutus</i>	*	..
49. <i>Synallaxis rutilans</i>	*	..	*
50. <i>Ancistrops lineaticeps</i>	*	..	*
51. <i>Automolus sclateri</i>	*	..	*
52. <i>Glyphorhynchus castelnaudi</i>	*
+ 53. <i>Xenops approximans</i>	*
+ 54. <i>Dendrocolaptes radiolatus</i>	*	..
+ 55. <i>Dendroornis ocellata</i>	*
56. —, sp. inc.	*
FORMICARIIDÆ.			
+ 57. <i>Thamnophilus fuliginosus</i>	*
58. — <i>melanurus</i>	*
+ 59. — <i>murinus</i>	*
60. <i>Pygoptila maculipennis</i>	*
61. — <i>margaritata</i>	*
+ 62. <i>Dysithamnus schistaceus</i>	*	*
+ 63. — <i>ardesiaceus</i>	*
64. <i>Thamnomanes glaucus</i>	*	..	*
65. <i>Myrmotherula pygmaea</i>	*	*	*
+ 66. — <i>hamatonota</i>	*	..	*
67. — <i>melana</i>	*	..	*
+ 68. — <i>cinereiventris</i>	*
69. — <i>hauxwelli</i>	*
70. <i>Ramphocænis melanurus</i>	*
71. <i>Cercomacra cinerascens</i>	*
+ 72. <i>Myrmeciza hemimelana</i>	*
73. <i>Hypocnemis cantator</i>	*	..	*
+ 74. — <i>myiotherina</i>	*	*	*
75. — <i>theresæ</i>	*

	Xebros.	Yurimaguas.	Chayvetas.
76. <i>Pithys albifrons</i>	*
77. — <i>leucaspis</i>	*	..	*
78. <i>Myrmelastes plumbeus</i>	*	..	*
79. <i>Formicarius analis</i>	*	..	*
TYRANNIDÆ.			
+80. <i>Euscarthmus spicifer</i>	*	..	*
81. <i>Mionectes olcagineus</i>	*	..	*
+82. <i>Leptopogon peruvianus</i>	*
83. <i>Tyrannulus elatus</i>	*
84. <i>Elainea modesta</i>	*	..	*
85. <i>Rhynchocyclus sulphureus</i>	*	..	*
86. — <i>megacephalus</i>	*	..	*
87. <i>Pitangus sulphuratus</i>	*	..
88. <i>Myiodynastes solitarius</i>	*	*	..
89. <i>Myiobius erythrurus</i>	*	..	*
90. — <i>barbatus</i>	*	..	*
91. <i>Pyrocephalus rubineus</i>	*	..	*
+92. <i>Empidonchus fuscatus</i>	*	..	*
93. —, sp. ign.	*	..
94. —, sp. ign.	*
+95. <i>Tyrannus aurantio-atro-cristatus</i>	*
96. — <i>melancholicus</i>	*	..	*
COTINGIDÆ.			
+97. <i>Tityra albitorques</i>	*
98. <i>Pachyrhamphus atricapillus</i>	*	..	*
+99. <i>Lipaugus lateralis</i>	*
+100. <i>Iodopleura isabellæ</i>	*
101. <i>Pipra auricapilla</i>	*
102. — <i>leucocilla</i>	*	*	*
103. — <i>cornuta</i> , ♀	*
104. — <i>cyaneocapilla</i>	*
105. —, sp. ign., ♀	*	..	*
+106. <i>Chloropipo</i> , sp. ign., ♀	*
107. <i>Machæropterus striolatus</i>	*	..	*
108. <i>Chromochæris manacus</i>	*
109. <i>Phenicocercus nigricollis</i>	*
110. <i>Rupicola peruviana</i>	*
111. <i>Cotinga cayana</i>	*
112. <i>Cephalopterus ornatus</i>	*
MOMOTIDÆ.			
113. <i>Momotus martii</i>	*
ALCEDINIDÆ.			
114. <i>Ceryle superciliosa</i>	*
GALBULIDÆ.			
115. <i>Galbula albirostris</i>	*	..	*
BUCCONIDÆ.			
116. <i>Bucco collaris</i>	*
117. — <i>macroactylus</i>	*	..	*

	Xebros.	Yurimaguas.	Chiyvetas.
118. <i>Malacoptila fusca</i>	*
119. <i>Nonnula frontalis</i>	*
120. <i>Monasa flavirostris</i>	*
121. — <i>peruana</i>	*
122. <i>Chelidoptera tenebrosa</i>	*	..	*
TROGONIDÆ.			
123. <i>Trogon viridis</i>	*
124. — <i>melanurus</i>	*
CAPRIMULGIDÆ.			
125. <i>Nyctidromus albigollis</i>	*
126. <i>Anrostomus parvulus</i>	*
CYPSELIDÆ.			
127. <i>Chaetura zonaris</i>	*
†128. — <i>brachycerca</i> , sp. nov.	*
129. <i>Cypselus squamatus</i>	*
TROCHILIDÆ.			
130. <i>Phaethornis malaris</i>	*	..	*
131. — <i>boucieri</i>	*	..	*
132. <i>Pygmornis amaura</i>	*
133. — <i>nigricinctus</i>	*
134. <i>Glaucis affinis</i>	*	*	*
135. <i>Campylopterus equatorialis</i>	*
136. <i>Aphantochroa gularis</i>	*
137. <i>Lampornis maugo</i>	*
138. <i>Doryfera johanna</i>	*
139. <i>Thalurania tschudii</i>	*
140. <i>Florisuga mellivora</i>	*	..	*
141. <i>Clais guimeti</i>	*
142. <i>Polenmistria verreauxi</i>	*
143. <i>Gouldia langsdorffi</i>	*	..	*
144. <i>Calliphlox amethystina</i>	*
†145. <i>Polytmus leucorrhous</i>	*
146. <i>Clytolama aurescens</i>	*
147. <i>Helioaster longirostris</i>	*
148. <i>Hylocharis cyanea</i>	*
149. — <i>sapphirina</i>	*
150. <i>Thaunantias fluvialis</i>	*	..
151. <i>Chrysuronia josephina</i>	*
152. <i>Eucephala cerulea</i>	*	..
CUCULIDÆ.			
†153. <i>Piaya mehleri</i>	*
†154. — <i>melanogastra</i>	*
155. <i>Coccyzus melanocoryphus</i>	*
RAMPHASTIDÆ.			
156. <i>Ramphastus ambiguus</i>	*
157. — <i>cuvieri</i>	*
158. — <i>inca</i>	*
159. — <i>culminatus</i>	*

	Xeberos.	Yurimaguas.	Chyavetas.
160. <i>Pteroglossus pluricinctus</i>	*
161. — <i>humboldti</i>	*
162. — <i>flavirostris</i>	*
163. <i>Selenidera reinwardti</i>	*
CAPITONID.E.			
164. <i>Capito peruvianus</i>	*
165. — <i>aurovirens</i>	*	..
PICID.E.			
166. <i>Campephilus trachelopyrus</i>	*	..
167. — <i>albirostris</i>	*	*
168. <i>Celeus citrinus</i>	*
†169. — <i>citreopygius</i>	*	..
170. <i>Chloronerpes hæmatostigma</i>	*	..	*
171. <i>Melanerpes cruentatus</i>	*
PSITTACID.E.			
172. <i>Ara macao</i>	*
173. <i>Conurus cyanopterus</i>	*	..	*
174. — <i>souancei</i>	*	*
175. <i>Brotogerys jugularis</i>	*	*
176. <i>Chrysotis amazonica</i>	*
177. † <i>Pionus menstruus</i>	*
178. <i>Caica melanocephala</i>	*	*
179. — <i>barrabandi</i>	*
†180. <i>Urochroma hueti</i>	*
VULTURID.E.			
181. <i>Gyparchus papa</i>	*
182. <i>Cathartes aura</i>	*
FALCONID.E.			
183. <i>Ibycter americanus</i>	*
184. <i>Morphnus guianensis</i>	*
185. <i>Urubitinga zonura</i>	*
186. <i>Herpetotheres cachinnans</i>	*	..
187. <i>Spizaetus ornatus</i>	*
188. <i>Asturina magnirostris</i>	*	..	*
†189. <i>Micrastur mirandollii</i>	*
190. <i>Harpagus bidentatus</i>	*
191. <i>Ictinia plumbea</i>	*
STRIGID.E.			
192. <i>Strix perlata</i>	*
193. <i>Syrnium</i> , sp. ign.	*
COLUMBID.E.			
194. <i>Columba speciosa</i>	*
195. <i>Chamæpelia amazilia</i>	*
196. <i>Peristera cinerea</i>	*
197. <i>Geotrygon montana</i>	*	..	*
PERDICID.E.			
198. <i>Odontophorus stellatus</i>	*

	Xeberos.	Yurimaguas.	Chyavetas.
TINAMID.E.			
199. <i>Tinamus parvirostris</i>	*
RALLID.E.			
200. <i>Porzana cayanensis</i>	*		
201. <i>Heliornis fulica</i>	*
SCOLOPACID.E.			
202. <i>Tringites rufescens</i>	*		
203. <i>Tringa maculata</i>	*		
ARDEID.E.			
204. <i>Ardea agami</i>	*	
LARID.E.			
205. <i>Rhynchops melanurus</i>	*		

The following notes apply to such of the above-mentioned species as are marked (+):—

(1.) *TURDUS PHÆOPYGUS*, Cab.

Chyavetas. Three examples; rather darker on the back than Cayenne specimens.

(4.) *TROGLODYTES TESSELLATUS*, Lafr. et D'Orb.

Four examples from Xeberos and Chyavetas. Rather more fulvous below than in Panama specimens.

(5.) *BASILEUTERUS UROPYGIALIS*, Slater, P. Z. S. 1861, p. 128, et 1866, p. 286, t. x. f. 2.

One example from Chyavetas, agreeing with the type in Slater's collection. This is a singular locality for the species, as we had believed it to be peculiar to Panama.

✧ (7.) *PROGNE LEUCOGASTRA*, Baird.

Many skins from Xeberos and Yurimaguas. "Generally seen in flocks about the church at Yurimaguas."—E. B.

(29.) *TACHYPHONUS PHENICEUS*, Sw. An. in Menageries, p. 311; Slater, P. Z. S. 1856, p. 116.

Three examples of this scarce species from Xeberos. Natterer obtained specimens on the Madeira.

(31.) *TACHYPHONUS SURINAMUS* (Linn.).

Many specimens from Xeberos and Chyavetas of both sexes of a local form of *T. surinamus*, which is probably the bird indicated by Lawrence (Ann. L. N. Y. viii. p. 42) as *T. napensis*. It differs from

the Cayenne bird principally in its smaller size and darker uropygial band. The females seem also different from those of the typical form, being of a brighter ochreous behind, and having the yellow circlet round the eye much less defined—in some specimens hardly apparent. Specimen *c* of *Tachyphonus surinamus* (from Guia) of Sclater's collection (Cat. A. B. p. 85) also belongs to this form.

(42.) *CLYPICTERUS OSERYI* (Deville).

Cassicus oseryi, Deville, Rev. Zool. 1849, p. 57; Des Murs, Zool. Voy. Casteln. p. 66, pl. 18. f. 3.

Clypicterus oseryi, Bp. Consp. i. p. 426.

One example of this fine species, not quite adult, from Xeberos. It is the first time we have met with it.

†(47.) *SCLERURUS MEXICANUS*, Sclater.

See our observations on this species (*anteà*, p. 574). It is interesting to meet with a second southern specimen, confirming our views there expressed.

†(53.) *XENOPS APPROXIMANS*, Pelzeln, Sitz. Ak. Wien, xxxiv. p. 113 (1859).

Two examples of this form from Chyavetas, agreeing with one of Natterer's typical skins of this species in Sclater's collection.

†(54.) *DENDROCOLAPTES RADIOLATUS*, Sclater, MS.

One example from Yurimaguas of a species in Sclater's collection allied to *D. cayennensis* and *D. sancti-thomæ* of Central America. It may be characterized as follows:—

Similis D. cayennensi, sed major, supra et subtus omnino fasciolis nigris distincte transradiolatus: alis et cauda ferrugineo-rufis, alarum tectricibus nigro transradiatis: rostro pallide corneo; pedibus fuscis: long. tota 12·5, alæ 5·0, caudæ 4·7, rostri a rictu 1·9 poll. Angl.

Hab. in Peruv. orient. Yurimaguas (*Bartlett*).

In *D. sancti-thomæ* the lower back is rufous, unbarred; the radiations are much closer, the bill is smaller and nearly black, and the whole bird is smaller.

A fourth species of this group (the only other with which we are acquainted) is the newly described *D. concolor*, Pelzeln.

(55.) *DENDROCNIS OCELLATA*, Spix.

Dendrocolaptes ocellatus, Spix, Av. Bras. i. p. 88, t. 91. f. 1.

A single specimen agrees with a skin (determined by Pelzeln to belong to Spix's species) in Sclater's collection, collected by Natterer on the Rio Negro.

(57.) *THAMNOPHILUS FULIGINOSUS*, Gould.

A female, probably of this species, from Xeberos. A somewhat similar specimen is in the British Museum.

† (59.) THAMNOPHILUS MURINUS.

Thamnophilus murinus, Natt. MS. sp. no. 923.

Xeberos. Specimens of both sexes of this species, of which Sclater has three examples in his collection under Natterer's MS. name. They may be characterized as follows:—

Schistaceus, subtus valde dilutior, ventre medio pæne albo: macula dorsi medii celata alba: alis fusciscenti-ochraceis, maculis tectricum terminalibus albis: cauda schistaceo-nigra, apicibus rectricum anguste albis: long. tota 5·3, alæ 2·4, caudæ 2·1, rostri a rictu 0·8.

Fœm. Fusca; subtus dilute ochracea, medialiter albescens: pileo alis et cauda rufescentibus: maculis tectricum terminalibus ochraceiscentibus.

Hab. Cayenne (*Mus. P. L. S.*); Marabitanas et Barra do Rio Negro (*Natterer*); Xeberos (*Bartlett*).

Obs. Species parva; affinis *Th. cærulescenti* et *Th. amazonico*, sed sane distincta.

(62.) DYSITHAMNUS SCHISTACEUS, D'Orb.

Yurimaguas and Chyavetas. This appears to be the true *Thamnophilus schistaceus* of D'Orbigny (figured Voy. t. 5. f. 1 under the name *Th. fuliginosus*); but it is not the same as the species referred to by Sclater in his articles in P. Z. S. (1858, pp. 66, 222) and American Catalogue. The latter is distinguishable by its white dorsal spot, darker cinereous colour below, and the narrow white terminations of the tail-feathers. For this species, of which one female skin is likewise in Bartlett's collection, we propose the new name *Dysithamnus ardesiacus*.

(66.) MYRMOTHERULA HÆMATONOTA, Sclater, P. Z. S. 1858, p. 235; Sclat. et Salv. P. Z. S. 1866, p. 185.

Xeberos and Chyavetas. Several specimens of this interesting species, and of each sex.

† (68.) MYRMOTHERULA CINEREIVENTRIS.

Myrmotherula cinereiventris, Sclater, MS.

♂. *Cinerea, paulo pallidior, unicolor: tectricum alarum apicibus nigris albo terminatis: cauda nigro-cinerea, apice vix pallescente: long. tota 3·5, alæ 2·1, caudæ 1·1.*

♀. *Supra cinerea, capitis lateribus et corpore subtus cinnamomeis.*

Hab. Cayenne (*Mus. P. L. S.*); Surinam (*C. Bartlett*); Rio Napo (*Verreaux*); Eastern Peru, Chyavetas (*E. Bartlett*).

Obs. Species, affinis *M. axillari* et ejusmodi formæ, sed corpore toto subtus cinereo ab aliis prorsus notabilis.

Mr. E. Bartlett's collection contains many examples of this species, which appears to be undescribed. Sclater's collection contains several skins of it from various localities.

(72.) MYRMECIZA HEMIMELÆNA, Selater, P. Z. S. 1858, p. 249.

A single skin, agreeing with the typical specimen in the British Museum.

(74.) HYPOCNEMIS MYIOTHERINA (Spix).

A series of ten specimens of this species proves, what we had long suspected, that "*H. melanosticta*, Selater, ♂" (as figured P. Z. S. 1854, pl. LXXIII.), is the young male of this bird before the black throat is attained; and "*H. melanosticta*, ♀," the female of this species. *H. elegans*, Selater, of Bogota, is also probably merely the female of the same bird rather more deeply coloured below.

(80.) EUSCARTHMUS SPICIFER (Lafr.).

See our remarks on this species, P. Z. S. 1866, p. 187.

†(82.) LEPTOPOGON PERUVIANUS, sp. nov.

Similis L. amaurocephalo, ex Brasilia or. merid., sed minor: pileo saturatiore, et cauda brunnea unicolore: long. tota 4.5, alæ 2.3, caudæ 2.0.

Hab. Peruv. orient. Chyavetas (Bartlett).

Dr. Cabanis has lately separated the northern form of this species as *L. pileatus* (Journ. f. Orn. 1855, p. 414). This is a third local form, resembling *L. pileatus* in the deep colour of the head, but smaller than either of the others, and without any green edgings to the tail-feathers. The bill of the single specimen sent is rather stouter, and the chest somewhat darker.

(92.) EMPIDOCANES FUSCATUS (Max.).

See our remarks on this bird (*anteà*, p. 578). We should rather have expected to find here the Cayenne form *E. olivus*.

(95.) TYRANNUS AURANTIO-ATRO-CRISTATUS, Lafr. et D'Orb.

See P. Z. S. 1866, p. 190.

†(97.) TITYRA ALBITORQUES, Du Bus.

This is the true *Tityra albitorques* of Du Bus (Bull. Acad. Brux. xiv. p. 104); and we are now for the first time enabled to compare it with the Mexican and Central American form, which we have hitherto referred to the same species. They are decidedly separable as local forms; and the northern bird, being the *Psaris fraseri* of Kaup, may be called *Tityra fraseri*. It is larger than the present species, has a much longer bill, and the black bar on the tail much broader.

(99.) LIPAUGUS LATERALIS, G. R. Gray; Selat. et Salv. Ex. Orn. p. 6.

In our synopsis of these birds in 'Exotic Ornithology' we have kept the present Peruvian form separate from the Brazilian *L. hypopyrrhus*. The specimens in Bartlett's collection do not tend to confirm this view, and the point requires further examination.

(100.) *IODOPLEURA ISABELLÆ*, Parz.

Both sexes and the young of this fine species are in the collection. The female is distinguished by the want of the violet side-tufts (as in *I. pipra*).

(106.) *CHLOROPIPO*, sp. — ?

A female, probably referable to a species of this genus. Sclater's collection contains a similar skin from Ecuador.

(128.) *CHÆTURA BRACHYCERCA*, sp. nov. (Pl. XXXIV.)

Æneo-nigra: *dorso inferiore uropygio et cauda tota cum tectricibus caudæ superioribus et inferioribus fusciscenti-cinereis*; *rectricum rachidibus acuminatis nigris*: *cauda brevissima*: *rostro et pedibus nigris*: *long. tota 4.0, alæ 4.6, caudæ 1.2, tarsi 0.4.*

Hab. Peruv. orient. Xeberos (*Bartlett*).

This is a new and very distinct species of the small group of American *Chætura*, remarkable for its short tail. Mr. Bartlett's collection contains nine specimens of it, all from Xeberos. The sexes are alike.

(145.) *POLYTMUS LEUCORRHŒUS*, Gould.

See our remarks on this species (*anted*, p. 584). Many specimens of it are in the present collection.

(153.) *PIAYA MEHLERI*, Bp.; Schlegel, Mus. d. P.-B. Cuculi, p. 57.

Piaya nigricrissa, Sclater.

It appears from Schlegel's recent researches that Sclater was mistaken in considering Bonaparte's type of *P. mehleri* referable to the Mexican form of this species (*cf.* P. Z. S. 1860, p. 285), and that the specimen in question was from Bogota. It follows, therefore, that this bird must be called *Piaya mehleri*.

(154.) *PIAYA MELANOASTRA* (Vieill.).

Cuculus melanogaster, Vieill. N. D. viii. p. 236, et Enc. Méth. p. 1337.

Cuculus cayanus, var., Gm. S. N. i. p. 417.

Macropus caixana, Spix, Av. Bras. i. p. 54, t. 43.

Piaya brachyptera, Less. Trait. p. 140; Bp. Consp. i. p. 111.

P. melanogaster, Schlegel, Mus. d. P.-B. Cuculi, p. 59.

Pyrhococcyx brachypterus, Cab. in Schomb. Guian. iii. p. 714.

Several examples of this bird from Chyavetas. Mr. Eyton's collection contains a skin of the same species from Guia (*Wallace*).

(169.) *CELEUS CITREOPYGIUS*, sp. nov.

Celeus citreopygius, Bp. MS.

Celeo-picus junana, Malh. Mon. Pic. ii. p. 27 (partim).

♂. *Luride badius*: *secundariis et interscapulis cum ventre imo et crisso castaneis*: *dorso postico aurantiaco*: *primariis extus et cauda nigricantibus*: *subalaribus citrino-flavis haud fascia-*

tis: macula mystacali coccinea: long. tota 12·0, alæ 6·0, caudæ 4·0, rostri a rictu 1·4.

Fœm. *Macula mystacali nulla.*

Hab. Peruv. orient. Yurimaguas (*Bartlett*).

We have already alluded to the existence of this species in our notes on the true *Celeus jumana* (Spix)*, with which it has hitherto been confounded. It is perhaps, however, strictly more nearly allied to *Celeus citrinus* than to *C. jumana*, having the under wings and underside of the primaries entirely unspotted, as in the former species.

Slater has a male specimen of this bird in his collection marked "*Celeus citreopygius*, Bp. MS.," which we accordingly adopt as its specific name. Malherbe's figure 1 (pl. 55) looks very like the present bird; but in his figure 3 and letterpress he clearly indicates the barred under surface of the primaries, which does not exist in this species†.

(180.) *UROCHROMA HUETI* (Temm.).

Psittacus hueti, Temm. Pl. Col. 491.

Urochroma hueti, Bp.

We were not previously acquainted with the true habitat of this beautiful species.

+ (189.) *MICRASTUR MIRANDOLLEI*.

Astur mirandollei, Schlegel, Ned. Tijdschr. i. p. 130, et Mus. d. P.-B. Astures, p. 27.

Micrastur macrorhynchus, Pelzeln, Reise d. Novara-Exp. Vögel, p. 11.

A single skin (marked female) from Chyavetas appears referable to this recently described species. Slater has lately seen in the Musée des Pays-Bas the typical example of Schlegel's *Astur mirandollei*, and has little doubt of its identity with Pelzeln's *Micrastur macrorhynchus*, a mounted skin of which, received from the Vienna collection, stands beside it. The present example agrees well with Pelzeln's description.

12. Notes on the Panolia Deer or Thamyn (*Cervus eldi*).

By Lieut. R. C. BEAVAN, C.M.Z.S.

Lieut.-Col. Blake, Commandant 9th Madras Native Infantry, has kindly furnished me with the following information concerning this Deer:—

"As regards the exact localities of the 'Thamyn,' I can only say

* *Antea*, p. 586.

† I have examined Malherbe's type-specimens of his *C. jumana* since the above was written, and found that one of them belongs to the true *C. jumana*, and the other to *C. citreopygius*. These specimens are now in the collection of M. Turati of Milan.—P. L. S.

where I have found them and where not. As far as I know they do not occur to the south of Moulmein; but from within a short distance of Thabyoo Point, the south-western headland of the Martaban district, to Sittang, bounded to the eastward by the forest line, they are found in large herds. Again, on the opposite side of the Sittang River, to the south and west of Pegu, they are also found in large numbers. How far they extend in a westerly and northerly direction, from the mouth of the Rangoon River, and in the Bassein district, I do not know; but I have heard that they are common even as high up as Munneepore.

"From Pegu to the north they are found in very small parties, the ground not suiting them until you cross the 'Koon' creek or river, the separating boundary between the Martaban and Thounghoo districts, and from this to within a few miles of Thounghoo they occur in large herds.

"Sometimes the plains or open spaces between the 'Eng*'-forests will be covered with them, and three or four hundred may be seen at one time. Under these circumstances they are shy and very difficult to approach. Strange to say, although the ground appears quite as favourable for them, I have never seen a single one to the eastward of the Sittang River, north of Sittang. From the above you will see that in habits they are gregarious. During the night and early morning and evening they frequent the plains, and where the forest jungle is not distant they retire into it during the heat of the day.

"Their food, I imagine, consists of grass. I cannot call to mind having seen more than *one* fawn with its mother.

"The colour of the young, as well as that of the females, is what is termed light fawn-colour. The males are sometimes of the same, and sometimes as dark as the male of the Sambur (*Cervus hippelaphus*). I know not if any change takes place in their coats with the change of seasons."

Colonel D. Brown, Officiating Commissioner at Moulmein, has noticed them to range along both banks of the Irrawaddy, on the proper right bank up to Meanoung, and on the left bank as far as Meaday on the British frontier, N. lat. 19° 40', E. long. 95° 20' (approximately). He has also observed them as plentiful at Theegwen near Bassein, a few at Padoung opposite Prome, and more sparsely scattered through the Thanawaddy district.

For most of the following information I am indebted to the courtesy of J. Davis, Esq., Superintendent of Police in the Martaban district, an officer well known for his intimate acquaintance with the Burmese language; hence his services as interpreter were invaluable when Burmese and Karen shikarees had to be questioned.

Pioneered by him, early in October last, I visited the haunts of the Thamyn near Thatone (a town about forty miles north-west of Moulmein); and although, owing to the dense nature of the vegetation covering the plains at that time of year, I was only able to see

* *Dipterocarpus grandifolia*, Wall., "Wood-Oil-tree," Mason's 'Burmah,' edit. 1860, p. 493.

a few scattered females and young of the second year, yet the insight thus afforded into their habits and economy more than repaid me for the severe attack of illness I subsequently incurred by exposure to the heat and wet.

This plain of Yengyaing was then, owing to recent and heavy falls of rain, one large swamp. Nearly the whole of its unbroken extent, which embraces an area of fourteen miles in length with an average breadth of ten, could be traversed in a small canoe, except here and there where mud and vegetation combined obliged one to resort to a very unpleasant system of half wading in water and half sticking in deep slime. A continuation of this plain, broken here and there by belts of jungle, extends for several hundred miles up the Burmese coast, and has evidently been formed by the gradual retirement of the sea, which at one time doubtless dashed its waves against the Martaban and other continuous ranges of laterite hills. It is now, at Yengyaing, some eight to ten miles distant from the hills, and seems to be still retiring, since the water along the coasts of the Gulf of Martaban is very shallow, and studded here and there with sand-banks. For the primary cause of this we may doubtless look to the immense amount of silt brought down by the waters of the Salween, Beeling, Sittang, and Rangoon rivers, all of which discharge themselves into the Gulf of Martaban. As the sea retires, a belt of mangrove-jungle, about a mile in width, appears to travel with it, and the plain is thus enclosed by a barrier of vegetation on one side and the mountains on the other. This strip of mangrove-jungle gives cover to numberless Hog-deer, Tigers, Leopards, and Pigs, but is never entered by the Thamyn, except where somewhat open; nor on the other side do they ever attempt to penetrate into the mountains. The plain is intersected by numerous tidal creeks, which, in the hot weather, when deprived of water from the hills, appear to dry up to a great extent; and those still open at that time of year contain no admixture of fresh water, so that it is evident that for two, if not three, months in the year the Thamyn must be entirely deprived of fresh water*; whilst during the rainy season, for six months at least, they may be said to live in water. It appears wonderful how they can manage to exist in such extremes of heat and wet.

With the exception of a few stunted trees here and there, and a fringe of *Hibiscus* bushes along the creeks, the plain is covered with nothing but grasses and paddy, of which latter both the wild and cultivated varieties are abundant. Owing to the paucity of the population and the consequent demand for labour in this immediate neighbourhood, perhaps only one-fourth of the whole area is under cultivation for paddy; the crop succeeds here admirably, and the grain forms one of the staple articles of export from Moulmein and other Burmese ports.

The remaining three-fourths is covered with the indigenous uncultivated plant, which in seasons of scarcity is reaped and used for food. This forms a vast grazing-ground both for the Thamyn and

* The Burmese assert that during this period the animal drinks urine!

for large herds of tame Buffaloes, which are during the rains pastured here by the Karens, but withdrawn into the heavy jungles near the hills when in April and May the whole of the vegetation on the plain becomes parched up and devoured by jungle-fires.

At the time of my visit vast flocks of waders and other water-birds were arriving from the north, and the creeks were filled with Pelicans of several species, whilst the mud-flats absolutely swarmed with Stints, Sandpipers, Egrets, and especially the Rosy Tantalus. Here and there, stalking gravely amongst the flowering paddy, might be seen pairs of the Siris Crane (*Grus antigone*), or a troop of Adjutants, both of which birds breed in the neighbourhood. Occasionally the rarer Javan Adjutant was met with, and the Jabiru Stork (*Mycteria australis*).

The rutting-season of this Deer commences in the middle of March, and lasts throughout April to the middle of May. The female gestates nearly seven months, and brings forth her young amongst the jungle-paddy in October and November, the paddy being then flowering or in seed and at its greatest height. The female has only one young one at a time, which frequently stays with its mother until the second year*. The females have only four teats. In colour they are much like the female Sambur, but perhaps a little lighter. The young are at first spotted or mottled, but these markings disappear with age. The females are hornless. Both sexes begin to breed at about eighteen months old. The young males first begin to acquire horns in the second year†. After two years they get two tines, and when about seven years old are in their prime, with twelve tines (including the brow-antler). The colour of a full-grown buck is dark brown, especially about the back and neck, with underparts lighter. As far as I can ascertain there is no trace of a mane; and the texture of the coat varies considerably with the seasons. More exact information on these points is, however, needed.

The natives have a vague idea that two distinct species, "the lesser and the greater Thamyn," are to be found in the same herds, distinguishable only by differences of the size of the horns and of colour; but this of course is to be accounted for by the individual distinctions common to all races of animals. The horns are perfectly developed in March, and shed in the middle of the rainy season—that is, about September.

The average weight of the male is from 50 to 60 viss‡, that of a female 40 viss. Four men can carry a male with ease when disembowelled and quartered§. The male averages $3\frac{3}{4}$ feet in height at the shoulder; the female a little less. The very largest males do not exceed $4\frac{1}{2}$ feet in height.

The flesh is much liked by the Burmese, and always finds a ready sale in the neighbouring villages. The Karens, however, will not

* The mother will breed a second time eighteen months after bringing forth, so that the young of two seasons are not unfrequently seen with their parent.

† As noticed above by Blyth, on Major Tickell's specimen at Moulmein.

‡ A viss is equal to 140 tolaks.

§ As noticed by Blyth, the Burmese always quarter deer with the skin on.

eat the meat, because they think it will bring on cholera. It is rarely brought into Moulmein. In the country the wholesale price* of a doe is rupees 3, a buck is rupees 4, which is of course less than the usual retail bazaar rate. The flesh is said to smell a little about the end of March, when the weather is very hot; it is best for food about November and December.

The range of the Panolia Deer, according to Mr. Davis, is as follows:—In the Martaban district they inhabit exclusively the open grassy plains between the sea and the mountains. In the Pegu plains they are perhaps more abundant than in any other part of Burmah; next to these the Yengyaing plain in Martaban produces most; near Rangoon they are found in the Dallah plain. About Pegu and Yengyaing they are found in herds of from fifty to a hundred in the month of March; but when hunted they congregate much more, and as many as two hundred may then be seen together. In habits they are essentially gregarious, and associate with no other species, although Hog-deer abound in the grass and jungle along the edges of the plain; nor will they allow the tame Buffaloes to come nearer to them than about 100 yards. In habits they are very wary and difficult of approach, especially the males. They are also very timid, and easily startled; the males, however, when wounded and brought to bay with dogs get very savage and charge vigorously. On being disturbed they invariably make for the open, instead of resorting to the heavy jungle like Hog-deer and Sambur. In fact the Thamyn is essentially a plain-loving species; and, although it will frequent tolerably open tree-jungle, for the sake of its shade, it will never venture into dense or matted underwood—*i. e.* “bush-jungle,” in contradistinction to “tree-jungle.”

Indeed I was credibly informed of a large stag which, being driven into a corner of the plain last year by herd-boys with pariah dogs, and finding no means of escape, took refuge in heavy jungle, where its horns got entangled in an *Hibiscus* bush, and so was actually captured alive. Its captors, however, soon put an end to its existence with a sharp “dhar.”

When first started the pace of the Thamyn is great. It commences by giving three or four large bounds like the Axis or Spotted Deer, and afterwards settles down into a long trot, which it will keep up for six or seven miles on end when frequently disturbed. This is when the vegetation on the plain is comparatively short. In the rains they do not go far before they find a hiding-place in the long paddy. Their powers of leaping are highly developed. On the Yengyaing plain alone there are at the present time about a thousand head, on the Thatong plain, a little further to the north-west, perhaps a hundred head only, which go about in small herds of seven and eight. At Yengyaing the annual number killed amounts to about forty-five, including those bagged by Europeans; and about five natives gain their livelihood in that place almost entirely by the sale of its flesh. They are least gregarious in the rainy weather. The females have mostly then retired in twos and threes into quiet

* The price quoted is what a shikarry usually expects to realize.

spots, and the herds are altogether more scattered, owing to the increased density of the vegetation.

They feed both during the day and night, chiefly in early morning and evening. Their food consists principally of jungle-paddy; during the night they do a great deal of damage to the cultivated variety, treading down more than they eat. They also feed on grass, and the leaves of two jungle-trees called in Burmese the "*keay*" and the "*thameh*," the scientific appellations of which I am unable to resolve. In a tamed state they will eat plantain-leaves.

The call of the female uttered when disturbed is a short barking grunt, that of the males is louder and more prolonged. It is most frequently heard in the rutting-season, during which period the males have frequent and severe battles. A pair have been known to have been captured whilst so engaged with their antlers interlocked.

About the end of January the first jungle-fire sweeps over the plain and destroys the dry herbage, leaving small patches here and there about the edges of swamps. The second burning takes place about the end of March, and leaves scarcely a blade of grass behind it; the plain is then almost entirely bare, and the deer, having no cover, congregate in large herds. They are then to be seen on all sides, and, the Buffaloes having previously been withdrawn to the tree-jungle, are left alone in their glory, and, as noticed before by Colonel Blake, become at this time excessively wary. From the middle of February until the first showers fall at the end of April they apparently subsist without water; they lie in the salt-swamps during this period, and get the benefit of heavy dews at night.

Their only enemy appears to be man; but an epidemic occasionally breaks out amongst them and destroys large numbers. The last occurred in 1863, and some fifty or sixty head fell victims. The cause of this murrain is unknown; it is probably analogous to that which yearly in Burmah, during the rains, causes such havoc amongst domestic cattle. The Burmese readily eat the diseased flesh, and experience no bad effects from doing so. The disease attacks old and young alike, apparently, causes great emaciation and loss of strength, and the animal at last dies of pure weakness. It will probably be found to be some swelling or affection of the throat and lungs which prevents the animal from eating.

There seems to be no doubt that in Burmah this species is gradually decreasing, and will at no distant date be excessively rare. This can be accounted for by the gradual but steady increase in the population, and the greater area of country (which must naturally increase yearly) which is taken up for the cultivation of rice. Unfortunately for the Thamyn, the whole of their favourite *locale* is excessively well adapted to the cultivation of rice; and there is no doubt that where the indigenous wild plant is found there also the cultivated variety will flourish. The rice-trade of Burmah is yearly increasing in extent; and a few years bid fair to see the present haunts of the Thamyn not unlike the present state of the greater portion of the rice-producing plains of Lower Bengal.

*An intelligent Burmese shikarry, who has been a hunter from his

youth upwards and is now an elderly man, tells me that in former years, before Martaban was taken by the British, the Thamyn were much more abundant than they are now, and that the natives used to destroy them wholesale at battues. A large number of men would assemble from the surrounding villages, and gradually encircle three or four moderate-sized herds with long strings, upon which plantain-leaves were tied so as to flutter in the wind. The circle, originally formed at some distance, was gradually lessened as the deer, afraid to pass the scarecrows, got gradually driven together, until they were completely surrounded and at the mercy of the hunters. The object was to get them into a corner near the heavy jungle, into which, if they attempted to run, they either became entangled or allowed their pursuers to get up quite close. As many as 150 to 200, my informant tells me, he has himself seen killed in one battue in former years. To such a length was this system carried, and such enormous havoc was thereby created, that the Burmese Government, fearing the species would be utterly exterminated, wisely put a stop to the practice. This shikarry informed me that twenty-five years ago he has seen as many as 500 head in one herd; and his account was confirmed by others. At the present day vast mounds of their bones in every stage of decay exist on the Thatong plain, the site of many a battue in former times. The value of a whole carcass then was only 4 annas, or $\frac{1}{4}$ tical weight of Burmese silver, equivalent to 8 or 10 annas of our coinage at the present day! Several intelligent men are living now in the vicinity of Thatong and Yengyaing who formerly took part in these wholesale slaughterings, and, like many others of the present generation, are apt to look back fondly to those good old times.

These battues or kyówine were preceded by all sorts of ceremonies and sacrificial rites, offerings being previously made to ensure success to the tutelary nats or deities of the woods and plains.

In addition to these battues, and the recent increase of cultivation and population, we may account for their gradual decrease by the great increase that has taken place of late years in the number and use of firearms. Nearly every Burman can shoot, and a large proportion have each their matchlock or cheap gun.

It is excessively difficult to catch the Thamyn alive, even a young one, owing to the open nature of the country they frequent; and several officers in the Burmese commission have for some time past been endeavouring, without success, to procure young individuals of both sexes for the Zoological Society of London. Major Tickell, as narrated by Blyth, had one alive for some time in Moulmein; but it was eventually killed by pariah dogs, who got into its enclosure at night. My informant, the shikarry, tells me he had one also tame some years since. He caught it when about three months old, fed it on milk at first, afterwards on grass and plantain-leaves. After a short time it became so tame that it would follow its owner about, and never attempt to leave the dwellings of man. After an interval of two years it got a small pair of horns, shaped like those of the adult, but much smaller, and afterwards, like most

pets, met with an untimely end, being stolen and killed for food by rapacious Burmese officials. By this the species appears to be capable of easy domestication, although said by some invariably to pine away and die after capture.

The horns of the species are, if large, kept by the natives for making handles for sickles; if small, they are of no value, and either thrown away or cut up and used as pegs. As to medicinal qualities, when a buffaloe is bitten by a snake, the horn of the 'Thamyn ground to powder is mixed with a solution of the leaves of the "yekazoon" (*Ipomœa*, sp.), or wild convolvulus, and given internally as a dose. It is said to cure the bitten animal immediately. No other part of the beast appears to be used medicinally, and the above-mentioned nostrum is of no avail for the human race.

13. Notes on the Myology of *Iguana tuberculata*. By ST. GEORGE MIVART, F.L.S., Lecturer on Comparative Anatomy at St. Mary's Hospital.

The muscles of Saurian Reptiles (in which group I by no means include the *Crocodylia*) have not hitherto, as far as I know, been described in any detail, and have scarcely at all been figured. Many facts have certainly been recorded by Meckel*; and Heusinger† has also published interesting notices (mainly referring, however, to those forms in which the limbs are rudimentary); but the greatest and most accurate record of saurian myology as yet accessible is that given in the second part of Professor Stannius's new edition of his 'Anatomy of the Vertebrata'‡.

It has been suggested to me that a series of notices, accompanied by woodcuts, of the main peculiarities presented by the myology of different oviparous vertebrates would be a not undesirable contribution to comparative anatomy; and I have now the honour of laying before the Zoological Society the results of my dissection of a fine specimen of *Iguana tuberculata*, for the opportunity of making which I am indebted to the rich stores of the collection of the Royal College of Surgeons, and to the kindness of my friend Mr. W. H. Flower.

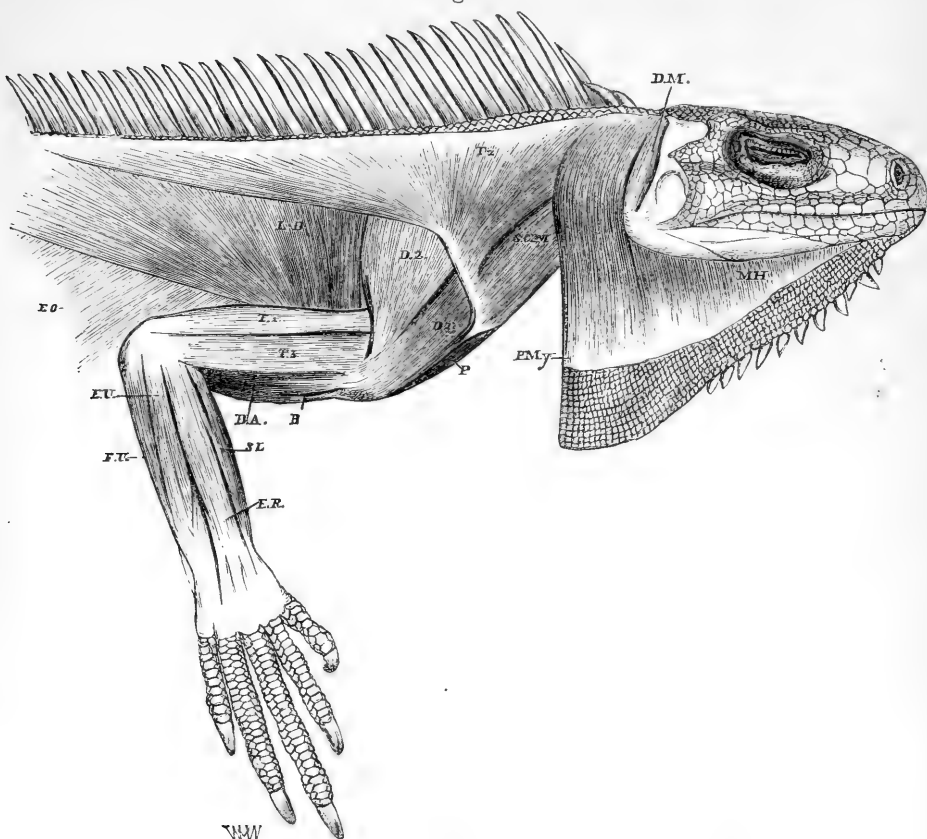
A correct determination of Saurian muscles, especially those of the posterior extremity, is not to be hoped for in a first attempt. I have therefore thought it well to begin with the Iguana, because it is a common species, readily procurable, on which account my errors and misinterpretations will be the more easily rectified.

* *Traité général d'Anatomie comparée*, par J. F. Meckel: traduit de l'allemand par MM. Riester et Alph. Sanson (Paris, 1829): tome v. 1^{re} partie, et tome viii.

† In *Zeitschrift für organ. Physik*. Bd. iii. Hft. 5. p. 481.

‡ *Handbuch der Zootomie*, von Siebold und Stannius. Zweiter Theil. Die Wirbelthiere. Zweite Auflage. Zweites Buch. Die Amphibien (Berlin, 1856), pp. 100, 117, 122, 126, 133.

Fig. 1.



Superficial muscles of outer side of thorax and arm, and of extensor surface of forearm,—the gular pouch being cut to show more of the sterno-cleido-mastoid.

B. Biceps. *B. A.* Brachialis anticus. *D. 1.* First part of deltoid. *D. 2.* Second part of deltoid. *D. M.* Depressor mandibulae. *E. O.* External oblique. *E. R.* Extensor carpi radialis. *E. U.* Extensor carpi ulnaris. *F. U.* Flexor carpi ulnaris. *L. D.* Latissimus dorsi. *M. H.* Mylo-hyoid. *P.* Pectoralis major. *P. My.* Platysma myoides. *S. C. M.* Sternocleidomastoid. *S. L.* Supinator longus. *Tz.* Trapezius.

MUSCLES OF THE HEAD AND TRUNK.

Mylo-hyoid (fig. 1, *M. H.*). This is a thin muscular layer, arising from the outside of the posterior part of the mandible and from the inferior margin of the middle and more anterior portion of the bone. It does not, however, extend to its anterior end. Descending inside the skin of the gular pouch its fibres gradually become lost.

Fibres similarly disposed below, but ending above in the fascia

covering the trapezius, constitute a more posterior layer of superficial fibres having no connexion with the mandible; these may perhaps represent the *platysma myoides* (fig. 1, *P. My.*).

On removing the *mylo-hyoid* a muscle becomes visible which is of rather large size, and descends from the middle of the lower border of the inner surface of the mandible to the cornu of the os hyoides. This is the *cerato-mandibular* (fig. 2, *C. M.*).

The *depressor mandibulæ*, which may perhaps represent the digastric (figs. 1, 2 & 2A, *D. M.*), arises from the posterior margin of the parietal process. Descending, it is inserted into the extreme posterior end of the mandible.

The *temporal* muscle is very thick and large, and fills the temporal fossa. It arises from the outside of the parietal process and from the front surface of the os quadratum*. It is inserted into the coronoid process of the mandible, and into the upper border of the bone behind that process.

Internal pterygoid. This large, thick muscle takes origin from the inner side of the pterygoid, and is inserted into the inside and posterior extremity of the mandible.

The *external pterygoid* arises outside the pterygoid, and is inserted into the inner surface of the mandible rather in front of the insertion of the internal pterygoid and behind the coronoid process.

Trapezius (figs. 1 & 2, *Tz.*). This muscle, as Meckel observes†, is very extensive. It lies beneath the *platysma myoides*, but superficial to the levator claviculæ; and the lowest part of its insertion overlaps that of the omo-hyoid (fig. 2, *Tz.*, *O. H.*). It forms a very delicate muscular layer, especially above, but becomes thicker towards its insertion. It arises, by aponeurosis, from the middle line of the back, from the last cervical to the fifth dorsal vertebra, and more anteriorly from the superficial fascia of the neck, and also from the margin of the parietal process, towards which part it is intimately united to the sterno-cleido-mastoid. The fibres converge, and are inserted into about the upper half of the clavicle between the deltoid and the insertions of the levator claviculæ, omo-hyoid, and sterno-cleido-mastoid. The most anterior and posterior fibres antagonize each other.

The *rhomboid* is wanting, unless it be represented by some part of the muscle described as the *serratus magnus*.

Latissimus dorsi (figs. 1 & 9, *L. D.*). This is a large muscle, and arises from the spines of the dorsal vertebræ from the first to the ninth, and from the last three cervical spines. Its fibres, converging, end in a strong tendon, which is inserted into the outer side of the summit of the humerus below, passing rather in front of, the insertion of the infraspinatus, covered moreover by the third head of the triceps. The tendon of the latissimus dorsi gives off another small tendon from its inferior margin (fig. 9, *t.*), which joins the triceps just where the two long heads of that muscle unite together.

* The part arising from the os quadratum and columella is considered by Stannius to be the *masseter*.

† *Loc. cit.* p. 311.

Longissimus dorsi. This is small and very indistinctly separable from the sacro-lumbalis. It partly arises from the posterior end of the crest of the ilium; partly it is the anterior continuation of the dorsal series of caudal muscular cones, or rather to the halves of those cones. Passing forwards it is inserted into, and takes fresh origin from, the spines and adjacent parts of the vertebræ.

The *sacro-lumbalis*, though wide, is very thin, except at its posterior end, and it is very imperfectly separable from the last. It arises from the crest of the ilium, and appears to be partly continuous with the supracaudal muscular mass. It is inserted, in an indistinct manner (by tendinous intervals which become more marked from behind forwards), into the ribs, including the cervical ones, as it passes insensibly into the *cervicalis ascendens*.

Complexus major (figs. 2 & 2A, *C. Ma.*). This is an elongated muscle arising by tendinous fibres from the spines of the first and

Fig. 2.

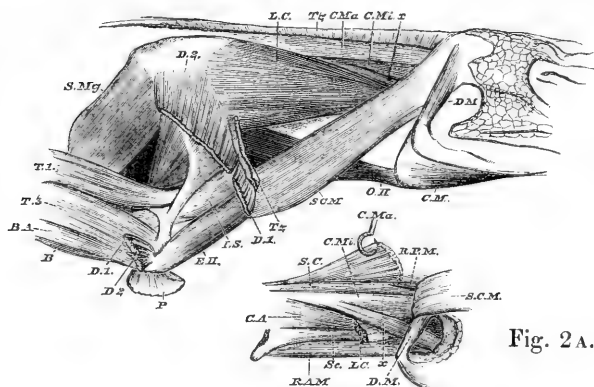


Fig. 2A.

Fig. 2.

Muscles of neck and shoulder, the trapezius and deltoid being cut short.

- B.* Biceps. *B. A.* Brachialis anticus. *C. M.* Cerato-mandibular. *C. Ma.* Complexus major. *C. Mi.* Complexus minor. *D. 1.* First part of deltoid. *D. 2.* Second part of deltoid. *D. M.* Depressor mandibulæ. *E. H.* Epicoraco-humeral. *I. S.* Infraspinatus. *L. C.* Levator claviculæ. *O. H.* Omo-hyoid. *P.* Pectoralis. *S. C. M.* Sterno-cleido-mastoid. *S. Mg.* Serratus magnus. *T. 1.* External long head of triceps. *T. 3.* External humeral head of triceps. *Tz.* Trapezius. *x.* Fasciculus from complexus minor. The muscle between *D. 2*, *S. Mg.*, and *T. 1.* is the subscapularis.

Fig. 2A.

Deeper muscles of right side of neck, the levator claviculæ being cut short, the sterno-cleido-mastoid cut and reflected forwards, and the complexus major cut and raised.

- C. A.* Cervicalis ascendens. *C. Ma.* Complexus major. *C. Mi.* Complexus minor. *D. M.* Depressor mandibulæ. *R. A. M.* Rectus capitis anticus major. *R. P. M.* Rectus capitis posticus major. *Sc.* Scalenus. *S. C. M.* Sterno-cleido-mastoid. *x.* Fasciculus from complexus minor.

second dorsal vertebræ, and from the transverse processes of the last four cervical vertebræ. It is inserted into the supraoccipital and into the parietal process.

Complexus minor (figs. 2 & 2A, C. Mi.). A muscle placed externally to the last arises from the transverse processes of the last four cervical vertebræ. It is inserted, by strong tendinous fibres, into the end of the parotic process, but gives off from its outer side a fasciculus (figs. 2 & 2A, x) which passes to the postero-external end of that depending process of the basioccipital which bounds internally the posterior part of the eustachian aperture.

Cervicalis ascendens. This (fig. 2A, C. A.), as has been said, is the continuation forwards of the sacro-lumbalis. It is inserted by tendinous fibres into the outer sides of the cervical ribs and into the transverse processes of the four anterior cervical vertebræ (including the atlas), which have no ribs.

Spinalis colli (fig. 2A, S. C.). The innermost portion of the deep part of the dorsal extensor mass fills the groove between the spinous and articular processes of the cervical vertebræ. It ends at the occiput, where it enters the deep fossa between the supraoccipital and the diverging parietal processes.

Rectus capitis posticus major. A more or less distinct muscular fasciculus (fig. 2A, R. P. M.) arises from the spinous process of the axis, and is inserted into the supraoccipital.

Scalenus. The scalene muscles appear to be represented by a very obscurely separable small muscular mass, which extends from the transverse processes of the first four cervical vertebræ to the anterior margin of the first cervical rib. It lies between the cervicalis ascendens and the rectus capitis anticus major (fig. 2A, Sc.).

The *longus colli* arises from the ventral surfaces of the bodies of the atlas and two following cervical vertebræ. It is inserted into the same surfaces of the next four cervical vertebræ and into the last three cervical ribs near their origins.

Rectus capitis anticus major (fig. 2A, R. A. M.). This muscle arises from the posterior end of the under surface of the basioccipital, and largely from the process bounding internally the posterior end of the eustachian aperture. Passing backwards it is inserted into the bodies of the cervical vertebræ from the fourth to the seventh inclusive, and finally into the anterior margin of the deep surface of the rib of the seventh cervical vertebra.

Rectus abdominis. The abdominal muscles are largely developed, both as regards superficial extent and number, as there appear to be no less than three layers of the external oblique muscle. The *rectus* is broad, but rather ill-defined superficially as to its outer margin, which, however, is readily seen on its internal surface. It arises by a strong tendon from the posterior end of the ventral surface of the symphysis ischii (figs. 13 & 14, R.). Thence it runs forwards along the middle line of the belly, and is inserted into the posterior margin of the last sternal rib, whence it is continued to the last sternal rib but one, where it is conterminous with the pectoralis major (fig. 6, R.), which is apparently its anterior prolongation.

The lateral superficial margins of the muscle are indistinguishably blended with the external oblique, which sends oblique tendinous fibres right across the superficial surface of the rectus.

External oblique. This muscle seems to consist of three parts* :—

(1) The most superficial portion arises by tendinous interdigitations with the dorsal extensor muscles, from the last cervical and all the thoracic ribs. It is a very delicate layer, and ends below by blending with the upper margin of the rectus, with which it becomes inseparably united. It is also inserted (by a tongue of muscular fibres) just above the very strong tendon of insertion of the third portion. It has five tendinous intersections.

(2) The second part arises, beneath the first, by less marked digitations from all the thoracic ribs. Passing downwards and backwards, its most anterior portion is strongly inserted into the fifth thoracic rib; elsewhere it ends in a delicate aponeurosis, which is connected with the sixth thoracic rib, and blends with the inner surface of the first or most superficial layer of the muscle.

(3) The third part of the *external oblique* (fig. 1, *E. O.*, and fig. 13, *Ex. o.*) arises from the posterior surface of the last thoracic rib and from the lumbar fascia. It is inserted, by a very strong tendon, into the spine of the pubis.

This muscle appears to continue backwards the upper, or external, intercostals.

The *internal oblique* is of great extent, lining the whole of the thorax. It arises from the inner surfaces of all the thoracic ribs, beginning by a tendinous aponeurosis which is attached to them along a line nearly corresponding to the outer edge of the dorsal extensor muscular mass. It also takes origin from the lumbar fascia just behind the third part of the external oblique. It is inserted by muscular digitations into the inner surfaces of the sternal ribs and (in the abdomen) into the margin of the rectus.

This muscle is evidently not continuous with the internal (or sternal) *intercostals*, as these are superficial to the fleshy insertions of the internal oblique, the fibres of which, moreover, run more parallel to the sternal ribs themselves than do the fibres of the internal *intercostals*.

Transversalis. This muscle is also very extensive, arising by a fascia extending from the pelvis to the last but one cervical rib. Indeed the fascia is continued on into the neck, where it passes beneath the nerves of the brachial plexus, which are external to it, like the abdominal nerves which pass between it and the internal oblique. It is inserted into the border of the *rectus* and the inner sternal part of the thorax.

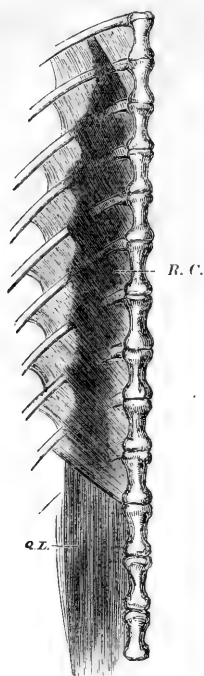
Internal intercostals. These extend between the sternal thoracic ribs, reaching vertically to the vertebral ribs, and underlying for some distance the external intercostals.

External intercostals. The external ones extend between the cervical ribs, as well as those of the trunk. In the thorax they only

* Stannius considers that the external oblique and internal oblique each consist of two layers (*loc. cit.* p. 104).

extend down to the junction of the vertebral ribs with the sternal ones.

Fig. 3.



Subvertebral muscles of right side.

Q. L. Quadratus lumborum. *R. C.* Retrahentes costarum.

Retrahentes costarum. A very remarkable muscular layer* (fig. 3, *R. C.*), which is tendinous at its insertion and at the posterior part of its origin, but muscular elsewhere. It has a certain resemblance to the diaphragm, as it is internal to all the other body-muscles.

It arises from the sides of the ventral surfaces of the bodies of nine vertebræ, beginning with the first dorsal. The muscular fibres proceed forwards and ventrad, and are inserted into the ribs of the seventh and eighth cervical vertebræ, and into the seven following ribs. The insertion of the aponeurosis is close to the origin of the fascia of the transversalis†.

Pyramidalis (fig. 14, *Py.*). This muscle is largely developed, and is placed beneath the rectus. It arises from the ligamentous arch extending back from the spine of the pubis; and its fibres ad-

* The *m. retrahentes costarum* of Stannius (*loc. cit.* p. 103).

† As Stannius remarks (*loc. cit.* note 4 to p. 103).

vance obliquely forwards towards the middle line of the body, those arising most anteriorly being the longest. The muscle extends forwards more than halfway from the pubis to the sternum.

Transversus perinei (fig. 14, *T. Pr.*). This is a thick triangular muscle, arising from the side of the os cloacæ and from the tendinous arch before mentioned passing to the ilium. It fuses more or less completely with the posterior part of the origin of the semimembranosus.

CAUDAL MUSCLES.

The essential nature of the *true* caudal muscles is best seen at about the middle of the tail (fig. 4). There the muscular mass of each lateral half of the tail, is easily demonstrated to consist of four longitudinal series of muscular and tendinous cones, the series being placed one above another, and all the cones having their apices directed forwards.

Fig. 4.

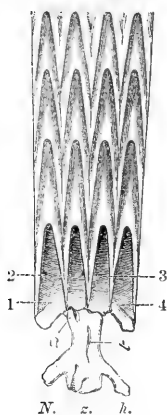


Diagram of caudal muscular cones of the right side of the tail.

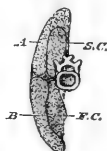
1. Dorsal lateral cone. 2. Upper median lateral cone. 3. Lower median lateral cone. 4. Ventral lateral cone. *h.* Inferior spine. *N.* Neural spine. *t.* Transverse process. *z.* Zygapophyses.

Four such cones appear to spring from each side of each caudal vertebra; but their length generally exceeds that of two such vertebrae. The base of each cone is aponeurotic, with the superficial part glisteningly tendinous. The apex of each cone is muscular. Each cone being hollow, it receives into its cavity the muscular apex of the cone next behind. The repetition of this serial enclosure gives rise to the four longitudinal rows of cones; and as the aponeurosis of each cone is more or less incomplete on its external surface, the tendinous margins of the aperture appear as two glistening lines, which converge anteriorly; moreover, the bases of the cones being on the same vertical line, the appearance of numerous acutely zigzag

lines results, four points being directed forwards and three backwards (fig. 4, 1, 2, 3, 4). Of the four vertically superimposed cones of each vertebra, the topmost one, or the dorsal lateral cone (fig. 4, 1), arises from the neural spine (*N.*) and the zygapophysis (*z.*). The cone next below, or the upper median lateral cone (fig. 4, 2), takes origin also from the zygapophysis; but below from the transverse process or (in more posterior caudal vertebræ) from the strong fascia which takes its place (*t.*). The next cone below, or the lower median lateral cone (fig. 4, 3), arises from the same transverse process or fascia and from the root of the inferior spinous process. The lowest, or ventral lateral cone (fig. 4, 4), springs from (*h.*) the inferior spinous process itself.

This arrangement continues forwards to about the fourteenth caudal vertebra. Then the bases of the cones become excluded from the articular processes and from the roots of the hæmal spines by the intrusion and backward prolongation of a *supracaudal* muscular mass coming from the trunk (the *sus-caudien externe* of Meckel, vol. v. p. 284), and by that of the *femoro-caudal* below (fig. 5, *S. C.* and *F. C.*); so that the series of cones, being thus modified, come to form a muscular sheath for these intruding muscles, the sheath being strongly attached still to the ends of the transverse processes and of the neural and hæmal spines.

Fig. 5.



Muscles of right half of a transverse vertical section of the tail at the seventh caudal vertebra, showing the separation of the caudal cones from the vertebra by the intrusion of the supracaudal above and of the femoro-caudal below.

A. Superior lateral caudal cones. *B.* Inferior lateral caudal cones.
F. C. Femoro-caudal. *S. C.* Supracaudal.

The two series of median lateral cones more and more approximate as they approach the trunk, and, ultimately coalescing, are inserted strongly into the first caudal transverse process (fig. 15, *x*).

The dorsal lateral cones, much modified, continue on as the *longissimus dorsi*.

The ventral lateral cones terminate mainly by a very strong tendon implanted into the posterior end of the tuberosity of the ischium (close to the origins of the two parts of the semimembranosus), a portion, however, running on into a *sphincter cloacæ* *.

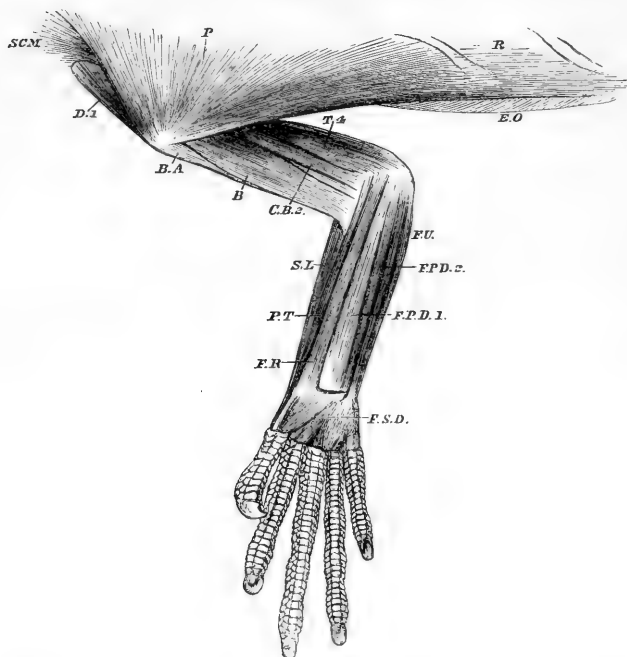
Of the intruding muscular masses the femoro-caudal, inserted into the femur, extends for about one-sixth of the length of the tail, as Meckel says†, or to about the thirteenth caudal vertebra.

* Meckel, *loc. cit.* p. 285.

† *Loc. cit.* p. 286.

The dorsal mass or *supracaudal* muscle is in part the continuation backwards of the sacro-lumbalis, in part takes fresh origin from the posterior surface of the ilium. It extends backwards also to about the thirteenth caudal vertebra.

Fig. 6.



Superficial muscles of front of thorax, of inside of right arm, and of flexor surface of right forearm.

- B.* Biceps. *B. A.* Brachialis anticus. *C. B. 2.* Second or long part of coraco-brachialis. *D. 1.* First part of deltoid. *E. O.* External oblique. *E. U.* Extensor carpi ulnaris. *F. P. D. 1.* First part of flexor profundus digitorum. *F. P. D. 2.* Second part of flexor profundus digitorum. *F. R.* Flexor carpi radialis. *F. S. D.* Flexor sublimis digitorum. *P.* Pectoralis. *P. T.* Pronator teres. *R.* Rectus abdominis. *S. C. M.* Sterno-cleido-mastoid. *S. L.* Supinator longus. *T. 4.* Fourth part of the triceps.

MUSCLES OF THE PECTORAL LIMB.

Pectoralis major (figs. 1, 2, 6, 8 & 10, *P.*). This muscle is largely developed, and arises from the sternal part of the sixth thoracic rib, and from the sternum and interclavicle, from the posterior end of the former to the anterior extremity of the latter.

From this extensive origin its fibres converge, and are inserted into the most prominent part of the radial tuberosity of the humerus, just opposite the insertion of the deltoid, but separated from the

latter by the summit of the brachialis anticus and by the insertion of the epicoraco-humeral. Externally the pectoralis major is intimately connected with the outermost layers of the external oblique, while posteriorly, as Meckel remarks*, it is similarly united with the rectus abdominis, of which, indeed, it has every appearance of being the anterior continuation.

Costo-coracoid (figs. 7 & 9, C. C.). A thin sheet of muscular fibres arises from the anterior margin of the first sternal rib, and is inserted into the deep surface of that strong tendon which is described below as in part the origin of the internal long head of the triceps. This tendon passes from the posterior end of the inner surface of the sternum (close to the hinder end of the edge by which it articulates with the coracoid), upwards to the anterior border of the scapula, between the spinous process projecting from that border and the point of attachment of the clavicle, and dividing the anterior (or lower) part of the subscapularis from its posterior portion.

This muscle answers no doubt to that which, in the *Echidna*†, goes from the first rib to the coracoid; for I have found such a muscle in *Alligator lucius*, and it is noticed by the Rev. Dr. Haughton in the *Crocodile*‡ under the name "*pectoralis secundus*"—a term I would readily adopt, but that I am inclined to think that the muscle may be the homologue of either the pectoralis minor or the subclavius. Stannius§ speaks of it as the sterno-scapular; but this name has been applied to a muscle widely different||.

Serratus magnus and *levator anguli scapulæ* (figs. 2 & 7, S. Mg.). Several small sheets of muscle proceed from certain ribs to the posterior margin and inner surface (towards the superior margin) of the scapula. These may perhaps include, besides the true serratus magnus, not only the *levator anguli scapulæ*, but also the *rhomboideus*, though I am inclined to regard the latter muscle as absent in the Iguana, not having succeeded in finding the muscle which Meckel speaks of¶ as having the same disposition in that animal as in the Chameleon, though absent in *Polychrus marmoratus*.

There appear to be four principal portions of this complex muscle:—

(1) The largest and most posterior portion arises from the outer surfaces of the last two cervical ribs (*i. e.* those of the eighth and ninth cervical vertebræ) near their free ends. Each rib gives rise to a distinct muscular layer; and these layers are inserted, in common, into about the upper half of the posterior (or axillary) border of the scapula (fig. 7, S. Mg. 1). At the lower end of its insertion it is slightly embraced by fibres of the subscapularis, a few of which arise externally to it.

* *Loc. cit.* p. 343.

† *Trans. Linn. Soc.* 1866, vol. xxv. p. 382.

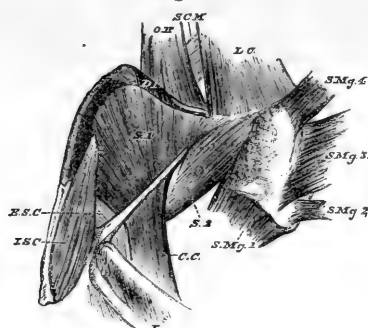
‡ Scientific papers read before the Royal Irish Academy, and published in its 'Proceedings,' 1866, vol. i. p. 702.

§ *Loc. cit.* p. 122.

|| *Proc. Zool. Soc.* 1865, p. 338, and 1866, p. 398 and figs. 2 & 3, S. S.

¶ *Loc. cit.* p. 312.

Fig. 7.



Muscles of the inside of the right half of the scapular arch.

C. C. Costo-coracoid. *D. 1.* First part of deltoid, curving over anterior (upper) margin of coracoid. *E. S. C.* External sterno-coracoid. *I. S. C.* Internal sterno-coracoid. *L. C.* Levator claviculae. *O. H.* Omo-hyoid. *S. 1.* First part of subscapularis. *S. 2.* Second part of subscapularis. *S. C. M.* Sternocleidomastoid. *S. Mg. 1-S. Mg. 4.* Four parts of serratus magnus.

(2) The second and smallest portion (and which some might take to represent the *rhomboideus*) arises from the last but one cervical rib, but considerably higher up than the first portion of the serratus magnus. It is inserted (fig. 7, *S. Mg. 2*) into the inner surface of the posterior (inferior) vertebral angle of the scapula.

(3) The third portion arises from the outside of the ribs of the sixth and seventh cervical vertebrae. It is inserted (fig. 7, *S. Mg. 3*) along the inside of the cartilaginous summit of the scapula, not far from its vertebral margin, and extending along the greater part of the extent of that margin. This portion is double at its origin, each rib giving rise to its own layer of muscle; but the two have a common insertion.

(4) The fourth part of the serratus magnus springs from the outside of the seventh cervical rib, below the origin of the third portion of the serratus. It is inserted (fig. 7, *S. Mg. 4*) into the inner side of the cartilaginous part of the scapula close to the anterior (superior) vertebral angle, between the most anterior parts of the origin of the subscapularis and of the insertion of the third portion of the serratus.

Deltoid (figs. 1, 2, 7 & 8, *D. 1* and *D. 2*). This muscle is very large, and, in the specimen examined by me*, is easily separable into two parts, which, however, have a common insertion:—

(1) The lower portion consists also of two layers, superimposed one on the other,—the superficial layer arising from about the lower (or sternal) half of the posterior part of the deep surface of the clavicle, and from a similar extent of the hinder border of that bone, posterior to the attachments of the trapezius, omo-hyoid, and sterno-

* This was not the case in Meckel's specimen (*loc. cit.* p. 340).

cleido-mastoid. The deeper layer of the same part of the deltoid springs from the anterior part of about the sternal third of the superficial surface of the clavicle, and just in-front of the attachment of the two last-mentioned muscles, which, passing forwards, hide it. It then curves over the anterior margin of the clavicle, and passing backwards, between that bone and the epicoracoid, appears to join the first or more superficial layer.

When the scapular arch is looked at from within, this layer is visible (fig. 7, *D. 1*) immediately above the lower (anterior) portion of the subscapularis, and nearer the observer than the omo-hyoid and sterno-cleido-mastoid muscles.

(2) The upper and larger portion of the deltoid arises from the deep surface and posterior border of the clavicle for rather more than its upper third, and from the outer surface of the scapula for the whole extent between the lower part of the attachment of the levator claviculæ and the hinder (or axillary) margin of the bone. It does not extend upwards to the superior margin of the cartilaginous upper portion of the scapula (fig. 2, *D. 2*),—that part presenting externally a space to which no muscle is attached between this upper or second portion of the deltoid, the serratus magnus, and levator claviculæ.

The two parts of the deltoid are together inserted into the outer side of the radial tuberosity of the humerus, just opposite to the insertion of the pectoralis major, but separated from that muscle by the insertion of the epicoraco-humeral.

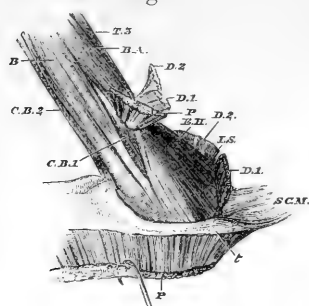
Infraspinatus (?). This rather small muscle (fig. 2, *I. S.*) arises from the outer surface of the spinous process of the scapula, and from the membrane intervening between that process and the first or upper spur of the epicoracoid; it takes origin almost down to the margin of the glenoid cavity. Thence it passes downwards in front of the long head of the triceps, and is inserted into the outer side of the humerus just below the head of the bone and between the summits of the external and internal humeral heads of the triceps. Its insertion is mainly superior to that of the latissimus dorsi, though the tendon of the latter slightly overlaps it.

The infraspinatus is as it were strapped down by a strong ligamentous band, which passes from the lower part of the axillary margin of the scapula to the outside of the head of the humerus, underneath the epicoraco-humeral and above the insertion of the deltoid.

The *epicoraco-humeral* is very largely developed, and arises from the two spurs of the epicoracoid and from the intervening membrane which closes the fenestra. It is inserted (figs. 2, 8 & 10, *E. H.*) into the summit of the radial tuberosity between the insertions of the pectoralis major and deltoid. It is covered externally by the lower part of the deltoid and by the pectoralis major; and its inferior margin is much connected with the adjacent part of the coraco-brachialis.

This muscle appears to me to answer to that which I have called by the same name in the *Echidna* (Trans. Linn. Soc. vol. xxv. 1866, p. 383, and pl. 52. fig. 2, *E. II.*).

Fig. 8.



Muscles of inside of right arm, the pectoralis and deltoid being cut short and reflected.

B. Biceps. *B. A.* Brachialis anticus. *C. B. 1.* First, or short, part of coraco-brachialis. *C. B. 2.* Second, or long, part of coraco-brachialis. *D. 1.* First part of deltoid. *D. 2.* Second part of deltoid. *E. H.* Epicoraco-humeral. *I. S.* Infraspinatus. *P.* Pectoralis. *S. C. M.* Sterno-cleido-mastoid. *T. 3.* Third, or external humeral, head of triceps. *t.* Tendinous fascia of origin of sterno-cleido-mastoid extending, between epicoraco-humeral and pectoralis, backwards to the true sternum.

Subscapularis. This muscle is enormously developed, and is divisible into two parts (fig. 7, *S. 1* and *S. 2*):—

(1) The first portion arises from the whole internal surface of the coracoid and epicoracoid, the spinous process of the scapula, and the membrane of each fenestra. The fibres converge, and towards its insertion this portion fuses with the second part.

(2) The second portion arises from the lower part of the internal surface of the scapula and from the lower half of its posterior, or axillary, margin. It becomes tendinous towards its insertion, and, fusing with the first part, is attached to the ulnar tuberosity of the humerus and to the capsular ligament. This muscle is shown in fig. 2 (though its letter has been accidentally omitted), between *D. 2*, *S. Mg.*, *T. 1*, and the band binding down *I. S.*

Internal sterno-coracoid (fig. 7, *I. S. C.*). The specimen examined by me had had the whole ventral surface of the body medianly divided from behind forwards, so that I cannot define the inner limit of this muscle. It arises, however, from the deep surface of the sternum, internal to the line of its junction with the coracoid and to the attachments of the ribs, and is inserted, by tendinous fibres, into the deep surface of the coracoid and lower part of the epicoracoid (*i. e.* to the deep surface of its lower spur), where it is contiguous to the inferior margin of the first portion of the subscapularis.

External sterno-coracoid (fig. 7, *E. S. C.*). This is a much smaller muscle than the preceding, which overlaps it when the inner surface of the scapular arch is looked at. It arises from the deep margin of that furrow (on the outer edge of the sternum) which receives the coracoid, and is inserted into the coracoid and epicoracoid, passing between those bones and the tendon of the internal sterno-coracoid.

The *sterno-cleido-mastoid* is of large size (figs. 1, 2, 2A, 6 & 8, *S. C. M.*). It arises by muscular fibres from rather more than the lower half of the outer margin of the anterior surface of the clavicle, and by a very strong tendinous fascia (fig. 8, *t.*) from the anterior part of the true sternum. This strong fascia extends forwards (covered by the *pectoralis major*); and the muscular fibres springing from it arise in a point between the *pectoralis major* and the lower portion of the deltoid. The muscle passes forwards, overlapping first the *omo-hyoid*, and afterwards the *levator claviculæ*. It then becomes intimately united with the outer side of the anterior part of the trapezius, and is inserted into the outer half of the postero-superior margin of the parietal process and into the postero-external end of the parotic process.

Sterno-hyoid. This was so much injured in my specimen that I am unable to describe it; according to Cuvier* and Meckel†, however, it proceeds from the outer part of the sternum to the *os hyoides*.

The *omo-hyoid* (figs. 2 & 7, *O. H.*) is rather large, and arises from rather more than the upper half of the clavicle, where externally it is adjacent to the trapezius and *sterno-cleido-mastoid* and internal to the deep layer of the first part of the deltoid. It is mainly inserted into the posterior cornu of the hyoid; but some fibres pass (nearer the middle line of the body) to the body of the *os hyoides*.

Levator claviculæ. This large muscle has a strong tendinous origin from the transverse process of the atlas. Passing backwards it emerges from beneath the *sterno-cleido-mastoid* (figs. 2 & 7, *L. C.*), and, spreading out, is inserted into the summit (or acromial end) of the clavicle and into the anterior margin of the scapula. About the lower half of its insertion is conterminous, posteriorly, with the origin of the upper (or second) portion of the deltoid; internally this muscle is in close juxtaposition with the second part of the *subscapularis* and the fourth part of the *serratus magnus* (fig. 7, *L. C.*).

The *triceps* (figs. 1, 2, 6, 8, 9 & 10) arises by four distinct heads‡, of which two are long, descending from the scapular arch:—

(1) The first part or external long head (which appears to answer to the ordinary long head of this muscle in mammals) arises from the strong, tendinous strap, or ligament before described as passing from the axillary margin of the scapula to the head of the humerus and as binding down the *infraspinatus*. Thus the head may be said to arise by a bifurcating tendon like that of the *rectus femoris* of Man (figs. 1, 2 & 9, *T. 1*).

(2) The second part, or internal long head (fig. 9, *T. 2*), takes origin by a long and rather slender tendon, which also bifurcates above,—its lower bifurcation being attached to the postero-internal angle of the deep surface of the coracoid, while its upper bifurcation fuses with that before-described tendinous arch into which the *costo-coracoid* muscle is inserted.

This second head of the *triceps* soon joins with the first head, and at its union with the latter receives a small tendinous slip (fig. 9, *t.*)

* *Loc. cit.* vol. iv. part 1, p. 531.

† *Loc. cit.* vol. viii. p. 135.

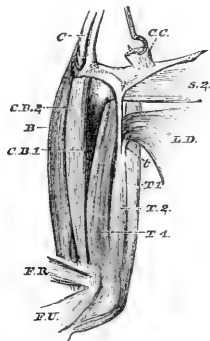
‡ Meckel, *loc. cit.* p. 364.

from the tendon of the latissimus dorsi. Is this head the homologue of the dorso-epitrochlear, which sometimes, as in Hyrax*, takes origin from the scapular arch, but normally springs from the tendon of the latissimus dorsi?

(3) The third, or external humeral head, arises from the whole outer surface of the humerus below the head of the bone, extending as it does above the insertions of the deltoid and infraspinatus (figs. 1, 2, 8 & 10, *T. 3*).

(4) The last, or internal humeral head (figs. 6, 9 & 10, *T. 4*), similarly arises from the internal surface of the humerus to the head of the bone. At its summit this part of the muscle has contiguous to it, antero-internally, the short part of the coraco-brachialis and the insertion of the subscapularis, while the tendons of the latissimus dorsi and infraspinatus are contiguous to it on its postero-external side (fig. 9).

Fig. 9.



Muscles of inside of right arm, the scapular arch being detached, and the costo-coracoid muscle (*C. C.*) being cut short and reflected.

- B.* Biceps muscle. *C.* Sternal margin of coracoid bone. *C. B. 1.* First, or short, part of coraco-brachialis muscle. *C. B. 2.* Second, or long, part of coraco-brachialis. *C. C.* Costo-coracoid. *F. R.* Flexor carpi radialis. *F. U.* Flexor carpi ulnaris. *L. D.* Latissimus dorsi. *S. 2.* Second part of subscapularis. *T. 1.* First, or external long, head of triceps. *T. 2.* Second, or internal long, head of triceps. *T. 4.* Fourth, or internal humeral, head of triceps. *t.* Tendon from latissimus dorsi to triceps.

All these four portions are united together at above the middle of the arm, and are together inserted into the proximal end of the ulna and into the patella-like sesamoid immediately above it.

Coraco-brachialis. This muscle consists of two parts:—

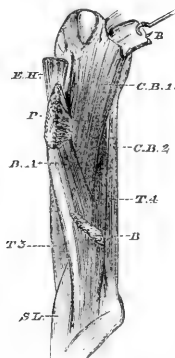
(1.) The first of these, or shorter portion, is a broad muscle, and much resembles the short coraco-brachialis of the *Echidna*†. It arises, by muscular fibres, from the whole outer surface of the coracoid, from the lower spur of the epicoracoid, and from the membrane

* Proc. Zool. Soc. 1866, p. 340, fig. 5, *D. c.*

† Trans. Linn. Soc. vol. xxv. p. 385.

intervening between these, and is inserted into the front of the humerus from the head and internal tuberosity to the middle of its shaft. The limit of its insertion begins above at the insertions of the epicoraco-humeral and pectoralis major, and below is continuous with the origin of the brachialis anticus (figs. 8, 9 & 10, *C. B. 1*). From the extent of its insertion this portion appears to me to answer both to the *coraco-brachialis proprius vel medius* and to the *rotator humeri* or *coraco-brachialis superior vel brevis* of Mr. Wood*.

Fig. 10.



Flexor surface of right upper arm, the biceps and pectoralis major being cut short.

B. Biceps. *B. A.* Brachialis anticus. *C. B. 1 & 2.* Coraco-brachialis. *E. H.* Epicoraco-humeral. *P.* Pectoralis major. *S. L.* Supinator longus. *T. 3 & 4.* Triceps.

(2) The second, longer portion (figs. 6, 8, 9 & 10, *C. B. 2*), which seems to answer to the *coraco-brachialis longus* of Mr. Wood†, arises, by muscular fibres, from the posterior end of the sternal border of the coracoid, and is inserted into the internal condyle of the humerus and into the shaft of the bone for a very slight distance above that condyle. There is a glistening tendon on the side next to the bone of the lower half of this portion of the coraco-brachialis.

The *biceps* (figs. 1, 2, 6, 8, 9, 10 & 12, *B.*) has, as in the *Echidna*‡, but a single head§, which takes origin, by a very broad tendon (with an aponeurotic longitudinal interval), from the anterior (not sternal) margin of the coracoid and adjacent part of the epicoracoid, and passes backwards so as to be immediately superficial to the short part of the coraco-brachialis. It soon fuses with the *brachialis anticus*, and is inserted in common with that muscle (by a very strong tendon, which slightly bifurcates below) into the upper parts of both radius and ulna; but the fibres continuous with the *biceps*

* Journal of Anat. and Phys., Cambridge, 1866, vol. i. pp. 48, 49.

† *Loc. cit.* p. 49.

‡ Trans. Linn. Soc. vol. xxv. p. 385.

§ Unless what I have named *brachialis anticus* be a humeral head of the *biceps*.

appear to go mainly to the ulna. Thus its insertion has much resemblance to that of the same muscle in the *Echidna*.

The *brachialis anticus* (figs. 1, 2, 6, 8 & 10, *B. A.*), which may be, as Meckel appears to think*, a humeral head of the biceps, springs from the front of the shaft of the humerus, immediately below the insertions of the deltoid, epicoraco-humeral, and pectoralis major. It soon fuses with the biceps, and is inserted in common with it into the upper ends of the flexor surfaces of both radius and ulna. The fibres of this muscle, however, appear to be connected mainly, if not exclusively, with the radius.

Supinator longus. This muscle (figs. 1, 6, 10 & 11) is exceedingly large, and, as Meckel observes†, arises by two heads, which do not unite till far down the forearm (fig. 1, *S. L.*). Indeed I find that that head which has the more posterior (lower) origin may be again divisible at and near its origin into two portions, of which the anterior (upper) one is much the smaller; all these parts, however, arise from the external condyle, and have a common insertion into the radial margin of the radius for almost its whole length, and therefore side by side with the pronator teres as far as the latter extends. The head, which has the more posterior (lower) origin, is intimately connected with the radial extensor.

The *extensor carpi radialis*, which appears to answer to both the *longior* and *brevior* of mammals, arises by tendinous fibres from the outer and posterior surface of the external condyle, immediately superficial to the posterior (lower) part of the origin of the supinator longus, with which, for some distance, it is very intimately connected. Passing downwards (fig. 1, *E. R.*) it divides into three parts, which are inserted, each by a tendon, into the proximal ends of the dorsal surfaces of the second, third, and fourth metacarpals.

Extensor communis digitorum. As Meckel observes‡, this muscle has, as it were, "*descendu à la main*" (fig. 11, *E. C.*). It is small, arises from the carpus, and is inserted into the bases of the digits. It is much subdivided, there being more or less distinct fleshy bundles for the several digits.

The *extensor carpi ulnaris* (fig. 1, *E. U.*, and fig. 11, *E. C. U.*) is rather indistinct. It arises indeed by tendinous fibres from the posterior surface of the external condyle; but its insertion is into the adjacent border of another muscle, the flexor carpi ulnaris.

Extensor ossis metacarpi pollicis. This is a rather thick muscle which arises from the posterior surface of rather less than the distal half of the ulna. It is inserted into the metacarpal of the pollex (fig. 11, *E. M. P.*).

Pronator teres (figs. 6 & 12, *P. T.*). The origin of this muscle is by a very strong tendon attached to the summit of the internal condyle. Its fibres spread out, and are inserted into the lower two-thirds of the radial margin of the radius.

The *flexor carpi radialis* (figs. 6, 9, *F. R.*, and fig. 12, *F. C. R.*) arises from the internal condyle immediately below the origin of the

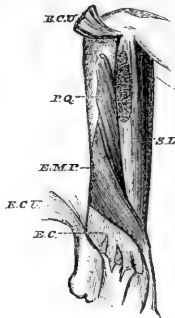
* *Loc. cit.* p. 362.

† *Loc. cit.* p. 367.

‡ *Loc. cit.* p. 391.

pronator teres. It is inserted into the carpal bone, which articulates with the radius, and also by a small tendon running on (figs. 6 & 12) into the radial side of the metacarpal of the pollex.

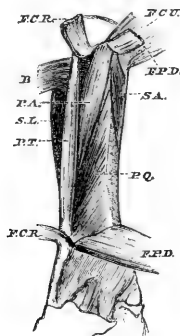
Fig. 11.



Deep muscles of extensor surface of right forearm.

E. C. Extensor communis digitorum. *E. C. U.* Origin of extensor carpi ulnaris and common insertion of extensor and flexor carpi ulnaris. *E. M. P.* Extensor ossis metacarpi pollicis. *S. L.* Supinator longus. *P. Q.* Pronator quadratus.

Fig. 12.



Deep muscles of flexor surface of right forearm, the flexor carpi radialis, flexor carpi ulnaris, and flexor profundus digitorum being cut and reflected.

B. Biceps. *F. C. R.* Flexor carpi radialis. *F. C. U.* Flexor carpi ulnaris. *F. P. D.* Flexor profundus digitorum. *P. A.* Pronator accessorius. *P. Q.* Pronator quadratus. *P. T.* Pronator teres. *S. A.* Supinator accessorius. *S. L.* Supinator longus.

Pronator accessorius (fig. 12, *P. A.*). A muscle I so name provisionally, arises from the anterior surface of the internal condyle, immediately beneath the humeral origin of the flexor profundus digitorum. It is inserted into the radius between the insertion of the pronator teres and that of the pronator quadratus.

Supinator accessorius (fig. 12, *S. A.*). Another muscle, which I also provisionally distinguish by a new name, arises from the internal condyle immediately below, but somewhat superficial to the pronator accessorius. It expands as it descends, and is inserted into about the proximal half of the ulnar margin of the ulna.

The *pronator quadratus* (figs. 11 & 12, *P. Q.*) is broadest below, and becomes very narrow towards its upper end. It arises from the flexor surface of the distal half of the ulna and from the whole radial margin of that bone, and it is inserted into the flexor surface of the radius.

Flexor carpi ulnaris (figs. 1, 6 & 9, *F. U.*, and fig. 12, *F. C. U.*). This forms a large muscular sheet, which, as usual, has the ulnar nerve passing between its double origin—that from the internal condyle and that from the olecranon. It is inserted into both the pisiforme and fifth metacarpal, as Meckel observes*. This muscle receives on its postero-external side the insertion of the extensor carpi ulnaris, the two together forming a layer of muscle which wraps round the ulnar side of the forearm.

The *flexor sublimis digitorum* (fig. 6, *F. S. D.*) is a thin muscle entirely confined to the hand†. It arises from the annular ligament, and is inserted into the second phalanges of the digits, being perforated in each case by a tendon of the flexor profundus digitorum.

Flexor profundus digitorum (figs. 6 & 12, *F. P. D.*). This is a very thick muscle, and has four, more or less distinct heads of origin.

The first head arises from the internal condyle, immediately beneath the origin of the flexor carpi radialis; it very soon unites with the portion arising from the ulna (fig. 6, *F. P. D.* 1).

The second head also springs from the internal condyle, just below the first head; it also joins the portion arising from the ulna (fig. 6, *F. P. D.* 2).

The third portion takes origin from the greater part of the flexor surface of the ulna.

These three portions unite and give rise to a very strong tendon (in which is a palmar ossicle); and into the deep surface of this tendon are inserted muscular fibres, which spring from the carpus and constitute the fourth head of the muscle.

From the distal margin of this tendon proceed the five perforating tendons, one going to each digit.

Lumbricales. I have only observed six lumbrical muscles:—

One going from the ulnar side of the index tendon to the ulnar side of the second digit.

Two from the tendon of the third digit (one on each side), inserted into each side of the third digit.

Two from the tendon of the fourth digit (one on each side), inserted into each side of the fourth digit.

One from the radial side of the fifth digit, inserted into the radial side of the same digit.

Interossei. There are dorsal interossei which arise from the carpus, and are inserted one on each side of the proximal phalanx of

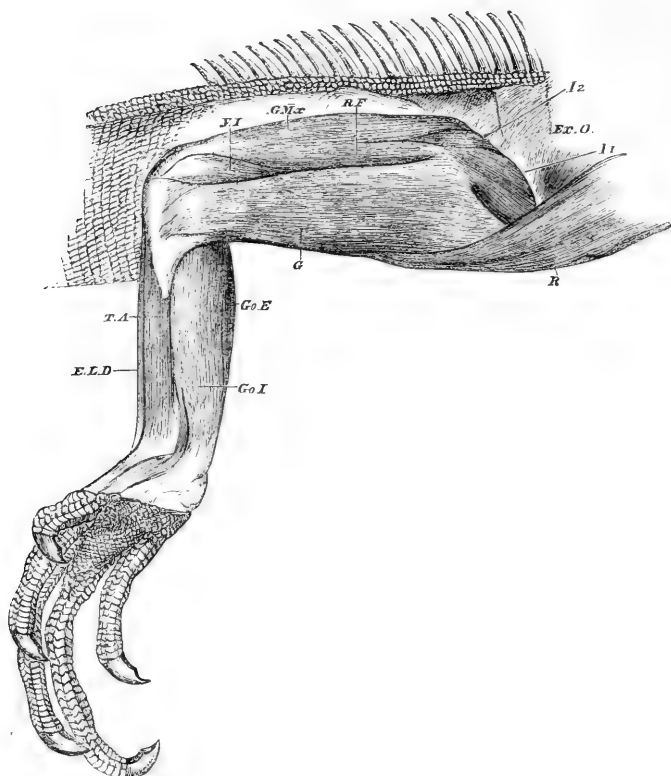
* *Loc. cit.* p. 383.

† Meckel, *loc. cit.* p. 392.

each digit, except the pollex, which has a large bundle of fibres inserted into the dorsal side of the ulnar border of its *metacarpal*!

Palmar interossei also spring from the carpus, and are inserted one on each side of the proximal phalanx of each of the three middle digits. Another rather large fasciculus is inserted into the radial side of the fifth digit, and, no doubt, represents one or more of the spinal muscles of that digit. Finally, a considerable number of muscular fibres are inserted into the proximal phalanx of the pollex and into the palmar side of the ulnar border of its metacarpal. These fibres, no doubt, represent the *flexor brevis* and *opponens pollicis* of higher animals.

Fig. 13.



Right pelvic limb. Superficial muscles of the anterior surface of the thigh and of the flexor surface of the leg.

E. L. D. Extensor longus digitorum. *Ex. O.* External oblique. *G.* Gracilis. *Go. E.* Gastrocnemius externus. *Go. I.* Gastrocnemius internus. *G. M.x.* Gluteus maximus. *I. 1 & 2.* Iliacus and psoas. *R.* Rectus abdominis. *R. F.* Rectus femoris. *T. A.* Tibialis anticus. *V. I.* Vastus internus.

MUSCLES OF THE PELVIC LIMB.

Psoas and *Iliacus*. I am inclined to regard the complex muscular mass which goes from the inside of the pelvis, passing over its brim to the femur, as the homologue of the *psoas* and *iliacus*. I find present four muscular bundles. The first (figs. 13, 14 & 16, I. 1) arises inside the pubis, from a median raphe separating it from its fellow of the opposite side and also takes origin from the most ventral portion of the pubis, overlapping its brim. Its upper (or posterior) margin is continuous with the inferior (or anterior) margin of the second part of the muscle, and lies superficially to the third part. Passing over the brim of the pelvis, above the spine of the pubis, it is inserted into the tendinous arch going from the front of the acetabulum to the symphysis ischii, and into the upper half of that part of it which is between the acetabulum and the spine of the pubis. It is intimately connected with the second and third parts of this complex muscle and with the tibial adductor.

The second part of the muscle (figs. 13, 14 & 16, I. 2) lies above (*i. e.* nearer the vertebral column than) the first part. It arises also inside the pelvis, from a median raphe which separates it from its fellow of the opposite side. It is inserted in common with the third portion, and is indeed, in part, only with some difficulty separable from the first portion, with the upper (or posterior) margin of which its lower (or anterior) margin is continuous.

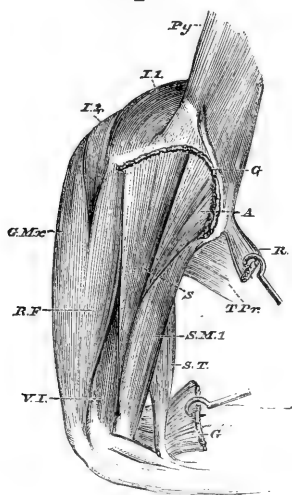
The third portion is a very broad muscular layer, which lies hidden by the first and second portions of the muscle. It arises from the internal surface of the pubis, ischium, and obturator foramen; and the upper (or posterior) part of its origin is easily separable from the more ventral (or anterior) portion. It is inserted into the tibial side of the upper part of the shaft of the femur, internally to the summit of the crureus, just above the insertion of the adductor, and slightly overlapping the tendon of insertion of the femoro-caudal. It is, however, mainly inserted by a strong tendon, which passes across the front of the upper end of the shaft of the femur, beneath the summit of the vastus externus, to the insertion of the gluteus medius, which slightly overlaps it. Thus, the tendinous insertion being on the peroneal side of the bone, while the muscular fibres (inserted with those of the two preceding portions of the *iliacus*) are attached rather to the tibial side, the upper part of the femur comes to be more or less embraced.

The fourth and smallest portion of the complex muscle (fig. 16, I. 4) springs from the surface of that upper (or more posterior) division of the origin of the third part already spoken of (namely that division of the third which arises from the ischium and obturator membrane, and which might be called a fifth portion), and lies nearer the vertebral column than do the other parts. It is inserted in common with the muscular insertion of the third part of the muscle just described; but its fibres are partly continuous with those of the crureus, crossing over the tendon of insertion of the third part of the *psoas* and *iliacus*.

Quadratus lumborum. This muscle (fig. 3, *Q. L.*) is very thick at its origin, but thins out anteriorly. It arises from the crest and anterior part of the internal surface of the ilium, and is inserted into the transverse processes of the lumbar ribs, and also of all, or of almost all, the thoracic ones. Besides the short ribs, it is separated, in the lumbar region, from the superimposed dorsal extensor mass by a strong fascia.

Gracilis. The muscle which appears to me to represent, possibly, the *gracilis* of mammals is a superficial one on the antero-internal surface of the thigh (figs. 13, 14 & 15, *G.*). It arises from the ischiatic symphysis, and from the long tendinous arch which passes from the front of the acetabulum, round behind the pubic spine, back to the symphysis just mentioned. It is inserted into the outer side of the upper part of the tibia, and at its insertion is intimately united with the semitendinosus. At the lower border of the insertion is a strongish tendon (fig. 14, *G.*), which is common to both muscles, muscular fibres from each being inserted into it.

Fig. 14.



Second layer of muscles of anterior surface of right thigh. The gracilis is cut away short above and reflected below. The rectus abdominis is hooked on one side to show the pyramidalis.

A. Adductor magnus. *G.* Gracilis. *G. Mx.* Gluteus maximus. *I. 1 & 2.* Iliacus and psoas. *Py.* Pyramidalis. *R.* Rectus abdominis. *R. F.* Rectus femoris. *S.* Tibial adductor. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. Pr.* Transversus perinei. *V. I.* Vastus internus.

The *tibial adductor* is a muscle which arises, beneath the gracilis, from about the upper half of the tendinous arch just mentioned as extending from the front of the acetabulum to the ischiatic sym-

physis (figs. 14, 16, 17 & 18, *S.*). It is slightly connected, at its origin, with the first part of the iliacus, and some fibres spring from the brim of the pelvis just below the tendon of the rectus femoris. Passing downwards between the rectus femoris and the adductor, and passing peroneal of the first part of the semimembranosus, it goes very deeply into the popliteal space (between the two heads of the gastrocnemius), and, uniting with the second part of the semimembranosus, is inserted by a tendon into the peroneal side of the head of the tibia above and behind the insertion of the tendon of the biceps. This muscle is easily separable longitudinally into two parts.

Semimembranosus. This muscle consists of two portions so distinct in insertion that they may well be considered two separate muscles:—

(1) The first portion (figs. 14, 15, 17 & 18, *S. M.* 1) arises from the tuberosity of the ischium, and from the tendinous arch which passes from the posterior end of the ilium to the spine of the pubis. Its origin is nearly in the same vertical line as, though ventral to, the common origin of the biceps and semitendinosus. Thick and fleshy, it is inserted into the back of the leg, embracing the inner head of the gastrocnemius, some fibres passing beneath the internal lateral ligament, while others extend along the posterior margin of the summit of the tibia.

(2) The second portion (figs. 15, 17 & 18, *S. M.* 2) arises in common with the first portion, and is inserted by a tendon (common to it and to the tibial adductor) into the summit of the peroneal surface of the tibia.

The *semitendinosus* (figs. 14, 17 & 18, *S. T.*) springs in common with the biceps from the strong tendinous arch just mentioned as passing from the posterior end of the ilium to the spine of the pubis, behind and a little above the tuberosity of the ischium. It is inserted by a strong tendon, common to it and to the gracilis, into the inside of the upper part of the tibia, at the lower end of the internal lateral ligament. The insertion is mainly superficial to the last-mentioned ligament; but a few tendinous fibres appear to pass inside it.

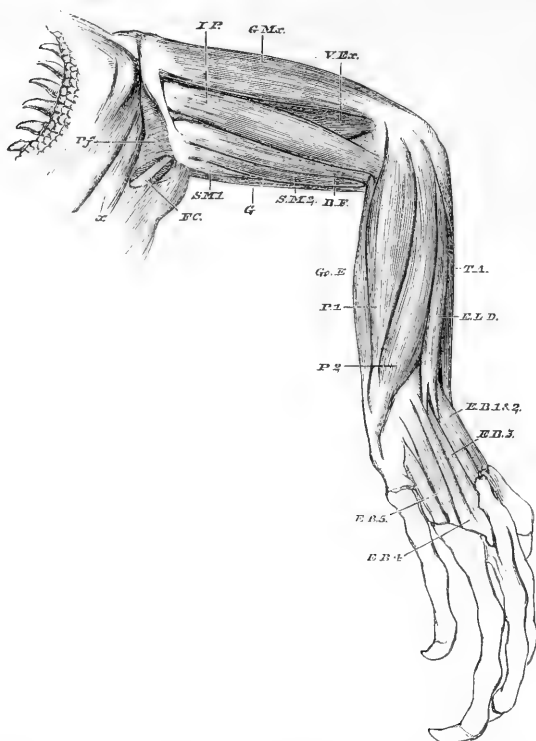
Biceps (figs. 15, 17 & 18, *B. F.*). This arises, in common with the muscle last described, from the strong ligamentous arch passing from the ilium to the spine of the pubis, and arching over the great femoro-caudal tendon. It is inserted by a slender tendon, which goes very deeply into the popliteal space (between the two heads of the gastrocnemius), and, passing between the tibia and fibula, is inserted into quite the anterior aspect of the outer (peroneal) side of the tibia a little below its upper margin and below and in front of the insertion of the tendon common to the second part of the semimembranosus and the tibial adductor.

The *biceps* becomes intimately united with the *gastrocnemius*, as it gives off a strong tendon (fig. 18), which runs down just internal to the outer border of the inner head of that muscle.

Ilio-peroneal (figs. 15, 16, 17 & 18, *I. P.*). A long and strong muscle, which arises from the posterior part of the outer side of the ilium, covered by the posterior portion of the tendinous origin of the

gluteus maximus, and even a little overlapped by the gluteus medius. It is inserted by a strong tendon (which dips in between the peroneus primus and the outer side of the outer head of the gastrocnemius) into the outer side of the fibula, near its summit*.

Fig. 15.



Right pelvic limb. Superficial muscles of the posterior surface of the thigh and of the extensor surface of the leg.

B. F. Biceps femoris. *E. B. 1-5.* Extensor brevis digitorum. *E. L. D.* Extensor longus digitorum. *F. C.* Femoro-caudal. *G.* Gracilis. *G. M.* Gluteus maximus. *Go. E.* Gastrocnemius externus. *I. P.* Ilio-peroneal. *P. 1.* Peroneus primus. *P. 2.* Peroneus secundus. *Pf.* Pyriformis. *S. M. 1 & 2.* Semimembranosus. *T. A.* Tibialis anticus. *V. Ex.* Vastus externus. *x.* End of the two median series of lateral caudal cones.

Pectineus? Three portions of muscle seem more or less to represent the *pectineus* :—

(1) A very small part, which arises from the ligamentous arch before mentioned as passing from the front of the acetabulum, round

* Meckel, *loc. cit.* p. 428.

by the spine of the pubis, to the ischiatic symphysis. It is inserted into the summit of the trochanter below, and superficial to, the other two portions (fig. 17, *Pc. 1*).

(2) The second part (fig. 17, *Pc. 2*) arises from the down-turned lip of the pubis, from the acetabulum to the symphysis. It is inserted immediately beneath the preceding portion.

(3) The third part (fig. 17, *Pc. 3*) arises from the symphysis pubis, backwards to the middle of the obturator foramen. At the posterior end of its origin the obturator externus is superficial to it and overlaps it. It is inserted into the summit of the trochanter immediately behind the second part.

The *adductor magnus* (figs. 14 & 17, *A.*) is a rather large muscle, which arises, by strong tendinous fibres, from the anterior part of the strong tendinous arch before mentioned which ends in front at the pubic spine. It is inserted into the inner side of the shaft of the femur (for about the second and third fifths of its vertical extent) between the vastus externus and the vastus internus.

Rectus femoris (figs. 13, 14, 16 & 17, *R. F.*). This muscle arises, by a very strong and rather broad tendon, from the ventral side of the acetabulum. It blends with the other extensors of the leg and with the aponeurosis of insertion of the gluteus maximus.

Vastus internus. A rather small muscle (figs. 14 & 17, *V. I.*) arising from the inside of the shaft of the femur, about as high as the bottom of the uppermost third of the insertion of the adductor; below it blends with the crureus and other extensors of the leg.

Vastus externus (fig. 15, *V. Ex.*). This is exceedingly small, and so intimately connected with the crureus as scarcely to admit of definition. It arises from the lowest two-fifths of the postero-external surface of the shaft of the femur, and is inserted with the rest of the extensor mass.

Crureus (figs. 16 & 17, *C.*). This muscle is so intimately connected with the last as to be separable from it only with great difficulty. It arises from the front of the femur, its origin extending up near to the head of the bone. It is inserted into the patella along with the rest of the extensor muscular mass. At its summit it is, in part, continuous with the fourth portion of the iliacus.

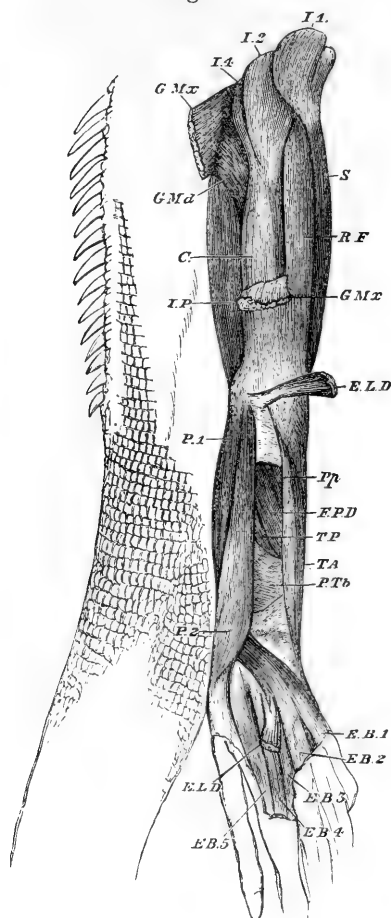
Gluteus maximus (?). A muscular layer, which may perhaps represent the gluteus maximus of mammals*, arises by a very strong tendinous fascia from the outer side and upper margin of the ilium. It covers the antero-external side of the thigh, becomes intimately united with the rectus femoris, and is inserted by aponeurosis into the outer surface of the vastus externus (figs. 13, 14, 15 & 16, *G. Mx.*).

The *gluteus medius* arises from the outer surface of the ilium, between the origins of the gluteus maximus and ilio-peroneal. It is a small muscle, and is inserted into the outer side of the upper part

* I am very doubtful as to whether this muscle and the next are really *glutei*; but the condition of these muscles in *Echidna* inclines me to name them so, provisionally at least (see Trans. Linn. Soc. vol. xxv. 1866, p. 391, and pl. 53. fig. 2. *G. mx.* and *G. md.*).

of the shaft of the femur behind and external to the summit of the origin of the vastus externus. The upper part of its insertion is into the lower portion of the trochanteric fossa (fig. 16, *G. Md.*).

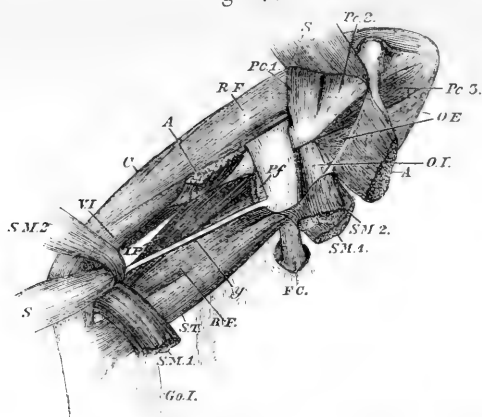
Fig. 16.



Deeper muscles of extensor surface of right pelvic limb. The gluteus maximus and the extensor longus digitorum are each cut short and reflected at both ends.

C. Crureus. *E. B.* 1-5. Extensor brevis digitorum. *E. L. D.* Extensor longus digitorum. *F. P. D.* Flexor longus digitorum. *G. Md.* Gluteus medius. *G. Mx.* Gluteus maximus. *I.* 1-4. Iliacus and psoas. *I. P.* Ilio-peroneal. *P.* 1. Peroneus primus. *P.* 2. Peroneus secundus. *Pp.* Popliteus. *P. Tb.* Peroneo-tibial. *R. F.* Rectus femoris. *S.* Tibial adductor. *T. A.* Tibialis anticus. *T. P.* Tibialis posticus.

Fig. 17.



Deepest muscles of right thigh; ventral aspect. The gracilis is entirely removed. The tibial adductor, the semimembranosus, and the adductor magnus are cut short and reflected.

A. Adductor magnus. B.F. Biceps femoris. C. Crureus. F.C. Femoro-caudal. Go. 1. Gastrocnemius internus. I.P. Ilio-peroneal. O.E. Obturator externus. O.I. Obturator internus. Pc. 1-3. Pectineus. Pf. Pyriformis. R.F. Rectus femoris. S. Tibial adductor. S.M. Semimembranosus. S.T. Semitendinosus. V.I. Vastus internus. y. Tendon of insertion of femoro-caudal given off from the larger tendon and going to the popliteal space.

*Obturator externus**. This is very fleshy, and arises from the ischium and the outside of the obturator membrane (fig. 17, O. E.). It is inserted into the trochanteric fossa immediately above the summit of the insertions of the gluteus medius and pyriformis.

The *obturator internus*† (fig. 17, O. I.) arises from the posterior part of the deep surface of the ischium. Curving round the outer margin of that bone (between the acetabulum and the tuberosity), it is inserted, by an exceedingly strong tendon, into a pit on the outer side of the articular head of the femur.

Pyriformis (figs. 15 & 17, Pf.). This muscle‡ arises from the under surfaces of the first four caudal transverse processes, between the large femoro-caudal muscle on the inside and the conjoined insertions of the two median series of lateral caudal cones on the outside. It is inserted into the strong tendinous arch passing from the ilium to the pubis and enclosing the tendon of the femoro-caudal muscle. Thence taking fresh origin, and accompanied by an anterior fasciculus coming direct from the caudal vertebræ, it is finally

* This appears to answer to the *m. quadratus femoris* of Stannius (p. 134. no. 10).

† The *obturator internus* of Stannius (*loc. cit.* p. 134. no. 5) is a part of my *iliacus*.

‡ It is the *m. subcaudalis* of Stannius (*loc. cit.* p. 133. no. 4).

attached to the base of the back of the trochanter, immediately next to the insertion of the *gluteus medius* on the one hand and of the *femoro-caudal* on the other.

Femoro-caudal (figs. 15 & 17, *F. C.*)*. This exceedingly large muscle arises from the infero-lateral aspect of the caudal vertebrae, where it separates from the vertebral column by its backward intrusion (fig. 5, *F. C.*), the contiguous parts of the ventral, and infero-lateral series of caudal muscular cones. It is inserted, by a very large and strong tendon, into the base of the trochanter on its extensor aspect and above the insertion of the adductor. A little before its insertion this large tendon gives off, nearly at right angles, a long delicate one, which, passing down the thigh into the popliteal space (figs. 17 & 18 y), is inserted into the interarticular cartilage between the femur and the tibia, as Stannius has stated†.

The *tibialis anticus* (figs. 13, 16 & 18, *T. A.*) arises from the front of the tibia, the part above the middle of the bone springing mainly from its peroneal aspect, and the part below the middle from its inner aspect. It ends in a single tendon, which is inserted into the tibial side of the distal end of the metatarsal of the hallux.

Extensor longus digitorum. This muscle arises, by a strong tendon (figs. 13, 15 & 16, *E. L. D.*), from the anterior surface of the external condyle of the femur. It continues fleshy down to the metatarsals, when it suddenly narrows and gives off two small tendons, which pass, one on each side of the middle metatarsal bone, near its proximal end. Of these two tendons, the peroneal one curves round tibiad, and is inserted into nearly the middle of the plantar surface of the third metatarsal. The other one is similarly implanted into the second metatarsal.

Extensor brevis digitorum. This muscle may be said to consist of five portions:—

(1) The first part (figs. 15 & 16, *E. B. 1*) is an oblique slip, proceeding forwards and inwards, which arises from the peroneal aspect of the lower end of the fibula, and is inserted into the dorsum of the hallux.

(2) The second part (figs. 15 & 16, *E. B. 2*) is similar in size and direction. It arises from the fibula, below the last, and is similarly inserted into the index digit.

(3) The third portion (figs. 15 & 16, *E. B. 3*) arises, by a strong though small tendon, from a pit in the middle of the anterior surface of the astragalus. Passing between the two tendons of the *extensor longus digitorum*, it is inserted into the dorsum of the third digit.

(4) The fourth part (figs. 15 & 16, *E. B. 4*) arises in common with the preceding, but does not pass between the tendons of the *extensor longus digitorum*. It is inserted into the dorsum of the fourth digit.

(5) The fifth and last part arises, by a strong tendon, from the bottom of the anterior face of the astragalus (figs. 15 & 16, *E. B. 5*). It is also inserted into the dorsum of the fourth digit.

* This is the "*sous-caudien profond*" of Meckel (*loc. cit.* p. 285).

† *Loc. cit.* p. 133. no. 3.

Peroneus primus. This muscle (figs. 15, 16 & 18, *P. 1*) arises, by a strong tendon, from the summit of the outer side of the external condyle of the femur. Passing downwards, it becomes tendinous just below the outer malleolus, and ends in a tendon which is inserted into the peroneal border of the fifth metatarsal bone, a little above its middle. Behind the ankle its tendon expands into a broad, strong, ligamentous fascia, which binds down the flexor muscles, being attached internally to the internal margin of the hinder surface of the astragalus.

Peroneus secundus. A muscle, somewhat larger than the preceding (figs. 15 & 16, *P. 2*), arises from the antero-external surface of the fibula for almost its entire length. It is inserted close above the insertion of the preceding muscle.

Gastrocnemius. Two distinct muscles compose the gastrocnemius:—

(1) The first of these (figs. 13, 17 & 18, *G. I.*) arises from the internal condyle of the femur, where it is closely connected with the insertion of the first part of the semimembranosus, which embraces it. It is also attached to the tibial margin of the tibia, close to the insertion of the semitendinosus. Passing downwards, it soon receives a strong tendon from the biceps, which tendon runs down just internal to its outer border. At the ankle it becomes aponeurotic, and constitutes the most superficial and external part of the plantar fascia.

(2) The second head (figs. 13, 15 & 18, *G. E.*) arises from the femur, immediately above the external condyle. Below it becomes a large muscle, considerably greater than the inner head of the gastrocnemius, which latter passes down superficially to this second portion. Becoming aponeurotic at the ankle, it contributes to form the superficial plantar fascia, especially that part which underlies the three peroneal metatarsals, its fibres, indeed, appearing to form as it were perforated tendons to the third and fourth digits.

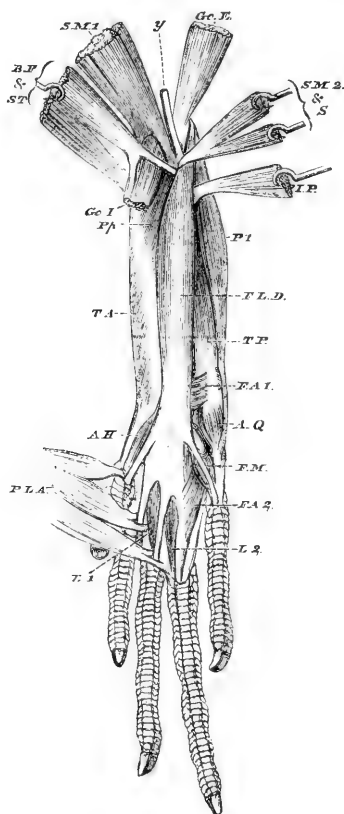
Plantaris. This muscle is at its origin so intimately connected with the outer head of the gastrocnemius that it is with some hesitation that I describe it by a distinct name. About the middle of the leg it separates somewhat from the gastrocnemius externus, and thence widens to the ankle, where it receives a reinforcement of a few muscular fibres from the fifth metatarsal bone, in the distal end of the outer surface of which is implanted a tendon which passes along the peroneal edge of the muscle. In the sole this muscle appears as three fleshy bellies (fig. 18, *P. L. A.*), which form the perforated tendons of the second and third digits, and perhaps of the hallux also.

The *popliteus* arises from the tibial aspect of the head of the fibula, and is inserted into the posterior surface and tibial margin of almost the upper half of the tibia (figs. 16 & 18, *Pp.*).

Flexor longus digitorum (fig. 16, *F. P. D.*, and fig. 18, *F. L. D.*). This rather large muscle arises (1) partly, in common with the last, from immediately above the external condyle of the femur, (2) from the upper third of the posterior surface (or margin) of the fibula, and (3) from almost the upper half of the tibial side of the fibula,

where it is closely connected above with the peroneal side of the popliteus. The second and third portions arise side by side and are closely connected together. Beneath the astragalus this muscle ends in a wide tendon, which divides into five narrow ones, one of these going to the last phalanx of each digit.

Fig. 18.



Flexor surface of right leg; the two heads of the gastrocnemius being cut off short above, and the plantaris reflected below. The semimembranosus, the biceps and semitendinosus, the ilio-peroneal and the tibial adductor are cut and variously reflected.

A. H. Abductor hallucis. *A. Q.* Abductor ossis metatarsi quinti. *B. F.* Biceps femoris. *F. A. 1* & *F. A. 2.* Flexor accessorius. *F. L. D.* Flexor longus digitorum. *F. M.* Flexor minimi digiti. *Ge. E.* Gastrocnemius externus. *Ge. I.* Gastrocnemius internus. *I. P.* Ilio-peroneal. *L. 1.* & *L. 2.* Lumbricales. *P. 1.* Peroneus primus. *P. L. A.* Plantaris. *Pp.* Popliteus. *S.* Tibial adductor. *S. M. 1* & *S. M. 2.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* Tibialis anticus. *T. P.* Tibialis posticus. *y.* Tendon of insertion of femoro-caudal.

The *tibialis posticus* is very narrow above and very broad below. It arises from the lower half of the posterior surface of the fibula, and its fibres pass downwards and tibial. It ends inferiorly in a broad expanded tendon, which is inserted into the posterior process and whole posterior border of that tarsal bone which fits into the concavity on the under surface of the astragalus (figs. 16 & 18, *T. P.*).

Peroneo-tibial. A remarkable muscle connects together rather more than the lowest two-fifths of the tibia and fibula. Its fibres pass from the posterior surface and tibial border of the last-named bone to the peroneal margin, and to a very little of the anterior margin of the tibia (fig. 16, *P. Tb.*). This muscle is unlike any with which I am acquainted, unless it be the very similar one found in the leg of the Wombat.

Flexor accessorius. Two small muscular bands, which may perhaps be so named, are thus conditioned:—

(1) The first springs from the plantar aspect of the os calcis, and is inserted into the peroneal side of the tendon of the flexor profundus digitorum before its division.

(2) The second part from the tibial aspect of the ridge on the plantar surface of the fifth metatarsal, and is inserted into the tendons of the second, third, and fourth digits (fig. 18, *F. A. 1* and *F. A. 2*).

Lumbricales. I have only detected two muscles which appear thoroughly to answer to mammalian lumbricales.

These arise from the plantar surfaces and tibial sides of the perforating tendon of the third and fourth digits, and go respectively to the tibial sides of the same digits (fig. 18, *L. 1* and *L. 2*).

Three other narrow flat muscular bands go from the deep surfaces of the perforating tendons of the third, fourth, and fifth digits to the plantar surfaces of the proximal phalanges of the same digits.

Abductor hallucis (fig. 18, *A. H.*). This is a flat muscular band, which arises from the plantar surface of the naviculare, very near to the proximal end of the first metatarsal, and is inserted into the proximal phalanx of the hallux.

The *abductor ossis metatarsi quinti* (fig. 18, *A. Q.*) is a similar flat muscular band arising from the distal end of the os calcis, and inserted into the peroneal border of the distal end of a groove on the deep surface of the fifth metatarsal bone. Next the surface of this groove is a strong tendon.

Flexor minimi digiti (fig. 18, *F. M.*). This small muscle arises from the tibial aspect of the ridge on the plantar surface of the fifth metatarsal, and is inserted into the proximal phalanx of the fifth digit.

Interossei. There are dorsal and plantar interossei in the pes very similar to the corresponding muscular fasciculi of the manus; but besides these there is a superficial layer of plantar muscular fibres. This layer takes origin from the tibial side of the cuboid and fifth metatarsal, and is covered superficially by the second part of the flexor accessorius. Spreading out in a fan-like manner, it is inserted into the three middle digits.

14. On the Platyrrhine Wombat (*Phascolomys platyrrhinus*, Owen). By JAMES MURIE, M.D., F.G.S., Prosector to the Society.

(Plate XXXV.)

In a former paper*, which I had the honour of laying before this Society, I endeavoured to prove, from a study of the skulls and skins, that the genus *Phascolomys* was represented only by three living species, viz. *P. wombat*, *P. platyrrhinus*, and *P. latifrons*, and that among fossil species one, *P. magnus*, could alone with propriety be considered distinct from the recent animals.

I then proposed that on a future occasion I should treat of the comparative differences exhibited in the other parts of the osteology of these three mentioned living species.

Several circumstances have caused me to delay putting together in the form of a communication the material then collected as notes. Recently, however, I have obtained four more Wombats for comparison. These afford such evidence of the general correctness of my previously asserted views that I no longer defer completing my unfinished labour.

On my first investigation into the specific differences of the genus *Phascolomys* I was much indebted to Mr. A. D. Bartlett for aid. Again I have to express acknowledgements to him, as through his kind mediation the four specimens of Wombat in question were generously placed at my disposal.

Captain Smart, of the ship 'Murray,' received (in Adelaide, South Australia) five living specimens of the Broad-fronted Wombat (*P. latifrons*), which he endeavoured to bring in safety to this country. During the voyage three of them unfortunately died. The bodies, however, were preserved by him in a strong brine, and one of them reached me in such fair condition as to permit a tolerable minute dissection of it to be made. Of the two others only the skeletons remained perfect. One entire skin and the cranial portions of the skin of its two companions I produce as satisfactory testimony that they all three possess the hairy muzzle, smooth silky fur, and prominent ears characteristic of *P. latifrons*. The skulls (which I now exhibit) also help to remove any existing doubts, if such there should be, as to error in the species. The two remaining living specimens, at present in the Gardens, cannot be mistaken specifically, and they agree in characters with the above-mentioned skin.

Besides the three carcasses spoken of, a still more acceptable boon, because of its rarity, was granted me—namely the examination of the body of a noble-sized Wombat, a thorough representative of *P. platyrrhinus*. This animal had been purchased alive by a gentleman in Sydney, New South Wales. During transport to this country it also died. Partially preserved in brine along with the specimens of *P.*

* "On the Identity of the Hairy-nosed Wombat (*Phascolomys lasiorhinus*, Gould) with the Broad-fronted Wombat (*P. latifrons*, Owen), with further Observations on the several Species of the Genus," P. Z. S. 1865, p. 838.

latifrons, it nevertheless has sufficed, through Mr. Bartlett's skill in taxidermy, for a mounted skin to be prepared.

The skull, the skeleton, and the skin of this large Wombat, as I shall hereafter point out, correspond in all essentials to what on the former occasion I was led to regard as *Phascolomys platyrrhinus*.

But, before entering into a consideration of the differentiation presented in the axial and appendicular skeleton of the existing species of Wombat, I deem it necessary to revert to some of my former statements, and to append some fresh information concerning the ostensible relation between the skins and crania of the three species.

Exterior Aspect.

Under the head of colour and general external appearance I shall chiefly confine my remarks to those distinguishing the Platyrrhine from the Common Wombat; for the Hairy-nosed or Broad-fronted species (*P. latifrons*) is not so readily confounded with either of the first-mentioned ones as those two are between themselves.

The accompanying lithograph (Pl. XXXV.) of the large specimen in question from Sydney and another, smaller, browner-coloured animal conveys a tolerable good idea of *P. platyrrhinus*, at least of the more distinguishing features of the species. This large animal is seen to possess an intermediate gradation of colour between what I formerly termed the "pale" and "brown" varieties. Thus, while more nearly approaching the colour of the "big yellow fellow" of the Australian natives (*P. latifrons*, Gould* and *P. setosus*, Gray†) on the sides &c., it still retains upon the back a partial likeness to Dr. Gray's *P. angasi*.

As the illustration shows, the limbs and sides of the body in it are more or less of a yellowish (isabelline) colour, which towards the back assumes a darker and browner shade. The nape of the neck, as formerly described in Mr. Bush's specimen of *P. platyrrhinus*, is darkest, the hairs there being more tipped with black; and, as in it (which I here give as an example of the brown variety), the median line of the back exhibits a continuation of the dark colour backwards to the rump.

The three varieties of *P. platyrrhinus* respectively denominated by me the "pale," the "brown," and the "black" would seem, therefore, in this later-acquired specimen to be further proved to graduate the one into the other—that is to say, if the living animal in the Society's Gardens, which Mr. Gould has named *P. niger*, should, as I suppose, turn out to be only a black variety of *P. platyrrhinus*—a fact yet to be ascertained by an examination of its skeleton.

I find, moreover, that in each of the three species of living Wombat there is a certain tendency to variation in the shade of colour. As regards the Platyrrhine Wombat, I have already mentioned this, and shall only add that there is a tiny young one in the British Museum of a perfect (isabelline) yellow tint. Of the specimens of Common

* Mammals of Australia, 1863, vol. i. text, and plates 57, 58.

† Annals and Magazine of Nat. Hist. 1863, vol. xi. p. 457.

Wombat some are darker than others; and this fact is seen even in two very young animals of this species in the same collection. Comparison of the Hairy-nosed Wombats shows also that some of them assume a browner hue than others.

There is one point which the recent acquisition of the specimen of *P. platyrrhinus* confirms, namely, the entire absence of the grizzly greyish tint, which is so very strongly marked and constant in the common species (*P. wombat*).

The peculiar silky structure of the fur of *P. latifrons* was adverted to in my former paper. *P. platyrrhinus* possesses the very reverse, the fur being coarse (almost bristly) to the touch. *P. wombat* has it of an intermediate fineness. So perceptible is this difference that the three species might almost be identified by touch alone.

Osteology.—The Skull.

The object of the present paper is not so much a perfect and detailed description of the entire osteology of *Phascolomys platyrrhinus* as of differentiation and specific distinction between it and other forms of the genus; I have therefore limited my remarks chiefly to those points elucidating variety or otherwise in its osseous conformation. Besides, the skeleton of the Common Wombat is well known, and has been sufficiently figured by Prof. Owen* and others; so that *P. platyrrhinus*, possessing only minor distinctions, needs not lengthened descriptive repetition.

Phascolomys latifrons, on the other hand, shears off from the common form of Wombat, and reverts to the true marsupial type in several particulars. Its skull has been well illustrated in vol. iii. of our 'Transactions;' and the graphic seizure of its salient points precludes the necessity of reiteration. As Prof. Owen has there clearly shown, the skull of *P. latifrons* presents such marked characters as to entitle it to specific distinction solely thereupon.

But between the skulls of the remaining two (*P. platyrrhinus* and *P. wombat*) no such clear line of demarcation exists. I find, after a careful reexamination of a more extensive series of crania, that these last-mentioned forms have very close resemblances to each other—or rather, I should say, that they glide together so insensibly by intermediate forms that the osteologist might find difficulty in assigning some specimens to their proper species, were it not that size lends aid to the determination.

Nevertheless, although freely admitting the tendency to gradation observable in a series of skulls of *P. platyrrhinus* and *P. wombat* (those examined by me were some twenty in all), I have still the satisfaction of finding that such distinguishing characters as I pointed out in the published paper referred to, in the main hold good. But be it observed that while in no ways asserting that the skull of a young specimen of *P. platyrrhinus* can at once and with certainty be distinguished from that of an adult but loosely connected cranium of *P. wombat*, I have yet reason to believe that with specimens of

* Trans. Zool. Soc. vol. ii. pl. 68.

an equal age (*e. g.* adult to adult or young to young) the same difficulty would not be encountered.

In my former paper (P. Z. S. 1865, p. 847) I have set down the specialities of *P. platyrrhinus*, as compared with *P. wombat*, to be these four:—(a) The greater size of the cranium. (b) The greater relative breadth of the nasal bones. (c) The moderately deep tympanic excavation. (d) The more triangular form of the posterior palatine foramina.

In elucidation of the proportional magnitude of the crania of the three species of Wombat I append the subjoined table. The first column represents the lately acquired skull of *P. platyrrhinus* (the larger animal figured in Pl. XXXV.), and the two next columns those of the specimens of *P. latifrons*. They are each taken in inches and lines, and correspond to the table of admeasurements of skulls given in my former paper. The remaining columns respectively show in twelfths of an inch the average of seven specimens of *P. platyrrhinus*, six of *P. wombat*, and four of *P. latifrons*.

Measurements of Skulls and Series of Average Proportions.

	Mr. Bartlett's specimen of <i>P. platyrrhinus</i> ,		Mr. Bartlett's specimen of <i>P. latifrons</i> , No. 1.		Mr. Bartlett's specimen of <i>P. latifrons</i> , No. 2.		Average measurements of seven specimens of <i>P. platyrrhinus</i> .	Average measurements of six specimens of <i>P. wombat</i> .	Average measurements of four specimens of <i>P. latifrons</i> .
	in.	lin.	in.	lin.	in.	lin.	lines.	lines.	lines.
Total length of cranium	8	9	6	8	6	3	92	75	77
Greatest width, which is at the posterior part of the zygomatic arch	5	9	4	9	4	3½	67	57	56
Width of skull behind orbits, where con- tracted by temporal fossæ	2	2	1	7	1	6	24	18	18
Width at anterior part of zygomatic arch ...	4	7	3	10	3	6½	53	43	45
Length from occipital crest to temporal fossa	2	3	1	11	1	11	26	21	23
Length of nasal bones	3	3	2	3	2	1	34	28	25
Width of same behind	2	3	2	4½	2	2	26	19	28
Width of same near apex.....	0	9	1	1	1	0	10	7	13
Length of frontal bones	3	5	2	4½	2	2	34	27	28
Width of same between orbits	2	6	2	9	2	5	29	23	32
Width of each intermaxillary bone as seen from above.....	0	11	0	2	0	2½	8	7	2
Length of palate	4	9	3	7½	3	5	52	38	43
Width between anterior molars	0	6	0	5	0	4½	4	4	5
Width between posterior molars.....	1	0	0	10½	0	9½	10	8	10
Width of both superior incisor teeth	0	8½	0	10	0	8½	9	7	9
Depth of same taken singly	0	6	0	3	0	3	5	3	3
Distance between incisor teeth (upper jaw) and molars	2	0	1	7½	1	6½	17	14	19
Total extent of row of molar teeth	2	3	1	10	1	10	26	23	22
Length of lower jaw	6	9	5	3½	4	9	71	53	57
Greatest breadth of same	5	11	4	5½	4	1½	68	55	51
Height in a vertical line dropped from coronoid process	3	7	3	1½	3	1	36	35	36
Width of lower incisors	0	7½	0	6	0	5½	7	7	6
Depth of the same.....	0	4½	0	3	0	3	4	3	3

First.—As to the greater relative size of the cranium, the above average measurements bring out that the proportion of breadth (at the posterior part of the zygomatic arch) to the length in

<i>P. platyrrhinus</i>	is as	73 to 100
<i>P. wombat</i>	„	76 to 100
<i>P. latifrons</i>	„	73 to 100

Again the proportion of breadth to length at the anterior part of the zygomatic arch in

<i>P. platyrrhinus</i>	is as	57 to 100
<i>P. wombat</i>	„	57 to 100
<i>P. latifrons</i>	„	58 to 100

The mandible bears correspondence to the first of these proportions; in it the breadth is to the length in

<i>P. platyrrhinus</i>	as	95 to 100
<i>P. wombat</i>	„	104 to 100
<i>P. latifrons</i>	„	89 to 100

From these results, then, it would appear that, besides absolute greater length, *P. platyrrhinus* and *P. latifrons* agree in having relatively a narrower skull than *P. wombat* at the hinder part of the zygomatic arch, while *P. platyrrhinus* and *P. wombat* resemble each other, again, in the comparative narrowing at the front part of the zygoma.

Second.—The shape and greater relative breadth of the nasal bones is a point which, if constant, would serve admirably as a differentiating characteristic. For instance, in six examples of *P. latifrons*, of various ages, the skulls of which I placed side by side, there was only one which exhibited a very slight perceptible difference in the nasals. It, as well as all the others, was of an extremely regular equilateral triangular form. The exceptional specimen (No. 1843, Osteological Series, College of Surgeons*) had a slight break in the basal line of the forehead, wherein was wedged a narrow sharp-pointed process of the frontal. In other respects the straightness of the contour basal line was not altered.

A similar inspection of crania of *P. platyrrhinus* does not, however, afford the same striking uniformity. At first sight there is seemingly a great irregularity in the form of the nasals; but these deviations resolve themselves into three kinds: one of these approaches the equilateral triangular figure found in *P. latifrons*; another merges into what is more commonly obtained in *P. wombat* (namely a kind of spear-headed pattern); and the third is of an inconstant and intermediate grade between these two extremes.

The proportional breadth of the two nasal bones at their hinder ends is to their length in

<i>P. platyrrhinus</i>	as	76 to 100
<i>P. wombat</i>	„	68 to 100
<i>P. latifrons</i>	„	112 to 100

* Owen's type specimen, for a representation of which, of the natural size, see 'Trans. Zool. Soc.' vol. iii. pl. 37. f. 4.

Towards the anterior ends of the nasals the breadth in proportion to length is in

<i>P. platyrrhinus</i>	as 29 to 100
<i>P. wombat</i>	„ 25 to 100
<i>P. latifrons</i>	„ 52 to 100

The relation of breadth to length in *P. platyrrhinus* is manifested most distinctly in the first and third forms. In these the fronto-maxillary suture approaches nearer the orbits, and the width of the nasals continues forward generally beyond their middles; in the first the nasals begin to narrow only at the anterior third. In the pattern which most nearly approaches that of *P. wombat* (*i. e.* spear-headed), the fronto-nasal articulation, from its angular setting, gives the nasals a certain narrowness; the naso-premaxillary sutures also early (at the posterior one-third) run towards each other, and continue narrowing forwards, so that the anterior two-thirds, compared with the posterior one-third, is very narrow.

It is this very far backward narrowing, therefore, wherein consists any real difference between *P. wombat* and *P. platyrrhinus*; so that the breadth of the anterior half of the nasals, compared with the corresponding adjoining premaxillaries, is in a series relatively greater in *P. platyrrhinus* than in *P. wombat*. The reverse or greatest relative breadth at the top of the premaxillaries is in favour of *P. wombat*. But this rule has occasional exceptions, which, however, do not militate against the general correctness of the proposition.

Third.—As to the moderately deep tympanic excavation in *P. platyrrhinus*, this obtained, with modifications, in six of the seven skulls of this species examined. The converse was observed in *P. wombat*, where one out of nine alone possessed a tendency to deep and broad excavation of the supratympanic region.

Fourth.—The more triangular form of the posterior palatine foramina. This character, as so expressed, requires modification, inasmuch as in the Platyrrhine Wombat, although it is generally large and has an elongated and somewhat triangular form, yet this is subject to variation. In the Common Wombat it is even more inconsistent, more often, however, round and small.

The Vertebral Column.

The regional distribution of the vertebral column in the genus *Phascolomys* is as in Marsupials generally; but the total number of vertebral elements in the dorsal, lumbar, and caudal regions varies so far as *P. latifrons* is concerned. *P. platyrrhinus* and *P. wombat* agree, excepting in the former of these two possessing occasionally an additional caudal ossicle. *P. latifrons*, on the contrary, seems always to have two less dorsal vertebrae, which come to be reckoned as additional lumbar ones, while the caudal vertebra may be said to be more than either of the other mentioned species.

The vertebral formula, according to my investigations, is represented as follows:—

<i>P. platyrrhinus</i>	Cv. 7, D. 15, L. 4, S. 4, Cd. 12,	=42.
<i>P. wombat</i> ..	Cv. 7, D. 15, L. 4, S. 4, Cd. 10 to 11,	=40 or 41.
<i>P. latifrons</i> ..	Cv. 7, D. 13, L. 6, S. 4, Cd. 15 to 16,	=45 or 46.

Cervical Vertebrae.—It has been remarked by Prof. Owen* that in the Koala and Wombat the body of the atlas remains permanently cartilaginous. This observation appears not to be exceptional in the case of *Phascolomys platyrrhinus* and *P. latifrons*, where the bony ring is incomplete in both. In the specimens examined by me of *P. platyrrhinus* the bony separation was as much as 0·4 of an inch, and in *P. latifrons*, as in *P. wombat*, about 0·3".

The first cervical vertebra in *P. platyrrhinus*, besides slightly larger dimensions, has a sensibly higher arched lamina than either *P. wombat* or *P. latifrons*, and there is the rudiment of a neural spine. The breadth from before backwards of the neural arch is usually greatest in *P. latifrons*; but this is not constant. The transverse processes seem also relatively longer and broader in *P. platyrrhinus*, although this may only appear to be so from the generally increased size of the vertebrae. They, however, are flatter in *P. latifrons*, in this respect approaching to the shape found in the Koala.

The greatest diameter to the tips of the transverse processes in the specimens compared respectively measured 2"·6 in *P. platyrrhinus* and 2"·2 in *P. wombat* and *P. latifrons*.

The antero-posterior diameter of the body of the axis in *P. latifrons* is comparatively greater than in either *P. platyrrhinus* or *P. wombat*.

In *P. platyrrhinus*, however, the perforated transverse processes extend considerably beyond the body, whereas they are short in *P. wombat* and *P. latifrons*, where they barely reach outside the anterior articulating surfaces.

The peculiar feature of the neural spine of the axis in *P. latifrons* is its possessing only in a slight degree the anterior projection, which is strongly marked in *P. platyrrhinus*, and even relatively more so in *P. wombat*. The superior border from this to the summit of the spine is also very perpendicularly inclined in its arch in *P. latifrons*; and both behind and before the neural spine and laminae there are not such deep concavities as in the two other species. In this manner the neural spine has a sharper and half-crescentic form, distinguishing it from the other species.

The two specimens of *P. platyrrhinus* examined varied, inasmuch as one had a spine of the shape attributed to *P. latifrons*; the other reverted to what is found in *P. wombat*—namely, where the spine is derived from broad laminae whose anterior and posterior edges are deeply concave.

In the succeeding cervical vertebrae *P. wombat* has the neural spine of the fourth slightly longer than those of the third, fifth, sixth, and seventh, which last are all about equal in length. In *P. platyrrhinus* the third cervical has only the rudiment of a spine, which is bifid and corresponds to a tubercle on the posterior arched concavity of the neural spine of the axis. The four cervical vertebrae posterior to the third have their spines nearly alike in length; the seventh, however, is perceptibly the longest. In *P. latifrons* the seventh neural spine is by far the longest (with the exception of that of the axis);

* *Op. cit.* p. 394.

the four neural spines in advance of it are subequal in length, besides being shorter.

Dorsal vertebræ.—Among the Marsupialia the dorsal vertebræ are thirteen in number, except in *Phascolomys wombat*, which has fifteen. *P. platyrhinus*, then, agrees with the latter in this respect; but *P. latifrons*, on the other hand, disagrees with its two allied specific forms, and reverts to the usual marsupial character.

In the three species of *Phascolomys* the number of dorsal and lumbar vertebræ taken collectively are nineteen. Of these, in *P. platyrhinus* and *P. wombat*, as the preceding formula shows, there are fifteen dorsal and four lumbar; but in *P. latifrons* there are only thirteen rib-bearing dorsal, and consequently six lumbar vertebræ.

The bodies of the dorsal vertebræ in *P. platyrhinus* and *P. wombat* resemble each other, excepting in size. The under surfaces of the centra are slightly laterally compressed, which gives the appearance of increased vertical depth, which they otherwise do not possess; this is most marked in the large adult male of *P. platyrhinus*. The bodies increase in antero-posterior thickness from the first to the last.

In the size of the bodies of the dorsal vertebræ *P. latifrons* agrees most with *P. wombat*. One specimen of *P. latifrons* presented a peculiar flattening of the under surface of the bodies.

In the largest *P. platyrhinus* the laminar arches are flatter and altogether broader. A better comparison is made between *P. wombat* and *P. latifrons*, on account of the equality of size; this brings out the fact that in the latter the neural laminæ, as seen from above, are relatively narrower than in the former species.

In one specimen of *P. latifrons* the neural spine of the first dorsal possessed a bifid tip, in all the other specimens of this and the two species compared it was single. In *P. platyrhinus* the same spine at its upper half has considerable antero-posterior flattening. This terminal flattening is just observable in *P. wombat*; but in *P. latifrons*, excepting the divergence of the bifid extremity, the spine is laterally compressed.

The remainder of the neural spines are relatively longer and more laterally compressed in the species *P. latifrons*; their antero-posterior diameter is also greatest.

In the powerful body of *P. platyrhinus* the dorsal spinous processes have each a bulbous extremity, and the sides of each spine are marked by grooves for the attachment of muscles.

All three species have the first dorsal spine the longest, those behind diminishing gradually until they reach the shorter and broader neurapophyses of the lumbar region.

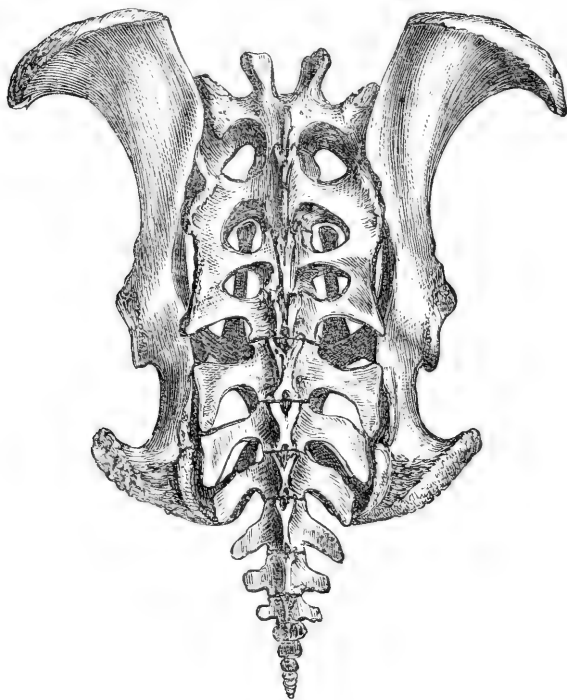
In the Common Wombat, as Owen has mentioned*, the metapophysis rises suddenly from the outside of the prozygapophysis of the twelfth dorsal, increases in length to the second lumbar, diminishes by degrees to the second sacral, and is rudimental in the following sacral and caudal vertebræ. The same remarks apply to the Platyrrhine Wombat.

* Osteological Catalogue Coll. Surg. vol. i. p. 330 (1853).

In *P. latifrons*, from the altered distribution of the dorsal and lumbar vertebræ, the metapophyses, commencing sometimes at the eleventh and sometimes at the twelfth dorsal vertebra, continue to increase in size to the fourth lumbar, after which they diminish as in the other species.

The anapophyses, which in *P. platyrhinus* and *P. wombat* are first observable on the eleventh dorsal, in *P. latifrons* make their appearance very rudimentally on the eighth and ninth dorsal. The diminution of these processes in the lumbar and disappearance in the last of the series are alike in the three species.

Fig. 1.

Bones of the pelvis of *P. platyrhinus*. One-third nat. size.

Lumbar Vertebrae.—From these being only four in number, as well as from their having a wider stretch of transverse processes, *P. platyrhinus* and *P. wombat* possess short, broad loins; whereas in *P. latifrons* the lumbar region is narrow, elongated, and conical in shape. The average proportional length of the lumbar region between the three species is respectively $4\frac{1}{2}$, $4\frac{1}{4}$ and $6\frac{1}{2}$ inches,—the dorsal region contrariwise measuring $12\frac{1}{2}$, 10 and $9\frac{1}{4}$ inches in the

Fig. 2.

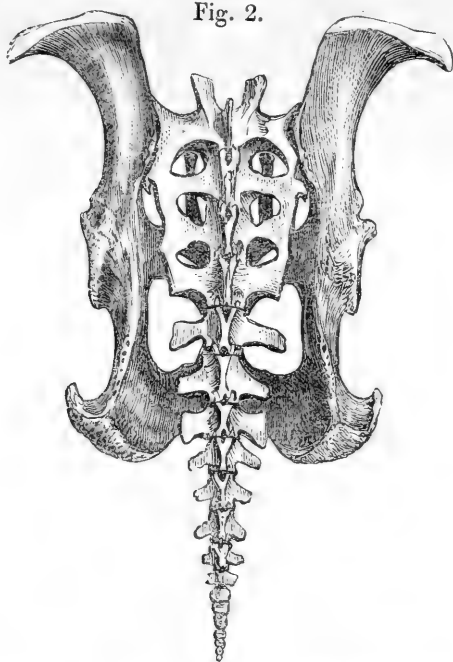
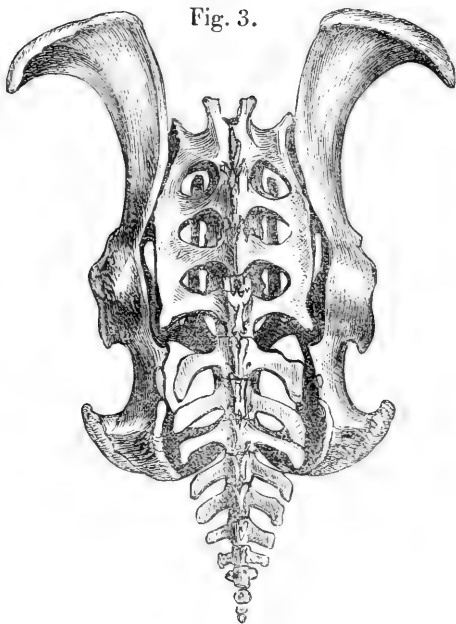


Fig. 3.



Bones of pelvis. Fig. 2. *P. latifrons*. Fig. 3. *P. wombat*. One-third nat. size.

same specimens. In *P. latifrons* the same flattening underneath of the bodies of the lumbar vertebræ occurs as in the dorsal region, but the bodies altogether seem stronger than in similar-sized Wombats.

In *P. platyrhinus* the transverse processes of the lumbar vertebræ are immensely long. The first and last are shorter than the two middle ones. The hindmost three are wider than the sacrum. Compared with those of *P. latifrons* they are narrower antero-posteriorly and somewhat rounder. The size being less in *P. wombat*, they otherwise correspond to what has been said of *P. platyrhinus*.

All the examples of *P. latifrons*, none of *P. platyrhinus*, and only one of *P. wombat* exhibited short suturally connected pleurapophyses resting upon the diapophyses of the first lumbar vertebræ.

If other proof were wanting of the termination of the dorsal and commencement of the lumbar vertebræ in *P. latifrons*, the presence of these pleurapophyses in *P. wombat*, where fifteen ribs exist, would satisfy objections which might be raised, that in *P. latifrons* their more regular occurrence indicated a greater number than thirteen ribs as the normal condition.

Sacrum.—In defining the number of sacral vertebræ present in specimens of the Common Wombat, Prof. Owen remarks*, "If we regard those vertebræ only as sacral which join the *ossa innominata*, then there are but three"—more often, it will be found, only two. If, on the other hand, anchylosis is the test, then the sacral vertebræ may vary from 3 to 4–5, or even as many as 7, in number in different specimens. I am inclined, however, to agree with a further statement of the same anatomist, that four are the normal number of bones (Cat. Coll. Surg. p. 330).

Besides the fact that the four vertebræ succeeding the lumbar ones have transverse processes directed almost straight outwards, or the posterior two of them even somewhat forwards, in contradistinction to the vertebræ behind, which have transverse processes inclined at an angle backwards, there is the still more cogent reason, that the sacral plexus passes through the three foramina, bounded by the usually coalesced four sacral elements.

This division between true sacral and caudal vertebræ is remarkably well seen in specimens of *P. latifrons*, where the transverse processes are shorter and less liable to anchylosis than in either of the other species.

The sacral vertebræ of *P. platyrhinus* are chiefly distinguishable from those of *P. wombat* by the greater width of the transverse processes and by their unusual flatness both on the pelvic and dorsal surfaces. The extent of the auricular surface abutting against the ilia is relatively greater; and, as compared with most specimens of *P. wombat*, the base of the sacrum and anterior edge of the first transverse process reach somewhat further forwards on the ilia. These conditions appear to give greater lateral and longitudinal capacity to the cavity of the pelvis; indeed it is the width and flattening of the dorsal surface of the sacral region of the pelvis continued backwards towards the tail which produces the characteristic hinder

* Trans. Zool. Soc. vol. ii. p. 396.

truncation of the body or shield-like flattening so very remarkable in the living Platyrrhine Wombat.

P. latifrons differs from the other species in having the transverse processes of the sacral vertebræ shortening from the first to the fourth; in other words, the sacrum narrows behind, whereas in *P. platyrrhinus* and *P. wombat* it is as broad, if not broader posteriorly than anteriorly.

Caudal Vertebræ.—In all the species the first six have transverse processes, the seventh vertebra in each presenting a rudimental one. The processes generally of the remaining caudal vertebræ are very obscure, and the last two or three are little better than tiny ossicles.

In *P. platyrrhinus* the great length and breadth of the backwardly inflected transverse processes of the first three or four caudal vertebræ is somewhat remarkable. These almost reach the tuber ischii, so that the sacral and these anterior caudal vertebræ taken together present a long, broad, and flat shield, which in the live animal (*P. niger* of Gould) in the Gardens is very conspicuous.

The Common Wombat, though very much resembling *P. platyrrhinus* in its caudal elements, seems to have the transverse processes relatively shorter, and consequently to present a greater interspace between their tips and the inner border of the ischium.

P. latifrons is readily distinguished by the very much shorter and pointed nature of the caudal transverse processes; but these are, moreover, comparatively broader antero-posteriorly at their roots than in *P. wombat* and *P. platyrrhinus*.

From this shortening of the outstanding transverse processes, and a more or less greater length in the vertebræ themselves, the caudal region in *P. latifrons* entirely wants the short truncated aspect present in the other two species.

In all the animals when alive the tail is very short; but it is more perceptible in the Hairy-nosed Wombat than in Common and Platyrrhine species.

Sternum and Ribs.

Sternum.—I have found the bones of the sternum of the specimens of the Platyrrhine and Hairy-nosed species, except in one instance, four in number, as is the case in the Common Wombat. In the exceptional example (a portion of a disarticulated skeleton of *P. platyrrhinus* in the College of Surgeons, at present labelled *P. wombat*) there are five bony pieces composing the sternum. This peculiarity in the number of sternal elements is a reversion to what obtains in the *Petaurus taguanoides*.

The sternal bones of *P. platyrrhinus* are altogether much the largest of the three, but those of *P. latifrons* are relatively the stoutest. The hindmost bone, that to which the xiphoid cartilage is attached, is broadened posteriorly in *P. platyrrhinus*, the fifth rib-cartilages abutting against the lateral protruding portions. In *P. latifrons* this bone is obtusely pointed, and in *P. wombat* more abruptly truncated posteriorly.

Ribs.—The Common Wombat has been regarded as very anomalous. Proc. Zool. Soc.—1867, No. LII.

lous among the Marsupials, by reason of its having fifteen ribs, in contradistinction to the other genera of its family, which have thirteen, excepting the Petaurists, where they are twelve in number. The *Phascolomys latifrons*, however, reduces this anomalous character to specific variety, for in it we have a return to the usual Marsupial number of thirteen. This diminution in the number of ribs may of itself be regarded as a marked character, fully justifying and carrying out Prof. Owen's proof, from the skull, of the specific distinctness of the animal.

This circumstance, however, is unfortunate for the Professor's reasoning upon the adaptive design of Wombats having fifteen pairs, as opposed to other genera of the Marsupialia. He remarks*, "The pressure to which the trunk of the Wombat must occasionally be subjected, in its subterranean burrowings, is probably the condition of the development of the additional pairs of ribs in that species." But in *P. latifrons* we have a doubtless burrowing Wombat wherein no more than the usual development of ribs in the Marsupials is found; for Mr. G. F. Angas's observations† lead to the belief that, so far as scratching and burrowing are concerned, the Hairy-nosed Wombat is a thorough adept in the art.

The ribs in the Platyrrhine Wombat bear a proportion to its much more strongly built body; and anteriorly the grooves for the attachment of the intercostal muscles are well marked. Both the Common and Hairy-nosed species have rounder as well as weaker costæ. In all the species the first rib is the flattest and shortest one.

Bones of the Fore Limb.

Scapula.—There is a distinct and well-marked difference in the form of this bone in the three species of Wombat, and such as would not occur by mere growth from a younger towards an older condition—that is, supposing that *P. wombat* were but an immature stage of the larger-sized *P. platyrrhinus*.

For example, the proportional breadth to length is in *P. platyrrhinus* as 72 to 100, in *P. wombat* 53 to 100, and in *P. latifrons* 56 to 100, the preponderance of breadth to length, then, being greatly in favour of the Platyrrhine species.

In *P. platyrrhinus* the scapula approaches to a square form, and is not oblong as in *P. wombat*, or irregularly oblong as in *P. latifrons*. The total length of the bone is more nearly alike in the three species; but the relative breadth in the first named is almost one-third greater. The entire bone in *P. platyrrhinus* is immensely strong and massive, and the free margin of the spine is unusually broad for attachment of the muscles.

In *P. latifrons* this bone does not conform to the remarkably regular oblong quadrate figure which Prof. Owen has pointed out to be characteristic of *P. wombat*‡, where the superior and inferior costæ run nearly parallel the one to the other.

* Trans. Zool. Soc. vol. ii. p. 396.

† P. Z. S. 1861, p. 270.

‡ Trans. Zool. Soc. vol. ii. p. 399.

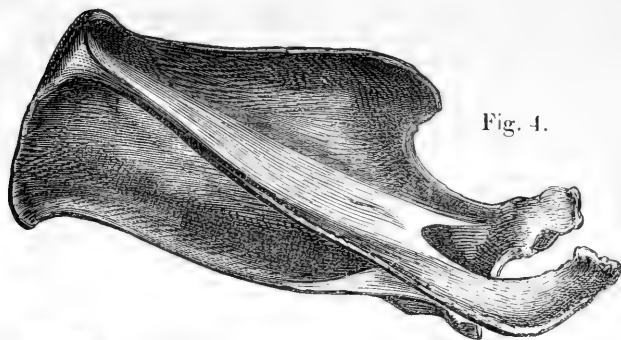


Fig. 4.

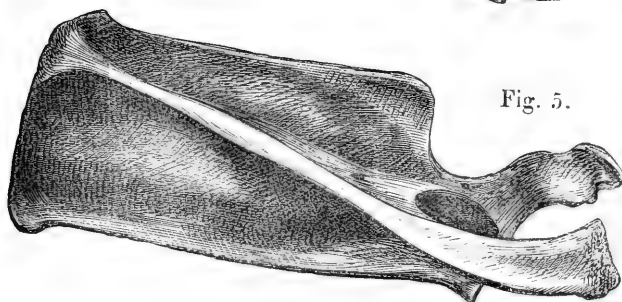


Fig. 5.

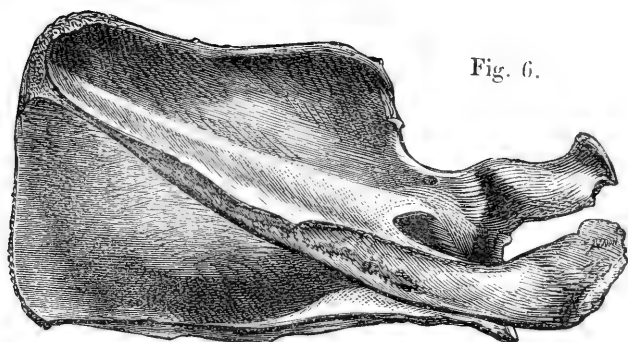


Fig. 6.

Scapula of the three species of Wombat. Two-thirds nat. size.

Fig. 4. *P. latifrons*.

Fig. 5. *P. wombat*.

Fig. 6. *P. platyrhinus*.

The scapular spine is likewise more arched and higher in the Broad fronted Wombat than in the common species, the curvature commencing closer to the base, rising almost two-tenths higher opposite to the root of the neck, and falling again as it forms the acromion, which last is much more elongated, and ends at the clavicle in a

sharper-pointed inwardly curved process. The free border of the spine is not thick posteriorly; but it becomes equal to that of *P. platyrrhinus* and almost broader than that of *P. wombat* at the posterior half of the acromion process.

The coracoid process is bent downwards and inwards, as usual in *P. wombat*; but the groove where the biceps tendon is lodged is in *P. latifrons* shallower. Towards the neck it rises with a convexity, and with a roughened elongated pit for the insertion of the tendon of the biceps.

In the Common Wombat the supra- and infraspinous fossæ are very flat; whereas in *P. latifrons* and, to a lesser extent, in *P. platyrrhinus* they are concave, more especially the infraspinous fossa. The subscapular surface of the bone in Wombat has shallow ridges and furrows, but in the other species these are much more marked.

Clavicle.—In the Platyrrhine and Common Wombats this bone equally has a double curvature, being by far the stronger and more grooved in the former animal.

In the Hairy-nosed Wombat the clavicles are somewhat straighter than in the others. Of about equal length to those of the Common species, they, in consequence of their straightness and also more inward projection of the acromion processes, give an apparently greater breadth of chest to the Hairy-nosed species.

Humerus.—The humerus of *P. platyrrhinus* is $4\frac{6}{10}$ inches long, of *P. latifrons* $4\frac{2}{10}$, and in the specimen of *P. wombat* examined $4\frac{5}{10}$ inches.

Excepting in the inequality of size, this bone in the first two species is hardly to be distinguished; but in *P. wombat*, although bearing a close resemblance to them in general outline, it has nevertheless pointed differences. Its breadth, both in shaft and extremities, is relatively one-third less; the deltoid ridge is not so prominent; and, moreover, in *P. platyrrhinus* and *P. latifrons* this has its outer margin rolled backwards so as to give a greater depth behind to that portion of the shaft. The posterior part of the articulating surface of the head of the humerus in the two latter curves considerably backwards, which is not the case in *P. wombat*, neither has this last such rough processes for the attachment of muscles. In neither of the specimens under consideration was the interspace of the condyles perforated*, as is said occasionally to be the case in *P. wombat*.

Ulna and Radius.—These bones in *P. platyrrhinus* and *P. latifrons* approach closely to each other, both in the bend of the bones and in the muscular grooves and ridges.

The separation distinctive between these two species is one only of size; the ulna of the first, from the olecranon process to the styloid process, is 6", the same measured in the second is 5"·5. The Common Wombat has this bone 5"·8 long, but not at all so broad and strong as in them, neither has it such a deep exterior muscular groove, and its sigmoid notch is also relatively smaller in size.

As to the radius, its length bears an analogous proportion to the other bones of the fore limb—in *P. platyrrhinus* 4"·4, in *P. latifrons* 4"·1, and in *P. wombat* 4"·2. In the last the shaft is not so strong

* Owen, Trans. Zool. Soc. vol. ii. p. 401.

and thick, and presents a lesser curve, the interosseous interspace being in consequence narrower; the two former, moreover, have a considerable forward bend in the shaft, which must admit of greater strength in the bones, and also give increased power to the muscles.

Metacarpal Bones.—Of the bones of the fore paw *P. platyrrhinus* agrees with *P. wombat* in that the metacarpals are somewhat longer as compared with the digits than is the case in *P. latifrons*.

Bones of the Hind Limb.

The Pelvis.—The sacral portion of this has already been referred to in connexion with the region of the spine.

In *P. platyrrhinus* the entire pelvic bones correspond with the powerful build of the body, being uncommonly strong and of great breadth and length. In the general form of the ilium, ischium, and pubis *P. platyrrhinus* more nearly resembles *P. wombat* than these two species do *P. latifrons*.

Between *P. platyrrhinus* and *P. wombat*, besides difference in size, the former has more marked muscular ridges and depressions. The anterior spinous process of the ilium in the first sweeps well outwards and backwards, and the ischium is unusually broad and flat at its tuberosity, the inner prominent border bending more towards the transverse processes of the caudal vertebræ. The axis of the pelvic bones, taken in a line from the spine of the ilium to the ischium, is somewhat straighter in *P. wombat* than in *P. platyrrhinus*. Possibly this may be due to sex more than to specific divergence.

In *P. latifrons* the very narrowed condition of the transverse processes of the sacral and caudal vertebræ give a characteristic appearance to the pelvic region as seen dorsally. The tuberosities of the ischia not only seem wider apart, but, in comparison with the size of the bones, are substantially wider than in *P. platyrrhinus* or *P. wombat*. The ventral surface, corresponding with the false pelvis of human anatomy, of each ilium in *P. latifrons* is more deeply grooved; and the anterior border of the bone, more unusually prominent, points downwards, and not outwards as in the Platyrrhine and common species. The anterior spinous process has a somewhat inward and forward curve—in this manner less backwardly falciform than in the two other species. The symphysis and the arch of the pubis are narrowest in *P. latifrons*; but the rami and tuberosities of the ischia diverge outwards and upwards (backwards). Thus each ischium has a very narrow and laterally compressed tuberosity compared with that of *P. wombat* and *P. platyrrhinus*, in the latter of which the enormously expanded and roughened ischial tuberosities forcibly indicate great muscular attachment and increased volume and strength in the hinder parts.

Marsupial Bones.—These are proportionally the longest in *P. latifrons*, and in breadth and thickness agree with those of *P. wombat*. *P. platyrrhinus* has them relatively the broadest. In this last also there is usually a larger interspace or foramen where they arch between the symphysis and the ilio-pubic ridge.

Femur.—The femur of *P. wombat* and that of *P. platyrrhinus* are

most like each other in form and size: in two specimens the first measured $5\frac{8}{10}$ inches in its long diameter, the second 6"; but in *P. platyrrhinus* it is considerably the stronger and thicker, the shaft being somewhat compressed from before backwards, whereas it is nearly round in *wombat*.

The length of the femur in *P. latifrons* is $5\frac{4}{10}$ inches, but, although shorter than in *P. wombat*, it is much stouter; the shaft is also straighter. The prominent antero-posteriorly compressed outer ridge, which extends downwards from the great trochanter, so as to form a kind of third trochanter in *P. wombat* and *P. platyrrhinus*, is absent in *P. latifrons*; a roughening behind the shaft merely represents this.

Tibia and Fibula.—*P. platyrrhinus* and *P. wombat* again approximate in the form of the tibia; it is much the broader antero-posteriorly in the former, while the shaft is straighter in the latter. The shaft of *P. latifrons* is still more laterally compressed; and about the centre of the shaft the anterior edge is slightly bent outwards, which also takes place in a less degree in *P. platyrrhinus*, but not in *P. wombat*. The lengths of these bones are respectively 4"·7, 4"·5, and 4"·4. The articulating surfaces in *P. latifrons* are abruptly flattened and spread out, but they are more sloping in the other species.

The tibia seems to be reversed, and differs in length, being $\frac{2}{10}$ of an inch shorter in *P. latifrons*; and the shaft is rather more compressed laterally; at least it is broader and stronger antero-posteriorly, the strong sharp ridge continued in front, the head rising to be a roughened protuberance in the upper part of the middle one-third of the shaft, as Owen has described in the Koala*.

The fibula is of about equal length in *P. wombat* and *P. latifrons*, but the shaft is straighter and stouter in *P. latifrons*; the interosseous space is also wider in it, giving a greater breadth for the origin of the anterior muscles of the leg.

Metatarsal and Phalangeal Bones.—In the hind foot *P. platyrrhinus* and *P. wombat* agree in having the index digit somewhat shorter than the third, and in having its proximal phalanx decidedly shorter than the metatarsal; whereas in *P. latifrons* the index is the longest, and has its proximal phalanx and metatarsal of almost equal length. This circumstance gives the hind foot of *P. latifrons* quite a characteristic shape.

Conclusion.

In reviewing the observations contained in the present paper it is necessary to take into account the results of my former communication on the Hairy-nosed Wombat and the species of *Phascolomys* generally.

What the axial and appendicular skeletons further show is, that *P. wombat* and *P. platyrrhinus* are closely related in several particulars, and that *P. latifrons* differs decidedly from them both.

Phascolomys platyrrhinus, it would seem, can only be recognized as specifically distinct from *P. wombat* in a zoological sense.

Size and colour, which last varies considerably, point out a departure from the type of *P. wombat*.

* Trans. Zool. Soc. vol. ii. p. 405.

The skull separates the animal individually from *P. wombat* by the characters previously defined; but these, the later examination proves, are occasionally inconstant, so that the more unstable ground of size has to be called into aid.

Hence *P. platyrhinus* does not present such permanent broadly marked osteological characters as would afford the paleontologist arguments for holding it up as a specific type. But when the external characters are brought to bear upon the question along with the osteological variations, most naturalists, as species are at present defined, would admit its separation.

Analogous instances occur in the *Felidæ*. Many other examples might be given where, although it is difficult rigidly to define differential characters from the skeleton alone, yet zoologists freely admit specific distinction.

P. latifrons is clearly specifically different, and may be generically so, although I have only given it the rank of a subgenus.

This last animal possesses many peculiarities, and fills up a gap between the Wombats and other genera of the Marsupials.

In the excellent volume on the Marsupialia by Waterhouse*, that author is "inclined to regard the genus *Phascolomys* as presenting an aberrant form only of the *Phalangistidæ*." The present observations concerning the skeleton of the genus *Phascolomys* lend weight to his opinion; for in a number of points *P. latifrons* bears affinities to the *Phascolarctus cinereus*, and in *P. platyrhinus* we even find a peculiarity in the number of sternal bones belonging to the genus *Petaurus*.

If we admit a general diminution in the size of recent Mammalia, compared with many of the old fossil forms, and wonder how such alteration in magnitude and proportions has been brought about, whether by natural selection or otherwise, we have in these Wombats a curious illustration of the phenomenon.

The postpliocene of Australia gives up its *Phascolomys magnus*, a gigantic Wombat. In some beds of the same deposits comes *P. platyrhinus*, which seemingly yet lives; lastly, we find now predominant the but slightly altered and comparatively diminutive form *P. wombat*.

November 14, 1867.

George Busk, Esq., F.R.S., V.P., in the Chair.

Mr. P. L. Sclater, Secretary to the Society, called attention to the following noticeable additions to the Menagerie, which had been made during the past summer:—

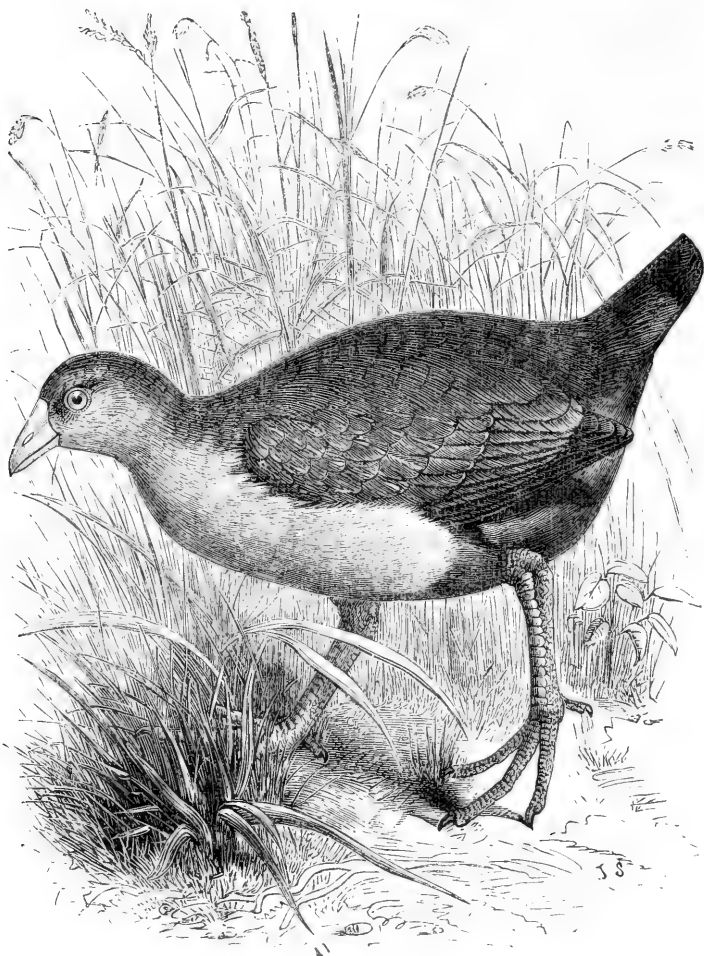
1. An adult specimen of the Golden Tiger-cat of Sumatra (*Felis*

* Nat. Hist. Mammalia, vol. i. (1846), p. 16.

aurata, Temm.)*, received June 19th in exchange from the Zoological Society of Amsterdam, where the animal had lived several years. A drawing by Wolf (Plate XXXVI.) was exhibited representing this animal, which had not been previously represented in the Society's collection.

2. A Mortier's Tribonyx (*Tribonyx mortieri*, Du Bus), purchased July 1st.

Mr. Selater had already communicated to the 'Annals of Natural



Tribonyx mortieri.

* For synonyms of the species see Dr. Gray's paper, *anteà* p. 265.

History'* a note respecting this scarce bird, which he believed to be the true *Tribonyx mortieri* of Du Bus, while the bird figured under that name by Mr. Gould (B. Austr. vi. pl. 71) appeared to be different, and had been proposed to be called *Tribonyx gouldi*.

3. Seven Ground-squirrels (*Xerus getulus*), from the province of Haha in Morocco, presented to the Society by Sir John Drummond-Hay, K.C.B., C.M.Z.S.†

4. A young Hornbill from West Africa (*Buceros elatus*, Temm. Pl. Col. p. 521), purchased August 19th.

5. A pair of Sömmerring's Antelopes (*Gazella sømmerringi*, Cretzschm. Rüpp. Zool. Atlas, tab. 19), purchased August 21st.

A drawing by Mr. Wolf (Plate XXXVII.) was exhibited representing this beautiful species, which had not been previously exhibited in the Society's Menagerie.

6. A fine example of the black variety of the Leopard (*Felis leopardus*, var. *nigra*), presented to the Society by Major James Langford Pearse, Madras Staff Corps, August 30th. This animal was stated to have been formerly in the menagerie of the Rajah of Mysore.

7. A Bear, presented September 14th by Mr. William Scott Stonehewer, of Ada Lodge, Old Shoreham, Sussex.



Head of *Ursus piscator*.

* Ser. 3. vol. xx. p. 122 (Aug. 1867).

† This is the *Xerus trivittatus* of Dr. Gray (Ann. N. H. vol. x. p. 264, et ser. 3, vol. xx. p. 334), but is certainly the species known on the continent as the *Sciurus getulus* of Linnaeus. Dr. Peters and M. Milne-Edwards, to whom I have shown specimens, both recognize it as such. It is the only species of the group found in Northern Africa that I am acquainted with.—P. L. S.

This Bear was imported into London in a vessel coming from Northern China, and was stated to have been brought from the interior of that country. Its general appearance was that of the Brown Bear (*U. arctos*); but it was distinguishable by its broader face, ears filled with long dense hair, and short beard. Dr. Gray had proposed to found a new species on this example, and to call it *Ursus lasiotus**; but Mr. Sclater regarded it as the same animal as that figured by M. I. Geoffroy St.-Hilaire in the 'Zoology of the Voyage of the Venus' (Mamm. t. 4) as "*Ursus arctos*, var. du Kamschatka," upon which M. Pucheran had established his *Ursus piscator* (Rev. Zool. 1855, p. 392).

8. A Formosan Bear (*Ursus formosanus*, Swinhoe), obtained for the Society by Mr. R. Swinhoe, and received September 24th. This animal did not appear distinguishable externally from the *Ursus tibetanus* of Northern India and China.

Referring to this subject, Mr. Sclater read extracts from letters received from Mr. R. Swinhoe, F.Z.S., dated British Consulate, Amoy, June 10th and August 6th, 1867, stating that the Bear sent by him to the Society in October 1866, and spoken of by the Secretary (P. Z. S. 1866, p. 418) as typical of *Ursus formosanus*, Swinhoe, was not from Formosa, but from the Port of Chefoo, on the Shantung Promontory, in Northern China. It was, therefore, the species referred to by Radde (Reisen in O. S. Säug. p. 12) as *Ursus tibetanus*, and not *Ursus formosanus*, which Mr. Swinhoe still regarded as a good species.

9. A female Swinhoe's Deer (*Cervus swinhoii*, Sclater) from Formosa, very acceptable as being the first female received of this species. This animal had likewise been obtained for the Society by Mr. Swinhoe, and received along with the Bear.

10. Two pairs of the Japanese Teal (*Querquedula formosa*, Georgi), purchased September 24th—an importation which it was hoped would lead to the addition of this beautiful species to the list of acclimatizable Waterfowl.

11. A young specimen of the Great Ant-eater (*Myrmecophaga jubata*) from Brazil, presented to the Society October 4th by Dr. John A. Palin, C.M.Z.S., from Brazil.

A second specimen of the same animal from Bogota had been presented to the Society by Percy Brandon, Esq., of Bogota, on the 8th of November.

12. A young Cape Penguin (*Spheniscus demersus* (Linn.), purchased October 26th, from the Cape.

13. A Black-headed Partridge (*Caccabis melanocephala*, Rüpp.), from Abyssinia, purchased October 30th.

14. A Bourke's Parrakeet (*Euphema bourkii*, Gould), purchased October 30th.

15. A young male Walrus (*Trichechus rosmarus*, Linn.), purchased on the 1st instant, of Messrs. Alexander Stephen and Co. of Dundee, for the sum of £200.

This animal had been captured in Davis's Straits by Captain

* Ann. Nat. Hist. ser. 3. vol. xx. p. 301.

Richard Wells, of the steam whaler 'Arctic,' belonging to Messrs. Alexander Stephen and Co., on the 28th of August last, under the following circumstances:—A herd of from 200 to 300 of these animals was met with on the ice by the 'Arctic' in lat. 69° N., long. 64° W. A boat's crew was landed on the ice, and the herd attacked and several individuals killed, amongst which was a large female. The body of the latter, being attached to the boat and rowed towards the vessel, was followed by a young male, who swam and dived around and refused to quit his deceased parent. This being noted, he was captured by a noose swung over his head and one fore limb from the ship and hauled on board. For some days the captive was kept tied to a ring-bolt on deck, and refused food altogether. Subsequently he was induced to swallow thin slips of boiled pork, and was thus fed until the vessel reached the Shetlands, when a supply of fresh mussels was provided for its use. A large box with openings at the sides was fabricated; and the animal, secured therein, was brought safely into Dundee on the 26th ult. From that port to London the Walrus had been conveyed in the steamer 'Anglia,' under the care of the Society's Superintendent. The animal was a male, with partially developed tusks, about the same size as the Sea-bear lately in the Society's Gardens, but more bulky in appearance. Although probably not a year old, it was 8 feet long, and weighed perhaps $2\frac{1}{2}$ cwt.

The only specimen of the Walrus previously acquired by the Society had been a young individual received in 1853, which had been brought home, in a vessel engaged in the seal-fishery on the coast of Spitzbergen, by Capt. Henry of Peterhead. This animal was, however, in a moribund state on its arrival, and lived only a few days in the Gardens*.

With reference to the present specimen of the Walrus the following remarks were addressed to the Meeting by Mr. A. D. Bartlett, the Superintendent of the Society's Gardens:—

"In the fifth volume of Sir Everard Home's Supplement to the 'Lectures on Comparative Anatomy,' at page 4, on the organs of digestion of the Walrus, it is stated that the food of this animal consisted principally of a species of seaweed; it is, however, remarked that the stomach of this animal differs from all others fitted for this purpose. A figure of the stomach is given in vol. vi. pl. 1; the dimensions are also given in the letterpress and on the plate to scale. According to these figures the stomach is no less than 16 feet in length and 4 feet wide; which wonderful blunder appears to have escaped notice.

"As regards the present animal, I may state that on my arrival at Dundee on the 29th of October, I found the young Walrus in a very restless state, and, as I thought, hungry; it was being fed upon large mussels; about twenty of these were opened at a meal; and the poor beast was thus fed about three times a day."

"I immediately told the owners that I thought the animal was being starved, and suggested that some fish should be tried. To

* See, for figures taken from this animal, Wolf and Sclater, 'Zool. Sketches,' vol. i. pl. 18.

this Mr. Stephen at once agreed, and a codfish was procured from the neighbourhood, and by me cut into long thin strips. On offering these pieces of cod to the animal, he greedily devoured them. Since that time I have fed the Walrus upon *fish, mussels, whelks, clams*, and the *stomachs* and *intestines* and other soft parts of fishes, cut small; for I find that it cannot swallow anything larger than a walnut. I am now convinced that the food of the Walrus is strictly animal substance; and from what I have observed during the last seventeen days I feel certain that the creature will feed freely upon almost any kind of animal matter."

"I am also inclined to believe that even carrion or decomposed flesh would not be refused. This probably has led to the frequent remarks upon the disgusting state of the contents of their stomachs. May not these creatures be the scavengers of the Arctic Seas, the vultures among mammals? The remarkable dentition reminds one of the carrion-feeding *Proteles*. May not the strong bristles on its muzzle have much to do with this kind of food as well as shrimp-catching, the mode of brushing backwards and forwards with these bristles the food and other substances on the ground, and sucking everything up it swallows?"

"I notice that indigestible portions or substances taken with its food pass off in the excretion; and probably in the adult animal, when shell, seaweed, and other substances are collected, these creatures, like other carnivorous animals, have the power of ejecting these indigestible bodies from the stomach."

"The fragments of shell, small stones, the byssus of the mussels, and the opercula of whelks, together with fragments of seaweed attached to the byssus of the mussels, pass freely from this animal. The terminal portion of the intestines must be of large size, judging by the size of the excretion."

Mr. Sclater also reported the return to this country on the 6th of August last, by the ship 'Marian Moore' from Calcutta, of Mr. Clarence Bartlett, the Society's agent, with a collection of animals, of which the most noticeable were:—

2 Black Tibetan Wolves (*Canis laniger*, Hodgs.). Presented to the Society by Lieut. Alexander A. Kinloch, 2nd Battalion Rifle Brigade, and Lieut. J. Biddulph, 19th Hussars*.

1 Female Gayal (*Bos frontalis*, Lambert). Presented by the Babu Rajendra Mullick, C.M.Z.S.

2 Pelicans (*Pelecanus*, sp. inc.). Presented by the Babu Rajendra Mullick, C.M.Z.S.

4 Demoiselle Cranes (*Grus virgo*). Presented by the Babu Rajendra Mullick, C.M.Z.S.

2 Polyplectrons, ♀ (*Polyplectron chinquis*). Presented by the Babu Rajendra Mullick, C.M.Z.S.

1 White Fruit-Pigeon (*Carpophaga luctuosa*). Presented by the Babu Rajendra Mullick, C.M.Z.S.

* These Wolves were obtained in the beginning of June 1866, by Lieut. Kinloch, from some wandering Tartars near the Tshommeriri Lake in Tibet.

1 Fruit-Pigeon (*Carpophaga ænea*). Presented by the Babu Rajendra Mullick, C.M.Z.S.

1 Fruit-Pigeon (*Treron sphenura*). Presented by the Babu Rajendra Mullick, C.M.Z.S.

1 Entellus Monkey (*Semnopithecus entellus*). Presented by the Babu Rajendra Mullick, C.M.Z.S.

1 Panolia Deer (*Cervus eldi*). Presented by A. Grote, Esq., F.Z.S.

1 Slow Loris (*Nycticebus tardigradus*). Presented by A. Grote, Esq., F.Z.S.

1 Hemipode (*Turnix pugnax*). Presented by A. Grote, Esq., F.Z.S.

1 Indian Badger (*Arctonyx collaris*). Presented by Dr. J. Anderson.

1 Slow Loris (*Nycticebus tardigradus*). Presented by Dr. J. Anderson.

8 Water-Tortoises (*Emys*, sp. var.). Presented by Dr. J. Anderson.

The total number of animals brought home by Mr. Bartlett amounted to upwards of thirty, and their value was estimated at about £760.

The Secretary read the following communication from Mr. Edward Newton with reference to a misprint in the last published part of the Society's 'Proceedings':—

"A singular and somewhat important error was introduced into my recent paper (P. Z. S. 1867, p. 344) during its passage through the press.

"I had stated that prior to my visit to the Seychelles only *five* species of land-birds were known to inhabit those islands, and I then proceeded to give their names.

"The word 'five,' which stood rightly enough in the proof, has now been altered into 'six,' the corrector of the press apparently not having understood that I intended to quote *Nectarinia seychellensis* as a synonym of *N. dussumieri*. A reference to the authorities I have cited both in this passage and in my longer paper 'On the Land-birds of the Seychelles Archipelago' (*Ibis*, 1867, pp. 336, 337) will show the necessity of these corrections."

The following communication was read from Dr. G. Hartlaub, For. Memb.:—

"In the Society's 'Proceedings' for 1866, p. 421, Prof. Schlegel writes, 'that *Semiophorus vexillarius* of Gould is based upon specimens (of *Caprimulgus longipennis*) freshly moulted, when part of the long quills has not yet been used.' Now all this is merely and foolishly theoretical. If Prof. Schlegel had ever compared specimens of *Macrodipteryx longipennis* and of *Semiophorus vexillarius*, he would have convinced himself, even *primo aspectu*, of the enormous difference between these two birds. This difference does not only consist in the very different size and the very different colouring of the two birds, but is structural. In *Macrodipteryx longipennis*

the curious long quill-feather is a supernumerary one. It is inserted, as Swainson very accurately remarks, immediately between the primary and secondary quills, and the naked basal or insertional part of it is curiously curved. The apical webs of these feathers are very broad, and show some broad black indistinct bands on a dark blackish ground.

"Now in *Semiophorus vexillarius* there is not even a trace of all this. The long ornamental wing-feather is the regular ninth quill, regularly webbed throughout, and getting more and more narrow towards the tip, where it becomes gradually very narrow; the colour of this feather is a pale brownish grey with whitish shafts on the upperside, and of a uniform brown with the shaft brown on the underside. The eighth quill-feather is double the length of the seventh.

"*Semiophorus vexillarius* is a much larger bird. I give some of the relative dimensions:—

	<i>S. vexillarius.</i>		<i>M. longipennis.</i>	
Long. rostr. a fr.	0"	5'''	0"	3'''
—— alæ	8½	0	6¾	0
—— caudæ	4	9	3½	0
—— tarsus	0	11	0	9

"The colour of the wings is totally different in these birds, not less so than their form. In *M. longipennis* all the quills are alternately banded with black and rufous; there is no white on the wing of this species. But the contrary is the case in *S. vexillarius*: in this species the colour of the remiges is of a brilliant black; the outer web of the first has the great middle portion white; the basal portion of all and the apical margin of the smaller quills is pure white, as well as the tips of the larger tectrices.

"The middle of the abdomen, the vent, and the under tail-coverts are pure white in *S. vexillarius*, while these parts are fulvous and darkly fasciated in *M. longipennis*.

"The ground-colour of the underside of the tail is whitish in *S. vexillarius*, pale rufous in *M. longipennis*.

"So much about *S. vexillarius* being the freshly moulted *M. longipennis*. It is sufficient to compare the figures of these species in Swainson's 'West African Birds' and in the 'Ibis.' It is really not necessary to compare actual specimens. An ornithologist of three days' experience will discover the truth of what we have just demonstrated.

"Fine specimens of both these birds are in the Bremen collection.

"By-the-by, I must say with Swainson that I cannot subscribe to the opinion that the laminæ in the naked part of the long pen-feathers in *M. longipennis* have been rubbed or worn off. *M. longipennis* is a common bird in collections. Amongst dozens of specimens examined by me I have never seen a bird where the naked parts of the shaft have shown a trace of webs. What may (?) be true in *Prionites* &c. is, I believe, not applicable to these *Cuprimulgi*.

"When Prof. Schlegel in the same communication pretends that

Ardea elegans, Verr., is identical with *A. garzetta*, he is certainly greatly mistaken. *A. elegans*, of which two fine adult specimens are in the Bremen collection, has nothing whatever to do with *A. garzetta*. It belongs to another group of the *Ardeæ*—to that of *A. comata*. The structure of the long dorsal plumes is very different; and so is the colour of the two birds, *A. elegans* having the head, neck, and the long dorsal plumes of a fine fulvous-isabelline hue, which colour may possibly disappear in specimens which have been for a length of time exposed to the light. *Ardea elegans* is also a much smaller bird than *A. garzetta*. The dimensions of our specimens are:—Rostr. 2" 4"', al. 8" 3"', tars. 2" 3"', dig. med. cum ung. 2" 5"'.

"Again, when Prof. Schlegel says that *Ploceus sakalava* certainly does not come from 'Madagascar,' I should like to know from what source he gets his knowledge. Certainly not from M. Pollen's travels, this traveller having explored only a comparatively small portion of that large island. I can only say this, the specimen, of which I possess a full and good description in an old MS. of my friend Jules Verreaux, was given to that ornithologist by M. Victor Sganzin on his return from Madagascar to the Cape. He collected it during his prolonged stay on that island. Mr. G. R. Gray, when he directed my attention to the specimen in the British Museum, told me that he believed it came from Madagascar. It is of a very different form from *Nelicurvius pensilis*."

Mr. W. H. Flower read a Memoir on the Osteology of the Cachalot, or Sperm-Whale, completing his account of the osseous structure of this animal. Mr. Flower came to the conclusion that there was no sufficient evidence of the existence of more than one species of Sperm-Whale, for which he was of opinion Linnæus's name, *Physeter macrocephalus*, ought to be retained.

This paper will appear in the Society's 'Transactions.'

The following papers were read:—

1. Report on a Collection of Birds formed in the Island of Zanzibar by Dr. John Kirk. By Dr. G. HARTLAUB*.

1. ELANUS MELANOPTERUS (Daud.).

2. STRIX FLAMMEA, L.

3. CYPSELUS PARVUS, Licht.; Selater, Proc. Zool. Soc. 1865, p. 601.

Two adult specimens and a younger bird. This latter shows the

* This collection was sent home to me by our Corresponding Member Dr. Kirk, with a request that I would get the specimens worked out and an account of them put in the 'Proceedings.' Dr. Hartlaub has most kindly undertaken this task. Dr. Kirk states that of two raptorial birds (*Haliaeetus vocifer* and *Milvus ægyptius*) which are common at Zanzibar he has not thought it worth while to transmit specimens.—P. L. S.

mottled appearance of the throat ; and the external tail-feathers are shorter and much less attenuated at the tip. The dimensions of the adult bird are:—Long. tota 6" 3"', alæ 4" 9"', rectr. ext. 3" 8"/>.

4. CORACIAS CAUDATA, L.

Zanzibar seems to be the northern frontier of this fine species, on the east coast of Africa ; whereas, on the opposite side, it does not proceed further up than Angola. Speke collected it in Uzaramo, "near the junction of the Kurgan and Myeta Rivers." J. Verreaux mentions a specimen from Kurrichaine. The range of this bird does not extend much further south than the latitude of Natal.

5. HALCYON STRIOLATA, Licht.

The well-known widely distributed species. For the somewhat smaller northern form (*H. chelicuti*) I cannot admit specific separation.

6. IRRISOR ERYTHORHYNCHUS, Lath.

There still remains much uncertainty about these birds. Whether the western and the southern birds are really distinct, as Sir W. Jardine pretends, is still an undecided question to me. I also believe that the colour of the beak is incident to age or season. But the form of that organ is also very variable and individually different. As to the white on the wing, it is curious that the Zanzibar bird has the larger white spots of the western race and the yellowish-green reflexions of the southern individuals. In the end *Irrisor erythrorhynchus* and *I. senegalensis* may turn out to be one and the same species (conf. Jard. Contrib. 1852, p. 344 ; Hartl. West Afr. p. 42).

7. NECTARINIA JARDINII, Verr. ; Hartl. West Afr. p. 47.

One adult specimen.

Zanzibar is a new and interesting locality for this species, all the known specimens of which came from the west coast, where it occurs from Gaboon to Benguela (cf. Barb. du Boc. Possess. Portug. p. 73). There is no difference whatever between the Zanzibar bird and a specimen from Angola in the Bremen collection.

8. NECTARINIA COLLARIS, Vieill. ; Jard. Monogr. Nect. pl. 6 ; Hartl. West Afr. p. 52.

Many years ago this species was collected by Boyer on the island of Zanzibar (Mus. Viudob.). On the west coast it extends from Senegambia to the Equator. There is no difference between eastern and western individuals.

9. NECTARINIA GUTTURALIS (L.).

Certhia brasiliensis nigricans, Briss. iii. 658 ; Shaw, Natur. Misc. p. 797.

Cæreba gutturalis, Gr. & Bp. Consp. p. 400.

Nectarinia natalensis, Jard. Monogr. pl. 12 ; Contr. Orn. 1850, p. 62, c. fig. med.

Cinnyris discolor, Bianconi, Spec. Zool. Mos. iii. p. 32.

C. bianconii, Hartl.

It was my friend Mr. Otto Finsch who directed my attention to the fact of this beautiful species being the old Brissonian bird! No doubt about it. It is difficult to understand how Gray and Bonaparte could have made a *Cæreba* of it.

There is no material difference between Natal and Zanzibar specimens, though a more eastern species, *N. gutturalis*, has been collected of late by Dr. Welwitsch and others in Loanda (conf. Barb. du Boc. Poss. Portug. p. 7).

10. *CISTICOLA SCHÆNICOLA*, Bp.

Quite the same as the European bird.

11. *IXOS NIGRICANS*, Vieill.

Several adult specimens.

12. *ANDROPADUS FLAVESCENS*, n. sp.

Supra olivaceus, cauda et alis dorso concoloribus; subtus flavescens, gutture et lateribus olivaceo adumbratis; margine alari et subalaribus læte flavis; rostro plumbeo; pedibus nigricantibus.

Long. 6" 4"', rostr. 6"', alæ 3" 1"', caudæ 2" 10"', tars. 9"'.
—

Very similar in colour to *Andropadus insularis* from Madagascar, but considerably smaller. There are now eight species of *Andropadus* known, viz. *Andropadi importunus*, *latirostris*, *gracilirostris*, *curvirostris*, *virens*, *erythropterus*, *insularis*, and *flavescens*.
⊥

13. *ANTHUS RAALTENII*, Licht.

A. campestri simillimus, sed notæi coloribus omnino intensioribus; gutture confertim et conspicue maculato.

Long. rostr. 6"', alæ 3" 1"', caudæ 1" 10"', tars. 11½"'.
⊥

14. *DRYOSCOPUS AFFINIS*, Gray, Ann. Mag. N. H. 1837, p. 489; Hartl. West Afr. p. 111.

Originally described from a Zanzibar specimen. Not rare in Gaboon collections.

15. *DRYOSCOPUS ORIENTALIS*, Swains.

Two specimens, exactly corresponding with the description given by Swainson (Menag. p. 342), in Heine's collection from South Africa (Mus. Hein. i. p. 68).

16. *DRYOSCOPUS SUBLACTEUS*, Cass.?

Av. jun. Supra obscure fuliginoso-nigricans; tergi et uropygii plumis longis, laxis, mollibus, maculis occultis anteapicalibus rotundatis albis; uropygii fascia ochroleuca; alarum tectricibus macula minuta rufescente terminatis; subtus albidus, pectore, abdomine imo, crisso, subcaudalibus et cruribus pallide

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rufescentibus; rectrice extima apice rufescente; rostro et pedibus nigricanti-plumbeis, mandibula basi pallida.

Long. circa $7\frac{1}{2}$ " , rostr. 10" , alæ 3" 3" , caudæ 2" 11" , tars. $13\frac{1}{2}$ " .

A young bird, probably of the above-named species. Wants further inquiry.

There is a *Dryoscopus* from Gaboon in the Bremen Museum exactly like *D. major*, but much smaller, my *D. picatus*. The dimensions are:—Long. tota 8" , rostr. $9\frac{1}{2}$ " (11" maj.) , alæ 3" 3" (3" 11" maj.) , caudæ 3" (3" 11" maj.) , tars. 14" (15" maj.) .

17. EUPLECTES FLAMMICEPS, Sw.

A Zanzibar specimen of this bird, obtained by Boyer, is in the Vienna collection. Monteiro collected this species at Pembe, and Dr. Welwitsch at Golungo, also in the interior of Angola (Barb. du Boc. Poss. Portug. p. 11).

18. MUNIA ORYZIVORA (L.).

We hope that Dr. Kirk will explain under what particular circumstances he collected this common but exclusively Indian bird?

19. SPERMESTES FRINGILLOIDES (Lafr.); Hartl. West Afr. p. 147.

A rare and less typical species, not quite without pretensions to generic separation. Senegal and Liberia, on the slave coast, are western habitats of this bird.

20. SPERMESTES CUCULLATA, Sw. = *S. scutata*, Heugl.

Extensively distributed over the African continent. No material difference between specimens from the Upper White Nile and those from Angola.

21. HYPHANTORNIS SUBAUREUS, Sm.

Three specimens.

A nearly allied species (*H. royeri*, Verr.), a description of which was published by me in Cabanis's 'Journal,' is very probably not distinct from *H. aurantius*, Vieill.

22. PASSER DIFFUSUS, Sm. Rep. of an Exped. p. 50; Hartl. West. Afr. p. 150.

Pyrgita spadicea, Licht. Verz. Vög. Kafferl. p. 15.

Zanzibar is a new locality for this bird. On the west coast it has not been observed higher up than Angola.

23. PSITTACUS FUSCICAPILLUS, Verr.

Two fine specimens.

24. CHRYSOCOCCYX AURATUS, Gm.

25. CENTROPUS SUPERCILIOSUS, Rüpp.

Schlegel may be right in taking this bird for a younger state of *C. monachus*, R.

26. *TRERON DELALANDII*, Bp.

27. *PERISTERA AFRA* (L.).

28. *TURTUR ALBIVENTRIS*, Gray, = *T. semitorquatus*, Swains.; Hartl. West Afr. p. 196.

29. *TURTUR ERYTHROPHRYS*, Swains. = *T. semitorquatus*, Rüpp.; Hartl. West Afr. p. 195.

30. *FRANCOLINUS KIRKII*, n. sp.

Mas ad. (calcar.). *Diversus a F. pileato, cui valde affinis, statura minore; rectricibus lateralibus nigris; uropygii plumis tectricibusque caudæ superioribus pallide flavescentibus, maculis anteapicalibus subtriquetris nigris; plumis lateralibus pectoris et epigastrii ochraceis, stria intermedia nigra, albido marginata; remigibus saturate fuscis, scapis intense fuscis; subcaudalibus latius transversim variis.*

Long. rostr. 9", alæ 5", tars. 14 $\frac{1}{3}$ ", dig. med. c. ung. 16".

One specimen. I know few things more annoying and disagreeable than to describe and characterize a new bird from a poor and incomplete skin. This is exactly what I am doing now. Superficially seen from above, this Francolin is no other than a small *F. pileatus*. By a more accurate inspection it is not difficult to discover several important discrepancies. The arrow-shaped black spots of the upper tail-coverts would alone suffice to characterize this bird as distinct from *F. pileatus*. But the whole under parts, which are very defective and mutilated in our specimen, appear to be differently coloured, &c. Besides it is altogether a smaller bird.

31. *SQUATAROLA HELVETICA* (L.).

32. *CHARADRIUS HIATICULA*, L.

33. *CHARADRIUS GEOFFROYI*, Wagl.; Schleg. Mus. Pays-Bas, livr. 7. p. 39.

The coasts of the Red Sea have been hitherto the only known African localities for this rather Indo-Australian species.

34. *NUMENIUS PHÆOPUS*, L.

35. *ACTITIS HYPOLEUCA* (L.).

36. *LIMNOCORAX FLAVIROSTRIS*, Sw.

37. *ARDEA PUSILLA*, Vieill. (*A. minuta australis*, Schleg.).

38. *ARDEA GULARIS*, Bosk.

39. *ARDEA ATRICAPILLA*, Afzel.

40. *ARDEA COMATA*, Pall.

41. *ANAS ERYTHORHYNCHA*, Gm.

42. *PODICEPS MINOR*, L.

Of the forty-two Zanzibar species here enumerated there are only three exclusively eastern—*Psittacus fuscicapillus*, *Andropadus flavescens*, and *Francolinus kirkii*. Six are essentially South African—*Dryoscopus orientalis*, *Ixos nigricans*, *Coracias caudata*, *Passer diffusus*, *Hyphantornis subaureus*, and *Treron delalandii*; two of these, *Coracias caudata* and *Passer diffusus*, extend up the western coast to Angola. Most of the remaining species have a wider distribution. As occupying a very extensive range we may name *Cypselus parvus*, *Halcyon striolata*, *Irisor erythrorhynchus*, *Spermestes cucullata*, *Chrysococcyx auratus*, *Centropus monachus*, *Turtur albi-ventris*, *Turtur erythrophrys*, *Limnocorax flavirostris*, *Ardea gularis*, *Ardea atricapilla*, and *Anas erythrorhyncha*.

2. On a Collection of Birds from some less-known Localities in the Western Pacific. By DR. G. HARTLAUB.

(Plate XXXVIII.)

The collectors of Mr. Johann Cæsar Godeffroy of Hamburg have of late touched at some localities not before explored by scientific expeditions. These localities are the Pelew or Palaos group (Western Caroline Islands), the Matelotas with the Island of Yap, the more northern Mackenzie Islands, and the Echiquier or Bougainville group near the northern coast of New Guinea. The collection contains twenty-three species, four of which are very probably new, and will prove an interesting addition to our knowledge of oceanic ornithology.

1. *PANDION HALIAËTUS*, var. *LEUCOCEPHALUS*, Gould.

One adult specimen from the Echiquier Island. Other oceanic localities for this widely distributed species are the Isle of Pines, where the Forsters observed it (Descr. Anim. ed. Lichtenst. p. 257), and Tonga-Tabu (G. R. Gray, Tropic. Isl. p. 1). Not yet observed on the great island of New Guinea.

2. *TRICHOGLOSSUS MASSENÆ*, Souancé.

One adult specimen from the Echiquier Island. In every respect similar to a specimen from the Salomons in the Bremen Museum.

“Eyes red, with a yellow ring.”

3. *HALCYON ALBICILLA* (Cuv.).

Five specimens from the Pelew group. These specimens show all the different states of plumage mentioned by Dumont and Lesson in birds collected on the Marian Islands by Quoy and Gaimard. Whether these differences are sexual or dependent on age is yet uncertain. In one of the Pelew birds the whole upper head is of

the fine greenish-blue colour of the back ; a second has the forehead and superciliaries white ; in another the crown of the head is white, with some bluish feathers in the middle, the auricular region and a very narrow interrupted nuchal collar being of the same colour ; in a somewhat younger specimen there is only one dark spot on the white cap, and the colour of the back is an obsolete dirty green.

For the complete synonymy of this species, conf. Cab. Mus. Hein. ii. p. 159. "Tanatick" inc.

The only existing original figure is that of Gould's (*Halcyon saurophaga*), in the 'Zoology of the Sulphur.' It shows the head all white.

H. albicilla has been collected on the Marian Islands, New Ireland, New Guinea, Batjan, Morotay, and the Pelew group.

4. MYZOMELA RUBRATRA, Less.

Two ad. spec., Pelew group and Carolines. "Sisebanjo" inc.

The Pelew group has been already indicated by G. R. Gray as a locality for this species. Von Kittlitz observed it on the island of Ualan, and gives interesting details about its manners, propagation, &c. We consider the *Myzomela major* of Bonaparte to be a merely nominal species (conf. Von Kittl. Reise, i. p. 381).

5. COLLOCALIA VANICORENSIS (Q. & G.).

It is extremely difficult and uncertain to find out definite differential characters between some of these *Collocaliæ*. A fine specimen of the true *C. fuciphaga* from the island of Réunion, in the Bremen collection, resembles in almost every respect our *Collocaliæ* from the Viti and Pelew group!

Inc. "Cobusock." Von Kittlitz mentions this bird under the name of *Cypselus inquietus*. He describes it as observed on the island of Ualan (Reise, ii. p. 26).

6. MONARCHA GODEFFROYI, n. sp. (Pl. XXXVIII.)

Ad. *Alba* ; *capite toto cum mento et gutture, alis et cauda nigris* ; *subalaribus et subcaudalibus nigris* ; *rectricibus nonnullis lateralibus macula alba minuta vix conspicua apicali notatis* ; *rostro plumbeo, tomis et apice pallidioribus* ; *pedibus nigricantibus*. Long. circa $7\frac{1}{2}$ " , rostr. a fr. 7" , alæ 3" 2" , caudæ 3" , tars. 10" .

Jun. (œm.?). *Dorso nigro alboque vario* ; *collo toto albo* ; *capite, alis, cauda, pectore et abdomine nigris*.

Juv. *Supra sordide cinerascens, fulvo lavata* ; *tergo uropygiogae magis fulvescentibus* ; *remigibus et tectricibus fulvo marginatis* ; *gastræo ochroleuco*.

Perhaps confined to the island of Yap, where the three specimens here described were shot. This fine new bird is nearly allied to *Monarcha rugensis*, from the much more eastern Hogoëu group. But the distribution of the black and white colour is altogether different.

7. *MONARCHA FULVIVENTRIS*, n. sp.

Pallide cinerea, alis et cauda subfuscescentibus; pectore, abdomine, subalaribus et subcaudalibus dilute fulvo-cinnamomeis; rostro plumbeo, tomis et apice pallidioribus; pedibus, ut videtur, pallidis; iride rubra.

Long. 8", rostr. a fr. 7", alæ 3" 4", caudæ 2" 9", tars. 9".

One specimen from the Echiquier group. Perhaps a female. Nearly allied to *M. inornata* of Lesson, which I have not seen. But the colour of the abdomen is by no means a "*brun marron*," and the secondary remiges are without a trace of the ferruginous margin so conspicuous in the figure given by Lesson and Garnot (Zool. Coq. pl. 15. f. 1).

Another bird of very similar colouring is *Monarcha cinerascens* (Temm.), of Timor.

8. *CALORNIS KITTLITZII*, Finsch & Hartl., Beitr. z. Faun. Central-Polyn. p. 109.

Lamprotornis columbinus, Kittl.

Four specimens from the Caroline Islands. "*Kinis*" inc. Iris yellow.

An Ualan specimen is in the Bremen collection. The younger bird is more brownish, and has much less of the greenish metallic gloss.

The naturalists of the 'Novara' Expedition collected this species on the island of Puynipet, Semiavin group. It seems to be distributed over the whole archipelago of the Carolines.

9. *CARPOPHAGA OCEANICA*, Less.

Two specimens from the Pelew group. "*Kajep*" incol. "Eyes red, with a yellow margin."

For interesting biological details of this widely distributed Pigeon see Von Kittl. Reise, i. p. 377; for a full account of it conf. Finsch et Hartl. Beitr. Faun. Central-Polyn. p. 142.

A good reduced figure is given by Kittlitz (Kupfert. t. 33. f. 1).

10. *MEGAPODIUS SENEX*, n. sp.

Ad. *Pileo et nucha dilute canis, nonnihil brunnescentibus; capitis lateribus colloque toto in fundo nudiusculo rubro sparsim plumosis; collo et interscapulio nigricanti-schistaceis; corpore reliquo obscure plumbeo-olivascens; rostro gracili, flavo; pedibus flavis, digitis et unguibus nigris.*

Long. circa 11", rostr. a fr. 7", alæ 6" 3", caudæ 2" 1", tars. 2" 3", dig. med. c. ung. 2" $\frac{1}{2}$ ".

One specimen from the Pelew group. All my efforts to reduce this species to any of the described have been fruitless.

11. *MEGAPODIUS EREMITA*, n. sp.

Dorso, alis et cauda olivascens-fuscis, cauda distinctius rufescente; collo et gastræo toto magis cinerascens; abdomine

inferiore, crisso et subcaudalibus magis in olivaceum vergentibus; capitis lateribus gulaque nudiusculis, rubicundis, sparsim plumosis; vertice et occipite plumis rarioribus obscure cinerascens; sincipite nudiusculo, rubro, nigro, subpiloso; rostro flavo, basi obscuro; pedibus obscuris; iride rubra.

Long. circa $12\frac{1}{2}$ ", rostr. a fr. $6\frac{1}{2}$ ", alæ 8", caudæ $2\frac{1}{2}$ ", tars. $2\frac{1}{2}$ ", dig. med. c. ung. $2''\ 1'''$.

One specimen from the Echiquier Island. Inc. "Apagai."

12. RALLUS PHILIPPENSIS, auct.

Two specimens from the Pelew group. "Tareth" incol. Iris red.

13. RALLINA FASCIATA, Raffl.

One specimen from the Pelew Islands. "Olaratta" inc. "Eyes red, with a yellow ring."

In every respect like Javan specimens. The geographical distribution of this species is certainly a curious fact amongst the *Rallidæ*. It has been observed in the islands of Java and Sumatra, in the peninsula of Malacca, in the Philippines, and now for the first time in the Pelew group.

14. ARDEA SACRA, Gm.

One specimen, a younger bird, from the Matelotas.

15. NUMENIUS PHÆOPUS, L.

Specimens from the Pelew and Matelotas Islands.

16. STREPSILAS INTERPRES, L.

A young bird in winter dress from the Pelew group.

17. STERNA LUNATA, Peale.

Two young birds from the Pelews.

Fronte, abdomine et interscapulio albis, vertice nigro-maculato, nucha et collo postico largius nigro variis; dorso, alis et cauda cinereis, dorso pallidior, alis obscurioribus, subfuscescentibus, scapis remigum fasciaque lata longitudinali pogonii interni albis; rectricibus pallide cinereis, pogonio interno versus basin albis; margine alari et subalaribus albis; rostro nigro.

18. DYSPORUS SULA (L.).

An adult specimen from the Pelew Islands.

19. DYSPORUS PISCATOR (L.).

Pelew group.

20. TACHYPETES MINOR (Gm.).

One specimen from the Mackenzie group.

21. *GYGIS ALBA* (L.), Pall.

Pelew Islands. Von Kittlitz describes the very young bird (Reise, ii. p. 158).

22. *ANAS SUPERCILIOSA*, L.

Two pullets in spirits from an uncertain locality.

23. *PUFFINUS OPISTHOMELAS*, Coues.

Four specimens from the Pelew Islands. "Kokeio" incol.

Var. *minor*: *subcaudalibus totis nigro-fuliginosis*.

The type of Coues's description from Cape St. Lucas is a somewhat larger bird; but, there being no other difference between it and our Pelew bird, I prefer considering this latter a smaller race. The dimensions of our specimens are:—Long. tota 11–11½", rectr. 12–12½", alæ 3" 4–7", tars. 17".

3. On a New Species of *Callene* from the Pulney Hills in Southern India. By WILLIAM T. BLANFORD, Assoc. Roy. School of Mines, C.M.Z.S. &c.*

(Plate XXXIX.)

The Rev. S. Fairbank has sent to me for description a very interesting new species of bird which he has recently shot upon the Pulney Hills, a lofty portion of the great range which stretches along the southern parts of the western coast of India, from the remarkable gap of Paulghatcherry, which divides the range from the Nilghiri hills, to Cape Comorin. This fine tract of hill country, about 150 miles in length and, in its northern portion, 60 to 70 miles broad, contains a very interesting fauna having, as might be expected, close affinities with that of Ceylon, and also with that of the Nilghiris, but still containing many peculiar forms. It has, however, hitherto been neglected in the most remarkable manner, and there is no portion of the Indian peninsula concerning the zoology of which so little is known. This may appear opposed to Dr. Günther's statement in the 'Reptiles of British India,' in which he asserts that the southern corner of India with Ceylon, including Travancore, the Nilghiris, Mysore, &c., is one of the best-explored parts of the country. Most Indian naturalists will probably be inclined to think that "best-explored" is a misprint for "worst-explored;" but, in fact, the mistake is one which few naturalists who had no personal knowledge of India would have avoided. The fauna of Ceylon, thanks

* Along with the present communication Mr. Blanford sent specimens of the bird described and its eggs for exhibition to the Meeting,—also skins of *Salpornis spilopota*, Franklin, *Emberiza huttoni*, Blyth, and *Hirundo fluminicola*, Jerdon.—P. L. S.

to its large European population and the number of energetic naturalists who have devoted themselves to the investigation of its zoology, has been very fairly made known; that of the Nilghiris has also been pretty well ascertained, the Reptilia especially having been very thoroughly worked out by Dr. Jerdon and Captain Beddome; and the Reptilia and Mollusca of a small portion of the southern range have been collected by Captain Beddome, almost the only naturalist who has ever penetrated the Anamallay hills (which adjoin the Pulneys); but of the fauna of the great range I have just described in general, less is known than of that of Bhotan or of the hills of Arakan.

It is therefore not surprising that the first ornithological novelty which has been obtained from Southern India since the publication of Dr. Jerdon's list of the birds in the years 1839-44 in the 'Madras Journal of Literature and Science' should have been procured from the Pulney hills, a group 7000 feet in height, forming the north-eastern corner of the mountainous tract above described. It is very interesting, however, to obtain from these hills a third representative form of the genus *Callene* (formerly *Cinclidium*) of Blyth, proposed first for a species inhabiting the Eastern Himalayas (*C. frontalis*, Blyth), and made by Jerdon, undoubtedly with justice, to include a Nilghiri bird first discovered by himself (*C. rufiventris*, Blyth). This distribution illustrates one of the most remarkable peculiarities in the fauna of Peninsular India, a peculiarity to which I will refer after first giving the description of the new species.

CalLENE ALBIVENTRIS, Fairbank. (Pl. XXXIX.)

Fusco-cyanea, mento lorisque holosericeo-nigris, fascia frontali albescenti-cærulea, rectricibus remigibusque fuscis cærulescente marginatis, abdomine medio albo, lateribus cinerascens; rostro nigro, pedibus fuscis, iridibus brunneis.

Long. tota 6, alæ 3·1, caudæ 2·6, rostri a fronte 0·5, a rictu 0·75, tarsi 1·1 poll. Angl. et dec.

Hab. Montes Pulney dictos Indiæ meridionalis, ad alt. circa 6000-7000 ped. Angl. in dumetis et sylvis.

C. albiventris is similar in form to the Nilghiri *C. rufiventris*, Blyth; but it is rather smaller and differs widely in colour, being much bluer above, with a distinct light-blue, almost whitish, frontal band, instead of the faint indication which alone exists in *C. rufiventris*. There is no trace of the ferruginous abdomen of that species; and the white in the new species is not, like the rufous colour in *C. rufiventris*, spread over the whole lower parts from the breast downwards, but is almost confined to the centre of the abdomen and the lower tail-coverts, shading gradually into slaty on the flanks.

C. frontalis, Blyth, of the Sikkim and Nipal Himalayas, is a still larger bird than *C. rufiventris*, with a longer tail. The frontal band is of a darker and richer blue than in *C. albiventris*, and the abdomen is grey. The blue of *C. albiventris* is purer and less dusky than that of either of the two other species, and, so far as can be judged by the somewhat faded specimens in the Asiatic Society's

Museum in Calcutta, resembles rather the colour of *Brachypteryx cruralis*.

The sexes do not appear to differ. In the two specimens sent by Mr. Fairbank the female is a little the paler; but this appears due to the male being in brighter and fresher plumage.

Callene albiventris inhabits the thick patches of forest (called Sholas), which are so remarkable a character in the hills of Southern India. It appears to be scarce. The eggs, two of which are sent, are two in number, of an olive-brown colour, darker at the larger end, measuring 0.92 and 0.63 inch in their greater and less diameters. Mr. Fairbank writes thus:—"The nest I found in a small hole, just big enough for it, in the trunk of a tree a yard above the ground. It was neatly made of moss and fibrous roots. I surprised the female on the nest several times. She laid two eggs in April, and was incubating when I discovered and took them. In June another nest was built in the same hole, and two eggs were laid, and then the bird began to sit. The song is sweet and loud (not so loud as that of *Merula simillima* or *Trochalopteron jerdoni*) and varied, though it is generally confined to four notes—sol, la, si, do."

We have thus, on the Nilghiri and Pulney hills in Southern India, two representatives of an Eastern Himalayan form, with, like most Eastern Himalayan forms, strong Malayan affinities. This case is the type of many others; and the remarkable peculiarity to which I alluded above is the representation of Himalayan types with Malay affinities, which are wanting throughout the plains of India, in the higher hill-groups of the southern portion of the peninsula and of Ceylon.

The fauna of the plains of India has very nearly as marked affinities with that of Africa as with that of Malaynesia, as is shown by the occurrence of antelopes, the nylgai, gazelles, the lion, the hunting-leopard, *Felis chaus*, *F. caracal*, hyænas, wolves, foxes, bustards, sand-grouse, &c. &c., not one of which is represented to the eastward, or is found in the hills of Southern India and Ceylon. In those hills, however, are numerous representatives of the Malay fauna of the Himalayas, such as *Trochalopteron* and *Garrulax* among the birds, *Diplommata* and *Alycaeus* among the land-shells; and it is to this representation of Himalayan forms, as I have before pointed out with reference to the land-shells, that I believe the greater portion of the affinity, where such really exists, between the fauna of Ceylon and that of Malaynesia is due. This subject, however, which has not received the attention it deserves, is one to which I hope to recur before long.

P.S. Since writing the above I have seen the specimens of the bird referred by Mr. Fairbank to *Trochalopteron jerdoni*, Blyth, and I am strongly inclined to believe that, although very closely allied to that species, it is a distinguishable race.

4. Notes upon Three Asiatic Species of Deer.

By EDWARD BLYTH.

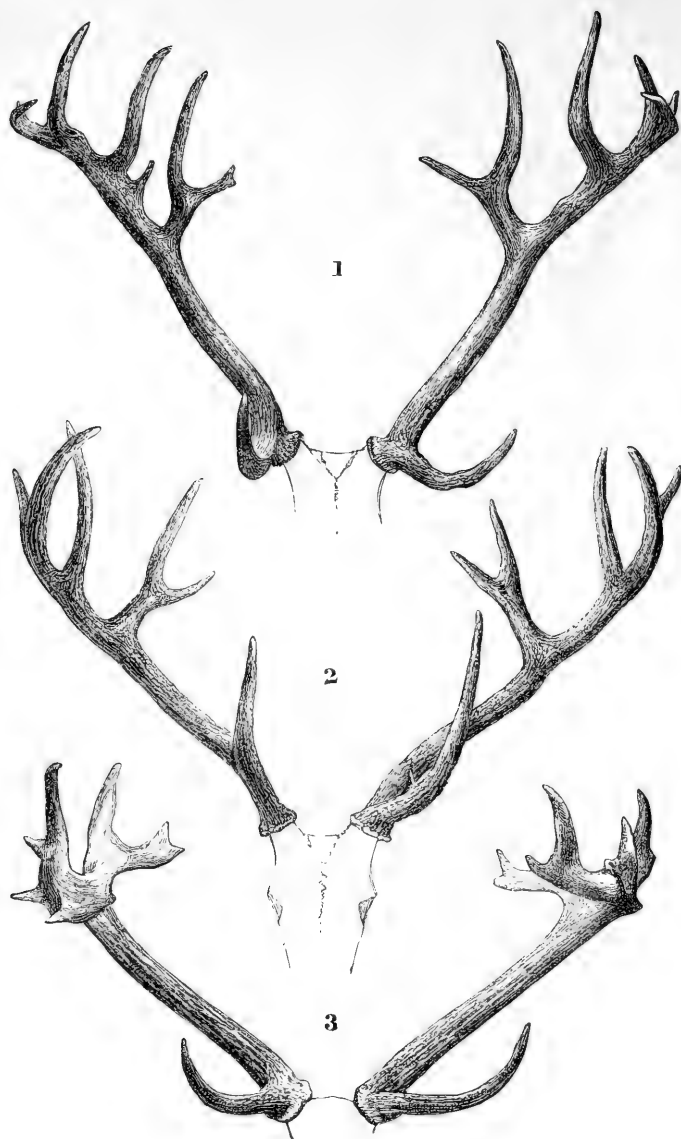
Upon a former occasion I exhibited at a Meeting of this Society (see P. Z. S. 1863, p. 155) some loose horns of a species of Deer believed to inhabit Siam, which I named in honour of my late friend Sir Robert H. Schomburgk, who at that time filled the position of H.B.M. Consul at Bangkok. When that accomplished naturalist returned from Siam he brought a miscellaneous collection of objects of natural history from that country, many of which were disposed of by auction after his decease. It contained two splendid pairs of horns of *Rucervus schomburgki*, and one very fine pair of horns of the Siamese variety or distinct race of *Panolia eldi*, which has been designated *P. platyceros* by Dr. Gray, as distinguished from his *P. acuticornis*. Those three pairs of horns were purchased for the British Museum, and I have there had photographs taken of them, which, with some other photographs and drawings illustrative of the different forms of *Rucervus*, Hodgson, and *Panolia*, Gray, I here-with submit for publication in the Society's 'Proceedings' *.

Figs. 1, 2, 3 represent three pairs of horns of the Indian *R. duvaucelli*, the lowermost being those of an aged buck with extraordinarily developed "crown," in the museum of the Asiatic Society, Calcutta. Fig. 4 represents the finest pair of horns of this species that I have seen, and which I sketched many years ago when in the possession of the late Frank Russell, Esq., of the Bengal Civil Service. Fig. 5 represents a pair in which the near affinity of *Rucervus* to *Panolia* is at once recognized.

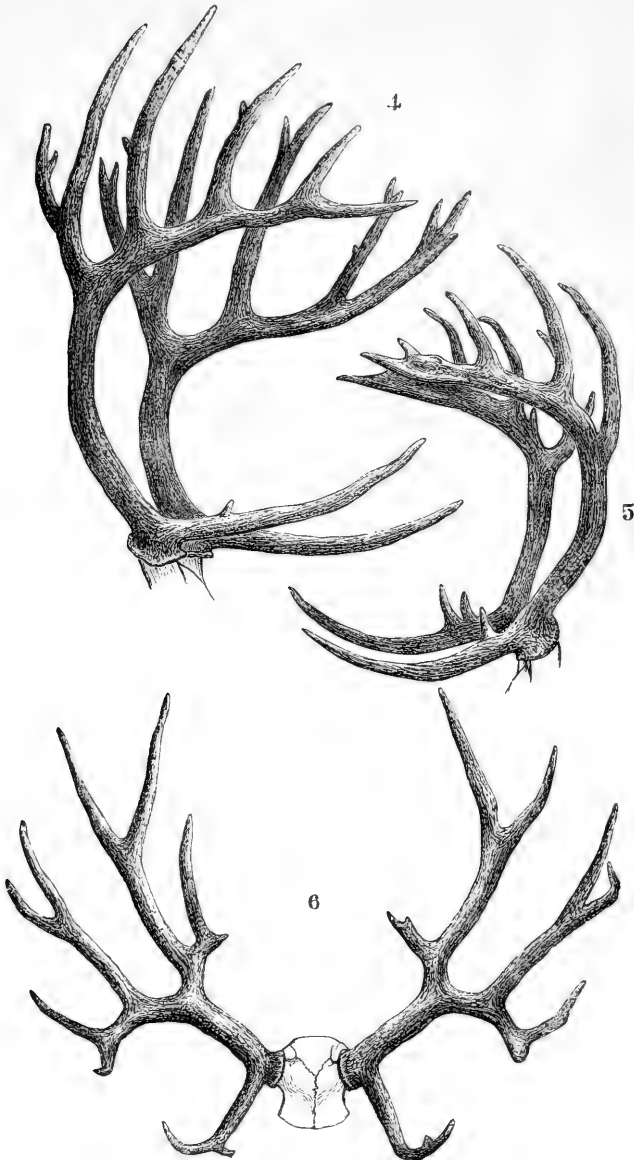
Figs. 6 to 12 (inclusive) represent the horns of *R. schomburgki*, fig. 6 being the only pair of the series which is still attached to the frontlet. This pair and that represented in two aspects of view by figs. 7 and 8 are the two pairs which belonged to Schomburgk, and I regard the last referred to as a genuine pair, although detached from the frontal bones. Figs. 10 and 11 I consider to represent odd horns matched, as also figs. 9 and 12. These three fine pairs, or rather series of six odd horns, were rescued from the stock of a cutler in Sheffield, who said that he had converted many like them into knife-handles. Both figs. 6 and 11, it will be remarked, have forked brow-antlers; and the near resemblance of several of these beautiful horns to the largest of the three which I formerly figured and restored conjecturally when first bringing the species to notice, will not fail to excite attention. The characteristic style of ramification is prominently observable. With regard to the animal, I have not been able to learn anything whatever, excepting that I have been assured that a living buck of the species is at this time living in the Jardin des Plantes at Paris.

Figs. 13 to 16 (inclusive) represent four specimens of *P. eldi*

* Three additional fine pairs of horns of *R. schomburgki* have been subsequently received, and are now in the national collection. These I have also had photographed, as the pair with branching brow-antlers (fig. 11).

Horns of *Rucervus duvaucelli*.

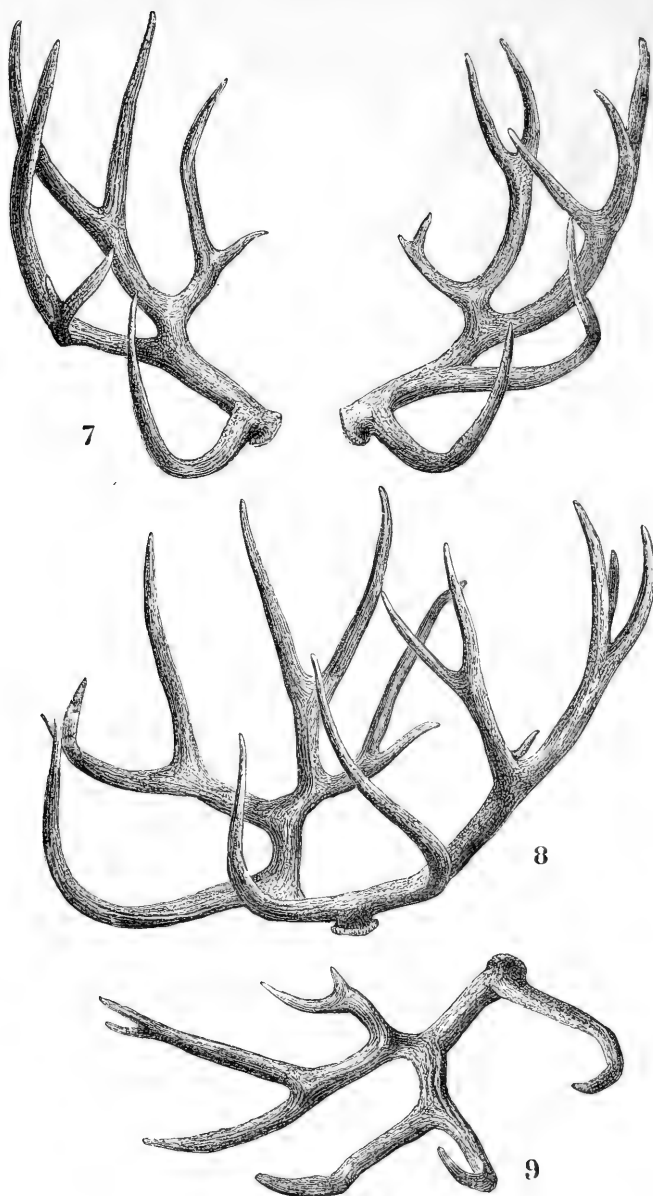
(misprinted *eedii* in the British Museum Catalogue) from Pegu, and a small specimen (fig. 17) from the valley of Manipur, which is wholly unbranched. I am assured by Col. Guthrie, formerly of the

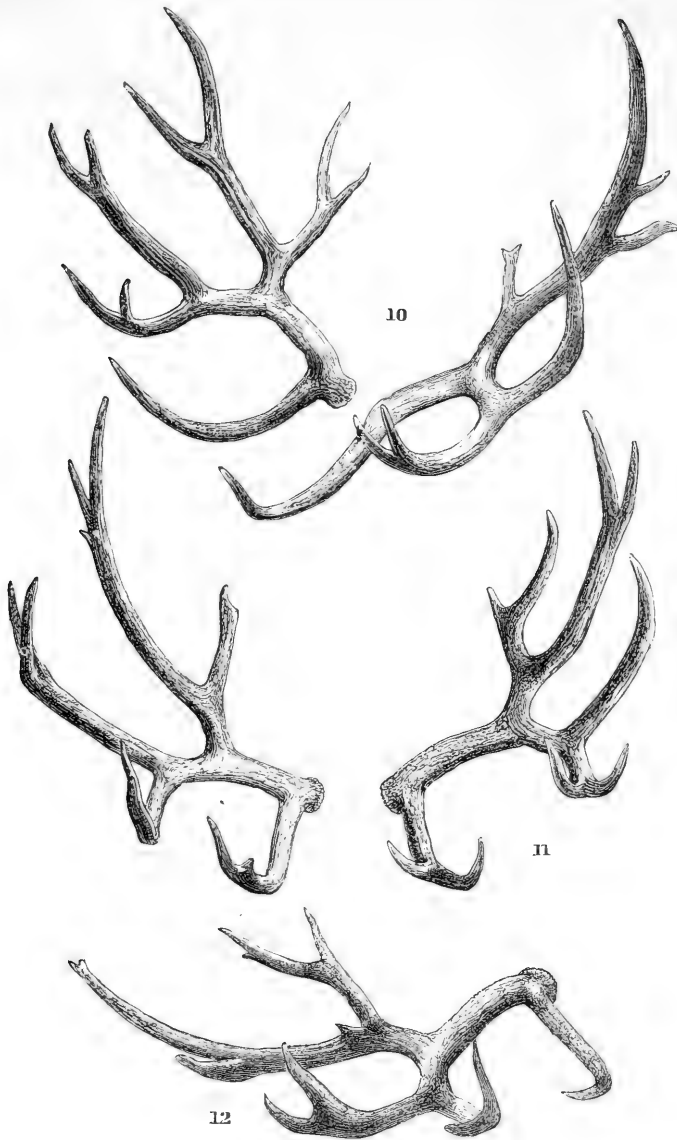


Figs. 4, 5. Horns of *Rucervus duvaucelli*. Fig. 6. Horns of *R. schomburgki*.

Bengal Engineers, who first brought this species to notice and dedicated it to his friend Lieut. Eld*, that he once possessed the horns

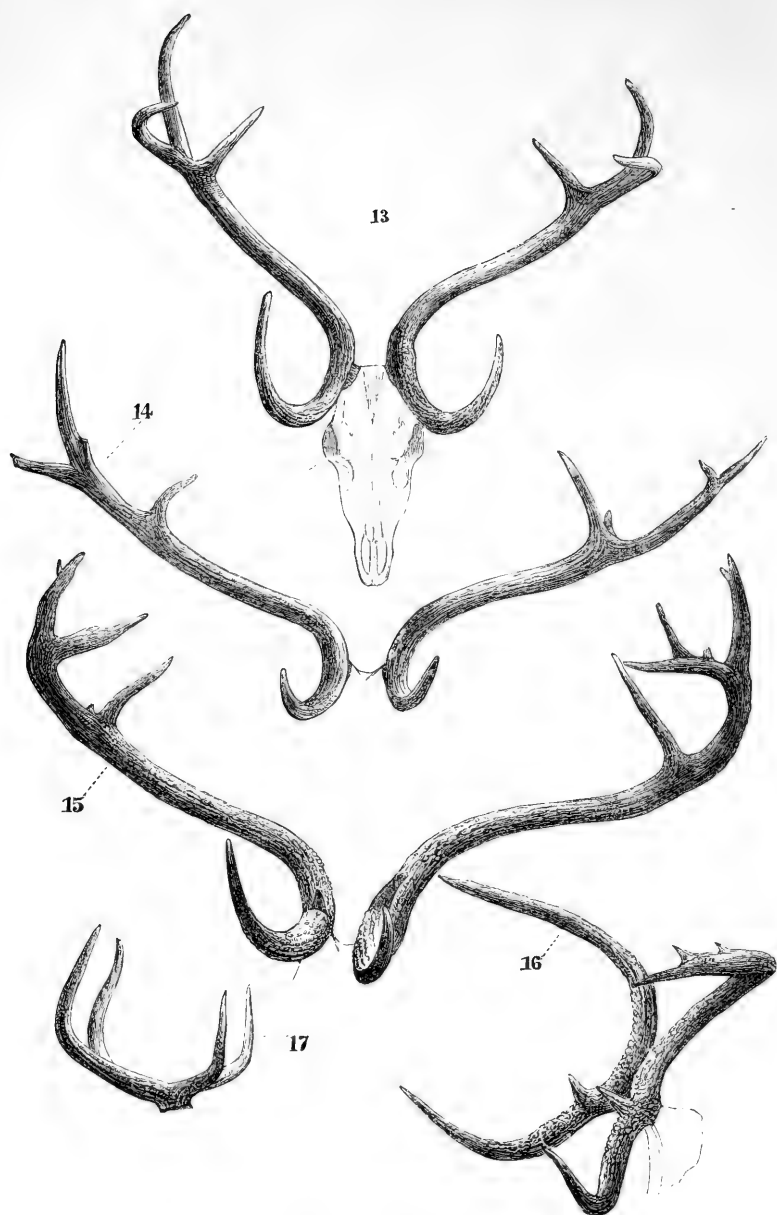
* Calcutta Journal of Natural History, vol. ii. p. 115 (1842), pl. 12.

Horns of *Rucervus schomburgki*.

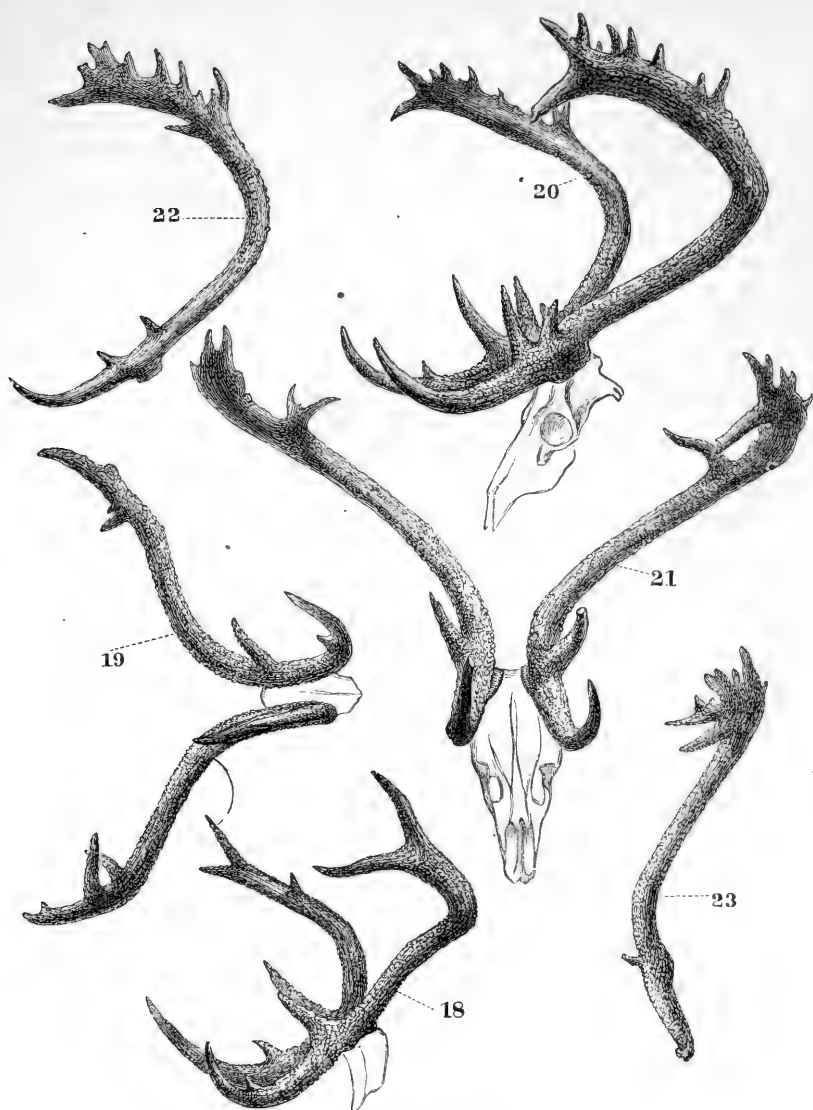


Horns of *Rucervus schomburgki*.

of a mature animal, from Munipur, similarly unbranched, and with the line of the beam continuous with that of the brow-antler. "The generality of the stags of Munipur," however, according to Lieut.



Horns of *Panolia eldi*.

Horns of *Panolia eldi*.

Eld, "have from six to ten branches or snags; but I have killed very old ones," he adds, "with no less than sixteen clearly defined branches," *i. e.* on the pair. I have seen numerous specimens both from Manipur and Pegu, which are essentially similar in character.

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They have commonly a prominent vertical snag near the base of the brow-antler, as represented in figs. 15 and 16. This particular race is the *Panolia acuticornis* of Dr. Gray, being identical with *Cervus frontalis*, M'Clelland, and *C. lyratus*, Schinz; also, as I believe, with *C. dimorphe*, Hodgson, figured and described in the 'Journal of the Asiatic Society of Bengal,' vol. xxii. p. 897,—the horns in that specimen, which is now in the British Museum, being somewhat abnormally developed in a state of captivity. Further to the south, in the province of Mergui and in that of Quedda, the horns of this animal appear to be constantly shorter, and have commonly two or three prominent vertical snags on the brow-antler. In figs. 18 and 19, a characteristic example of this variety (procured from Quedda by the late Dr. Cantor, and now in the India Museum) is figured in two aspects of view. In the Museum of the Asiatic Society, Calcutta, there are several specimens of similar character from Mergui, and I have never seen an example with more elongated beam from that province. A third and more strongly marked variety is that from Siam, of which the particular horn upon which Dr. Gray founded his *P. platyceros* is represented in figs. 22 and 23; while figs. 20 and 21 represent a head of this variety from the collection of the late Sir R. H. Schomburgk. The brow-antlers, as will be observed, have several vertical snags; and the crown is laterally much flattened and remarkably serrated, with a series of small tines on its posterior margin. I have seen, probably, more than a hundred pairs of horns of the preceding varieties, but none even approaching in the form of crown to this Siamese race, which Dr. Gray has perhaps rightly discriminated, though further knowledge of the animal is required to decide how far it may be worthy of distinction by a separate name. It is not improbably a well-marked second race of *Panolia*, as *Rucervus schomburgki* is undoubtedly a second race of that subtype; and in the latter instance the geographical area inhabited by the ordinary *P. eldi* intervenes between the range of distribution of *Rucervus duvaucelli* and that of *R. schomburgki*.

DESCRIPTION OF THE FIGURES.

Rucervus duvaucelli.

Figs. 1, 2, 5. Ordinary well-developed horns.

4. Remarkably fine.

3. Horns of an aged individual.

Rucervus schomburgki.

6. Horns on frontlet, procured by Schomburgk.

7, 8. Another pair, procured by Schomburgk.

9-12. Series of odd horns, imported for commercial purposes.

Panolia eldi.

13-17. Pegu and Munipur variety.

18, 19. Mergui and Quedda variety. Specimen procured from Quedda by the late Dr. Theodore Cantor.

20, 21. Siamese race (*P. platyceros*, Gray). Specimen procured by Schomburgk.

22, 23. Type specimen described as *P. platyceros*.

5. Batraciens nouveaux de l'Afrique occidentale (Loanda et Benguella). Par M. J. V. BARBOZA DU BOCAGE, F.M.Z.S.

1. *RANA ANCHIETÆ*. (Fig. 1.)

Tête large, à museau allongé et pointu; narines placées un peu plus près du bout du museau que de l'œil; tympan à peine égal aux $\frac{2}{3}$ du diamètre de l'œil; dents vomériennes en deux petites séries, situées précisément au-devant des arrière-narines et séparées par un large intervalle. Aux membres antérieurs les 2^e et 4^e doigts égaux, le 3^e le plus grand; orteils palmés jusqu'à la base de la dernière phalange, excepté le 4^e dont les deux dernières phalanges sont libres. Un seul tubercule sur le métatarse à son bord interne. Quatre plis longitudinaux de la peau, de chaque côté du dos, étroits et distinctement granuleux; le dessus de la tête et les intervalles des plis dorsaux parsemés de petits tubercules; des tubercules plus gros et confluents couvrent les flancs, le partout de l'anus et la moitié postérieure du dessous de la cuisse. La peau est lisse en dessous sans aucune trace de granulations ni de pores.

Fig. 1.

*Rana anchietae*.

Régions supérieures d'une teinte grisâtre ou olivâtre, marbrées de brun ou variées de petites taches brunes plus ou moins distinctes; sur la face externe des membres des bandes transversales d'un brun plus foncé; un petit trait noirâtre du bout du museau à l'œil en passant par la narine; une tache allongée du même couleur s'étendant de l'œil à l'épaule par-dessus le tympan. La face postérieure des cuisses est d'un brun rougeâtre ou couleur chocolat, avec de petites taches rondes et de vermiculations jaunes. Parties inférieures blanches ou d'un blanc jaunâtre. Sur quelques individus la face inférieure des cuisses se montre colorée d'un jaune vif.

Dimensions (d'un individu mâle): Du bout du museau à l'anus 48 millimètres, memb. ant. 28 millim., memb. post. 86 millim.

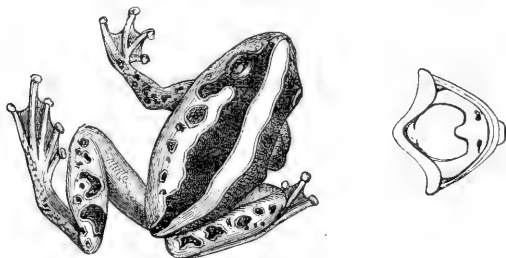
Hab. Benguella, d'où nous avons regus plusieurs individus par M. d'Anchieta.

Ressemble par la taille et par l'ensemble des formes à la *R. bibroni*, Hall. (*R. supraciliaris*, Günther), mais les caractères indiqués ci-dessus me semblent suffisants pour la bien distinguer.

2. *HYPEROLIUS INSIGNIS.* (Fig. 2.)

Tympan caché, tête courte à museau court et arrondi; langue large, fendue en arrière; yeux gros et saillants; peau lisse sur le dos et sur les flancs, granuleuse sur la gorge et la face inférieure du tronc et des cuisses; un petit amas de granulations vers l'angle de la mâchoire; doigts réunis à la base par une petite palmure, orteils complètement palmés, à l'exception du 4^e dont la dernière phalange est libre. Couleur générale (dans l'alcool) d'un jaune teint de rouge; sur le dos deux larges bandes longitudinales d'un bleu noir lisérées de rouge vif, confluentes chez quelques individus sur le museau au-devant des yeux; une raie plus étroite de la même couleur, également lisérée de rouge va de l'œil à l'épaule, et avance plus ou moins interrompue jusqu'à l'aîne; sur les bords de la mâchoire supérieure des petites taches bleues bordées de rouge; d'autres taches semblables, mais plus grandes et irrégulières, couvrent la face dorsale des membres antérieurs et postérieurs, à l'exception des cuisses qui sont unicolores. La gorge pointillée de noir.

Fig. 2.



Hyperolius insignis.

La coloration d'un certain nombre d'individus ne paraît pas sensiblement altérée par leur séjour dans l'alcool, tandis que d'autres, conservés dans le même bocal, présentent la teinte bleue remplacée par un gris cendré terne; cependant le liséré rouge y reste toujours bien distinct.

Dimensions: Du bout du museau à l'anus 37 millim., memb. ant. 21 millim., memb. post. 58 millim.

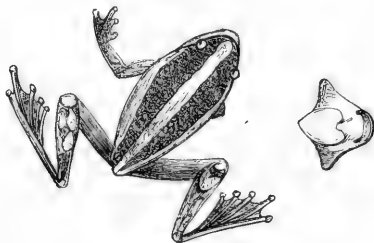
Hab. Benguella. Plusieurs individus envoyés par M. d'Anchieta.

L'espèce est connue des naturels sous le nom de "Gimbots," qu'ils donnent également à d'autres petits batraciens.

3. *HYPEROLIUS TOULSONII*. (Fig. 3.)

Tympan caché; tête large à museau court et arrondi; langue petite, cordiforme, fendue en arrière; peau lisse en dessus, granuleuse en dessous et sur les flancs; une très-petite palmure à la base des doigts; orteils réunis par une membrane jusqu'à la base de la dernière phalange.

Fig. 3.

*Hyperolius toulsonii*.

Coloration (dans l'alcool): En dessus, sur un fond d'une teinte de plomb, trois larges bandes longitudinales blanches, l'une sur la ligne dorsale du bout du museau à l'anus, les autres naissant de chaque côté derrière l'œil et se dirigeant le long de la partie supérieure des flancs; les cuisses couleur de plomb uniforme; la jambe en dessous et le pied, ainsi que la face inférieure des membres antérieurs et la main, d'un brun foncé; région gutturale et ventre blancs; sur la face dorsale des membres antérieurs et de la jambe des larges taches arrondies blanches; un trait noirâtre, bordé de blanc en dessous, du bout du museau à la tempe, en traversant l'œil; bord de la mâchoire supérieure couleur de plomb.

Dimensions: Du bout du museau à l'anus 26 millim., memb. ant. 16 millim., memb. post. 39 millim.

Hab. Loanda. Un individu envoyé par M. Toulson.

4. *BUFO SPINOSUS*, nov. sp.?

Tête large, déprimée, plane; bords orbitaires supérieurs non saillants; parotides allongées, étroites, parallèles à la ligne dorsale, trois fois plus longues que larges; pas de glande sur la face supérieure de la jambe; tympan distinct, égalant presque le diamètre de l'œil; doigts libres, le 3^e beaucoup plus long que le 2^e et le 4^e, qui sont égaux; orteils réunis par la membrane jusqu'à moins de la moitié de leur longueur, le 4^e d'un tiers plus long que le 5^e. Les callosités du talon plus volumineuses que celles de la paume de la main; un pli de la peau, bien prononcé, au bord interne du tarse; sans tubercules. La peau des parties supérieures, à l'exception de celle qui couvre le milieu du crâne et le museau, est partout couverte de gros tubercules garnis d'épines cornées noirâtres; les plus gros de ces tubercules portent au centre une épine beaucoup plus forte que les autres.

Parotides et régions supra-orbitaires également couvertes d'épines. En dessous la peau est granuleuse.

Coloration: En dessus d'un brun cendré avec des taches brun foncé bordées de noir, distribuées plus ou moins régulièrement sur la tête, le dos et la face supérieure des membres; en dessous, d'un brun jaunâtre uniforme sur le ventre et la face inférieure des membres, et d'un noir fuligineux pointillé de jaunâtre sur la gorge.

Dimensions: Tête et tronc réunis 68 millim., memb. ant. 46 millim., memb. post. 83 millim.

Hab. Benguella. Un seul individu par M. d'Anchieta; il porte le nom vulgaire de "Minongo."

Ce crapaud se rapproche beaucoup du *B. tuberosus*, Günther (Batr. Salientia, p. 60, pl. 3. fig. C), dont il semble différer par la forme des parotides, par des épines moins fortes sur les tubercules cutanés, par l'existence d'un pli de la peau au bord interne du tarse, tandis que chez l'espèce de Fernando Po ce pli n'existe pas et est remplacé par des tubercules, &c. Cependant pour arriver à une opinion décisive il conviendrait de pouvoir comparer les deux espèces.

6. The Fishes of Seychelles. By Lieut.-Colonel R. L. PLAYFAIR, F.Z.S., H.M. Consul-General in Algeria.

(Plates XL. & XLI.)

The Seychelles Archipelago is included in the region the ichthyology of which was described in 'The Fishes of Zanzibar.' Since the publication of that volume I have paid another visit to those remarkable islands; and during a stay of nearly two months there I have been enabled to add very considerably to my former collections. I have obtained fifty-five additional species, of which five are new to science, and I have observed many others not previously known to exist there. In all I am enabled to publish a list of 211 species, only fifteen of which are given on other authority than my own observation.

I cannot refrain from recording the obligation I owe to Swinburne Ward, Esq., H.M. Civil Commissioner, whose interest in everything connected with sport and natural science is as unbounded as his hospitality.

ACANTHOPTERYGII.

PERCIDÆ.

1. *ETELIS CARBUNCULUS*, C. & V.
2. *APRION VIRESCENS*, C. & V.
3. *ANYPERODON LEUCOGRAMMICUS*, Reinw.

Two specimens of this fish were obtained at Seychelles,—the first

exactly identical with those previously described; the second an adult male, 21 inches long, differing in coloration only.

It is brownish on the back, lighter on the belly; the entire body and fins, including even the thick outer membranes of the eyes, covered with round red spots; these are largest on the body, smallest on the occiput and snout, and hardly conspicuous on the pectoral rays. The white lateral bands were quite inconspicuous in the fresh state, but after maceration in spirits for several weeks a faint trace of them has become visible.

4. *SERRANUS LOUTI*, Forsk.

5. *S. ERYTHRÆUS*, C. & V.

6. *S. CYANOSTIGMATOIDES*, Blkr.

7. *S. MINIATUS*, Forsk.

8. *S. GUTTATUS*.

Perca miniatæ var. B, Forsk. p. 41.

Bodianus guttatus, Bl. t. 224.

Serranus myriaster, Cuv. & Val. ii. p. 365; Rüpp. Atlas, Fische, p. 107, t. 27. f. 1; Quoy & Gaim. Voy. Astrol. p. 653, pl. 3. f. 1; Less. Voy. Coqu. pl. 37.

S. guttatus, Pet. Wieg. Archiv, 1855, p. 235; Günth. Fish. i. p. 119 (not C. & V.).

The specimens from Seychelles have exceedingly fine denticulations to the præoperculum, and five or six darker cross bands on the body behind the termination of the pectorals. Length 9 inches.

9. *SERRANUS SONNERATI*, C. & V.

10. *S. SUILLUS*, C. & V.

11. *S. DISPAR*, Playf.

12. *S. MARGINALIS*, Bl.

13. *S. HOEVENII*, Blkr.

14. *S. HEXAGONATUS*, Först.

15. *S. FLAVO-CÆRULEUS*, Lacép.

16. *S. GAIMARDI*.

Serranus gaimardi, ? Bleek. Nat. Tydschr. Ned. Ind. 1853, Batav. p. 455; Quoy & Gaim. Voy. Astrol. Poiss. p. 656, pl. 3. f. 3; Günth. Fish. i. p. 150.

In 'The Fishes of Zanzibar' I considered *S. gaimardi*, Blkr., identical with *S. longispinis*, Kner; but I have obtained another example at Seychelles which leads me to doubt the propriety of having done so. The Zanzibar specimens exactly correspond to that described in the 'Voyage of the Novara,' while the Seychelles one

agrees with that in the 'Voyage of the Astrolabe.' The latter is distinguished not only by the form, number, and distribution of the spots, but by the greater height of the body, and the shape of the spinous portion of the dorsal.

Diagnosis.—Caudalis with rather convex posterior margin. The length of the head is contained thrice and three-quarters, and the height of the body four times in the total length. Diameter of the eye one-fifth of the length of the head. The upper maxillary does not extend as far as the posterior margin of the orbit. Præoperculum serrated, with four or five stronger denticulations at the angle; sub- and interoperculum entire; operculum with three points, the upper of which is minute, and the middle one very long. Scales ciliated. Third dorsal spine longest, but not half the length of the head. The third anal spine longest?

Colour.—Brownish, with numerous small yellow spots, which are smaller and more distinct on the head than on the body. Spinous dorsal with indistinct yellowish spots, soft portion with a yellow margin and two series of distinct and one (the basal) series of indistinct large round brown spots, about eight in each. Anal and caudal blackish, with numerous large dark brown spots, the latter with a yellow margin. Ventrals and pectorals similarly spotted.

Length 14 inches.

17. *S. AREOLATUS*, Forsk.

There is not the slightest doubt that the fish described in Günther's 'Catalogue,' and quoted in 'The Fishes of Zanzibar,' is the true *S. areolatus* of Forskäll, and of the 'Hist. Nat. des Poissons.' On a recent visit to the Paris Museum, specimens of this species were shown to me bearing the name of *angularis*, Cuv. Probably these were not the typical specimens of *angularis*, but were confounded with it at some later period. Cuvier's description of the latter agrees perfectly with a specimen in the British Museum.

18. *S. CHLOROSTIGMA*, C. & V.

19. *S. CYLINDRICUS*, Gthr.

20. *PLECTROPOMA MACULATUM*, Bl.

21. *POGONOPERCA OCELLATA*.

Pogonoperca ocellata, Günth. Fish. i. p. 169.

Two specimens of this remarkable fish were obtained at Seychelles, where it appears quite unknown to the fishermen. Only two other examples are known to exist, one in the British and the other in the Paris Museum.

22. *GENYOROGES SEBÆ*, C. & V.

23. *G. BENGALENSIS*, C. & V.

24. *G. RIVULATA*, C. & V.

25. *G. CIVIS*, C. & V.

26. *MESOPRION ARGENTIMACULATUS*, Forsk.

27. *M. GEMBRA*, Schn.

A specimen from Seychelles is remarkable as having an indistinct black blotch on the lateral line, below the first rays of the dorsal, occupying about five or six series of scales. Length $12\frac{1}{2}$ inches. Creole name "Giblot."

28. *M. MACHAS*.

M. machas, Cuv. & Val. vii. p. 446; Günth. Fish. i. p. 200.

D. $\frac{10}{13}$. A. $\frac{3}{9}$. L. lat. 58–60. L. trans. 7/17.

Diagnosis.—Height of body nearly equal to length of head, and contained from thrice and two-thirds to four times in the total length. Diameter of eye about one-fourth of the length of head. Upper profile of head descending at a slight angle, rather straight; jaws equal in front; upper maxillary not reaching as far back as centre of eye. Suprascapular and præoperculum entire, the latter slightly notched; a small knob on the interoperculum, which is entirely covered with scales. Caudal truncate; pectorals reaching as far as vent; dorsal spines feeble, the fourth longest; the third of anal rather longer and stronger than the second.

Colour.—Olive, with yellow oblique streaks above the lateral line, and three longitudinal ones below it, of which the second, from the posterior of orbit to back of tail, is broadest. Dorsal, anal, and caudal fins yellow; upper half of pectorals yellow, lower half rosy.

Length $11\frac{1}{2}$ inches.

29. *M. FULVIFLAMMA*, Forsk.

30. *M. ERYTHROGNATHUS*, C. & V.

31. *M. LUTJANUS*, C. & V.

32. *M. VITTA*, Q. & G.

33. *M. ERYTHRINUS*.

Diacope erythrina, Rüpp. N. W. Fische, p. 92, t. 23, f. 2.

Mesoprion erythrinus, Günth. Fish. i. p. 199.

D. $\frac{10-11}{14}$. A. $\frac{3}{9}$. L. lat. 65.

The specimen observed at Seychelles differs slightly from that described by Rüppell; but there is little doubt of their identity.

Diagnosis.—Height of body twice and four-fifths, and length of head thrice and two-thirds in the total length. Upper profile of head gibbous above the eyes. Snout elongate, pointed; lower jaw prominent. Diameter of eye one-sixth of the length of the head. Præoperculum finely serrated, with a shallow notch; knob of interoperculum not very prominent. Pectorals pointed, reaching to vent. Caudal subtruncated.

Colour.—Bright red; dorsal, caudal, and anal with very narrow black margins; ventrals stained with blackish.

Length 18 inches. Creole name "Bourgeois."

Hab. Seychelles; Red Sea.

34. PRIACANTHUS SPECULUM.

Priacanthus speculum, Cuv. & Val. vii. p. 471; Règne Anim. Ill. Poiss. pl. 11. f. 1; Günth. Fish. i. p. 221.

D. $\frac{10}{14}$. A. $\frac{3}{15}$. L. lat. 84.

Diagnosis.—Caudal crescent-shaped, the exterior rays being somewhat produced. The height of the body is contained thrice and fourth-fifths, and the length of the head rather more than four times in the total length. The diameter of the eye is equal to the length of the snout, and is contained twice and two-thirds in the length of the head. Præoperculum finely denticulated, with a small serrated spine at the angle. Operculum, sub- and interoperculum entire; the first with two small spines. The posterior opening of the nostril is a long narrow slit, four times as long as broad. Dorsal spines increasing in length posteriorly, the last being twice the height of the second; the fifth ray is longest. The first three spines and all the rays have a rough surface. The middle rays of the anal are nearly half as long as the body is high; both spines and rays are striated. Ventrals elongated, reaching to the third anal spine.

Colour.—Red; all the fins except the pectorals have blackish edges.

Length 11 inches. Creole name "Miroir."

35. PRIACANTHUS FAX, C. & V.

36. AMBASSIS COMMERSONII, Forsk.

37. A. UROTENIA, Blkr.

38. A. DUSSUMIERI, C. & V.

39. APOGON HYALOSOMA, Blkr.

40. A. FASCIATUS, White.

41. A. CYANOSOMA, Blkr.

42. DULES FUSCUS, C. & V.

PRISTIPOMATIDÆ.

43. THERAPON SERVUS, Forsk.

44. PRISTIPOMA LEUCURUM, C. & V.

45. DIAGRAMMA AFFINE, Gthr.

46. D. GRISEUM, C. & V.

Several specimens of this fish were caught in a mountain-torrent

in Seychelles, which loses itself in a sand-bank without reaching the sea. The only direct communication between the two is after unusually heavy floods; so that it would appear that this salt-water species not only visits, but habitually lives, in fresh water.

47. *DIAGRAMMA PUNCTATISSIMUM*, sp. n. (Pl. XL.)

D. $\frac{12}{19}$. A. $\frac{3}{7}$. L. lat. 90-95.

Allied to *D. pardalis* and *D. gaterina*, but differing from these principally in the size of the scales.

Diagnosis.—Height of body thrice and two-thirds in the total length; length of head four times in the same. Diameter of eye a fourth of the length of the head. Lips thick, swollen. The upper maxillary barely reaches the vertical from the anterior nostril. Præoperculum with the posterior limb slightly inclining forwards, with a very shallow emargination in the middle, and, together with the angle, moderately denticulated. Dorsal fin rather deeply notched, the fourth and fifth spines longest; they are contained twice and a half in the length of the head, and are longer than the longest ray. The second and third anal spines are about equal in length, but the former is much the stronger; they are hardly shorter than the fourth dorsal ray. Caudal truncated. The free portion of the tail below the termination of the dorsal is less than the distance thence to the base of the caudal.

Colour.—Grey; the upper two-thirds of the head and trunk, the soft dorsal, anal, and caudal covered with rather large, crowded, blackish spots, occupying from two to five series of scales. The spinous dorsal with a broad black margin, and a series of large black spots along the middle, the largest being half the diameter of the orbit. Soft dorsal with a narrow black margin. Pectorals grey, with a red black-edged spot at the axil, one or two reddish black spots on the base, and the membrane behind the base red. Ventrals with two red spots on the base superiorly.

Length $16\frac{1}{2}$ inches.

48. *DIAGRAMMA CENTURIO*, C. & V.

49. *SCOLOPSIS FRENATUS*, C. & V.

50. *S. PHÆOPS*.

Scolopsides phæops, Bennett, Proc. Comm. Zool. Soc. i. p. 165.

Scolopsis phæops, Günth. Fish. i. p. 358.

Hab. Seychelles; Mauritius.

51. *PENTAPUS AUROLINEATUS*.

Sparus lineatus, Lacép. iv. p. 132.

Pentapus aurolineatus, Cuv. & Val. vi. pp. 269, 559, pl. 157; Günth. Fish. i. p. 381.

Hab. Seychelles; Mauritius; Molucca Sea; Louisiade archipelago.

52. APHAREUS FURCATUS.

Labrus furcatus, Lacép. iii. pp. 424, 477, pl. 21. f. 1.

Caranxamorus sacrestinus, Lacép. v. p. 682.

Aphareus caeruleus, Cuv. & Val. vi. p. 487, pl. 162 b.

A. furcatus, Günth. Fish. i. p. 386.

Creole name "Vivant au grande gueule."

Hab. Seychelles; Mauritius.

53. CÆSIO STRIATUS, Rüpp.

54. C. MACULATUS.

Cæcio maculatus, Cuv. & Val. vi. p. 439; Günth. Fish. i. p. 391.

D. $\frac{10}{16}$. A. $\frac{2}{13}$. L. lat. 65. L. transv. 7/14.

Diagnosis.—Height of body four and a half, and length of head four and two-thirds in the total length; diameter of eye thrice and four-fifths in the length of the head, and rather shorter than the interorbital space. The entire vertical fins scaly; only two anal spines.

Colour.—Deep blue above; each scale with a lighter centre, an indistinct yellow band from suprascapular, along the series of scales next but one above the lateral line. A black band along each caudal lobe. Axil black.

Length 12 inches.

SQUAMIPINNES.

55. CHÆTODON SETIFER, Bl.

56. C. ZANZIBARENSIS, Playf.

57. C. TRIFASCIATUS, Mungo Park.

58. HENIOCHUS MACROLEPIDOTUS, L.

59. HOLACANTHUS IGNATIUS, sp. n. (Pl. XLI.)

D. $\frac{13}{22}$. A. $\frac{3}{10}$. L. lat. ca. 72.

Diagnosis.—Præopercular spine smooth, shorter than the diameter of the eye. Præoperculum slightly serrated on the posterior edge, a few minute spines on the anterior portion of its lower limb. Other opercles entire. A few conspicuous denticulations on the inferior edge of præorbital. Dorsal and anal fins much produced posteriorly, extending beyond the posterior of caudal. Anal spines long, the third nearly equal to the longest of the dorsal. Caudal rounded. Scales small, very irregularly arranged, about seventy-two between upper angle of operculum and root of caudal.

Colour.—Dull yellowish; the body densely spotted with black; head and breast without such spots; a blue streak along the median line of snout; another from occiput, skirting anterior margin of orbit, to middle of lower præopercular limb. Vertical fins spotted with pale blue, and with a few undulating lines along their base.

Dorsal and anal with a narrow blue margin, the extreme points of the produced portions being yellow. Caudal with a very narrow white margin. Ventrals with a few more or less interrupted blue lines along the rays.

Length $7\frac{1}{2}$ inches. Creole name "Ignace."

MULLIDÆ.

60. *MULLUS VITTATUS*, Forsk.

61. *M. BARBERINUS*, Lacép.

62. *M. OXYCEPHALUS*, Blkr.

63. *M. LUTEUS*, C. & V.

64. *M. DISPILURUS*, Playf.

65. *M. FRATERCULUS*, C. & V.

66. *M. FLAVOLINEATUS*.

M. flavolineatus, Lacép. iii. p. 406.

Upeneus flavolineatus, Cuv. & Val. iii. p. 456; Rüpp. N. W. Fische, p. 101, t. 26. f. 1.

Mulloides flavolineatus, Bleek. Nat. Tydschr. Ned. Ind. 1852, Ceram, ii. p. 697; Günth. Fish. i. p. 403.

Hab. Seychelles; Bombay; from Red Sea to Chinese Seas.

67. *M. CYCLOSTOMA*.

M. cyclostomus, Lacép. iii. p. 404, pl. 19. f. 3 (bad).

Sciæna heptacanthus, Lacép. iv. pp. 308, 312.

Upeneus cyclostomus, Cuv. & Val. iii. p. 472; Rüpp. N.W. Fische, p. 101; Günth. Fish. i. p. 409.

Hab. Seychelles; from Red Sea, through Indian Ocean, to East-Indian archipelago.

SPARIDÆ.

68. *CANTHARUS GRANDOCULIS*, C. & V.

69. *LETHRINUS LONGIROSTRIS*, Playf.

70. ? *LETHRINUS GENIVITTATUS*.

? *Lethrinus genivittatus*, Cuv. & Val. vi. p. 306, pl. 159; Steindachner, Verhandl. zool.-bot. Ges. Wien, 1866, p. 478; Playf. in Fishes of Zanzib. p. 144.

D. $\frac{10}{9}$. A. $\frac{3}{8}$. L. lat. 50. L. transv. 5/15.

Diagnosis.—No true molars; teeth conical, moderately strong. Height of body equal to length of head, and one-fourth of the total length. Diameter of eye about one-fourth of the length of the head, and half that of the snout, which is pointed and conical. The maxillary does not nearly reach the vertical from the anterior nostril. The interspace between the eyes is about equal to their diameter.

Third dorsal spine longest, and twice and a half in the length of the head.

Colour.—Olive, each scale with a darker margin. The naked parts of the head, including the opercular margin, dark; a bright pink spot, half as large as the eye, at the angle of operculum; sometimes a small pink blotch at the root of the pectoral, and on the middle of its superior margin. Caudal with a pink posterior margin.

Length 11 inches. Creole name "L'éclair."

71. *LETHRINUS RAMAK*, Forsk.

72. *L. NEBULOSUS*, Forsk.

73. *L. STRIATUS*.

L. striatus, Steindn. Verhandl. zool.-bot. Ges. Wien, 1866, p. 479, pl. 5. f. 3; Playf. in Fishes of Zanz. p. 145.

A specimen of this species was observed at Seychelles, corresponding exactly to Dr. Steindachner's description, and very distinctly different from the specimen of *L. nebulosus* obtained at the same place. Creole name "L'éclair."

74. *L. CÆRULEUS*, C. & V.

75. *L. CROCODERUS*, C. & V.

76. *CHRYSOPHRYS SARBA*, Forsk.

77. *SPHÆRODON GRANDOCULIS*.

Sciæna grandoculis, Forsk. p. 53.

Chrysophris grandoculis, Cuv. & Val. vi. p. 134.

Sphærodon grandoculis, Rüpp. N. W. Fische, p. 113, t. 28. f. 2; Günth. Fish. i. p. 465.

Hab. Seychelles; Red Sea.

78. *CHRYSOPHRYS SARBA*, Forsk.

SCORPÆNIDÆ.

79. *SCORPÆNA POLYPRION*.

Scorpena polyprion, Bleek. Natur. Tydsch. Neder. Ind. 1849, Scleroparei, p. 21; Verhand. Batav. Gen. xxii. Bali, p. 5; *ibid.* Sclerop. p. 7; Günth. Fish. ii. p. 115.

Creole name "Laf."

Hab. Seychelles; East-Indian archipelago.

TEUTHIDIDÆ.

80. *TEUTHIS CORALLINA*, C. & V.

81. *T. SUTOR*, C. & V.

82. *T. ROSTRATA*, C. & V.

83. T. MARGARITIFERA.

Amphacanthus margaritifera, C. & V. x. p. 145.*Teuthis margaritifera*, Günth. Fish. iii. p. 317.

Diagnosis.—Height of body rather more than one-third of the total length. Caudal emarginate, the lobes pointed.

Colour.—Brown, with rather large pale blue spots, those in the middle of the sides are largest and have brown centres. Fins immaculate.

Length 11 inches. Creole name "Cordonnier."

Hab. Seychelles; East-Indian archipelago.

BERYCIDÆ.

84. MYRIPRISTIS PRALINIUS, C. & V.

85. HOLOCENTRUM RUBRUM, Forsk.

86. H. SPINIFERUM, C. & V.

87. H. DIADEMA, Lacép.

88. H. LÆVE.

H. læve, Günth. Fish. i. p. 47, pl. 6. f. B.

The specimen from Seychelles differs slightly from those in the British Museum in the formula of the fins &c.; the former has:—

D. $10\frac{1}{12}$. A. $\frac{4}{8}$. L. lat. 42. L. transv. $3/8$.

Hab. Seychelles; Louisiade archipelago; Salomon Islands; Amboyna.

89. HOLOCENTRUM CAUDIMACULATUM.

Holocentrum spiniferum, Cuv. & Val. iii. p. 206, vii. p. 498; Rüpp. Atlas, Fische, p. 86, t. 23. f. 1 (not N. W. Fische).

Holocentrus caudimaculatus, Rüpp. N. W. Fische, p. 97.

Holocentrum caudimaculatum, Günth. Fish. i. p. 41.

D. 11 | 14. A. $\frac{4}{9}$. L. lat. 40. L. transv. $3/7$.

Diagnosis.—Height of body contained thrice and a half, and length of head thrice and two-thirds in the total length; interocular space five times and a half in the length of the head. Operculum with two flat spines, the upper of which is largest. Third and fourth dorsal spines longest; the soft portion higher than the spinous, but less than half the height of body. The upper maxillary bone does not reach as far as the centre of eye. Upper caudal lobe longest, and contained five times and a third in the total length. Third anal spine much longer and stronger than the fourth. Length of snout equal to diameter of eye.

Colour.—Red, each scale with a vertical silvery crescent-shaped stripe. A large silvery spot on the back of tail, behind termination of dorsal. A dark red spot behind angle of præoperculum. Fins rosy; the points of the lobes of the spinous dorsal, the anterior mar-

gin of soft portion, the exterior margins of caudal, the membrane between the third and fourth spines of anal, and the superior margin of pectorals darker. A white red-edged spot at axil of pectorals.

Description of the specimen.—Form rather elongate. Snout long, equal to diameter of eye. The interocular space is contained five times and a half in the length of the head; the two central bony ridges distant from one another and parallel. The groove for the process of the intermaxillary bones goes as far back as the anterior third of the eye, and is equal to the length of the snout. The turbinal bone terminates in front in two spines, the upper of which is directed forward, the lower downward; it does not cover the intermaxillary. The upper maxillary bone reaches below the anterior third of the eye, the diameter of which is contained thrice and a half in the length of the head, the operculum and spine included.

All the opercles are striated and denticulated, as also are the scapular and humeral bones.

The præopercular margin is inclined forwards, terminating in a large and strong spine, longer than half the margin above it, which is coarsely denticulated. The opercular spines are broad and flat, the upper being the longer. Suboperculum entire, except on the upper third, where the striæ are produced beyond the edge. Interoperculum strongly and irregularly denticulated.

Dorsal spines moderately strong, the third and fourth longest, but shorter than the soft portion, which is less than half the height of body. First spine of anal minute; the second is one-fifth of the third; the third is very long and strong, much more so than the fourth, or than any other spine or ray in the vertical fins; it is half the height of the body, and nearly one-fifth of the total length; the fourth can be entirely hidden in the groove of the third. Superior lobe of caudal longest, and contained five times and one-third in the total length. Pectorals contained five times and two-thirds in the same, and about equal to the ventrals; the spine of the latter is two-thirds of its length; the longest ray reaches to the thirteenth scale of the lateral line, and is remote from the vent.

Scales not striated, but strongly serrated on the edge, and having numerous pores or perforations.

Length $8\frac{1}{2}$ inches.

Creole name of this and the other species of *Holocentrum* and *Myripristis*, "Lion."

Hab. Seychelles; Red Sea.

POLYNEMIDÆ.

90. POLYNEMUS SEXFILIS, C. & V.

XIPHIIDÆ.

91. HISTIOPHORUS BREVIROSTRIS, Playf.

92. II. GLADIUS.

Scomber gladius, Brouss. Mém. Acad. Sc. 1786, p. 454, pl. 10.

Istiophorus gladius, Lacép. iii. pp. 374, 375.

Xiphias ensis, Lacép. ii. p. 296.

Histiophorus indicus, Cuv. & Val. viii. p. 293, pl. 229; Cuv. Règ. Anim. III. Poiss. pl. 53. f. 1.

H. americanus, Cuv. & Val. viii. p. 303.

H. gladius, Günth. Fish. ii. p. 513.

I am indebted to Mr. Ward for the head, portion of the skin, and the entire fins of a very interesting specimen of *Histiophorus* captured at Mahé. This differs from *H. gladius* in several important points, such as the depressed shape of the rostrum, which in *H. gladius* is conical and of much greater length; nevertheless, as my specimen is so incomplete, and as there is so strong a resemblance between the two, I hesitate to describe this as a new species. The following is a description of the specimen:—

D. 42 | 7. A. 11 | 6. V. 1. P. 18.

The first three dorsal spines short and closely united to the fourth, which is roughly granulated and considerably longer than the produced portion of the rostrum; the next seven spines do not differ greatly in length; the fifteenth to the thirty-sixth are much produced, the longest being longer than the length of the head; the last six are short, the longest being less than half the diameter of orbit. Second dorsal fin emarginate above; the first and last rays longest, and longer than any of the spines after the thirty-sixth. Second anal similar to second dorsal; the first is more elevated, the longest spine being one-half the length of the fourth of the dorsal. The ventral consists of a single ray, its length is equal to the distance from the centre of orbit to end of snout. Pectorals much shorter, about half as long as head. Two conspicuous keels on each side of base of caudal. The caudal lobes are about one-fourth of the total length, measured from end of snout to fork of caudal.

The upper profile of head descends nearly in a straight line; *upper jaw depressed, much broader than deep*. The distance from the end of snout to posterior margin of orbit is about two-thirds of the length of the entire head. *The produced portion of rostrum about equal to the distance from the extremity of the mandible to the posterior limb of the præoperculum.*

Dermal productions numerous, lanceolate, hidden in the skin.

Membranes of first dorsal fin with numerous round light spots.

Creole name "L'empereur."

	ft.	in.
Total length, to fork of caudal	7	8
Length of head	2	9
—— of produced part of upper jaw	1	2
—— of upper jaw from angle of mouth	2	2
—— of pectorals	1	0
—— of ventrals	2	0
Greatest height of dorsal	3	0
Length of caudal lobes	1	9

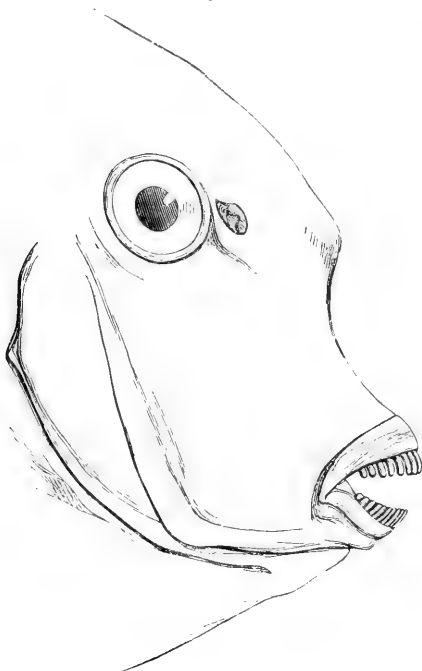
ACRONURIDÆ.

93. ACANTHURUS TRIOSTEGUS, L.

94. A. MATOIDES, C. & V. (Fig. 1.)

A remarkable specimen of this fish was obtained at Seychelles, with a very protruding profile, approaching that of *Naseus*; in other respects it is identical with the specimens formerly observed on the east coast of Africa.

Fig. 1.

*Acanthurus matoides.*

95. A. VELIFER, Bl.

96. NASEUS BREVIROSTRIS, C. & V.

CARANGIDÆ.

97. CARANX CRUMENOPHTHALMUS.

Scomber crumenophthalmus, Bl. t. 343.

Caranx crumenophthalmus, Cuv. & Val. ix. p. 62; Günth. Fish. ii. p. 429.

C. plumieri, Cuv. & Val. ix. p. 65.

C. mauritanus, Quoy & Gaim. Voy. Freyc. Zool. p. 359.

C. macrophthalmus, Rüpp. Atlas, Fische, p. 97, t. 25. f. 4.

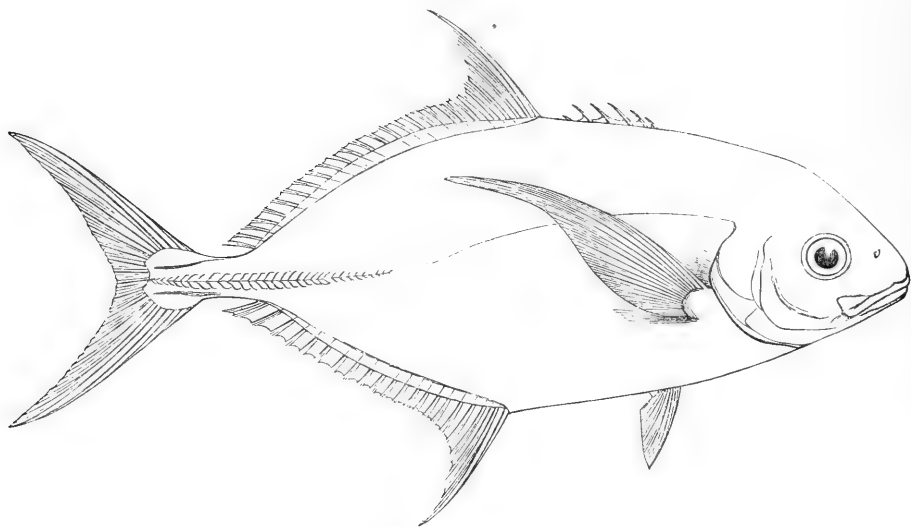
Hab. Seychelles; Mauritius; Red Sea; Indian Ocean; Polynesia; west coast of Africa; Atlantic coasts of Tropical America.

98. *CARANX VENATOR*, sp. n. (Fig. 2.)

D. $7 \frac{1}{27-29}$. A. $0-1 \frac{1}{21-24}$. L. lat. 39.

Diagnosis.—First dorsal little developed, the spines feeble and hardly connected together by membranes. Anal with sometimes one, generally no free spine. Teeth in both jaws in a single series without canines; teeth on vomer, palatine bones, and tongue. Height of body contained thrice and a third in the total length; length of head four times and three-quarters in the same. Breast naked. Lateral line slightly bent, becoming straight in the vertical from middle of soft dorsal. Plates strong, occupying nearly the whole of the straight portion. Snout subtruncated, lower jaw not prominent. Maxillary reaches the vertical from anterior margin of orbit.

Fig. 2.



Caranx venator.

Colour.—White, bluish above, with a few small yellow spots scattered over the body. No opercular spot. Posterior margin of caudal blackish. During life there are several broad transverse bands on the side, as in *C. speciosus*; but these invariably disappear after death.

Description of specimen.—Body compressed, elliptical; the upper profile of the head much more curved than the lower one (in which respect it differs from *C. helvolus*). The greatest depth is between the origin of the soft dorsal and anal fins, where it is contained thrice

and a third in the total length. Head longer than high, its length contained four times and three-quarters in the same. Eye moderately large, its diameter contained once and a half in the length of the snout, which is obtuse. Lower jaw not prominent; cleft of mouth slightly oblique, low down in snout. Maxillary reaches to, or slightly beyond, the vertical from front margin of orbit. The interorbital space is equal to the length of the snout. Diameter of the eye contained four times and a half in the length of the head; no adipose eyelid. Teeth in both jaws in a single series, without canines; those on the vomer in a rather large tetrahedral patch, those on the palatines and tongue in elongated bands.

The first dorsal is little developed, the spines feeble, and hardly connected together by membranes; its origin is nearer to the roots than to the points of the ventral fins. The origin of the second dorsal is nearer to the snout than to the fork of caudal; its anterior rays, as well as those of anal, produced (in this also it differs from *C. helvolus*). Caudal deeply forked; the lobes are equal, their length contained four times and a half in the total length; a keel on each side of its base. Soft anal similar to soft dorsal. Ventrals inserted behind the pectorals, and reaching a little beyond vent; their length is contained thrice and a half in that of the pectorals, which are long, falciform, and extend to the seventeenth dorsal ray.

Scales small, breast naked. Lateral line slightly arched, becoming straight below the sixteenth dorsal ray; the straight portion is armed with about thirty-nine spiniferous plates, those on the free portion of the tail being very strong and well developed.

Length 16 inches. Creole name "Carangue chasseur."

99. *CARANX HASSELTII*, Blkr.

100. *C. XANTHURUS*, K. & v. H.

101. *C. VOMERINUS*, Playf.

102. *C. MALABARICUS*, Schn.

103. *C. BAJAD*, Forsk.

104. *C. FULVOGUTTATUS*, Forsk.

105. *C. SPECIOSUS*, Forsk.

106. *C. RÜPPELLII*, Gthr.

107. *C. MELAMPYGUS*, C. & V.

108. *C. SANSUN*.

Scomber sansun, Forsk. p. 56; Russell, ii. p. 33, pl. 144.

Caranx sansun, Rüpp. Atlas, Fische, p. 101; N. W. Fische, p. 48, t. 13. f. 3; Günth. Fish. ii. p. 447.

Hab. Seychelles; Mauritius; Red Sea; coast of India.

109. *C. ARMATUS*, Forsk.

110. *SERIOLICHTHYS BIPINNULATUS*, Q. & G.111. *CHORINEMUS TOLOO*.

Toloo-parah, Russell, ii. p. 29, pl. 137.

Lichia tolooo-parah, Rüpp. Atlas, Fische, p. 91.

Chorinemus tolooo, Cuv. & Val. viii. p. 377; Günth. Fish. ii. p. 473.

Hab. Seychelles; Red Sea to Indian Ocean.

112. *TRACHYNOTUS OVATUS*, L.113. *T. BAILLONII*, Lacép.114. *PLATAX VESPERTILIO*, Bl.115. *P. TEIRA*, Forsk.116. *P. ORBICULARIS*.

Chaetodon orbicularis, Forsk. p. 59.

C. pentacanthus, Lacép. iv. p. 454, pl. 9. f. 2.

Platax orbicularis, Cuv. & Val. vii. p. 232; Rüpp. Atlas, Fische, p. 67, t. 18. f. 3; Günth. Fish. ii. p. 490.

P. pentacanthus, Cuv. & Val. vii. p. 235.

Creole name of all the species of *Platax* "Poule d'or."

Hab. Seychelles; Red Sea; East-Indian archipelago; north-west coast of Australia.

117. *EQUULA FASCIATA*.

Equula fasciata, Russell, i. p. 51, pl. 66.

Clupea fasciata, Lacép. v. p. 463.

Equula filigera, *longispinis*, *carak*, et *fasciata*, Cuv. & Val. x. pp. 92-97, pl. 84.

E. fasciata, Günth. Fish. ii. p. 498.

Hab. Seychelles; Red Sea; Indian Ocean and Archipelago.

118. *GAZZA MINUTA*, Bl.

CORYPHÆNIDÆ.

119. *CORYPHÆNA HIPPURUS*, L.

SCOMBRIDÆ.

120. *SCOMBER MICROLEPIDOTUS*, Rüpp.121. *THYNNUS THUNNINA*, C. & V.122. *ECHENEIS NAUCRATES*, L.

TRACHINIDÆ.

123. *SILLAGO SIHAMA*, Forsk.

PEDICULATI.

124. *ANTENNARIUS MARMORATUS*, Gthr.

125. A. MULTIOCELLATUS.

Chironectes multiocellatus, Cuv. & Val. xii. p. 420.

Antennarius leucosoma, Bleek. Nat. Tydschr. Ned. Ind. 1854, Floris, p. 328.

Chironectes leprosus, Eyd. & Soul. Voy. Bonite, Zool. i. p. 187.

Antennarius multiocellatus, Günth. Fish. iii. p. 194.

Var. *a*. D. 3 | 13. A. 7. P. 10.

Colour.—Blackish, marbled with lighter and with red; the upper part of the body with numerous large black ocelli, the lower part thickly covered with small black spots. Four large black ocelli along the edge of the soft dorsal, two on anal, and four on caudal.

Length 5 inches.

Var. *b*. D. 3 | 12. A. 6. P. 10.

Colour.—Whitish, dotted all over with blackish, especially on the belly; three or four large spots on the sides, one at the base of the third dorsal spine, three along the margin, and two along the base of anal, and three arranged as a triangle on the caudal.

Length 4 inches.

Hab. Seychelles; Caribbean Seas; East-Indian archipelago; Sandwich Islands.

GOBIIDÆ.

126. G. GobiUS ORNATUS.

Gobius ornatus, Rüpp. Atlas, Fische, p. 135; N.W. Fische, p. 137; Günth. Fish. iii. p. 21.

G. ventralis (Ehrenb.), Cuv. & Val. xii. p. 113.

G. interstinctus, Richards. Voy. Ereb. & Terr. Fish. p. 3, pl. 5. f. 3-6.

Hab. Seychelles; Red Sea; East-Indian archipelago; Philippine Islands; north-west coast of Australia.

127. *G. CANINUS*, C. & V.

128. *PERIOPHTHALMUS KOELREUTERI*, C. & V.

129. *ELEOTRIS OPHIOCEPHALUS*, K. & v. H.

130. *E. FUSCA*, Schu.

131. *E. SOARESII*, Playf.

132. *E. CYANOSTIGMA*.

? *Eleotris cyanostigma*, Bleek. Natur. Tydschr. Nederl. Ind. 1855, Kokos, iv. p. 452; Günth. Fish. iii. p. 119.

? *Eleotriodes cyanostigma*, Bleek. Enum. Sp. p. 112.

D. $6\frac{1}{10}$. A. $\frac{1}{9}$. L. lat. 26-28.

Diagnosis.—The third dorsal spine produced into a filament. Nine series of scales between the root of posterior dorsal and anal.

Head scaly, with the exception of the snout. Body compressed. Height of body equal to length of head, and a quarter of the total length. Eyes close together, the diameter of one of them being longer than the snout, and one-third of the length of the head. Jaws equal; the maxillary hardly extends beyond the anterior margin of the eye. Teeth in villiform bands, those in the outer series being enlarged. No canines in the lower jaw. Scales ctenoid.

Colour.—Greenish, marbled and spotted with darker and lighter, each scale with a silvery dot. Vertical fins brownish; the second dorsal, anal, and caudal with silvery spots.

Length $1\frac{1}{2}$ inch.

Hab. Seychelles; East-Indian archipelago.

BLENNIIDÆ.

133. *SALARIAS VERMICULATUS*, C. & V.

134. *S. FASCIATUS*, Bl.

SPHYRÆNIDÆ.

135. *SPHYRÆNA JELLO*, Russ.

136. *S. COMMERSIONII*.

S. commersonii, Cuv. & Val. iii. p. 352; Günth. Fish. ii. p. 338.

Hab. Seychelles; Mauritius; East-Indian Ocean.

ATHERINIDÆ.

137. *ATHERINA PINGUIS*.

Atherina pinguis, Lacép. v. p. 372, pl. 11. f. 1; Bleek. Act. Soc. Sc. Indo-Neerl. viii. Sumatra, viii. p. 24; Günth. Fish. iii. p. 399.

A. affinis, Benn. Proc. Comm. Zool. Soc. i. 1831, p. 166.

A. pectoralis, Cuv. & Val. x. p. 447.

Hab. Seychelles; east coast of Africa; Bombay; coast of Australia.

138. *A. AFRA*.

A. afra, Peters in Wieg. Arch. 1855, p. 244; Günth. Fish. iii. p. 378.

Hab. Seychelles; Mozambique.

MUGILIDÆ.

139. *MUGIL AXILLARIS*.

? *Mugil axillaris*, Cuv. & Val. xi. p. 131.

Mugil axillaris, Bleek. Natur. Tydsch. Ned. Ind. iv. 1853, p. 266; Act. Soc. Sc. Indo-Neerl. viii. Sumatra, ix. p. 3; Günth. Fish. iii. p. 444.

M. parsia, Bleek. Natur. Tydsch. Ned. Ind. iii. 1852, p. 166.

Hab. Seychelles; Mauritius; East-Indian archipelago.

140. *M. CÆRULEO-MACULATUS*, Lacép.

141. *M. TROSCHELII*.

M. troschelii, Bleek. Nat. Tydschr. Ned. Ind. xvi. p. 277; Act. Soc. Sc. Indo-Neerl. vi. Sumatra, viii. p. 80; Günth. Fish. iii. p. 448.
Hab. Seychelles; Ceylon; East-Indian archipelago.

FISTULARIIDÆ.

142. *FISTULARIA SERRATA*, Bl.

CENTRISCIDÆ.

143. *AMPHISILE PUNCTULATA*, Bianc.

LABYRINTHICI.

144. *OSPHROMENUS OLFA*, Commers.

PHARYNGOGNATHI.

POMACENTRIDÆ.

145. *POMACENTRUS BANKANENSIS*, Blkr.

146. *GLYPHIDODON CÆLESTINUS*, Soland.

147. *G. SEPTEMFASCIATUS*.

G. septemfasciatus, Cuv. & Val. v. p. 463; Günth. Fish. iv. p. 40.

The specimens obtained at Seychelles do not materially differ from those previously described, except in the great width of the interorbital space, which is once and a half the diameter of the eye. Length 8 inches.

148. *G. SORDIDUS*, Forsk.

149. *HELIASTES CINCTUS*, sp. n.

D. $\frac{13}{13}$. A. $\frac{2}{13}$. L. lat. 29. L. transv. $\frac{2}{8}$.

Diagnosis.—Height of body contained twice and a half in the total length, or twice in that without caudal; the length of the head is contained four times and two-thirds in the former, or thrice and three-fifths in the latter. Teeth in the jaws in a single series, with an outer series of larger ones in the front of the lower jaw. Width of præorbital more than half the diameter of the eye. Breadth of interorbital space equal to the diameter of the orbit. Posterior limb of præoperculum straight, not emarginate; the cheek-scales are in three series, and do not cover the præopercular margin. Præorbital naked. Spines of dorsal slender, the middle being slightly longer than the posterior ones; they decrease gradually in length from the seventh to the first; the soft portion is higher than long; one of the longest rays is more than once and two-thirds the length of the longest spine.

Caudal forked, with the lobes rounded. Second anal spine longer than any of the dorsal.

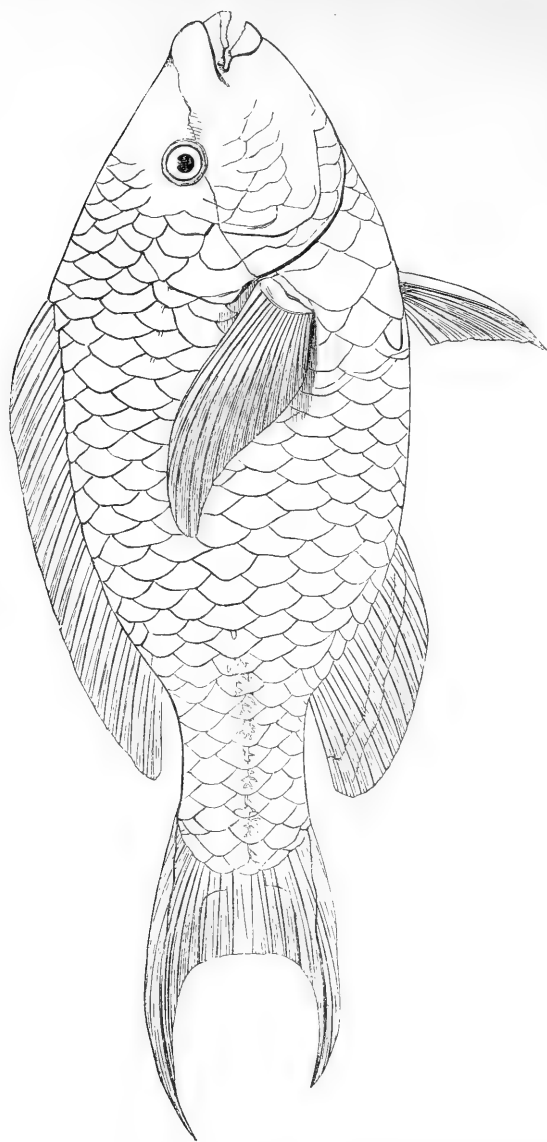
Colour.—Dark violet, with a yellowish transverse band crossing the body below the fifth and sixth dorsal spines, its breadth is equal to that of two lateral series of scales; in immature specimens (1 inch long) it crosses the entire body; in adults (3·9 inches) it extends over the upper two-thirds of its height. Dorsal fin yellowish, with a black margin; a black white-edged ocellus on the base posteriorly, extending on to the top of the tail; and in immature specimens a large similarly coloured ocellus on the last spines, extending slightly on the body. Caudal yellowish, with a brighter cross band near the base. Anal and ventrals blackish. Pectorals yellow, with a small spot on axil.

LABRIDÆ.

150. CHEILINUS TRILOBATUS, Lacép.
 151. C. PUNCTATUS, Benn.
 152. C. FASCIATUS, Bl.
 153. EPIBULUS INSIDIATOR, Pall.
 154. STETHOJULIS STRIGIVENTER, Benn.
 155. JULIS LUNARIS, L.
 156. J. TRILOBATA, Lacép.
 157. CORIS CUVIERI, Benn.
 158. C. FORMOSA, Benn.
 159. C. ANNULATA, Lacép.
 160. SCARICHTHYS AURITUS, K. & v. H.
 161. S. CÆRULEOPUNCTATUS, Rüpp.
 162. CALLYODON VIRIDESCENS, Rüpp.
 163. PSEUDOSCARUS HARID, Forsk.
 164. P. MACULOSUS, Lacép.
 165. P. DUSSUMIERI, C. & V.
 166. P. NUCHIPUNCTATUS, C. & V.
 167. P. CYANOGNATHUS, Blkr.
 168. P. FALCIPINNIS, sp. n. (Fig. 3, p. 866.)
- D. $\frac{9}{10}$. A. $\frac{3}{9}$. P. 14.

Closely allied to *P. janthochir*, but differing from it in coloration and in the shape of the pectoral fin, which, in this species, is falci-

Fig. 3.

*Pseudoscarus falcipinnis.*

form, with the point rounded, and unusually long, reaching to the origin of the anal.

Diagnosis.—Jaws green, rather strong, with a posterior conical tooth in the upper jaw. Lips broad, covering more than half of the

upper jaw. Forehead straight. Two series of scales on the cheek, with a single one below, the lower præopercular limb being entirely naked. Caudal with the lobes much produced. Pectorals long, reaching to anal, falciform, with the point rounded.

Colour.—General colour of the body dirty green, each scale with a brownish margin. A broad green patch on the head below the eye, continued as a band across the snout, above the upper lip and below the lower one, leaving the lips and an irregular spot on each side of the symphysis of the lower jaw of a dirty fawn-colour; it is also continued as a patch on the body, between the roots of the pectorals and ventrals, and as a series of spots from the latter to the origin of the anal. Dorsal blue, with vertical yellowish bars on the membranes. Anal bluish green, with a narrow, wavy, yellowish median band. Caudal green, with a broad yellowish band along each lobe. Ventrals with a similar band parallel to the first ray.

Length 19 inches.

169. *GERRES LINEOLATUS*, Gthr.

170. *G. ARGYREUS*, Forst.

Sciæna argyrea, Forster.

Gerres waigiensis, Quoy & Gaim. Voy. Freyc. Zool. p. 292.

G. argyreus, Cuv. & Val. vi. p. 478; Günth. Fish. iv. p. 263.

The specimens from Seychelles have the second dorsal spine two-thirds of the height of the body. Creole name "Beau temps."

Hab. Seychelles; Mozambique; Red Sea; East-Indian archipelago; Port Jackson.

171. *G. POETI*, C. & V.

PLEURONECTIDÆ.

172. *RHOMBOIDICHTHYS PANTHERINUS*, Rüpp.

173. *PLAGUSIA MARMORATA*, Blkr.

PHYSOSTOMI.

SILURIDÆ.

174. *PLOTOSUS ANGUILLARIS*, Bl.

SCOMBERESOCIDÆ.

175. *BELONE ANNULATA*.

Belone annulata, Russell, pl. 175; Cuv. & Val. xviii. p. 447, pl. 550; Cant. Mal. Fish. p. 244; Günth. Fish. vi. p. 240.

Hab. Seychelles; Indian Ocean; Friendly Islands.

176. *HEMIRAMPHUS DUSSUMIERI*, C. & V.

177. *H. GEORGII*, C. & V.

178. *H. DISPAR.*

H. dispar, Cuv. & Val. xix. p. 58, pl. 558; Bleek. Natur. Tydsch. Ned. Ind. vi. p. 498; Günth. Fish. vi. p. 274.

Zenarchopterus dispar, Bleek. Nat. Tydsch. Ned. Ind. iii. p. 164.
Creole name "Aiguille."

Hab. Fresh waters of Seychelles; East Indies.

179. *EXOCETUS EVOLANS*, L.180. *E. SOLANDRI*, C. & V.181. *E. AFFINIS.*

E. affinis, Günth. Fish. vi. p. 288.

Hab. East coast of Africa, between Cape Guardafui and Seychelles; Atlantic.

CYPRINODONTIDÆ.

182. *HAPLOCHILUS PLAYFAIRII*, Gthr.

CLUPEOSOCIDÆ.

183. *BUTYRINUS GLOSSODONTIS*, Forsk.

GONORHYNCHIDÆ.

184. *LUTODEIRA CHANOS*, Forsk.185. *L. CHLOROPTERUS.*

L. chloropterus, Russell, pl.

Chanos chloropterus, Cuv. & Val. xix. p. 195.

Russell states that this fish is found only in water entirely fresh, and never in that which is even brackish. Valenciennes observes, "Cette observation se rapporte à celle faite aux Séchelles sur une autre espèce donnée par M. Dussumier."

I have observed two species of this genus in considerable numbers at Seychelles, but never in fresh water. They are generally captured in drawing the seine on the sandy beaches of the various islands, and sometimes in bays which receive the small mountain-streams, which are the only fresh water found there.

CLUPEIDÆ.

186. *ALOSA VENENOSA*, C. & V.187. *ENGRAULIS BOELAMA*, Forsk.

ANGUILLIDÆ.

188. *ANGUILLA AMBLODON*, Gthr.

MURÆNIDÆ.

189. *MURÆNA CHLOROSTIGMA*, Kp.190. *M. NUBILA*, Richards.

191. *M. VARIEGATA.*

M. variegata, Forster, Des. An. p. 181 ; Rich. Zool. Ereb. & Terr. Fish. p. 94, t. 47. f. 11-16.

M. ophis, Rüpp. Atlas, Fische, p. 116, t. 29. f. 2.

Pæcilophis variegata, Kaup, Cat. Ap. Fish. p. 98, t. 13. f. 6, 7.

Echidna variegata, Bleek. Atl. Ichth. Muræn. p. 80, t. 168. f. 2.

Hab. Seychelles ; Indian Ocean.

PLECTOGNATHI.

OSTRACIONIDÆ.

192. *OSTRACION ARCUS*, Schn.

GYMNODONTIDÆ.

193. *DIODON RETICULATUS*, Will.194. *TETRODON ARGENTEUS*, Lacép.195. *T. LATERNA*, Richards.196. *T. STELLATUS*, Lacép.197. *T. IMMACULATUS*, Lacép.

BALISTIDÆ.

198. *BALISTES NIGER*, Osbeck.199. *ALEUTERES SCRIPTUS*, Osbeck.

LOPHOBRANCHII.

200. *SYNGNATHUS FASCIATUS*, Gray.201. *S. BIACULEATUS*, Bl.

CHONDROPTERYGII.

202. *CARCHARIUS ACUTUS.*

Carcharius acutus, Rüpp. N. W. Fische, p. 65, pl. 18. f. 4 ; Müll. & Henle, Plag. p. 29 ; Cant. Mal. Fish. p. 399 ; Dum. Hist. Poiss. i. p. 345.

Snout pointed, the distance between its extremity and the nostrils equals two-thirds of the distance of the latter from the angles of the mouth. The first dorsal nearer to the pectorals than to the ventrals ; the posterior edge of the former emarginate, their breadth is two-thirds of their length. Base of anal about once and a half the length of that of second dorsal. Distance between caudal and anal double the length of the base of the latter. Caudal low, the superior lobe very obliquely cut at the free extremity, which has a cutaneous fold.
—*A. Dum.*

Creole name "Requin."

Hab. Seychelles ; Indian Ocean ; China ; Brazil.

203. *CARCHARIUS BLEEKERI*.

Carcharius (Prionodon) bleekeri, Dum. Hist. Poiss. i. p. 367.

Præocular portion of snout a little less than the width of the interocular space. Nostrils equidistant between the point of the snout and the anterior of the mouth. Teeth different in each jaw; those in the upper jaw are oblique, with a reentering angle on the exterior side, and are denticulated both on the point and base; those in the lower jaw are straighter and more finely denticulated. The first dorsal commences a short distance behind the interior angle of pectorals, and is more than four times as high as the second, which is situated immediately above the anal, and, like it, has the posterior angle much prolonged. Caudal one-fourth of the total length; its upper lobe is twice the length of the lower one. The extremity of the pectorals, particularly underneath, the superior angle of the second dorsal, but not the first, and the angle of the inferior lobe of caudal are marked with deep black.—*A. Dum.*

Length 3' 10".

Hab. Seychelles; Pondicherry.

Two typical specimens of this species exist in the Paris Museum; length respectively 1^m·31 and 0^m·78.

204. *ZYGÆNA MALLEUS*, Shaw.

Creole name "Marteau."

205. *TRIENODON OBESUS*.

Squalus obesus, Rüpp. N. W. Fische, p. 64, pl. 18. f. 2.

Trienodon obesus, Müll. & Henle, Plag. p. 55, pl. 20; Dum. Hist. Poiss. i. p. 386.

Snout short, rounded. Nostrils equidistant between the anterior edge of the mouth, which is broader than high, and the extremity of the snout. They have a transverse valvule, small, and without cirrus. Teeth with an elongated median point, and with one or two toothlets on each side of the base; some have a double toothlet on the inner side. First dorsal nearer the ventrals than the pectorals. Anal opposite, and nearly equal to the second dorsal. A semicircular groove at the top of the root of the caudal. Lower caudal lobe about half as long as the upper.

General colour grey; the superior angle of both dorsals and the points of both caudal lobes of a milky white.—*A. Dum.*

Creole name "L'endormi."

Hab. Seychelles; Red Sea.

206. *GALEOCERDO TIGRINUS*.

Galeocерdo tigrinus, Müll. & Henle, Plag. p. 59, pl. 23; Dum. Hist. Poiss. i. p. 393.

Snout flat, rounded, and rather short. Nostrils lateral, equidistant between the extremity of the snout and the anterior of the mouth. Circular spout-holes behind the eyes. Median tooth of

both jaws smooth at the point, denticulated at the base; the others strongly denticulated along the entire edge. First dorsal much nearer the pectorals than the ventrals; the base of the second once and a half as long as that of the anal. Lower caudal lobe short, hardly a third of the length of the upper one.

Colour yellowish grey, darker superiorly, marked with spots and vertical bands of a darker colour on the back, sides, and tail; on the last they are rounded.—*A. Dum.*

Creole name "Damoiselle."

Hab. Seychelles; Indian Ocean.

207. RHYNCHOBATUS LÆVIS.

Raja djeddensis, Forsk. p. 18. no. 17.

Rhinobatus lævis, Bl. Schn. p. 354, pl. 71; Russell, pl. 10.

R. djeddensis, Rüpp. Atlas, Fische, p. 54, t. 14. f. 1.

Rhynchobatus lævis, Müll. & Henle, Plag. p. 111; Dum. Hist. Poiss. i. p. 433.

Snout long, pointed. Nostril very oblique, the interior angle almost reaching the anterior margin of mouth; their length is one-fourth more than the space between them, and three times that between their external angle and the edge of the disk. The pectorals have their exterior angles almost right ones. The superior lobe of the caudal is a third longer than the inferior one.

The colour varies with age. Young examples have a yellowish-olive ground and a small brown spot on each side of the end of the snout; a band of the same colour on the edge of the eyelid; a large brown spot surrounded with small ones on the root of each pectoral; white spots on the rest of the body, those on the flanks being sometimes disposed in bands. In mature specimens these markings disappear, and the fish assumes a uniform brown colour.—*A. Dum.*

Creole name "Violon."

Hab. Seychelles; Red Sea; Indian Ocean.

208. UROGYMNUS ASPERRIMUS.

Raja asperrima, Bl. Schn. p. 367. no. 24.

Urogymnus asperrimus, Müll. & Henle, Wieg. Arch. 1837, p. 400, 434; Dum. Hist. Poiss. i. p. 580.

Anacanthus asperrimus, Müll. & Henle, Plag. p. 157, pl. 60.

Disk ovate, rhomboidal, almost as broad as long, the exterior and posterior angles rounded. Snout slightly prominent; its length in front of eyes is equal to the interorbital space. Tail hardly longer than the disk, having a groove on its lower side containing a cutaneous fold.

The middle of the upper surface from the interorbital space to the tail, and for more than one-third of its breadth, covered with a mosaic of tubercles closely set together, between which rise here and there spines with stellated bases, the branches of which, frequently divided, surround several of the adjacent tubercles. On the remainder of the disk there are scattered pointed tubercles, often as

large as the others, but with a circular or oval base. Underside smooth.

Colour above yellowish green; below white.—*A. Dum.*

Hab. Seychelles; Indian Ocean.

209. TRYGON UARNAK, Forsk.

The specimen obtained at Seychelles differed only from that found at Zanzibar in having much smaller tubercles on the median region of the back, and in having the upper surface immaculate.

210. HYPOLOPHUS SEPHEN.

Raja sephen, Forsk. p. 17; Russell, i. p. 2, pl. 3.

Trygon sephen, Rüpp. Atlas, Fische, p. 52.

T. forskalii, Rüpp. ib. p. 53, pl. 13. f. 2.

Hypolophus sephen, Müll. & Henle, Plag. p. 170; Dum. Hist. Poiss. i. p. 616.

Disk rhomboidal, broader than long, the edge almost straight or slightly convex; angles rounded, except the anterior, which is very obtuse. Ventrals united on the median line; the anterior angle rounded, the exterior one sharp. Tail about twice and a half as long as disk, depressed as far as the spine, below which commences a cutaneous fold, which occupies about a third of the lower edge. Superior median region from head to tail covered with scales closely placed together. On the middle of the scapular region there are three tubercles much larger than the others.

Colour above of a reddish brown, except the scaly portion, which is leaden grey. Lower parts light; caudal fin dark.—*A. Dum.*

Hab. Seychelles; Red Sea; Indian Ocean.

211. ÆTOBATIS NARINARI.

Narinari brasiliensis, Marcgrav, Hist. ver. Natur. Brasil. in Piso Hist. Nat. Brasil. pp. 175, 176.

Raja quinqueaculeata, Quoy & Gaim. Voy. Freyc. p. 200, pl. 43. f. 3.

Eel tenkee, Russell, i. pl. 18.

Myobatis celtenkee, Rüpp. N. W. Fische, p. 70, pl. 19. f. 3 (teeth)

Stoasodon narinari, Cant. Mal. Fish. p. 1416.

Ætobatis narinari, Müll. & Henle, Plag. p. 179; Dum. Hist. Poiss. i. p. 641.

Disk twice as broad as long, the anterior edges a little convex, the posterior ones concave. Anterior angle pointed, posterior one rounded. Snout with an obtuse prominence, broader than long. Lobes of nasal valvule broad, rounded and toothed on their free edges. Dental plate on lower jaw curved, prominent. Caudal fin commencing on the level of the extremity of the insertion of the ventrals. Tail three or four times the length of disk.

Colour brown, with round white spots edged with black distributed irregularly over the back. Lower side white.

Hab. Seychelles; Brazil; Red Sea; Indian Ocean.

7. Note on the *Nymphalis caledonia* of Hewitson.

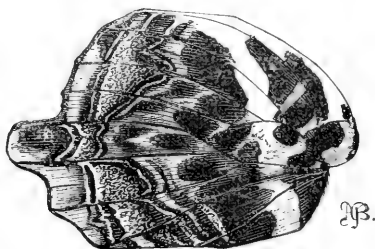
By ARTHUR G. BUTLER, F.Z.S.

In the first part of his 'Exotic Butterflies' (p. 86, pl. 43. f. 3, 4) Mr. Hewitson has described and figured a new Butterfly under the name of *Nymphalis caledonia* (incorrectly printed *calydonia*). It is one of the most beautiful of the species of *Nymphalidae*, and has until quite recently been unique in the collection of Mr. A. R. Wallace.

Mr. Hewitson says of this insect, "This glorious butterfly is beyond description. Both of the posterior wings are so much injured that I have had to imagine part of the outer margin, but have little doubt that, if we ever have the good fortune to see a perfect example, it will prove to be of nearly the same form as *N. berenice* of Drury."

As it has fallen to my lot to see the second specimen of this beautiful species in the collection of Lieutenant H. Roberts, I have asked his permission to figure the hind wing; he has kindly conceded to my wishes, and I am thus enabled to give a correct drawing of the outline*.

The hind wings of *N. caledonia* are certainly somewhat similar to those of the female of *N. berenice*; they, however, more nearly resemble those of *Prothoë francki* (*Nymphalis franck* of Godart): moreover the markings and general colouring of the underside appear to be a modification of the markings and colouring of that species; therefore, though *N. berenice* and *N. caledonia* have hitherto been looked upon as species of *Charaxes* (*Nymphalis* of Westwood), and are as such included in my monograph of that genus†, I should recommend that they be henceforth referred to the genus *Prothoë*, the great size of the thorax being the only character that I can discover to warrant their admission into the genus *Charaxes*.

Hind wing of *Nymphalis caledonia*.

The synonymy of *N. caledonia* must therefore stand as follows:—

PROTHOË CALEDONIA.

Nymphalis calydonia (misprint), Hewitson, Exot. Butterf. i. p. 86, pl. 43. f. 3, 4 (1855).

* Since writing the above a third specimen has arrived from Labuan (Borneo). It is now in the collection of Mr. Hewitson.

† P. Z. S. 1865, pp. 637, 638.

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Charaxes calydonia, Butler, P. Z. S. 1865, p. 638.

Hab. Malacca (*Colls. Wallace, Roberts, and Hewitson*).

The specimen of this butterfly lent to me by Mr. Roberts differs from that figured by Mr. Hewitson in its greater size, and in having the upperside of the hind wing more suffused with greenish: on the underside the markings are slightly different, the basal red bands being broader, the central band whiter, the discal red band narrower, darker, and rather more irregular, the submarginal green band duller, and the blue lunulate line more irregular and not so deeply margined with black; the large black caudal spot is, of course, wanting in the original figure.

8. Additional Observations on the Species of Cats (*Felidæ*)
in the British Museum. By Dr. J. E. GRAY, F.R.S.,
V.P.Z.S., F.L.S., &c.

The following memoranda were accidentally omitted from my former paper on the Cats in the British Museum (see P. Z. S. 1867, p. 258).

To the species of the restricted genus *Felis* mentioned in the former paper I may add the Manul (*Felis manul* of Pallas). This was regarded as a new species by Mr. Hodgson under the name of *Felis nigropectus*, and is beautifully illustrated in the drawing of his Nepalese animal in the British Museum. In the British Museum also is a fine specimen of this Cat, presented by Mr. Hodgson, under the latter name. It has many characters in common with the other wild species of the restricted genus *Felis*; but it is at once known by its very long, soft hair, the pale whitish colour only varied by a slight black wash on the upper part of the legs and the black on the chest. Fischer, who only worked from books, considers it a variety of *Felis domestica*; but it is a very distinct and well-marked species.

The Wild Cat of Europe (*Felis catus*) is distinct from the African and Asiatic species of the restricted genus *Felis* in the British Museum. It is at once known by its thick cylindrical truncated tail; but it is so well known, and has been so often described, that I need not add any further observations respecting it. It is said that it breeds with the domestic Cat, and that the skull of the hybrid, as well as the coloration of the fur, is more or less modified by the interbreeding.

Having confidence in the declaration of M. F. Cuvier, that the skins he had received from Malabar were exactly like those of the animal named by M. Geoffroy in the Museum Catalogue *F. chaus* which came from Egypt, and with those that M. F. Cuvier figured and described under the same name that were received from North Africa, and also in Mr. Edward Blyth's observation (see P. Z. S. 1863, p. 181), that "the Egyptian specimen (of *F. chaus*) now living in the Society's Gardens is absolutely similar to the common animal of Bengal," I was misled and adopted their conclusion.

These authors must have examined their specimens very cursorily, and cannot have paid any attention to the length of the tail and the distribution of the bands when present. It will be seen by my preceding observations, founded on the examination of the specimens in the British Museum received from all parts of Africa—from Tunis and Egypt in the north, Abyssinia in the east, and the Cape of Good Hope in the south, that these Cats are all of one species, and of a species easily distinguished from the *Chaus* of Asia by the greater length and development of the tail.

Of the genus *Chaus* (as defined by the shortness of the tail), which appears to be confined to Asia, there are what I am inclined to regard as three distinct species in the Museum Collection.

The largest species is the animal that I figured in the 'Illustrations of Indian Zoology' under the name of *Felis affinis*, having convinced myself that it was a distinct species years ago, when I was studying the animals of India from the Hardwicke Collection of Drawings. I have little doubt that this is the Cat described and figured by Pallas in the 'Zoographia Rosso-Asiatica,' t. 2, under the name of *Felis catolynx*. It is certainly the *Lyncus erythrotis* of Hodgson, whose drawings for his 'Nepal Fauna' contain several good figures of it. It may be the *Felis kutas* of Pearson. It inhabits, according to Mr. Hodgson, the central and lower regions of Nepal. There is a well-stuffed adult specimen of this Cat in the British Museum; it is a magnificent animal.

It is known by the bright yellow colour of the fur, without any, or with only very indistinct, indications of darker streaks across the body, which, when present, are only to be seen when the body is looked at at certain angles.

Güldenstädt's (Nov. Comm. Acad. Petrop. xx. p. 483, t. 14) description and figure of the *Felis chaus* from the shores of the Caspian agree with this animal in most particulars, and represent the short tail of the genus *Chaus*, the tail being rather more than one-fourth of the entire length of the body, or one-third of the length of the body and head (30 + 11). The fur is described as "fusco-lutescens, gulæ et regionis umbilicalis albidus; pectoris et abdominis dilute rufescens." In the figure the under part is represented as much paler than this description justifies, or than may have been intended. Otherwise it is a good representative of the Nepal animal. I have not seen any specimen from the Caspian. The red ear is common to the Nepal *F. affinis* and most specimens of *F. caligata* from Africa.

In the British Museum there are two small specimens of the genus *Chaus* with short tails from India which have more distinct dark bands across their body and legs, and which are without doubt the Cats that MM. F. Cuvier and Blyth have confounded with the longer-tailed *Felis maniculata* of Africa.

This Cat was figured, from a specimen then alive in Exeter Change, under the name of the Bangalore Cat (*F. chaus*), in my 'Spicilegia Zoologica,' t. 2. f. 1. It is probably the *Felis jacquemonti* of M. Isidore Geoffroy, in the 'Zoology to Jacquemont's Voyage,' the skull of which is figured t. 3. f. 1. Unfortunately the specimens in the

Museum are few in number, and not in a very perfect state; but I can scarcely think that this Cat can be the young state of *Felis affinis* from Nepal. It is doubtless the Cat that Mr. Blyth confounds with the Egyptian Cat (*F. chaus*, Geoff.), stating that it is "the common animal of Bengal" (see P. Z. S. 1863, p. 186), and that, as in the case of many common animals, its skins are rarely brought to Europe. It seems spread over various parts of India, as the specimens in the British Museum were sent from the Matoralla territory by Sir Walter Elliot, and from Gangootra.

The third species of *Chaus* in the British Museum is the beautiful animal that I figured in the 'Illustrations of Indian Zoology' as *Felis ornata*. The small specimen of the species in the British Museum is not in a very good state. *Chaus ornatus* is of a pale, more or less bright, yellow-brown colour, with transverse bands of nearly uniform-sized roundish blackish spots on the body. The spots are larger, darker, and closer together on the thighs and upper parts of the legs. The tail has some black rings near the end, and a small black tip.

Hab. Northern India (*Capt. Boys*).

This does not appear to be a common Cat in India, as we have only received a single half-grown example, which was purchased at the sale of Capt. Boys's specimens; and I do not find it described in any systematic work, nor do I recollect to have seen any specimens of it in continental collections.

In his crude paper on the Asiatic species of the genus *Felis* (P. Z. S. 1863, p. 185), Mr. Blyth places *Felis ornata* under *Felis torquata*, observing that the figure is "very bad." If he had compared the specimen in the British Museum with the figure, he must have reversed this note; for it is very characteristic, but is taken from a larger and brighter specimen. Mr. Blyth, when he saw the specimen in the Museum collection, in his usual offhand manner, said it is only one of the numerous varieties of the common Indian Cat. This species is quite distinct from the Cat that Sir William Jardine afterwards figured as *Felis ornata* in the 'Naturalist's Library,' *Felidæ*, t. 28.

9. Notice of a New Species of American Tapir, with Observations on the Skulls of *Tapirus*, *Rhinocærus*, and *Elasmognathus* in the Collection of the British Museum.
By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S.

(Plate XLII.)

The British Museum having recently received the skulls of some specimens of American Tapirs in different states of development, I have been induced to reexamine the series of skulls in the collection, and herewith send the notes which I have made during the process.

Mr. Sclater has kindly presented to the Museum the skull of an

adult Baird's Tapir from Central America, which had been sent to him by Capt. Dow*; and more lately Mr. Salvin has obtained for the Museum the skin and the skull of a half-grown specimen of the same animal. Thus we have the skull of this interesting genus in two very distinct states of development. Mr. Selater has also kindly shown me a photograph of the very young animal, in its spotted and banded state, which is on its way to the Gardens of the Society. These materials have enabled me to study this very interesting animal in considerable detail. To understand its characters more completely I have compared the skull with the series of skulls of Tapirs in the British Museum and in the Museum of the College of Surgeons, and with the figures of the skulls to be found in Cuvier's 'Ossemens Fossiles' and De Blainville's 'Ostéographie.'

These examinations have enabled me to point out the craniological characters by which the species may be distinguished, and also to record the differences which occur in the skulls of the different kinds as the animal passes from youth to adult age.

These researches have induced me to believe that one of the skulls of Tapirs in the British Museum indicates the existence of a South-American species that has not yet been observed in the living state.

This is not extraordinary when we recollect that the Tapir of Central America, which belongs to a peculiar group, was not distinguished from the common Tapir until the very peculiar formation of its skull was observed and figured.

FAM. TAPIRIDÆ.

Nose produced into a short proboscis. Toes two or three, subequal, all reaching the ground, without any prehensile process on the upper edge, nail short; each with a separate hoof. Face not horned. Neck short. Cutting-teeth in each jaw, erect, normal.

Tapirina, Gray, List Mamm. B. M. p. 184.

Multungula genuina, Giebel, Säuegeth. p. 177.

Onguligrades, Blainville.

There is a peculiarity in the change of the teeth of the Tapirs which I do not find noticed in Owen's 'Odontographia,' or in De Blainville's 'Ostéographie,' or in any work that has occurred to me. In most mammalia the second series of the cutting-teeth are developed rather within the base of the milk series; but in the Tapirs they are developed so far within their hinder edge that, when the milk series are about to be shed and the permanent series are just about being developed, there are two distinct series of apertures to be observed in the intermaxillaries and the front edge of the lower jaw.

The skulls of the American Tapir and of Baird's *Elasmognathus* in the British Museum show this peculiarity.

The skull of a young American Tapir in the Museum Collection shows the same peculiarity. In this specimen, which has lost all its

* See Mr. Selater's remarks on exhibiting this skull, *antèa*, p. 473.

milk-teeth, the development of the alveoles is not so uniform, the cavities left by the milk-teeth being much larger and more or less broken away on the outer edge; while the inner series of pits, from which the permanent teeth are to be developed, are much smaller, shallower, and far apart; perhaps they would have been larger and more developed if the animal had been allowed to live until the permanent teeth were more developed.

The space between the two series is much larger in the skull of the *Elasmognathus bairdi*. The skull of the younger specimen of *E. bairdi* in the British Museum has lost all its milk cutting-teeth in each of the jaws, each leaving a well-marked, regular, circular, conical cavity on the edge of the jaw. Just within these cavities, but well separated from them by a bony plate, and alternating with the cavities of the milk-teeth, is placed a regular series of six well-developed similar, but not quite so large, circular, conical cavities. At the base of each cavity is to be observed the commencement of a tooth, being the teeth of the permanent series. The front of the lower jaw exhibits the same peculiarity; but the cutting-teeth of the lower jaw are more unequal in size, the cavities of the central series being the largest, and gradually diminishing in size to the outer one. In the skulls of the young American Tapir and of the *E. bairdi* there is a second cavity on the inner side of the base of the milk-canine. In the skull of *T. americanus* one of the milk-canines is remaining; it is of a very small size, and compressed lancet-shaped in form. In the *E. bairdi* the milk-canines are shed.

In the skull of the young *Tapirus americanus* in the British Museum, which has shed its cutting-teeth, there is an abnormal tooth (probably a false grinder) to be observed on each side of the maxilla, rather in front of the middle of the space between the base of the canine and the front edge of the first grinder. They are each placed on the outer side of the jawbone, near the lower edge, and are covered with well-developed enamel, and are similar in form and size. Are these teeth similar to the front or false grinders in *Anoplotherium*?

The family may be divided into two groups or tribes:—

Tribe I. TAPIRINA.

The nasal aperture elongate, gradually contracted into a narrow opening in front, extending nearly to the root of the upper canines. The upper jaws only united in front as far as the root of the canines; the upper part on the sides of the nasal aperture broad, rounded. The internasal cartilage only ossified at the hinder part under the nasal bone.

M. Cuvier, in the 'Ossemens Fossiles,' vol. ii. p. 145, gives the osteology of the American Tapir (*T. americanus*) with considerable detail, and devotes a chapter to the comparison of the bones of the Indian Tapir (*T. indicus*) with those of the American Tapir (p. 156); he figures the skeleton and skull of the two species and some of the other bones. The figures of the separate skull and of the skeleton

of the American species are very incorrectly drawn; they are very unlike, and both give a very false idea of the form of the nose. It is to be observed they are some of Cuvier's earliest works, drawn and etched by Cuvier himself, and certainly not to be compared with those drawn and engraved by his humble but talented colleague M. Laurillard.

Blainville, in his 'Ostéographie,' "Mammifères Onguligrades," figures:—the skeleton of *Tapirus indicus* (t. 1), and the details of the skull (t. 2), details of the members (t. 4), and of the dentition (t. 5); the skull of *Tapirus americanus* (t. 3), details of the members (t. 4), and of the dentition (t. 5); the skull of *Tapirus pinchacus* (t. 3), and details of the dentition (t. 5).

1. TAPIRUS.

The internasal cartilage ossified just at the hinder part under the base of the nasal; foramen maximum nearly circular. Occipital crest narrow, high. Forehead small, narrow. Canines in the maxilla just behind the intermaxillary suture. The hinder upper edges of the intermaxillaries produced behind, and forming part of the upper margin of the nasal aperture.

Teeth 42:—In. $\frac{3-3}{3-3}$. C. $\frac{1-1}{1-1}$. Pm. $\frac{4-4}{3-3}$. M. $\frac{3-3}{3-3}$. Milk-molars $\frac{4-4}{3-3}$.

Hab. South or Tropical America.

Tapirus, Cuv. Oss. Foss. iv. p. 293; Owen, Odont. p. 604, t. 96. f. 4, 5.

Rhinocærus, part., Wagner, Syst. Amph. p. 19.

These animals are generally brown, with white edges to the ears. The hinder part of the back above the tail is generally more or less destitute of hair.

1. TAPIRUS TERRESTRIS.

Fur short, dark brown, rather paler beneath. Skull with a high regularly arched crest over the brain-case; nasal bones over the back of the orbits elongate, triangular, acute; the front edge of the cavity of the internal nostrils in a line with the hinder edge of the sixth grinder in the adult series, or with the back edge of the last well-developed grinder in the imperfect series of grinders; the front part of the nasal apertures contracted, and gradually tapering in width towards the front end; face rather elongated; the space between the grinders and canines rather longer than the length of the outer edge of the two true grinders; the occipital end of the skull triangular, arched above, higher than broad; lower jaw with an arched lower edge.

Var. 1. The front edge of the cavity of the internal nostrils in a line with the middle of the inner edge of the penultimate or sixth grinder in the complete series.

Var. 2. The space between the grinders and the canines larger.

In other respects both these skulls are exactly like the normal skull of *T. terrestris*.

Var. 3. With a small additional premolar close in front of the base of the usual first premolar on the right side of the lower jaw.

Hippopotamus terrestris, Linn. S. N. p. 174.

Tapirus americanus, Schreb. Säugeth. t. 319; Cuvier, Oss. Foss. iii. p. 277, t. 66-68; Blainv. Ostéog. Ongulig. t. 1, 5; P. Z. S. 1850, p. 102; 1851, p. 121; 1859, p. 51; 1860, pp. 181, 261.

T. anta, Zimm.

T. terrestris, Gray, List Mamm. B. M. p. 184; Gerrard, Catal. Bonés, B. M. p. 275.

T. suillus, A. Wagner, Schreb. Säugeth. iv. p. 777, t. 319; P. Z. S. 1860, p. 261.

Tapirete, Mareg. Bras. p. 229, fig.

Tapirou l'anta, Buff. H. N. xi. p. 444, t. 43.

Junior. *Cabani éléphantipède*, Geoff. Mus. Paris; Desm. N. Dict. H. N. p. 503.

The British Museum possesses six skulls of this species. Four skulls are of full-grown or nearly full-grown animals; one is young, with only four grinders; and another is young, with only the milk-teeth.

These skulls show that this species is found in Brazil (where it was obtained by Mr. Miers), and also in Berbice and Demerara. The specimen from the latter country was obtained by Sir Robert Schomburgk.

The skull of the younger animal, which has only the four or five grinders developed (even when the other grinders are being developed), has the front edge of the hinder nasal aperture in a line with the hinder edge of the last well-developed grinder—that is to say, the fourth or fifth, as that tooth may happen to be the last well-developed one. A skull in this state is figured by Cuvier, Oss. Foss. ii. t. 2. f. 2; but the last or fifth grinder, canines, and cutting-teeth are represented more developed than they ought to be to agree with our specimens. This position of the aperture has been verified in a series of five skulls of animals with the teeth in five different states of development. The aperture is figured in its proper position in the adult skull.

In the skull of the nearly adult animal, in which the last or seventh grinder is not completely formed, but of a moderate size and nearly ready to pass through the gums, the front edge of the internal nasal aperture is in a line with the back edge of the sixth or penultimate grinder, as in the skulls of the adult animals which have cut the last or seventh grinder. The internal nasal aperture probably slightly changes its place when the animal increases in age, or is sometimes liable to variation.

In the skull of an adult (perhaps rather aged) animal, which has all the seven grinders well developed, in the British Museum, and which agrees with the adult skull of the common Brazilian Tapir, the front edge of the hinder nasal aperture is rather more forward than in the other adult skull; that is to say, the front edge is in a line with the middle of the sixth or penultimate middle grinder. The

skull figured by M. de Blainville in his 'Ostéographie,' t. 3, as that of *Tapirus americanus* agrees much better with this skull than with any of our skulls of *T. americanus*, as, in this skull, the face is more elongated and slender. The upper line of the central crest of the skull is regularly arched, and not arched in front and with a nearly straight line on the hinder part of the crown. It differs from the skull of *T. laurillardi* in the nasal bones being long, tapering, and acute, as in the skull of the normal *T. americanus*.

The length of the space between the hinder edge of the canine and the front edge of the first grinder in the figure agrees with that found in the *T. americanus*; that is to say, it is only rather longer than the length of the first two grinders.

There is a skull of an American Tapir in the Museum of the College of Surgeons which is rather more elongate than the rest of the skulls; and in this respect it bears some resemblance to the skull of *Tapirus laurillardi*.

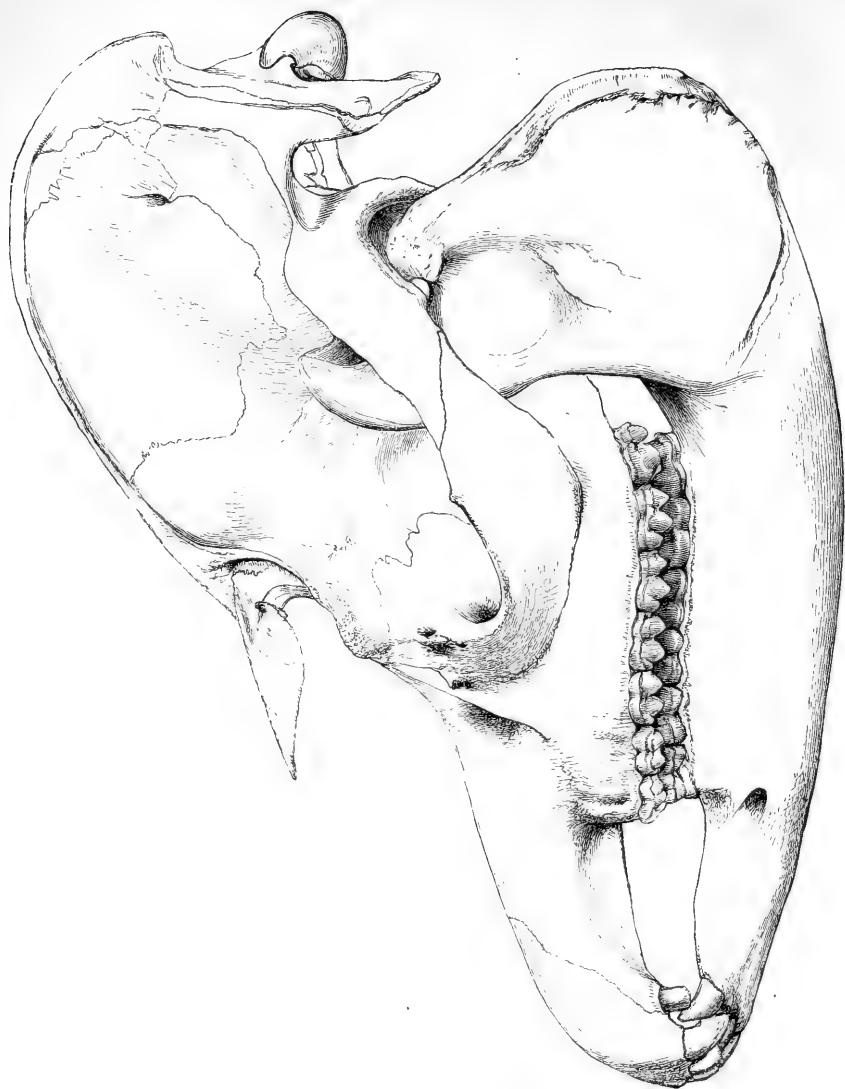
2. TAPIRUS LAURILLARDI. (Fig. A.)

Skull with a high, regularly-arched crest over the brain-case; the nasal bones over the back of the orbit very short, broad, broader than long, and with rounded ends; the front edge of the cavity of the internal nostrils in a line with the middle of the last or seventh grinder in the complete series; the face rather elongate, the space between the canines and the grinders as long as the length of the outer side of the first three grinders; the front part of the nasal aperture suddenly contracted, and then continued as a narrow linear groove to the front of the nose; the occipital end of the skull triangular, arched, higher than broad; the lower edge of the lower jaw slightly arched, the front part rather produced and contracted; the grinders are rather small, the complete series being about $\frac{1}{4}$ inch shorter than in the former species, being $5\frac{1}{4}$ inches in *T. laurillardii*, and $5\frac{1}{2}$ in *T. terrestris*.

The skull here described was purchased of Mr. Brandt of Hamburg in 1852 as that of "*Tapirus americanus* from South America," without any more special habitat. I know that Mr. Brandt had a collector in Venezuela; so it may be he who "shot and skinned himself"—that is, the animals from that country; and Dr. Seemann says he has seen many Tapirs in that province.

I have named this species after M. Laurillard, the Assistant in the Museum of Comparative Anatomy of Paris, who made most of the drawings of M. Cuvier's 'Ossements Fossiles.' He was a most kind, attentive, modest man, who was always willing to give assistance to all students, and devoted much time to assist others in their labours; it is to his industry and accuracy that great part of the value of the 'Ossements Fossiles' is to be attributed. I am personally indebted to him for great kindness and an unceasing desire to facilitate any researches that I might have in hand. He was one of those men who seem satisfied—so that the work of science progressed, any one might claim the reputation of doing it; and few men have done more for osteology and palæontology than M. Laurillard.

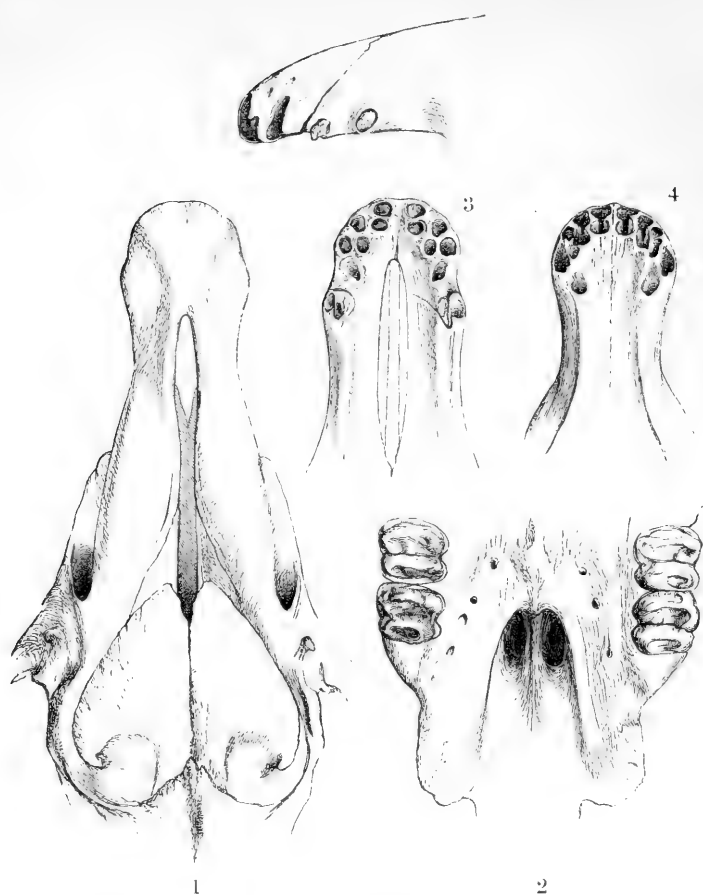
Fig. A.

Skull of *Tapirus laurillardii*.

This skull, in the length of the front of the face and in the comparative straightness of the lower edge of the under jaw, agrees in some respects with the skull figured by De Blainville under the name of *Tapirus pinchacus* (t. 3). It differs from the figure of that skull

Fig. B.

5



1. The nasal bones and upper part of the skull of *T. laurillardii*.
2. Internal nasal opening of *T. laurillardii*.
3. End of the upper jaw of *T. laurillardii*.
4. End of lower jaw of *T. laurillardii*.
5. Front of the upper jaw of *Tapirus terrestris*, showing the rudimentary premolar.

in the shortness and breadth of the nasal bones, and also in the front of the upper jaw not being so much produced, and in the lower edge of the lower jaw not so straight, and in the narrow linear form of the grooves between the maxillæ forming the internasal cartilages. The position of the internal nostril on the palate at once separates it from the other American Tapirs.

3. *TAPIRUS PINCHACUS*.

"Neck round, without fleshy crest. Body covered with very close blackish-brown hair, which is darker at the tips. Chin with a white spot, which is elongated behind, and bent up to the middle of the lip."

Tapirus pinchaque, Roulin, Ann. Sci. Nat. xvii. 1829, p. 107; Wagner, Schreb. Säugeth. vi. p. 392; Goudot, Compt. Rend. A. S. Paris, xvi. 1843, p. 331.

T. pinchacus, Blainv. Ostéog. Ongulig. t. 1-5.

T. roulini, Fischer, Syn. Mamm. p. 606; Giebel, Säugth. p. 182.

T. villosus, Fischer.

Hab. Cordilleras.

Shull, as figured by De Blainville, depressed behind, the crest being nearly straight over the brain-case; the nasal bone is elongate, acute over the hinder part of the orbit; the front edge of the cavity of the internal nostril is in a line with the back edge of the sixth or penultimate grinder in the complete series; the space between the canines and grinders is rather longer than the length of the outer side of the first two grinders; the occipital end of the skull low, broader than high; the lower jaw is nearly straight beneath.

I have never seen this species, and only know it from M. Roulin's description and the figures of the two skulls in De Blainville's 'Ostéographie.'

2. *RHINOCÆRUS*.

The internasal cartilages ossified at the hinder part; the bony plate extending above nearly the whole length of the nasal, not so far below; foramen maximum subquadrangular, large. Occipital crest very broad, flat-topped. Forehead and crown broad. Lower jaw straight beneath.

Hab. Asia.

Rhinochærus, part., Wagner.

1. *RHINOCÆRUS SUMATRANUS*. The Kuda, Ayer. B.M.

Fur very short, black; back and sides white.

Tapirus indicus, Desm. Mam. p. 411; F. Cuv. Oss. Foss. iii. p. 297, t. 69, 70; Giebel, Säugeth. p. 183; Blainv. Ostéogr. Ongulig. t. 1-5.

T. sumatranus, Gray, Med. Repos. p. 1821.

T. malayanus, Raffles, Linn. Trans. xiv. p. 270; Griffith, A. K. iii. t.; Horsf. Zool. Journ., Zool. Java, t.; Gerrard, Cat. Bones, B. M. p. 276.

T. bicolor, A. Wagner, Schreb. Säugeth. vi. p. 400.

Cuvier (Oss. Foss.) states that the Malay Tapir was discovered in India by M. Duvaucel. It does not inhabit India; and M. Duvaucel only knew the animal from the drawing of it that was in General Hardwicke's collection, from a specimen obtained by Major Farquhar in Malacca, and from a skull which he obtained from the same source.

The upper hinder edge of the intermaxilla triangular, narrow, produced, with a part of the maxilla on the inner side separating it from the margin of the internasal aperture. The front edge of the cavities of the internal nostrils in a line with the hinder edge of the sixth tooth when all the seven grinders are developed, and in a line with the back edge of the fifth grinder when the sixth grinder is being developed, and also when it is completed and the seventh grinder is being developed. This last or seventh grinder is developed very late in life; indeed I have not seen any skulls, either in the British Museum or in the College of Surgeons, where it is developed. There are three in each of these collections.

De Blainville (*Ostéographie*, *Tapirus*, pl. 2) figures the skull of an adult animal with all the seven grinders developed; and he represents the front edge of the hinder nasal opening as in a line with the hinder edge of the *sixth* or penultimate grinder, as in the skull of *Tapirus americanus*.

The skull of the skeleton figured in plate 1 of the same work, like the skull in the British Museum, has only six grinders in the upper (and five in the lower).

2. RHINOCÆRUS ME.

Me des chinois, Remusat, *Ann. Sci. Nat.* xviii. p. 5, t. 1.

Hab. China.

Tribe II. ELASMOGNATHINÆ.

The nasal aperture short, broad, subcordate, and truncated in front by the bony ridges of the maxilla. The upper jaw with a high sharp-edged crest on the upper inner edge, embracing the sides of the very large internasal cartilages, which early become entirely ossified into a bony plate, permanently dividing the nasal cavity, and forming a high bony crest on the front of the skull.

ELASMOGNATHUS.

The internasal cartilages ossified nearly the whole length, the bony part produced beyond the end of the nasal.

Elasmognathus, Gill.

ELASMOGNATHUS BAIRDII. (Pl. XLII.)

Fur very short, close, dark black brown; lower part of the cheeks and sides of the neck bay brown; chin, throat, chest, and front edge of the shoulders greyish white.

Young, born with pale stripes, Verrill, *Silliman's Amer. Journ. Sci.* July 1867; *Ann. & Mag. N. H.* 1867, xx. p. 232.

Elasmognathus bairdii, Gill (?), *vide* Verrill.

Hab. Panama; skull, *Mus. Coll. Surgeons*; *Brit. Mus.*, adult and young skull.

The internasal septum is continued between the elevated sharp upper edges of the maxillæ, and even between the upper edges of the

intermaxilla. It remains cartilaginous until it reaches its adult size, and then becomes ossified, forming a thick bony erect plate.

In the younger skull the cartilaginous septum is produced nearly to the root of the cutting-teeth; but in the older skull, where the septum has become ossified, the front parts of the intermaxilla are produced, and the septum ends over the root of the canines. The shortness of the nasal cavity and the sharp-edged crest of the maxillæ distinguishes the skull from those of the Tapirs in all ages.

The sides of the face of the skull are flattened; the zygomatic arch and the front of the orbit over the preorbital foramen is expanded, flattened, and compressing the foramen into an oblong erect shape; the upper edge of the orbit is narrow and flat, not produced into lobes as in the American Tapir; the nasal bones are narrow, longer than broad at the base, with an oblong deep concavity on each side of their base, which is continued upwards behind it, so as to be only separated by a small central ridge; the hinder palatine nasal opening varies in size in the two sexes, or it becomes much wider and broader in front as the animal increases in age. In the skull with the cartilaginous internasal septum, and only four grinders in each side, the concavity containing the internal nostrils is narrow and oblong. In the older skull with the septum entirely bony, and with seven grinders in each side, the concavity containing the internal nostrils is much broader, being nearly as wide as long, and the vault is more evenly rounded.

The young animal, like the young of the Brazilian and other Tapirs, is spotted and striped with white. Mr. Sclater has kindly lent me a photograph of a young Panama Tapir, which is on its way to the Society's Gardens; and a copy of the photograph has been added to Mr. Wolff's figure (Pl. XLII.) of the half-grown animal, which Mr. Salvin has obtained for the British Museum.

The young animal is described by Mr. Verrill as above quoted; and the description is printed in the 'Annals and Magazine of Natural History' for 1867, xx. p. 232.

The animal is similar to the Brazilian Tapir externally; indeed all the naturalists and zoologists who have observed it at Costa Rica regarded it as the same as that species until the skull was examined; and it is said that one was exhibited alive in the Jardin d'Acclimation at Paris for some time as a Brazilian Tapir; but it is easily distinguishable by the bay cheek and white chest.

10. On New Species of Birds from South Africa.

By REV. H. B. TRISTRAM, M.A., F.L.S., C.M.Z.S.

Among a collection of birds recently sent to me from the Cape Colony by Mr. E. L. Layard I find two specimens of a Swift labelled by Mr. Layard *Cypselus melba*.

These birds are clearly distinct from *C. melba*. In size and form there is no difference, excepting that the wing of the South-African

bird is a trifle smaller than that of most of my European and Asiatic specimens; but the coloration is very distinct. The whole of the upper plumage is a uniform brown black, very much darker than that of *C. melba*; the white of the throat is much less in extent, and gently blends into the brown of the pectoral collar. In *C. melba* the pectoral collar is a narrow gorget of about $\frac{1}{2}$ inch in diameter. In the South-African species it extends for a breadth of about 2 inches, leaving only the abdomen white; while the flanks, white in the northern species, are brown in this.

It may seem strange that so well-marked a species should have hitherto nearly escaped observation; but a Swift is a bird more often seen than obtained, and the only author I have been able to ascertain as speaking of the present species from personal examination is Levaillant. Mr. Gurney has not received this bird from Natal; and I am unable to discover a South-African specimen in any museum, except the British Museum, to which I have had access.

I should have dedicated it to Mr. Layard, to whom ornithologists are deeply indebted for his persevering and almost unaided researches in the fauna of South Africa, but for Vieillot's name of *C. gutturalis* having been specially applied to Levaillant's figure.

CYPSELUS GUTTURALIS, Vieill.

Magnitudine C. melbæ, sed supra æneo-niger, nec fuscus: gutture medio albo, lateraliter grisescente: pectore toto et lateribus metallicè grisescentibus: abdomine medio tantum albo.

Mus. H. B. Tristram.

I have also received from Mr. Layard several specimens of a Swift, labelled *C. apus*, but which differ from our Common Swift, exactly as described by Dr. Sclater in P. Z. S. 1865, p. 599, in their lighter colour above, particularly on the secondaries and scapulars, in the white feathers of the gular patch (which is much smaller, presenting a narrow black central line), and in the feathers of the lower back, belly, and under wing-coverts being narrowly margined with white. Mr. Gurney's specimens from Natal have the same characteristics.

As all the specimens known from South Africa agree in these peculiarities, I venture to submit that Temminck's MS. name in the Leyden Museum should be recognized, and that the South-African representative of *Cypselus apus* should be acknowledged as *Cypselus barbatus*, as has been already suggested by Dr. Sclater.

Specimens in the same collection have also enabled me to recognize a new species of the Saxicoline genus obtained by Dr. Kirk on the Zambesi. Dr. Kirk, in his paper on the "Birds of the Zambesi Region" (Ibis, 1864, p. 318), mentions "*Campicola pileata*, among the rocks of the Murchison Rapids, common; in other situations not observed." This is the only Chat obtained in those regions. I possess one of Dr. Kirk's type specimens, and, on comparing it with skins from the Cape of Good Hope, find it clearly a distinct species, though representative of *Campicola pileata* (Gm.). The dimensions are smaller in every way; the white on the forehead is

much more contracted; the black does not descend so low on the occiput; the back is rather darker in hue; while, instead of a broad pectoral band of deep black extending from the white throat to the abdomen, there is merely a narrow black gorget between the throat and the breast. I propose therefore to describe the species as

CAMPICOLA LIVINGSTONII, n. sp.

Campicolæ pileato similis, sed minor: fronte vix albo notata: capitis colore nigro non in occiput descendente: tergo cinnamomeo-fusco: gula alba, zona nigra contracta a pectore divisa, neque scuto lato nigro, ut in C. pileato: pectore albo, in rufo-cinnamomeum descendente: abdomine, lateribus, caudaque sic ut in C. pileata.

Long. tota 6 pull., alæ 3·7, caudæ 2·5, rostri a rictu 0·7, tarsi 1·15.

Hab. Murchison Falls, Zambesi River.

Mus. H. B. Tristram.

11. Descriptions of Six New Species of *Helicidæ*, from the Solomon Islands, Western Pacific. By GEORGE FRENCH ANGAS, F.L.S., C.M.Z.S.

(Plate XLIII.)

1. *GEOTROCHUS GAMELIA*. (Pl. XLIII. figs. 1, 2, 3.)

Shell imperforate, flatly conical, thin, obliquely, faintly, and irregularly plicately striated, white, rather broadly banded with dark brown at the suture and periphery, the lower edge of the sutural band sometimes diffused and paler, and with a spiral band of the same colour at the base; spire conical, rather obtuse at the apex; whorls five, nearly flat, the last more or less descending, subangulate at the periphery, convex at the base; columella sloping, moderately wide; aperture diagonal, truncately oval; peristome thin, the margins distant, the right flexuous and slightly expanded, the basal slightly reflexed.

Variety. With the basal band very broad, columella and lip brown, and an additional narrow band on the three lower whorls.

Diam. maj. 12, min. 10, alt. 10 lin.

Hab. St. Stephen Island and Ysabel Island, Solomon group.

2. *GEOTROCHUS EROS*. (Pl. XLIII. figs. 4, 5, 6.)

Shell umbilicated, subtrochiform, rather solid, obliquely striated, on the last whorl decussated with very fine sloping rugose striæ, pale fawn-colour, banded with white at the periphery, and ornamented with two rows of irregular chestnut blotches; spire conoidal, apex rather obtuse and rose-coloured; whorls four and a half, slightly convex, the last a little descending, keeled at the periphery, convex

at the base, which is also ornamented with two partially interrupted spiral chestnut bands; aperture oblique, rhomboidally ovate; peristome rose-coloured, the margins distant, the right slightly flexuous and expanded, the basal reflexed, arcuated and obsoletely toothed within.

Diam. maj. 9, min. $7\frac{1}{2}$, alt. $6\frac{1}{2}$ lin.

Hab. St. Stephen Island and Ysabel Island, Solomon group.

3. GEOTROCHUS AMBROSIA. (Pl. XLIII. figs. 9, 10.)

Shell imperforate, globosely conical, moderately thin, very finely obliquely striated, whitish, ornamented with two purplish brown bands, the lower one broader, and frequently mottled with irregular opaque bluish-white oblique blotches; spire convexly conical, apex rather obtuse; whorls five, convex, the last descending, convex at the base, which at the front part is purplish brown, from which a third band of the same colour extends a little below the periphery; columella sloping, rather wide, nearly straight, flattened; aperture diagonal, truncately oval; peristome white, the margins distant, the right slightly expanded and flexuous, the basal reflexed.

Diam. maj. 10, min. $8\frac{1}{2}$, alt. 10 lin.

Hab. Galera, or Russell Island, Solomon group.

4. GEOTROCHUS COXIANUS. (Pl. XLIII. figs. 7, 8.)

Shell imperforate, trochiform, rather thin, obliquely finely striated, polished, creamy white, the lower whorls ornamented with irregular chocolate-brown spots; spire conical, apex rather obtuse; whorls six, flatly convex, the last scarcely descending, obtusely angled at the periphery, convex at the base, the umbilical region pale purplish brown, with the central portion chocolate-brown; columella sloping, flattened, chocolate-brown; aperture very oblique, ovate; peristome chocolate-brown, the margins approximate, slightly thickened and expanded, the right flexuous above.

Diam. maj. 11, min. $9\frac{1}{2}$, alt. 11 lin.

Hab. Ysabel Island, Solomon group.

I have named this beautiful species in honour of Dr. Cox of Sydney, whose indefatigable exertions in the cause of science have made us acquainted with many new Australian and Polynesian shells.

5. GEOTROCHUS MENDANA. (Pl. XLIII. figs. 11, 12.)

Shell perforate, conical, solid, obliquely finely striated, pale brown, ornamented with a whitish sutural band and two chestnut bands, the upper contiguous to that at the suture; spire conical, apex acute; whorls seven, slightly convex, the last not descending, obscurely angled at the periphery, convex at the base, which is broadly banded with reddish brown; aperture diagonal, truncately oval; peristome white, widely expanded and reflexed, the columellar margin triangularly dilated and reflexed, almost covering the perforation.

Diam. maj. 11, min. 9, alt. 13 lin.

Hab. Ysabel Island, Solomon group.

6. *TROCHOMORPHA PARTUNDA*. (Pl. XLIII. figs. 13, 14, 15.)

Shell widely and deeply umbilicated, somewhat conically lenticular, rather solid, obliquely striated, pale horn-colour, broadly banded with dark chestnut; spire convexly depressly conical, apex obtuse, suture narrowly margined; whorls five, rather convex, the last a little descending, acutely keeled, slightly convex at the base, which is sometimes brown, the colour extending to within a short distance of the keel, at other times broadly spirally banded with brown; umbilicus conical, nearly one-fifth the diameter of the shell; aperture diagonal, truncately oval; peristome nearly straight, the margins converging, the right slightly flexuous, the basal a little thickened.

Diam. maj. $6\frac{1}{2}$, min. 6, alt. 4 lin.

Hab. Galera, or Russell Island, Solomon group.

DESCRIPTION OF PLATE XLIII.

- Figs. 1, 2, 3. *Geotrochus gamelia*, p. 888.
 4, 5, 6. — *eros*, p. 888.
 7, 8. — *coxianus*, p. 889.
 9, 10. — *ambrosia*, p. 889.
 11, 12. — *mendana*, p. 889.
 13, 14, 15. *Trochomorpha partunda*, p. 890.
 16, 17. *Cœliaxis exigua*, p. 907.

November 28, 1867.

John Gould, Esq., F.R.S., V.P., in the Chair.

Mr. P. L. Sclater read notes upon some recent remarkable additions to the Society's Menagerie, namely:—

(1) A specimen of the Black-headed Partridge (*Caccabis melanocephala*)* from Abyssinia, purchased October 30th; not previously exhibited in the Society's Avaries.

(2) Two Red-billed Hornbills (*Toccus erythrorhynchus*), purchased October 30th. This addition increased the Society's series of *Bucerotidæ* to eleven in number, representing the following six species:—

- Buceros bicornis*, Linn., ex. Ind.
 — *rhinoceros*, Linn., ex Malacca.
 — *elatus*, Temm., ex Afr. occ.
 — *atratus*, Temm., ex Afr. occ.

* *Perdix melanocephala*, Rüpp. Wirb. Abyss. i. p. 11, t. 5.

Toccus erythrorhynchus, Temm., ex Afr. occ.

Bucorvus abyssinicus (Gm.), ex Africa.

(3) A specimen of the very rare Australian Parrot lately described by Mr. Gould in the Society's 'Proceedings' (1861, p. 100) under the name of *Geopsittacus occidentalis*, presented to the Society by Dr. Ferdinand Müller, of Melbourne, C.M.Z.S., and received November 17th by the ship 'Essex,' under the special charge of Capt. Ridgers, the obliging commander of that vessel.

Dr. Müller, who had forwarded this bird to the Secretary under the impression that it was undescribed, had supplied the following particulars concerning it:—

"This peculiar Parrot was presented to me by Mr. Ryan, on whose sheep-station, on the Gawler ranges west of Spencer Gulf, it was obtained. The most extraordinary circumstance connected with this bird is, that it is *nocturnal*! It lives in the rocky caves of the ranges, and comes out at night to feed."

Mr. Sclater stated that it was evident from observations made upon this bird since it had reached the Society's Gardens that Dr. Müller's account of its nocturnal habits was correct.

Mr. P. L. Sclater also exhibited a skin of the Lesser Sheathbill (*Chionis minor*, Hartlaub), being that of an individual of this species which had been transmitted living to the Society by Mr. E. L. Layard, F.Z.S. This bird had been brought from the Crozet Islands by Capt. Armson, and had been for some time in the Aviary of Mr. Searle of Cape Town, who had kindly parted with it in favour of the Society.

An extract was read from a letter addressed to the Secretary by Capt. J. M. Dow, Corr. Memb., dated Panama, 10th September, 1867, announcing that, after many endeavours, he had succeeded in procuring for the Society a young living specimen of the newly discovered Tapir of Panama (*Tapirus bairdi*), and was intending to transmit it to the Society at an early opportunity. Capt. Dow enclosed some photographs of the animal, which were exhibited to the Meeting*.

Prof. Owen communicated two memoirs on the extinct birds of the genus *Dinornis* of New Zealand, forming the eleventh and twelfth of a series of papers on this subject. These were entitled "On *Dinornis* (Part XI.), containing a description of the integument of the sole and tendons of a toe of the foot of *Dinornis robustus*;" and "On *Dinornis* (Part XII.), containing a description of the femur, tibia, and metatarsus of *Dinornis maximus*, Owen."

These papers will be published in the Society's 'Transactions.'

* See Dr. Gray's remarks, *ante*, p. 886.

The following papers were read:—

1. On the Egg of *Æpyornis*, the Colossal Bird of Madagascar.
By GEORGE DAWSON ROWLEY, M.A., F.Z.S. &c.

The first notice of the remains of this bird was the paper in 1851 by M. Isidore Geoffroy St.-Hilaire (Comptes Rendus, no. 4, 27 Janvier). Succeeding that came Professor Owen's in the 'Proceedings' of this Society (1852, p. 9). In 1863 Professor Bianconi put forth a long and painstaking discussion upon the fragments of the metatarsal which were discovered with the other bones. I had intended to have a full translation of this made from the Italian; but the result of the first part was not equal to my expectations; I therefore did not go on to the next, but believe Professor Bianconi arrives at the conclusion that *Æpyornis* might be allied to the Vultures—a notion which I do not think I need dwell upon.

In 1864, having purchased the only specimen of the egg which, as far as I know, ever came to England, I published a brochure on the subject.

This year, in August, I met M. Alfred Grandidier in Paris, and had some conversation with him respecting *Æpyornis maxima*; and he in September read a communication on it to the French Academy, displaying at the same time fresh fragments of eggs, which he had himself dug up at Cape Sainte Marie in Southern Madagascar, as shown in the map which he has drawn and sent me, along with some of the same fragments and his article upon them. I now have the satisfaction of placing these before you. They are nine in number, one having been apparently broken in coming. It is to this broken portion to which I wish to direct your attention. The granulation is, in a marked degree, different from that of the other pieces; the difference may easily be seen by the eye alone, and is still more apparent through a magnifier. The air-pores, which in the other specimens seem much like a comet with a tail, are here only small indentations without any tail; the shell also is only half the thickness, is much finer, and presents an aspect so diverse that the difference is detected by the most careless observer, even when the pieces are all mixed. These fragments belonged to the egg of a much smaller bird, the embryo of which required less strength in the shell. Yet the colour, quality, and locality of that shell clearly point to a bird of the same family as *Æpyornis maxima*—in short, a smaller and more delicate *Æpyornis*. For this species I propose the name *Æpyornis grandidieri*.

The number of eggs of *Æpyornis* discovered up to this time I take to be as follows:—Four in the museum of the Jardin des Plantes, of which I exhibit casts of the two first found, sent me by M. E. Verreaux, and also casts of the three portions of bone discovered with them. Two more eggs were shown by M. C. Talavande in the Venezuelan department of the Paris exhibition, both with very large holes, having probably been used by the natives for holding water. I took their dimensions, which are as follows:—No. 1, great circumference $33\frac{2}{8}$ inches, small circumference $29\frac{2}{8}$ inches; this egg was

cracked, but with the granulation and the surface perfect. No. 2 measured $33\frac{3}{8}$ and $28\frac{3}{8}$ inches respectively; the surface was not so well preserved. I regret that I can give no history of these. I offered to purchase them, and am now informed that I may have both for the small sum of £320, or one for £200!

The 'Journal de Toulouse' states that M. Nau, who had been thirteen years a prisoner among the Hovas, has brought to Toulouse a specimen with diameters 12 inches and 10 inches, found in a recent alluvial deposit at a depth of $4\frac{1}{2}$ feet. This one I have not seen. I believe it to be different from one mentioned to me in a letter by Count Raoul de Baracé, at Nantes. M. Grandidier speaks of one or two other eggs in a letter I have just received from him, making ten or twelve in all. I am bound also to state that he doubts any having been found except at Cape St. Marie, the village of Ampalaze and Machichora, all in close proximity on the shore of South Madagascar. To his opinion I attach the greatest weight. It is therefore quite possible that the statement I received in French, naming Mananzari as one locality, may be founded upon an error. M. Grandidier's letter goes on to say, "All the southern tract, where these ports are, is only a plateau without the smallest hill, without a ravine, without a cave, where one digs in a bed of sand as smooth as the surface of the table." The eggs have been found "in the places I mention, only on the sea-shore, on the abrupt rise of the dunes, even on the surface of the sand, when there is a crumbling of the earth, or when tropical rains heave up parts of the sand." He has deposited in the museum the following specimens of the strata:—"No. 1. Un calcaire quaternaire, which does not rise above the sea-level, and serves as a base to the dunes. To this calcareous stratum are joined specimens of modern breccia. No. 2. Sand of the dunes, composed of impalpable fragments, shells, and grains of quartz. No. 3. Land-shells, which are found along with the remains of the eggs of *Æpyornis*. No. 4. Fragments of calcareous rolled stones mixed with shells. All the subfossil shells that are mixed up with the remains of eggs would probably be still found alive, and are land-shells. For fossils I have tried without hope of success, and I do not think any further efforts can be made." In my first paper I located the *Æpyornis* in modern times; and each new discovery confirms the idea. There is every reason to believe, from M. Grandidier's account, that it was extant in or about Flacourt's period, *i. e.* 1658. All the eggs found have been taken from recent strata, modern alluvia—whole ones deeper, and fragments on the surface, the latter in great abundance, showing that these *Æpyornithes* were by no means uncommon. M. Grandidier says that the recent stratum in which he found his remains contained also land-shells, which partially retain their colour and still exist in Madagascar. M. Grandidier concludes his most interesting paper thus:—"I am led to acknowledge that this gigantic bird was living at a recent period, since its remains are found in the most modern formations, the deposition of which is still in progress. Possibly it existed at the beginning of our era; but when the country was peopled it became speedily exter-

minated, as in the case of the Moa (*Dinornis giganteus*) in New Zealand."

It is true that the pieces themselves present a subfossil appearance; but this condition by no means indicates antiquity in all cases. I know a spring in the Isle of Wight which quickly gives any object a lithological aspect; and many others there are of the same kind. One thing is certain, the bird does not exist now. M. Grandidier is positive on this head. One most singular circumstance is, that all the seven eggs which I have seen (and I suppose it is the same with the others) were never hatched. I can only account for this on the supposition of their being what the Bechuanas of Africa call (in the case of the Ostrich) "Lesetla," and the Spaniards of South America (in that of the Rhea) "Nuachos," viz. solitary and abandoned eggs. This habit of the *Struthionidæ* has not been assigned to any satisfactory reason. The *Æpyornithidæ* may have had the same propensity. As regards the size of the largest *Æpyornis* and *Dinornis*, if we compare the dimensions of the *Æpyornis* egg and that of an Ostrich, (I quote a writer in the 'Field') "bearing in mind that similar solids are to each other in the triplicate ratio of their dimensions, we see that if the egg of the Ostrich measures $6\frac{1}{8}$ inches and that of *Æpyornis* $12\frac{1}{4}$ inches in the direction of their major axes, the size of the latter as compared with the former is $(6\frac{1}{8})^3 : (12\frac{1}{4})^3 :: 1 : 8$."

In certain cases, I admit, the height and bulk of the bird is not proportioned to the size of the egg. In two very different species (*Cuculus canorus* and *Apteryx mantelli*) they are not so. These are, however, special adaptations of nature, for purposes of her own, which are apparent to every one. In *Cuculus* the egg has to be hatched by a very small bird. In *Apteryx* it is necessary to retain the embryo long, as its apterous and defenceless condition requires it to be strong enough to escape danger at once.

I confidently affirm it to be axiomatic to ornithologists, that *large eggs produce large birds*.

But here Professor Owen steps in and takes us out of the region of Oology into the sober scene of comparative anatomy. He compared the dimensions of the portions of the right and left metatarsal with the corresponding ones of the *Dinornis*, and at the same time the fragment of the fibula (casts of these are now before you), and he justly admits that it is hazardous to judge of the entire length of the metatarsus from the breadth of the distal end. Strickland observes, in his work upon the Dodo, "No argument as to the general affinities of a doubtful ornithic genus can be drawn from the relative proportions of the tarso-metatarsal, the posterior metatarsal, and the proximal phalanx; these proportions vary in each genus according as its habits are more or less cursorial, ambulatory, or insessorial." I have not gone over Professor Owen's measurements; they are, no doubt, correct; and he says the fibula of *Æpyornis* is smaller than that of *Dinornis*, indicating a smaller leg-bone than the latter. This is so. But more ample experience of these eggs leads me to suppose that there were not only two species of *Æpyornithidæ*, but several;

and to which of them the bones belonged, who shall say? The full-sized specimen of *Dinornis* has been selected for comparison; and if, as would certainly appear, the bones might have belonged to a smaller bird, I contend that they are not those of the bird which laid an egg eight times the volume of that of the Ostrich, but some smaller species of *Æpyornis*; it may be of *Æpyornis grandidieri*, or another. We ought to bear in mind that these osseous remains and the eggs bear indications of disturbance, and therefore it is probable of mixture of species. No authenticated egg of *Dinornis giganteus* has yet been discovered; those put forward as such may belong to some of the smaller kinds of that bird, or may not. We have no certain knowledge to go upon, and I have made no scientific examination of any.

2. Descriptions of a New Genus and a New Species of Macrurous Decapod Crustaceans belonging to the *Penæidæ*, discovered at Madeira. By JAMES YATE JOHNSON, C.M.Z.S.

One of the two forms of Crustaceans I am about to describe belongs to the genus *Penæus*; whilst the other, though closely allied to that genus, is so remarkable for the peculiar structure of the mandibles, that I propose to make it the type of a new genus named *Funchalia*. In the normal species of *Penæus* the jaws compose a combined cutting- and crushing-apparatus, each having externally an acute edge with teeth; whilst outside the mouth the jaws are so formed as to constitute a tuberculated implement for breaking or pulping by pressure any substance introduced between them. But in the crustacean on which the new genus is founded the jaws are represented by a pair of long sickle-shaped shears, which cross each other from opposite sides of the mouth.

FUNCHALIA WOODWARDI, gen. et sp. n., ♀.

Colour a uniform red. Carapace compressed and studded with minute warts, which bear short downy hairs. A median crest commences near the posterior border, and projects in front as a rostrum. The surface of the carapace is unarmed; but there is a blunt tooth at the outer side of the ocular excavation, and another at each anterior lateral angle of the carapace, each of these teeth being the termination of a crest or ridge, the upper one of which, after bending so as to form an elbow at a point which is a little in advance of the middle of its course, runs backwards to the posterior border of the carapace. Eyes —? The basal joint of the superior antennæ is excavated for the reception of the eyes; and the inner border of the excavation carries a lamellar-fringed appendage; whilst the outer border is beset with long hairs, and terminates in a weak acute tooth. The second joint is trigonous and shorter than the first, but longer

than the third, which is cylindrical. Filaments —? The cylindrical peduncle of the inferior antennæ does not extend quite so far as the basal joint of the superior antennæ. It carries a single filament. The lamellar palp is narrowly oval, and reaches beyond the peduncle of the superior antennæ. Its upper surface is marked by a deep longitudinal groove. The basal joint is unarmed.

The external jaw-feet are pediform and slender. They extend beyond the peduncle of the inferior antennæ, but not so far as the distal extremity of the superior antennæ. They are furnished with a many-jointed palp as long as the feet, fringed with hair on both edges. The second joint has a sharp exposed edge; and the lamellar appendage attached to the basal joint is bifid and similar to the appendages of the ambulatory legs. The next pair of jaw-feet are flattened, and are much shorter than either the external pair or their own palps, which are not quite so long as the palps of the external pair. The three remaining pairs of jaw-feet are elongate, imperfectly divided into joints and very thin. The mouth is destitute of the powerful cutting- and crushing-jaws which characterize the species of the genus *Penæus*; but it is furnished with a pair of long sickle-like shears, which cross each other from opposite sides. At each side of the mouth there is a broad lamellar appendage.

None of the ambulatory legs is multiarticulate. They are slender, and the order of their length is 4, 3, 5, 2, 1, the fourth pair being the longest. The legs of the three anterior pairs are didactyle; and at the base of each of these legs there is a lamellar bifid fringed appendage. The legs of the two anterior pairs carry a spine at the distal extremity and at the underside of the second and third joints. The other legs are unarmed, but have hairs on the undersides or edges of their joints. The legs of the third pair extend the furthest forward, but they do not reach so far as the distal extremity of the peduncle of the inferior antennæ. The orifices of the oviducts are on tubercles upon the inner side of the basal joint of these legs. The sternum is very narrow, and has a protuberance between each of the fourth and fifth pairs of legs.

The unarmed abdomen is compressed and clothed with short hairs on the less exposed parts. The sides are corrugated and project over the bases of the false feet. The first segment is the highest, the sixth the longest. A low median crest commences on the third, and is continued on the fourth, fifth, and sixth segments. At the sides of the anterior five segments there are ridges of irregular form. On the sixth there are four straight longitudinal ridges in addition to the median crest. At each side of the posterior margin of the sixth segment there is a small projecting lobe, and a small tooth is seen at each posterior angle. To the anterior five segments are attached well-developed false feet with stout peduncles, bearing (except in the case of the first pair) two many-jointed fringed palps, the outer one being the longer. The false feet of the first pair have only one palp that does not extend beyond the middle of the carapace. The second, third, and fourth pairs of false feet are longer than the first. The seventh abdominal segment, or middle caudal

plate, is shorter than either the sixth segment or the lateral swimming-plates. It is narrow and pointed, furnished with a deep longitudinal groove on its upper surface and a small marginal tooth at each edge, nearer the base than the posterior extremity. The lateral swimming-plates are narrowly oval, and those of the inner pair are marked on their upper surfaces by two longitudinal ridges, those of the outer pair by four similar ridges. There is a tooth at the outer side of the latter pair of plates, not far from the posterior extremity.

The imperfect condition of the single individual obtained prevents me describing the rostrum, the eyes, and the filaments of both pairs of antennæ. It may be stated, however, that the rostrum appears to have carried a crest at each side, that the longer filament of the superior antennæ is thickened at the base and setiform above, whilst the shorter filament of these antennæ is setiform throughout, and that the filament of the inferior antennæ is compressed below. It may be further stated that the median carapacial crest appears to have carried a small tooth at a point distant about three-tenths of the length of the carapace from the anterior border.

The species is named in compliment to my friend Mr. Henry Woodward of the British Museum, well known for his labours amongst fossil crustacea.

The following are the dimensions of the specimen, which is now in the British Museum:—

	inches.
Total length from anterior border of carapace to end of caudal plates	$6\frac{1}{2}$
Carapace, length of side	$2\frac{1}{2}$
———, height	1
———, thickness	$\frac{3}{4}$
Lamellar palp of inferior antennæ	$1\frac{1}{8}$
Jaw-feet, length of external pair	$1\frac{1}{2}$
Ambulatory legs, length of fourth pair	$1\frac{1}{4}$
——— —, length of third pair	$1\frac{5}{8}$
——— —, length of first pair	$1\frac{1}{8}$
False feet, length of second, third, and fourth pairs ..	$1\frac{3}{8}$

PENÆUS EDWARDSIANUS, sp. n., ♀.

Colour a brilliant crimson, with an obscure fuscous cross band on the hinder part of the carapace and on each abdominal segment. Carapace somewhat compressed, shining, hairless, its surface unarmed, with a low obtuse median crest commencing near the posterior border. This crest rises gradually, and projects in front as the rostrum, which is long, pointed, compressed, rather slender, and curved obliquely upwards for its anterior half. At each side of its basal portion there is a rounded crest. It extends beyond the peduncles of both pairs of antennæ, and beyond the lamellar palp of the superior antennæ; but it is considerably shorter than the carapace. It carries two small teeth—one a little in advance of its base, and a second further in front, separated from the first by a distance equal to one-fourth of the length of the rostrum. About the same

distance behind the posterior rostral tooth there is a tooth on the median crest of the carapace. The under edge of the rostrum is destitute of teeth. There is a fringe of hair in the neighbourhood of the rostral teeth, and on the under edge of the rostrum as far as the upper fringe extends. At the front border of the carapace there are four small teeth—one over the exterior base of each of the superior antennæ, and one over the base of each of the inferior antennæ. Each of these teeth forms the termination of a ridge; and of these ridges the two nearer the lateral margins of the carapace are higher and longer than the other two. About the middle of the height of the carapace there is another ridge on each side, but it does not extend backwards beyond the middle of the length of the carapace. Between the two principal ridges the carapace is concave; and there is a furrow on the upperside of the exterior ridges; these furrows extend backwards to about the middle of the length of the carapace, and they then bend obliquely downwards towards the lateral borders. At the bend another furrow commences, which widens backwards and upwards until it reaches nearly to the posterior border of the carapace. An intramarginal furrow extends round the carapace, except in front; and the sides have a broad membranous border.

The eyes are black, round, large, and of greater diameter than the stalk. The eye and stalk together are less than half as long as the peduncle of the superior antennæ, and do not reach so far as the base of the filament of the inferior antennæ.

The basal joint of the superior antennæ is excavated to receive the eye; there is a blunt recumbent tooth on the external edge of the excavation, near the base, and a second tooth, which is sharp, near the distal extremity; the inner edge is thickly set with hair, and bears a small tooth near the base. The third joint is shorter than the second, which is cylindrical, and the second than the first. The lower of the two filaments is very long, being about equal to the total length of the animal; whilst the other is compressed and very short, being much shorter than the carapace. The peduncle of the inferior antennæ is cylindrical; and its single filament is slender and very long, being much longer than the animal. The antennal scale or lamellar palp extends beyond the peduncle of the superior antennæ; on its upper face there is a deep longitudinal groove near the outer margin, and a small tooth on the outer border near the extremity; the inner border is fringed with hair. The joint to which this scale is attached is stout, and carries a strong tooth on its under-side.

The external jaw-feet are large and pediform; they are more than twice as long as the multiarticulate ciliate palp, and they reach to the distal extremity of the lamellar palp of the inferior antennæ. The next pair of jaw-feet are much shorter, and are only half as long as their very elongate multiarticulate ciliate palps. The third joint of these jaw-feet is much compressed and broad. Each of the jaw-feet of the two outer pairs is furnished with a ciliate lamellar appendage at the base; the remaining three pairs of jaw-feet are short, and are furnished with several lamellar appendages.

The jaws are powerful, each consisting of an external cutting edge and a tuberculated crushing-apparatus inside. On the upperside of the mouth there is a large membranous lip.

The sternum is very narrow, and between each of the fourth and fifth pairs of legs there is a large transverse deltoid tooth. All the ambulatory legs are slender and unarmed, except by their terminating nails; the order of their length is 3, 5, 4, 2, 1, those of the third pair being the longest. The legs of the three anterior pairs are didactyle, with smooth hands and slender fingers. On the underside of the first pair of legs are some long bristly hairs. The two posterior pairs are monodactyle. None of the members are multiarticulate. To the basal joint of all except those of the last pair is attached a lamellar appendage, which lodges under the carapace.

The abdomen is hairless, shining, sparsely puncturate, subcompressed in front, much compressed behind; the sides of the segments project over the bases of the false feet. On the third segment commences a low median crest, which becomes more and more conspicuous on the posterior segments; and this crest projects a small tooth at the posterior border of the third, fourth, fifth, and sixth segments. The three anterior segments are marked by a deep transverse groove in their anterior halves; and there is a small notch at each side of the posterior border of the first, second, fourth, and fifth segments, whilst at the same place on the sixth there is a large rounded lobe. A small tooth is seen at the posterior angles of the segments from the second to the sixth inclusive. The false feet of the five anterior segments are well developed; their peduncles are stout; and all (except in the case of the first) carry two many-jointed ciliate palpi, one of which is much longer than the other. The single palp of the first pair of false feet is longer than the other palps. The inferior surface of the abdomen is covered with membrane. Between the bases of the first three pairs of false feet there is a deltoid process terminating in a tooth. The middle caudal plate or seventh abdominal segment is narrow, and terminates in a spine; its sinuous borders are fringed with hair. The middle of the upper surface is depressed, and the sides are marked by two low ridges. The lateral swimming-plates are narrowly oval, and extend beyond the middle plate; those of the outer pair are fringed with hair on the inner edge, whilst the upper surface is marked with two longitudinal furrows near the outer margin, and there is a small spine on the outer edge near the extremity. The inner pair of plates are fringed with hair on both edges. At the middle of the upper surface there are three longitudinal furrows.

A single specimen of this fine crustacean, the largest and handsomest of its genus, was obtained at Madeira, where it appears to be of rare occurrence; but in the fish-market of Algiers I have frequently seen considerable quantities of a red *Penæus* which, after careful examination, I do not hesitate to assign to the same species, notwithstanding a few differences of minor importance.

The species is dedicated to Dr. Alphonse Milne-Edwards, of the Jardin des Plantes, Paris, the son of the celebrated author of the 'Histoire Naturelle des Crustacées,' and himself the author of several valuable contributions to carcinological science.

The following dimensions were afforded by the Madeiran specimen, which has been added to the collection of the British Museum:—

	inches.
Length from tip of rostrum to end of caudal plates .	13 $\frac{1}{4}$
—— of rostrum	2 $\frac{1}{8}$
Carapace, length from base of rostrum to middle of posterior margin	3 $\frac{7}{8}$
——, width near the middle	1 $\frac{1}{2}$
——, height	1 $\frac{3}{4}$
Eyes with their stalks, length	1 $\frac{3}{8}$
Superior antennæ, length of peduncle	1 $\frac{3}{4}$
Inferior antennæ, length of lamellar palp	1 $\frac{3}{4}$
—— ———, width	$\frac{3}{4}$
Jaw-feet, length of external pair	4
——, length of next pair	2 $\frac{1}{4}$
Legs, length of first pair	2 $\frac{3}{4}$
——, length of third pair	5 $\frac{7}{8}$
——, length of hand and fingers of third pair	1 $\frac{1}{4}$
Abdomen, length to end of caudal segment	6 $\frac{1}{2}$
False legs, length of first pair	4 $\frac{1}{4}$
—— ———, length of last pair	2 $\frac{3}{8}$
Middle caudal segment, length	1 $\frac{1}{2}$

PENÆUS BOCAGEI, mihi, P. Z. S. 1863, p. 255.

I will take this opportunity of stating that the *Penæus* of the Tagus, described by me under the name of *P. bocagei*, is identical with the *P. longirostris* of M. Lucas (Exploration Scientifique de l'Algérie: Crustacées, p. 46, Atlas, pl. 4. f. 5), as I have ascertained by an examination of specimens obtained at Algiers, and by a study of M. Lucas's description. Dr. Camil Heller (Die Crustaceen der südlichen Europa) is of opinion that *P. longirostris* is itself identical with *P. membranaceus*, Risso, and thinks that Dr. Milne-Edwards, in his 'Histoire Naturelle des Crustacées,' vol. ii. p. 417, has inadvertently attributed to the *P. membranaceus* of Risso some of the characters of *P. siphonocerus*, Philippi (Archiv der Naturgeschichte, 1840, p. 19, t. 14. f. 3), which has a very short rostrum, whilst the true *P. membranaceus* has a long one. If Dr. Heller's views are correct (and I have no reason to suppose that they are not), it will be seen that the range of *P. membranaceus*, Risso (not Milne-Edwards), is not, as has been hitherto believed, limited to the Mediterranean.

It may be useful to point out how the five known species of Mediterranean *Penæi* may be distinguished from one another by means of their rostra.

- A. Rostrum shorter than peduncle of superior antennæ
(six teeth on upper edge) *P. siphonocerus*, Phil.
- B. Rostrum longer than peduncle of superior antennæ,
but shorter than carapace.
- a. Teeth on the under edge (filaments of superior antennæ shorter than peduncle)... *P. caramote*, auct.
- b. No teeth on the under edge.
- * Three teeth on upper edge, including carapacial crest (no spines on surface of carapace) *P. edwardsianus*, J. Y. J.
- ** Nine teeth on upper edge, including carapacial crest (four spines on surface of carapace, two on each side) *P. membranaceus*, Risso.
- C. Rostrum equal to carapace in length *P. foliaceus*, Risso.

3. On *Hyalonema lusitanicum*.

By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S. &c.

On January 24th, 1867, Dr. Gray read a paper at the Zoological Society entitled "Notes on *Hyalonema lusitanicum*, and on the Genus in general," announcing that Prof. Bocage had presented to the British Museum a specimen of the above-named species. The author adds, "I am enabled to state that I believe it to be a most distinct species from the *Hyalonema sieboldii* of Japan," or, in other words, from the species he formerly described as *H. mirabilis*, the structural specific differences said by the author to exist between the two species consisting of differences in the number of spicula in the spiral axis, and their diameter as compared with each other in the respective species; but as these differences in length, number, and diameter of the spicula exist to a very great extent between young and old specimens of *H. mirabile*, such characters cannot certainly be admitted as specific distinctions. His observations on the size and form of the so-called polypes are equally vague and uncertain; and the varieties in structure cited may be as readily found in different specimens of *H. mirabile* as in Prof. Bocage's specimen of *H. lusitanicum*.

There is an aphorism in natural history that no two individuals of the same species are ever exactly alike; and this observation applies with greater force to the protean forms of the *Spongiadae* than to any other class of animals existing. If the author had but carefully studied the axial columns of the numerous specimens of *H. mirabile* in his possession, he could not but have rejected such very uncertain characters as those he has adopted. The above are the only organic characters cited by the author in behalf of his opinions; and he then takes flight into the realms of imagination in support of his purely speculative ideas on the structure and habits of the interesting animal under consideration.

Sterne took his hypothetical prisoner and shut him up in a dungeon, and then described all his imaginary woes and sufferings most pathetically; so the Doctor took his *Hyalonema*, denuded him of

the most important portion of his body, his basal spongy mass, turned him upside down, so that his so-called polypes were situated at his supposed base, instead of at the upper part of his spiral column, and then turned him adrift a denizen of the wide ocean. With this imaginary constitution the poor animal could no longer be considered a *Hyalonema*; but this difficulty was readily to be got over, and the Doctor, with his usual facility in such operations, soon devised a new genus, founded on the imaginary characters he had himself created, which he has denominated *Hyalothrix*, and which he thus characterizes:—

“The polypes with forty tentacles in several concentric series, the outer series the largest. The axis, covered to the very base with the polype, bearing bark strengthened with cylindrical filiform siliceous spicules, and with a smooth external coat without any imbedded granules.”

Having thus imagined his animal, and fitted him with a new genus, the Doctor, with an artless simplicity that is really very charming, observes, “This genus is at once distinguished from *Hyalonema* by the coral not living with its base immersed in a sponge. It lives evidently free; but how it keeps itself in an erect position so that all the polypes round the axis may obtain food is yet to be discovered.”

But alas for the stability of this ingenious natural-history romance! The irresistible logic of facts has destroyed the whole edifice; for scarcely could the ink have dried with which Dr. Gray's imaginations were printed before Prof. Bocage announced that he had at last obtained a specimen of his *H. lusitanicum* with the basal sponge embracing the proximal uncovered end of the spiral column in the same manner as in the Japanese specimens. All reasoning upon Dr. Gray's imaginary animal now becomes superfluous, and we have only to deal with Prof. Bocage's specimens of *Hyalonema lusitanicum*.

Shortly after I had learned from Dr. Gray that Prof. Bocage had acquired a specimen of his species with the basal sponge adhering to it, I wrote to him on the subject, enclosing a small portion of the spongy base of my specimen of *H. mirabile*, figured in the ‘Proceedings of the Zoological Society,’ Part 1, Pl. IV. f. 2, for the year 1867, that he might compare its organic structures with those of the basal sponge of his *H. lusitanicum*, and begging the favour of a small portion of the basal sponge of his specimen. To this request he replied with much kindness and liberality, enclosing a piece of the sponge 4 lines in length by about 3 in width—a quantity, as it will be seen, amply sufficient to demonstrate accurately the structural characters and relations of the two species. The fragment of sponge is apparently from the surface of the specimen, as it is enveloped in the remains of a rather stout brown membrane. After examining the specimen in water, I disintegrated about half of it, and mounted the spicula in Canada balsam, and then mounted the remaining portion in the same material, in the state in which I had received it. The results of my examinations of it were most satisfactory. In the

piece mounted in its natural state the structure of the skeleton was distinctly exhibited, exactly resembling, in the forms of its component spicula and in the mode of their arrangement, those of the skeleton of the spongy base of *H. mirabile*. In the disintegrated portion I found no less than eight forms of spicula which exist in the basal sponge of *H. mirabile*, and which I have figured in the plates illustrating my paper on that species (Proc. Zool. Soc. 1867, p. 18). The spicula found were those represented in Plate V. by figures 2, 4, 6, 7, 8, 9, 18, and those of the skeleton. The only difference between the forms of spicula found in Prof. Bocage's specimen and those from *H. mirabile* is that those of the former are rather more slender in their proportions, indicating a young and not fully developed state of its organization.

The skeleton-spicula of *H. lusitanicum* are of about the same length as those of *H. mirabile*, but somewhat less in their diameter, and they have the same malformations of their apices that so commonly occur in those of the last-named species. In truth, the spicula of *H. lusitanicum* are so identical in form with those of *H. mirabile* that, without knowing whence they came, it would be impossible for an observer to say from which species they had been obtained. With these slight differences in the organization of the two specimens under consideration, there is little doubt in my own mind that they belong to one and the same species; and the slight discrepancies now apparent in the structure of *H. lusitanicum* will probably disappear when other perfect and more fully developed specimens are hereafter obtained and compared with *H. mirabile*; and in the consideration of these slight differences of structure the influence of their widely separated localities must also be taken into consideration.

Another strong argument against *H. lusitanicum* being a species distinct from *H. mirabile* is, that no form of spiculum can be detected in the spongy base of the former that is not abundantly present in the corresponding parts of the latter. As regards organic structure, there is no true specific distinction existing between them. Their differences amount only to those of development and such as may naturally arise from variations in climate and locality.

I have seen the specimen of *Hyalonema lusitanicum* in the British Museum that was presented by Prof. Bocage, through the sides of the glass tube in which it is carefully preserved. It is $21\frac{1}{4}$ inches long, and has 10 inches of the distal portion of the column covered with corium. The specimen is about $2\frac{1}{2}$ lines in diameter. There is the same paucity of sand in the crust that is observable in Mr. Lee's specimen, described by me in the Society's 'Proceedings' (1867, p. 350); and, as in that case, each osculum is situated in an elongate-oval area, in which, by the aid of a lens of 2 inches focus, the radiating fibres are readily to be seen. The oscula are none of them elevated to the same extent as in the Japanese specimens, but, like those in Mr. Lee's one, they project very slightly. The oval areas do not all coalesce at their respective boundaries; in some there is a small space of smooth corium separating them from each other.

Having disposed of his new genus *Hyalothrix*, Dr. Gray proceeds

to reiterate his belief that "*Hyalonema* is a type of a peculiar family of Corals, formed by zoanthoid polypes, characterized by forming for their support a siliceous axis formed of many thread-like spicules coiled together into a rope-like form, each formed of numerous concentric laminae, and surrounded and separated from one another by the corium of the community of polypes." I should not have noticed this reassertion of his opinions if he had not endeavoured to establish certain laws which are in themselves essentially false, and on which he bases his reasonings in favour of his own theory. In the first of these Dr. Gray asserts, "Silica is not exclusively secreted by sponges, as the advocates of the sponge-theory seem to believe, but is found mixed with corneous matter (as it is mixed in *Hyalonema* and *Euplectella*) in *Gorgonia* and *Antipathes*, and with calcareous matter in *Madrepores*."

In the first place, no one, to my knowledge, has ever asserted that silica is exclusively secreted by sponges; nor is the silica to be obtained from Corals and Gorgonias in the same state as it is in *Hyalonema* and *Euplectella*. In the former two it has never been discovered in an organized condition, while in the latter two it is always in that state.

Dr. Gray quotes the analysis by Mr. Children of *Gorgonia flabellum*, in which he found silica enough to form "a globule before the blowpipe;" and the Doctor says, "This proves that silica is found in the coral of *Aleyonaria* or polypes with pinnate tentacles."

But the results of this analysis by Mr. Children do not bear effectively on the point in dispute, which is whether polype-bearing animals secrete silex as well as carbonate of lime in an organized form as portions of their bony skeletons. There is no doubt that corals, Gorgonias, and zoophytes living in waters continually charged with minute grains of sand and with silex in solution would receive and retain within their fine pores numerous grains of that substance which would only be liberated and recognized by the chemical dissolution of those bodies. But this adventitious acquisition of silex by creatures whose organic structures are essentially calcareous is no proof of their power to secrete and organize silex as well as carbonate of lime; and Dr. Gray does not produce a single example of any polypiferous animal, either among the bony corals, the Gorgoniadæ, or zoophytes, secreting and organizing silex as part of their skeleton-structure. The difficulty of the purely siliceous structure of all parts of the skeleton and internal siliceous organs of *Hyalonema*, considered by Dr. Gray a coral, still remains to be solved by him; and among all the beautiful siliceous organized forms so familiar to microscopists of the present day there is not one that can be assigned to any polype-bearing animal, described or undescribed; and I believe that the animal power of organizing siliceous matter to form either an internal or an external skeleton will be found to be strictly confined to the great subkingdom of the Protozoa.

The second law that Dr. Gray enunciates is, "The structure of the siliceous spicules of sponges is very similar to, almost identical with, the structure of the axis of *Gorgonia* among the sclerobasic

alcyonoid, and of *Antipathes* among the sclerobasic zoanthoid polypes."

The fact of the general law of increment by means of concentric layers being common to the spicula and fibres of sponges and to the horny axes of the *Gorgoniadæ*, upon which the author lays so much stress, no more proves their relationship to each other than it would to the trees and herbs of the vegetable kingdom, or to the bones of the mammalia; and the reasonings deduced from this aphorism are so inconsequential as to render it quite unnecessary to pursue this portion of the subject any further.

The third position assumed by the author is, that "The spicules of sponges are only covered with sarcode; while the spicules of the *Hyalonema* are each surrounded by a layer of corium exactly like the inner surface of the bark or corium of the polypes."

The law thus attempted to be laid down is essentially incorrect, and could never have been enunciated by any one even moderately acquainted with the anatomy and physiology of the *Spongiadæ*. In all Halichondroid sponges, where the spicula are connected with each other the junctions are formed not by sarcode, but by masses of keratode closely enveloping the adjoining points of the spicula, much after the fashion of a plumber's joint; and in some genera, as in *Chalina*, the spicula are entirely immersed in the keratose fibres of the sponge, as represented in figures 262 and 263, pl. 13, vol. i. of 'Monograph of the British Spongiadæ.' The same structure obtains in the genus *Diplodemia*, as represented in pl. 14. f. 273, and also in the genera *Desmacidon* and *Raphyrus*, represented by figs. 264 and 265, pl. 13, of the same work. The premises attempted to be established by the author thus being proved to be essentially false, it is unnecessary to follow him through the series of reasonings which he has based upon them.

The fourth position assumed by the author is, that "The essential character of a sponge is, that it is permeated by canals for the circulation of the water, which is emitted by oscules; and there is no such structure in *Hyalonema*."

This law, as far as it concerns the structure of a sponge, is correct; but as regards the assertion that "there is no such structure in *Hyalonema*," I must leave my readers who are acquainted with the papers of Professors Brandt and Max Schultze and myself to form their own opinions on the subject.

The author's fifth law is, that "The attachment to the sponge appears to be the habit of a single species; for the Portuguese species, which agrees with the Japanese in most of its essential characters, lives free in the sea, and has the small end of the coral, which in the Japan species is sunk in the sponge, covered with polypes like the rest of the surface."

This position, after our knowledge of the acquirement by Prof. Bocage of a specimen of his *H. lusitanicum* with the basal mass of sponge attached to it, is effectually negatived by the inexorable logic of facts.

Dr. Gray, in his paper on "*Hyalonema lusitanicum*," read January Proc. Zool. Soc.—1867, No. LVIII.

24th, dismisses the consideration of my paper on "*Hyalonema mirabilis*," read on the 10th of January, in not the most courteous style imaginable. In a short note to his paper (p. 120) he observes, "Dr. Bowerbank has written a long and diffuse paper to attempt to prove his position, when a cut in the polype-cell would have settled the question. It is a pity he did not recollect King Charles's question about the fish and the water." This style of pooh-poohing disputed facts in natural history is neither just nor gentlemanly, and in the present case it is at variance with the truth. Dr. Gray was invited by me to be present at the reading of the paper on the 10th of January, but he declined to appear on that occasion. Had he been there he would have known that I had, not once only, but repeatedly, cut into his supposed polype-cells, and that the results of their examinations were duly described and their anatomical peculiarities figured in illustration of the descriptions of them. Neither then, nor since, has Dr. Gray attempted to disprove a single fact advanced by me in that paper.

In conclusion I may observe that, since the reading of a short supplemental paper on March 28th, entitled "Additional Observations on *Hyalonema mirabile*," I have been fortunate in obtaining from Mr. Jonathan Couch, of Polperro, several dried specimens of *Zoanthus couchii*, in which the polypes were living when dredged up at Shetland, and in which the motive fibres passing from the polypes have their distal extremities attached in a circle to the inner surface of the polype-case of the animal. The terminal portions of these fibres have a stout, dilated-cylindrical, and very fleshy appearance. They are attached to the inner surface of the mouth of the polypidom by their apices only; and from these points they pass inward to the upper part of the polype to which their bases are attached, and down the sides of which each of them may be traced for a considerable distance, gradually diminishing in diameter as they pass downward on the body of the animal.

As the end to be attained by means of these organs, in both *Zoanthus* and *Hyalonema*, is precisely the same, that of opening and closing a purse-like orifice on the apex of a cylindrical tube, Nature, as might have been expected, has adopted nearly the same mode of action in either case—that of a series of motive fibres, the distal ends of which are attached in a circle around the orifice to be contracted; and there is just that difference in their structure and mode of disposition that is appropriate to the conditions of each separate animal.

In *Hyalonema*, destitute of polypes, they are imbedded between the outer and inner tissues of the corium of the organ on which they are destined to operate; while in *Zoanthus* they are not immersed in the tissues of the case or polypidom of the animal, but are parts of the enclosed polype within it, and their distal ends only are attached to the oral opening of the external case, while the remaining portions of these organs are attached to the outer integument of the retractile polype within the polypidom.

These organs in *Zoanthus* are few in number, and very much

stouter than those of *Hyalonema*. No tentacles of the *Zoanthus* could be detected, the skin of the polype and the motive organs only remaining within the polypidom in a favourable condition for observation.

4. Description of a New Species of Land-shell belonging to the Genus *Cœliaxis*, H. Ad. and Angas. By H. ADAMS, F.L.S., and G. F. ANGAS, F.L.S., C.M.Z.S.

(Plate XLIII.)

In a paper read at the Meeting of the Society on the 10th January, 1865, we gave a description of a new species of Land-shell from the Cape of Good Hope, for which the subgeneric name *Cœliaxis* was proposed. Adult specimens of a second species, possessing a continuous peritreme and distinct parietal plate, have since been received by us from the Solomon archipelago, from which it would appear that *Cœliaxis* must be considered a distinct genus, having more affinity with *Gibbulina* and *Ennea* than with *Subulina*, to which we at the time referred it. Of the species upon which *Cœliaxis* was founded, only two examples, in the British Museum Collection, have the apertures at all complete. In one of these there is no trace of any parietal plate; while in the other, which is rather more mature, a callosity or tubercle, considered at the time accidental, exists, thus rendering it probable that in quite mature examples of this species the parietal plate will also be found distinctly developed, and the peritreme of the aperture continuous.

Genus CÆLIAXIS, nob. (char. emend.).

Testa umbilicata, turrita, oblique costulata; spira plerumque decollata; apertura plica parietali vel tuberculo munita; perist. continuum, simplex, rectum.

CÆLIAXIS EXIGUA, nob. (Pl. XLIII. figs. 16, 17, p. 890.)

C. testa anguste et profunde umbilicata, cylindraceo-turrita, tenui, oblique costulato-striata, pallide fulva; spira decollata, superne attenuata; anfr. superst. 11, subplanatis, ultimo costa basali sulcum interiorem angustum formante; apertura subverticali, rhomboidea, plica parietali spirali in medio posita; perist. simplici, continuo, soluto, margine columellari expanso.

Long. 17 mill., diam. 4 mill., ap. 4 mill. longa.

Hab. Solomon archipelago.

5. On a New Genus and some New Species of Marine Mollusca from Port Jackson, New South Wales. By GEORGE FRENCH ANGAS, F.L.S., C.M.Z.S. &c.

(Plate XLIV.)

Genus ALICIA, Angas.

Shell inequivalve, transversely ovate, thin, slightly compressed, not gaping; beaks entire, interior subnacreous. Hinge composed of a posterior more or less prominent callus in the right valve, fitting into a corresponding depression in the left valve, and an anterior elongated marginal lamellar tooth or ridge; cartilage internal, situated perpendicularly under the umbones, and covered by a large triangular ossicle. Muscular impressions moderate; pallial line sinuated.

This genus has much the appearance externally of *Periploma*, but the ossicle is large and triangular as in *Lyonsia*. It differs from both genera in the cartilage not being supported by projecting spoon-shaped processes, and in its being perpendicular to the umbones.

ALICIA ANGUSTATA, n. s. (Pl. XLIV. fig. 1.)

Shell elongately oblong, white, surface of valves (under the lens) very finely decussated, inequilateral; anterior side five-sixths the length of the shell, rounded at the extremity, the dorsal margin slightly convex; posterior side truncate at the extremity, the dorsal margin incurved, umbonal slope angulated; ventral margin almost straight. The hinge with the posterior callus in the right valve prominent and tooth-like, and the corresponding depression in the left valve bordered by a slightly raised ridge. Pallial sinus deep, extending to half the length of the shell.

Long. $6\frac{1}{2}$, alt. 3, lat. $1\frac{1}{2}$ lines.

Hab. Port Jackson. Dredged inside South Head Reef.

ALICIA ELEGANTULA, n. s. (Pl. XLIV. fig. 2.)

Shell oblong, white, obsoletely concentrically plicate, very minutely decussated, inequilateral; anterior side three-fifths the length of the shell, rounded; posterior side roundly truncate, the dorsal margin concave, umbonal slope angulated; ventral margin convex. The hinge with the posterior callus almost obsolete. Pallial sinus deep, extending to the umbones.

Long. $5\frac{1}{2}$, alt. 3, lat. $1\frac{1}{2}$ lines.

Hab. Port Jackson. Dredged between Watson's Bay and "Sow and Pigs" reef.

THRACIA MODESTA, n. s. (Pl. XLIV. fig. 3.)

Shell ovate, thin, white, rather ventricose, surface of valves irregularly concentrically striate, inequilateral, beaks posterior; anterior side rotundate; posterior side obliquely truncate, the dorsal margin

nearly straight, the umbonal slope angulated; ventral margin convex. The hinge with the cartilage processes small. Pallial sinus extending beyond the umbones.

Long. 7, alt. $4\frac{1}{2}$, lat. $2\frac{1}{2}$ lines.

Hab. Dredged off Ball's Head, Port Jackson, in 15 fathoms.

DOSINIA PUELLA, n. s. (Pl. XLIV. fig. 4.)

Shell small, orbicular, rather thick, moderately convex, whitish, finely and closely irregularly concentrically striated; umbones somewhat produced and approximate; ligamental area but slightly excavated; lunule small, superficial, not impressed.

Long. 6, alt. 6, lat. 3 lines.

Hab. Botany Bay, New South Wales.

SUNETTA ADELINÆ, n. s. (Pl. XLIV. fig. 5.)

Shell smooth, elongately ovate, anterior side rounded, posterior slightly truncate; ventral margin somewhat bulged in the middle, a little tumid towards the umbones, whitish, painted with angular chocolate markings along the posterior slope, with a few of the same description, but fainter, proceeding downwards from the umbones, and covered towards the margins with a very slight pale olive epidermis; ligamental area narrowly excavated; lunule strongly defined and narrow, with the lips projecting beyond the line of the dorsal slope; interior white, tinged with flesh-colour, edges of the valves finely crenated within.

Long. 8, alt. 6, lat. 3 lines.

Hab. Dredged in deep water near Port-Jackson Heads.

This species differs from *Meroë hians*, Reeve (from Cochin China), in being smaller, much less tumid, more rounded at the ventral margin, and somewhat truncate posteriorly; the lunule also is prominent and projecting, whereas in *M. hians* it is flat; and the dark purple spot so characteristic of the interior of the latter is wanting in the species described above.

SPISULA CRETACEA, n. s. (Pl. XLIV. fig. 6.)

Shell triangularly ovate, solid, rough, chalky-white, rudely concentrically striated; umbones nearly central, acute, approximate; basal margin arcuate; anterior side rounded; posterior side slightly angled, and obtusely keeled from the umbones; the dorsal area broad, with the margin slightly arcuate; lateral teeth elongate and strongly cross-ribbed on both sides.

Long. 9, alt. $6\frac{1}{2}$, lat. 5 lines.

Hab. Dredged at Port Stephen, off Tarlee.

SPISULA PRODUCTA, n. s. (Pl. XLIV. fig. 7.)

Shell small, rather solid, ovately cuneiform, white, finely irregularly concentrically striated, and covered with a thin membranaceous epidermis towards the sides and basal margin; umbones tumid, acute, approximate; anterior side rounded, shorter; posterior side pro-

duced, somewhat beaked, obtusely keeled from the umbones; lateral teeth finely serrated.

Long. 7, alt. 5, lat. 3 lines.

Hab. Johnson's Bay and Parramatta River, Port Jackson.

This species resembles in external appearance the *Macra lateralis* of Say, from South Carolina; it is, however, flatter and less sharply keeled, with the posterior dorsal slope longer and straighter, and the umbones closer together, whilst the serrated character of the lateral teeth would alone distinguish it from the American shell.

LORIPES ASSIMILIS, n. s. (Pl. XLIV. fig. 8.)

Shell somewhat triangularly orbicular, rather inflated, slightly superficially excavated at the anterior side, solid, whitish, concentrically very finely elevately striated throughout; margins crenate; cartilage in an oblique groove of the hinder hinge-margin.

Long. 6, alt. 6, lat. $3\frac{1}{4}$ lines.

Hab. New South Wales; and Hobson's Bay, Port Philip.

This species differs from *L. icterica*, Reeve, in being more solid and inflated, more strongly concentrically ridged, and in the absence of the diverging radiate striæ of the latter.

MYSIA (FELANIA) ADAMSI, n. s. (Pl. XLIV. fig. 9.)

Shell depressly orbicularly elongate, white, shining, covered with a very thin transparent horny epidermis; concentrically very finely irregularly striated, smooth and polished at the umbones; lunule very small; margins simple. Hinge with two teeth in each valve, one of which is bifid.

Long. 6, alt. $6\frac{1}{2}$, lat. $3\frac{1}{2}$ lines.

Hab. Port Jackson. Dredged in deep water.

MYSIA (FELANIA) JACKSONIENSIS, n. s. (Pl. XLIV. fig. 10.)

Shell triangularly depressly orbicular, posterior side rounded, anteriorly somewhat obliquely produced, pale rosy flesh-colour, covered with a light-green shining epidermis; umbones produced, approximate; concentrically finely irregularly striate, the lines of growth strongly impressed at intervals; interior pinkish.

Long. 4, alt. $4\frac{1}{4}$, lat. $2\frac{1}{2}$ lines.

Hab. Dredged in deep water in Port Jackson.

LEPTON ADAMSI, n. s. (Pl. XLIV. fig. 11.)

Shell triangularly ovate, rather convex, inequilateral, milky white, somewhat transparent, thin, shining; surface of valves finely concentrically striated, and minutely shagreened anteriorly and posteriorly, smooth in the middle; anterior side short, rounded; posterior side ovate, widely plicate towards the margin; umbones prominent and slightly oblique; superior margin convex; the inferior margin straight.

Long. $6\frac{1}{2}$, alt. 5, lat. $2\frac{3}{4}$ lines.

Hab. Port Jackson.

MODIOLARIA BARBATA, n. s. (Pl. XLIV. fig. 12.)

Shell small, oblong-ovate, more or less convex, whitish, covered with a yellowish-green horny epidermis, which becomes long, thick, and fibrous posteriorly; the valves very finely concentrically irregularly striated, and decussated with elevated radiating ribs, which are obsolete near the middle.

Long. 5, alt. 2, lat. $1\frac{1}{2}$ lines.

Hab. Botany Bay, New South Wales.

OSTREA VIRESCENS, n. s. (Pl. XLIV. fig. 13.)

Shell solid, orbicular, inequivalve, with the margins of the valves crenulately frilled. Superior valve smaller, flattened, radiately plicate, and laminately scaled, whitish, irregularly striped with purplish brown; inferior valve larger, the cavity deep; interior greenish olive, paler at the margins; cardinal area large, triangular, and flattened.

Long. $1\frac{3}{4}$, lat. $1\frac{1}{2}$ inch.

Hab. Attached to rocks and madrepores at low spring tides at Watson's Bay, Port Jackson.

CROSSEA CONCINNA, n. s. (Pl. XLIV. fig. 14.)

Shell narrowly umbilicate, turbinate, rather solid, white, semipelucid; spire raised, suture distinct; whorls five, rounded, the first three transversely ribbed and longitudinally striated, the remainder transversely punctate-striate; umbilicus bordered by a rounded callosity; aperture circular, with a channelled angular projection in front; outer lip simple, the margin acute.

Diam. 2 lines, height $1\frac{1}{2}$.

Hab. "Sow and Pigs" reef, Port Jackson, from 2 to 4 fathoms.

This species has much the form of *C. bellula*, A. Ad., but differs in size, being considerably larger, and in the sculpture of the whorls; the angular projection of the aperture also is not so strongly developed. The only two species of the genus hitherto known were obtained by Mr. Arthur Adams from the Gotto Islands in Japan.

DESCRIPTION OF PLATE XLIV.

Fig. 1. *Alicia angustata*, p. 908.

2. — *elegantula*, p. 908.

3. *Thracia modesta*, p. 908.

4. *Dosinia puella*, p. 909.

5. *Smetia adelina*, p. 909.

6. *Spisula cretacea*, p. 909.

7. — *producta*, p. 909.

Fig. 8. *Loripes assimilis*, p. 910.

9. *Felania adamsi*, p. 910.

10. — *jacksoniensis*, p. 910.

11. *Lepton adamsi*, p. 910.

12. *Modiolaria barbata*, p. 911.

13. *Ostrea virescens*, p. 911.

14. *Crossea concinna*, p. 911.

6. A List of Species of Marine Mollusca found in Port Jackson Harbour, New South Wales, and on the adjacent Coasts, with Notes on their Habits &c. By GEORGE FRENCH ANGAS, F.L.S., C.M.Z.S. &c.—Part II.*

[The length, as given in inches or lines, must be understood to represent the extreme measurement of the shell.

Those species marked with an asterisk (*) have been described from specimens in my own collection.—G. F. A.]

Class CONCHIFERA.

Order PHOLADACEA.

Fam. GASTROCHENIDÆ.

1. BRYOPA (DACOSTA) AUSTRALIS.

Clavagella australis, Sow.

Found burrowing in sandstone rocks, at very low tide, near Port-Jackson Heads. The tube, which is simple, projects outwards from 1 to 2 inches. The valves are hidden in the dilated hinder part of the tube, below the surface of the rock.

2. HUMPHREYIA STRANGEI.

Aspergillum strangei, A. Ad. P. Z. S. 1852, p. 91, pl. 15. f. 5.

Of this singular form three or four specimens were obtained by the late Mr. F. Strange, and one by myself, at Watson's Bay, Port Jackson. The tube, which is merely an expansion and modification of the valves, is curved and obtusely carinated on each side. It is found attached to the flat surface of rocks at the bottom of pools, projecting upwards amongst the pebbles and sand, at extremely low spring tides. Length of the tube 2 inches 4 lines.

Fam. SOLENIDÆ.

3. SOLEN SLOANII.

Solen sloanii, Gray, in Brit. Mus., Hanley, Sp. of Shells, p. 12.

? *Solen philippianus*, Dunker.

A pretty species, mottled with purplish flesh-colour like *S. vaginoides*, Lam., from Tasmania; it is, however, a narrower shell, and not curved like the latter. Length $3\frac{1}{4}$ inches. Burrowing in the sand at Middle Harbour &c.

4. CULTELLUS AUSTRALIS.

Cultellus australis, Dunker, P. Z. S. 1861, p. 423.

Dredged in Lane-Cove River, Port Jackson. Length $1\frac{1}{4}$ inch. Found also at Moreton Bay and Port Curtis, where it attains the length of 3 inches.

* Continued from p. 233.

Fam. SAXICAVIDÆ.

5. SAXICAVA AUSTRALIS.

Saxicava australis, Lam. Anim. sans Vert. vi. p. 153.

Found amongst crevices of rocks at low water in Port Jackson. It is extremely variable in form, like the other species of the genus. Length 10 lines.

Fam. CORBULIDÆ.

6. CORBULA TUNICATA.

Corbula tunicata, Hinds, P. Z. S. 1843.

This fine species has the left valve, which is much the largest, deeply grooved over its entire surface. The right valve is grooved near the umbo only. Dredged in 5 to 7 fathoms in Port Jackson. Also from the Philippines (Cuming), and the Straits of Macassar and L'Agulhas Bank (Hinds). Length 1 inch.

7. CORBULA NASUTA.

Corbula nasuta, Sow. P. Z. S. 1833.

It is impossible to separate this species from *C. nasuta*, Sow., which comes from the Gulf of Nicoya. Dredged in Port Jackson. Length 10 lines.

8. CORBULA SCAPHOIDES.

Corbula scaphoides, Hinds, P. Z. S. 1833.

Dredged in Port Jackson. Length 6 lines.

9. CORBULA ZELANDICA.

Corbula zeylandica, Quoy et Gaim. Voy. de l'Astrol.

? *C. catlowæ*, Reeve, P. Z. S. 1844.

Dredged in Middle Harbour. Length 6 lines. It occurs also in New Zealand and at Moreton Bay.

Fam. ANATINIDÆ.

10. ANATINA CRECCINA.

Anatina creccina, Valenciennes, MS. in Mus. Cuming; Reeve, Conch. Icon. *Anatina*, pl. 2. f. 12.

In this species the posterior portion of the valves is widely gaping and curved upwards. It is found in sandy mud at Illawarra Lake, Port Stephen, and Port Jackson. Length 1 inch 10 lines.

11. ANATINA TASMANICA.

Anatina tasmanica, Reeve, Conch. Icon. *Anatina*, pl. 3. f. 20.

More ovate than the preceding, with the umbones nearly central. From sandy mud in Port Jackson. Length 2 inches.

12. *ANATINA PROLONGATA.*

Anatina prolongata, Reeve, Conch. Icon. *Anatina*, pl. 4. f. 28.

A thin narrow species, with the valves produced posteriorly and ridged throughout. Dredged in sandy mud near Spectacle Island, Parramatta River. Length 9 lines.

13. **ALICIA ANGUSTATA.*

Alicia angustata, Angas, *anteà*, p. 908, Pl. XLIV. f. 1.

In this genus the ossicle is large and triangular as in *Lyonsia*; but the cartilage is not supported by projecting spoon-shaped processes, and is perpendicular to the umbones. The shells externally somewhat resemble *periploma*, and are thin, white, and abruptly truncate at the posterior side. Dredged inside South Head reef. Length $6\frac{1}{2}$ lines.

14. **ALICIA ELEGANTULA.*

Alicia elegantula, Angas, *anteà*, p. 908, Pl. XLIV. f. 2.

More rounded than the preceding species, with the umbones more central. Dredged between Watson's Bay and the "Sow and Pigs" reef. Length $5\frac{1}{2}$ lines.

15. *THRACIA ANATINOÏDES.*

Thracia anatinoïdes, Reeve, Conch. Icon. *Thracia*, pl. 3. f. 12.

Roundly ovate, thin, and convex, shortly angled posteriorly, and broadly rounded in front. Dredged in Port Jackson. Length 1 inch.

16. *THRACIA AUSTRALICA.*

Thracia australica, Reeve, Conch. Icon. *Thracia*, pl. 3. f. 13.

A somewhat depressed species, with the aspect of a *periploma*. Dredged in Port Jackson. Length 9 lines.

17. **THRACIA MODESTA.*

Thracia modesta, Angas, *anteà*, p. 908, Pl. XLIV. f. 3.

A small ovate species, with the posterior side very obliquely truncate. Dredged off Ball's Head, Port Jackson, in 15 fathoms. Length 7 lines.

18. *NEÆRA (RHINOMYA) RUGATA.*

Rhinomya rugata, A. Ad. Ann. & Mag. Nat. Hist. 3rd ser. vol. xiii. p. 207.

An elegant little shell, largely rostrate, and concentrically ridged throughout. Dredged at the "Sow and Pigs" reef. Length $3\frac{1}{2}$ lines. The type specimen of this species was dredged by Mr. A. Adams at Tabu Sima, in Japan.

19. *THEORA NITIDA.*

Theora nitida, Gould, 'Otia,' p. 162.

A thin, hyaline shell, with the valves attenuate posteriorly; the

hinge with a small spoon-shaped process projecting inwards. Dredged in Port Jackson, in deep water. Length 6 lines.

20. MYODORA CRASSA.

Anatina crassa, Stutchbury, Zool. Journ. v. p. 100, Tab. Suppl. 43. f. 5, 6.

A thick, triangular species, with both valves transversely ribbed. Dredged in Middle Harbour. Length 6 lines.

21. MYODORA PANDORÆFORMIS.

Anatina pandoræformis, Stutchbury, Zool. Journ. v. p. 99, Tab. Suppl. 43. f. 3, 4.

The striæ on the right or flattened valve are very fine and smooth. Dredged in Middle Harbour on a sandy bottom. Length 10 lines.

22. MYODORA OVATA.

Myodora ovata, Reeve, Conch. Icon. *Myodora*, pl. 1. f. 4.

Shorter than the preceding species, with the striæ on both valves raised and prominent. Dredged in Port Jackson. Length 7 lines.

This species occurs in Port-Adelaide Creek, South Australia; and also in the Philippines, according to Cuming.

23. MYODORA BREVIS.

Anatina brevis, Stutchbury, Zool. Journ. v. p. 99, Tab. Suppl. 43. f. 1, 2.

A very elegant, thin, triangular-shaped shell, with the left valve flexuously striated anteriorly. Dredged in Lane Cove, Farm Cove, and Mossman's Bay. Length 1 inch.

24. MYOCHAMA ANOMIOIDES.

Myochama anomioides, Stutchbury, Zool. Journ. v. pl. 42. f. 1-4.

This remarkable shell is usually found attached to the living shells of *Trigonia lamarecki*. It varies in form, is of a pinkish colour, and in its sculpture partakes somewhat of that of the shell on which it is parasitic. Dredged near the "Sow and Pigs" reef, in Port Jackson. Length 9 lines.

25. MYOCHAMA STRANGEI.

Myochama strangei, A. Ad. P. Z. S. 1852, pl. 15. f. 2.

An oblong, wrinkled species, of a blackish colour, found attached to stones or dead shells. Dredged in Port Jackson (inside the North Head), but of very rare occurrence. Length 1 inch.

26. CHAMOSTREA ALBIDA.

Chama albidu, Lam.

Cleidotherus chamoides, Stutchbury, Zool. Journ. p. 98, Tab. Suppl. 42. f. 5-8; Sow. Gen. of Shells, f. 1-3.

This curious genus, of which one species only is known, is pecu-

liar to Australia. The valves are connected internally by an ossicle in the cartilage, are rough outside, and somewhat pearly within. The left valve is nearly flat and triangular; whilst the right one is convex, and attached by its front slope to the upper surface of flat sandstone rocks which are laid bare at low water. It occurs near Port-Jackson Heads. I have also procured fine large specimens from Port Lincoln, in South Australia. Length $2\frac{1}{2}$ inches.

Order VENERACEA.

Fam. MACTRIDÆ.

27. TRIGONELLA CONTRARIA.

Macra contraria, Desh. P. Z. S. 1854; Reeve, Conch. Icon. *Macra*, pl. 17. f. 86.

Somewhat like *M. rufescens*, Lam., but flatter and more beaked at the sides, with the umbones smooth, and stained with two violet rays. Rare in Port Jackson. Length $1\frac{3}{4}$ inch.

28. TRIGONELLA LUZONICA.

Macra luzonica, Desh. P. Z. S. 1854; Reeve, Conch. Icon. *Macra*, pl. 16. f. 81.

A neat species, more or less rayed with brown, and tinged with purple at the umbones. Dredged in Middle Harbour on a sandy bottom, also in Botany Bay. Length 1 inch 3 lines.

29. TRIGONELLA PUSILLA.

Macra pusilla, A. Adams, P. Z. S. 1855, p. 226.

A pretty, little, shining species, either white or rayed with brown. Dredged in Middle Harbour along with the foregoing. Length 7 lines.

30. *SPISULA CRETACEA.

Spisula cretacea, Angas, *antè*, p. 909, Pl. XLIV. f. 6.

A dull-white, chalky-looking shell, not unlike in form to the British *S. subtruncata*. Dredged in Port Stephen. Length 10 lines.

31. SPISULA CORBULOIDES.

Macra corbuloides, Desh. P. Z. S. 1854; Reeve, pl. 19. f. 103.

? *Macra rostrata*, Spengler, Skrift. Nat. Selsk. v. p. 115.

A stout, gibbous, trigonal species, strongly keeled from the umbones, and covered with a pale greenish-olive epidermis. Dredged in Illawarra Lake. Length 11 lines. A dwarf variety is found in Rushcutter's Bay, Port Jackson, and also at Moreton Bay; it measures 5 lines in length.

32. *SPISULA PRODUCTA.

Spisula producta, Angas, *antè*, p. 909, Pl. XLIV. f. 7.

A small, whitish, triangular, somewhat compressed species, pro-

duced posteriorly. Found in the mud at Johnson's Bay, and on the banks of the Parramatta River. Length 7 lines.

Subfam. LUTRARIINÆ.

33. LUTRARIA DISSIMILIS.

Lutraria dissimilis, Desh. P. Z. S. 1854; Reeve, Conch. Icon. *Lutraria*, pl. 2. f. 8.

Like *L. rhynchæna*, Jonas, but less curved and gaping. In sandy mud, Middle Harbour. Washed up on the beach at Edward's Bay occasionally after storms. Length 3 inches 9 lines.

34. ?STANDELLA OVALINA.

Mactra ovalina, Lam. Anim. sans Vert. vi. p. 104.

A smooth, ovate, whitish shell, rather gaping posteriorly, with the hinder slope narrowly keeled. Dredged in Middle Harbour. Length 1 inch 5 lines. This species occurs also at Port Phillip.

35. ZENATIA ACINACES.

Lutraria acinaces, Quoy & Gaim. Voy. de l'Astrol. iii. p. 545, t. 83. f. 5, 6; Reeve, Conch. Icon. *Lutraria*, pl. 4. f. 14.

A large, oblong, compressed shell, resembling a flattened *Lutraria*, with the umbones anterior; covered at the sides with an olive-brown epidermis. Botany Bay, very rare. Length 4 to 5 inches. Also from New Zealand, according to Quoy, Earl, and Dieffenbach.

Fam. TELLINIDÆ.

36. GARI (PSAMMOCOLA) TOGATA.

Psammobia togata, Desh. P. Z. S. 1854, p. 318.

A large ovately transverse shell, obliquely truncate posteriorly, white, and clothed with a strong olive-green epidermis, more or less eroded at the umbones. Length $3\frac{1}{2}$ inches. Port Jackson, Port Essington, and the Philippines.

Externally this shell has somewhat the aspect of a *Glauconomya*, and may be regarded as the type of a distinct group of the family *Tellinidæ*.

37. GARI MALACCANA.

Psammobia malaccana, Reeve, Conch. Icon. pl. 6. f. 42.

A shining white species, delicately sculptured with oblique grooved striæ, which suddenly terminate on the posterior side. Length 1 inch 3 lines. Dredged at Lane Cove, Port Jackson; also Port Denison, and Malacca (Cuming).

38. GARI ZONALIS.

Psammobia zonalis, Lam. Anim. sans Vert. vi. p. 182.

A compressed species, of a pale livid-brown colour, rayed with white. Length 1 inch. Middle Harbour; also Tasmania.

39. GARI (AMPHICHÆNA) MENKEANA.

Psammodia menkeana, Reeve, Conch. Icon. pl. 6. f. 43.

A pretty little species, somewhat resembling the British *P. tellinella*, Lam., of a yellowish or purplish white, faintly rayed with pale rose-colour. Length 11 lines. Dredged near the "Sow and Pigs" reef and in Middle Harbour.

40. HIATULA EPIDERMIA.

Soletellina epidermia, Desh.; Reeve, Conch. Icon. pl. 1. f. 3.

A somewhat rounded species, livid purple or orange near the umbones, and covered with an olive epidermis. Length $2\frac{1}{2}$ inches. This species ranges commonly from Port Jackson to Swan River.

41. HIATULA BIRADIATA.

Solen biradiatus, Wood, Gen. Conch. pl. 33. f. 1.

Flatter and more elongated than the preceding species, zoned with livid purple, with two white rays posteriorly and an olive-green epidermis. Length 1 inch 9 lines. Middle Harbour. This is a common species in the South-Australian gulfs.

42. HIATULA FLORIDA.

Psammodia florida, Gould, Expedition, Shells, Proc. Boston Nat. Hist. Soc. 1846.

Soletellina donacioïdes, Reeve, Conch. Icon. pl. 3. f. 11, 1857.

A transversely oblong thin species, livid purple, paler anteriorly, with two faint posterior rays, and covered with a dark transparent horny epidermis. Length 15 lines. Dredged in Illawarra Lake in brackish water.

43. TELLINA (TELLINELLA) DELTOIDALIS.

Tellina deltoidalis, Lam. Anim. sans Vert. vi. p. 206.

T. lactea, Quoy.

A flattened, rounded, white shell, beaked posteriorly. Dredged in Illawarra Lake and Botany Bay. Length $1\frac{1}{2}$ inch. This species varies greatly in size and aspect, and has a wide range over the southern portion of Australia, Tasmania, and New Zealand. All the specimens obtained in the Illawarra Lake are tinged with flesh-colour.

44. *TELLINA (ARCOPIAGIA) ELLIPTICA.

Tellina elliptica, Sow. in Conch. Icon. *Tellina*, pl. 39. f. 223.

A small, white, ovate, and somewhat flattened species, with the posterior side the shorter. Dredged in Port Jackson. Length 5 lines.

45. *TELLINA (? MACOMA) SUBELLIPTICA.

Tellina subelliptica, Sow. in Conch. Icon. *Tellina*, pl. 39. f. 220 a, b.

Rounder and more inflated than the preceding, with the umbones central; finely concentrically ridged; white or livid purple. Dredged at Watson's Bay in 3 fathoms. Length 5 lines.

46. **TELLINA* (*MÆRA*) *SEMITORTA*.

Tellina semitorta, Sow. in Conch. Icon. *Tellina*, pl. 39. f. 221 *a, b*.

A small, elongately ovate, bean-shaped species, very short posteriorly, and finely concentrically grooved throughout, pale yellowish or pinkish white. Dredged in Port Jackson. Length 6 lines.

47. *TELLINA* (*ANGULUS*) *TICAONICA*.

Tellina ticaonica, Desh. P. Z. S. 1854, p. 358.

A nearly smooth, pale rose-coloured, shining species. Dredged at Lane Cove. Length 5 lines. Found also in the Philippines.

48. **TELLINA* *TENUILIRATA*.

Tellina tenuilirata, Sow. in Conch. Icon. *Tellina*, pl. 39. f. 219 *a, b*.

A small elegantly shaped shell, somewhat beaked and truncate behind, and finely lirate throughout, white and shining, sometimes carnation-red. Dredged at the "Sow and Pigs" bank. Length 6 lines.

49. **TELLINA* (*ANGULUS*) *UNIFASCIATA*.

Tellina unifasciata, Sow. in Conch. Icon. *Tellina*, pl. 29. f. 156.

A thin flattened species, smooth and shining anteriorly, and delicately one-rayed, with pink at the posterior slope. In aspect very like *T. exilis*, Lam., from Japan, which is pink, with two white rays posteriorly. Dredged in Port Jackson. Length $5\frac{1}{2}$ lines.

50. *TELLINA* (*ANGULUS*) *LILIUM*.

Tellina lilium, Hanley, P. Z. S. 1844; Thes. Conch. *Tellina*, pl. 58. f. 85.

A pure-white species, nearly smooth, with the posterior area grooved. Dredged at Lane Cove. Length 8 lines.

51. **TELLINA* *SEMIPLANA*.

Tellina semiplana, Sow. in Conch. Icon. *Tellina*, pl. 39. f. 222 *a, b*.

A smooth, flattened, white species, with but little character. Dredged in Port Jackson. Length 1 inch.

52. **TELLINA* *SEMIFOSSILIS*.

Tellina semifossilis, Sow. in Conch. Icon. *Tellina*, pl. 41. f. 237.

A rough-looking, somewhat ovately formed species, more or less eroded at the umbones, yellowish white, here and there rudely concentrically ridged. Johnson's Bay, Port Jackson, on mud at low water. Length 9 lines.

Subfam. DONACINÆ.

53. DONAX (LATONA) DELTOIDES.

Donax deltoides, Lam. Anim. sans Vert. vi. p. 241.

D. epidermia, Lam.; Reeve, Conch. Icon. *Donax*, pl. 1. f. 4 *a*, *b*.

This fine species is abundant on most of the sandy beaches of Australia which are exposed to the surf. It ranges from Swan River to Moreton Bay. In colour it varies from greenish olive to purple, and sometimes orange-yellow. Outer Manly Beach, in sand at low water. Length $2\frac{1}{2}$ inches.

Subfam. PAPHIINÆ.

54. DONACILLA ELONGATA.

Mesodesma elongata, Desh.; Reeve, Conch. Icon. *Mesodesma*, pl. 1. f. 5.

Triangularly elongated, and at the posterior side short and truncated; covered with a shining yellowish-olive epidermis. Buried in sand at low tide. Botany Bay. Length 1 inch 1 line. This species has a wide range to South Australia, Tasmania, and Swan River.

55. *DONACILLA OBTUSA.

Mesodesma obtusa, Crosse & Fischer, Journal de Conch. 1864, p. 350.

An ovate species, of a waxy white, roundly truncate behind, and compressed and wedge-shaped in front, with a light-brown epidermis towards the margins. From the Sand-spit, Middle Harbour. Length 9 lines. This species is common at Port Lincoln, in South Australia.

Fam. VENERIDÆ.

Subfam. VENERINÆ.

56. VENUS LAQUEATA.

Venus laqueata, Sow. Thes. Conch. xi. pl. 153. f. 15; Reeve, Conch. Icon. *Venus*, pl. 6. f. 20.

This noble species is characterized by the concentric ridges forming erect crenated frills, the interstices between which are regularly longitudinally ribbed. Colour pale fulvous, sometimes rayed with four indistinct brown bands. Dredged in sandy mud in Port Jackson. Length 3 inches. Found also at Moreton Bay.

57. CHIONE STRIATISSIMA.

Venus striatissima, Sow. Thes. Conch. p. 44, pl. 157. f. 103-105; Reeve, Conch. Icon. *Venus*, pl. 26. f. 135.

A pretty little pointed ovate species, cancellated with concentric waved ridges and longitudinal striæ; in general aspect somewhat like the British *V. ovata*, Penn. Dredged at Watson's Bay &c. Length 8 lines.

58. CHIONE (CIRCOMPHALUS) ROBORATA.

Venus roborata, Hanley, P. Z. S. 1844, p. 161; Reeve, Conch. Icon. *Venus*, pl. 23. f. 113.

A solid, rounded species, less inflated than *V. calophylla*, of a waxy-white colour, with the concentric ridges very numerous, thickened, and curved inwards. A single example only of this shell was dredged at the "Sow and Pigs" bank, Port Jackson; in Tasmania it is of frequent occurrence. Length 1 inch 2 lines*.

59. CHIONE (CIRCOMPHALUS) CALOPHYLLA.

Venus calophylla, Hanley, Recent Shells, App. p. 361, pl. 16. f. 26; Reeve, Conch. Icon. *Venus*, pl. 23. f. 114.

A very elegant species, with distant, thin, erect frills, the surface of the valves between which is smooth; white or pale flesh-colour. Dredged in black mud at the mouth of Lane Cove, and at Port Stephen. Length $1\frac{1}{2}$ inch. This shell may at once be distinguished from the still more beautiful *V. lamellata*, Lam. (from South Australia), by its rounded form, smaller size, and the erect frills being nearly smooth, and not grooved on their undersides.

60. CHIONE (CIRCOMPHALUS) ALATUS.

Venus alatus, Reeve, Conch. Icon. *Venus*, pl. 18. f. 83.

A solid, nearly smooth species, broadly rayed with pale brown, with a few erect ridges at the posterior side. The young shells are more or less distantly ridged throughout. From deep water on the coast, at Wollongong, Port Stephen, &c. Length 2 inches 3 lines. I obtained several specimens of this species on the beach at Porirua, Cook's Straits, New Zealand.

61. CHIONE (TIMOCLEA) AUSTRALIS.

Venus australis, Sow. Thes. Conch. p. 48, pl. 157. f. 111, 112; Reeve, Conch. Icon. *Venus*, pl. 22. f. 107.

A pretty, ovate species finely ridged and cancellated, and blotch-rayed with chestnut. Interior rose-purple. Dredged at Watson's Bay. Length 1 inch 3 lines. It occurs also in South Australia and at Swan River.

62. CHIONE (MARCIA) FUMIGATA.

Venus fumigata, Sow. Thes. Conch. p. 102, pl. 159. f. 152-155; Reeve, Conch. Icon. *Tapes*, pl. 7. f. 31.

A somewhat inflated, ovate species, acuminate produced posteriorly, smooth, and of a light olive-grey colour throughout, with the posterior slope of the dorsal margin grooved. Dredged in Illawarra Lake. Length $1\frac{1}{2}$ inch.

* The *Venus isabellina*, Phil. (Reeve, Conch. Icon. pl. 23. f. 112), stated to come from "Sydney," I have never met with there. My specimens are from Port Curtis. It seems to be intermediate between *V. calophylla*, Hanl., and *V. dysera*, Chemn., the latter a well-known Chinese species, which Mr. Reeve curiously ignores.

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63. CHIONE (MARCIA) LÆVIGATA.

Venus lævigata, Sow. Thes. Conch. p. 103, pl. 159. f. 156-158.

Flatter and less beaked than the preceding species, painted with two or three zigzag rays from the umbones, and wanting the characteristic grooving of the posterior dorsal slope. Dredged in mud in Port Jackson and Port Phillip (Hobson's Bay). Length $1\frac{1}{2}$ inch.

64. CALLISTA DISRUPTA.

Cytherea disrupta, Sow. Thes. Conch. p. 117, pl. 163. f. 208, 209.

A transversely ovate shell, with the dorsal margin arched; smooth, or very finely concentrically striated, yellowish, and painted with purplish-brown zigzag bands and flames. Dredged at Watson's Bay &c. Length $1\frac{1}{3}$ inch. Found also at Moreton Bay, on the banks off Stradbroke Island.

65. CALLISTA RUTILA.

Cytherea rutila, Sow. Thes. Conch. p. 116, pl. 163. f. 205.

More rounded and larger than the preceding species, smooth, and painted with irregular interrupted bands of chestnut, and tinged with rose-colour round the posterior side and ventral margin. Dredged at Watson's Bay, and found on the beach at Cabbage-tree Cove, outside the north head of Port Jackson. Length 1 inch 9 lines. I have received specimens from the east coast of Tasmania 2 inches 3 lines across.

66. TIVELA UNDULOSA, var.

Venus undulosa, Lam. Anim. sans Vert. vi. p. 370.

V. variabilis, Sow. P. Z. S. 1835; Thes. Conch. *Venus*, pl. 158. f. 142-146.

This species varies considerably in shape and markings. At Swan River, where it is very abundant, the shells are richly rayed and marked with angular and undulating brown lines; occasionally they are white. The Port Jackson specimens, which are of rare occurrence, are smaller, more trigonal, painted sparingly with narrow fulminating lines, and clothed with a thick, silky, fibrous epidermis. Dredged at Watson's Bay. Length 1 inch.

67. *SUNETTA ADELINÆ.

Sunetta adelinæ, Angas, *anteà*, p. 909, Pl. XLIV. f. 5.

A pretty little species, less tumid than *Meroë hians* of Reeve (from Cochin China), with the lunule pinched outwards and projecting. Length 8 lines. Dredged in deep water near Port-Jackson Heads.

68. CIRCE UNDATINA.

Cytherea undatina, Lam.; Sow. Thes. Conch. *Circe*, pl. 138. f. 22-26.

A fine species, more ventricose than *C. scripta*, Linn., and elegantly painted with broad rays, blotches, bands, and zigzag lines of

brown on a whitish ground. Dredged off Spectacle Island, Parramatta River, Port Jackson, in sandy mud. Length 2 inches.

Subfam. DOSINIINÆ.

69. DOSINIA SCULPTA.

Artemis sculpta, Hanley; Reeve, Conch. Icon. *Artemis*, f. 52.

This species may readily be distinguished by its concentric striæ being decussated at the sides by fine radiating lines. Dredged in Port Jackson. Length 1 inch. At Moreton Bay it attains a larger size. Some of the Port Jackson specimens are slightly tinged with rose-colour at the umbones.

70. DOSINIA SCABRIUSCULA.

Artemis scabriuscula, Phil. Abbild. und Besch. Conch. ii. p. 230; Reeve, Conch. Icon. *Artemis*, pl. 3. f. 14.

I have only met with young examples of this fine species in Port Jackson. Japan, Ceylon, and North Australia are cited as its habitats. Full-grown shells measure nearly 2 inches across.

71. *DOSINIA PUELLA.

Dosinia puella, Angas, *antea*, p. 909, Pl. XLIV. f. 4.

A small, solid, orbicular species, with the lunule superficial, and the valves finely concentrically ridged. Length 6 lines. Botany Bay.

72. CLEMENTIA MORETONENSIS.

Clementia moretonensis, Deshayes, P. Z. S. 1853, p. 18.

A transversely oblong species of a dull white hue, with the surface of the valves rudely concentrically plicate. Length 1 inch 9 lines. Dredged at Mossman's Bay and off Spectacle Island. This species was first obtained by the late F. Strange at Moreton Bay; hence its name by Deshayes.

Subfam. TAPESINÆ.

73. TAPES INFLATA.

Tapes inflata, Desh. P. Z. S. 1853, p. 8, pl. 19. f. 3.

A fine ovately transverse species, irregularly concentrically sulcated, and smooth at the umbones; of a rufous fawn-colour, more or less radiately mottled with grey, and shining. Dredged in mud, at the mouth of Lane Cove and Parramatta River. Length $2\frac{1}{2}$ inches. Allied to *T. sulcosa*, Phil., but much more ventricose and polished, with the sulcate ridges obsolete in the young shells.

74. TAPES UNDULATA, var.

Venus undulata, Born.

Tapes rimosa, Phil. Abbild. t. 7. f. 7.

This is a curious variety of the well-known *T. undulata* from the

China seas, in which the prevailing colour of the valves is greenish olive, passing into purple on the ventral margins, where alone the zigzag markings are visible. The dorsal area is strongly crossed with purple lines. Dredged in mud in the Parramatta River. Length 2 inches.

75. *TAPES TURGIDA*.

Venus turgida, Lam. Anim. sans Vert. vi. p. 353.

? *Tapes turgidula*, Desh. P. Z. S. 1853, p. 8.

A fine species, more or less finely concentrically ribbed, of a pale brown colour, ornamented with zigzag purplish lines, or three faint bands. Length $3\frac{1}{2}$ inches. In mud at low water, Middle Harbour, Rose Bay, and Parramatta River.

76. *RUPELLARIA MITIS*.

Venerupis mitis, Desh. P. Z. S. 1853, p. 5.

A small species, not unlike *V. irus* of Europe. Length 8 lines. Botany Bay.

77. *RUPELLARIA CRENATA*.

Venerupis crenata, Lam. Anim. sans Vert. vi. p. 164.

A fine species, imbricately sculptured, and laminately frilled at the posterior side. It may be recognized by its peculiar chalky appearance blotched here and there with pale lilac. Found in crevices of rocks at low water in various bays in Port Jackson. It occurs also in Tasmania, and in South Australia, at the roots of mangrove trees. Length $1\frac{1}{2}$ inch.

Fam. PETRICOLIDÆ.

78. **CHORISTODON RUBIGINOSUM*.

Narario rubiginosa, A. Ad. & Ang. P. Z. S. 1863, p. 425, pl. 37. f. 17.

This very interesting species is a thin ventricose shell, finely divaricately sculptured, rayed with brown and purple at the umbones, passing into white towards the ventral margin. I only obtained one living specimen and a single valve; the former was enclosed in a nodule of clay, dredged at 4 fathoms in Watson's Bay, Port Jackson. Length 10 lines.

Fam. GLAUCONOMYIDÆ.

79. *GLAUCONOMYA ANGULATA*.

Glaucanome angulata, Reeve, P. Z. S. 1844; Conch. Icon. *Glaucanome*, pl. 1. f. 5.

A much smaller species than *G. rugosa*, Hanley (which is found at Moreton Bay), in which the green epidermis is peculiarly shrivelled and wrinkled in the middle, whilst in *G. angulata* it lies in ridges parallel to the lines of growth. From sandy mud at low water,

Parramatta River and Lane Cove. Length 1 inch. Both these species occur also at the Philippine Islands.

Fam. CARDIIDÆ.

80. CARDIUM (PAPYRIDIUM) PAPYRACEUM.

Cardium papyraceum, Chem. Conch. Cab. vi. p. 190, pl. 18. f. 184; Reeve, Conch. Icon. *Cardium*, pl. 2. f. 9.

A thin whitish species, faintly mottled with flesh-colour, and tinged with deep purple at the umbones; the valves are radiately impressedly striated, and minutely granulated anteriorly, thus distinguishing it from *C. muticum*, which the elder Sowerby has figured as a variety in his 'Conch. Illustr.' f. 55. Dredged in Middle Harbour. Length $1\frac{1}{2}$ inch.

81. CARDIUM (PAPYRIDIUM) TENUICOSTATUM.

Cardium tenuicostatum, Lam. Anim. sans Vert. vi. p. 372; Reeve, Conch. Icon. *Cardium*, pl. 10. f. 50.

A thin, light, somewhat ventricose shell, radiately very numerously finely ribbed, the epidermis bristling along the summit of the ribs; more or less waved with flesh-coloured painting, and purple at the umbones. Dredged in Port Jackson, Botany Bay, &c. Length $1\frac{1}{2}$ inch.

82. CARDIUM PULCHELLUM.

Cardium pulchellum, Reeve, Conch. Icon. *Cardium*, pl. 8. f. 42.

C. striatulum juv., Sow. Conch. Ill. f. 45.

This beautiful little species is finely striated and armed with sharp tubercles posteriorly; its colour is whitish, handsomely rayed with orange. *C. striatulum*, Sow., from Cook's Straits, New Zealand, is very similar in its sculpture, but it is a much larger shell, and wants the characteristic orange rays. Dredged inside Port-Jackson Heads in deep water. Length 7 lines.

83. CARDIUM AUSTRALIENSE.

Cardium australiense, Reeve, P. Z. S. 1844; Conch. Icon. pl. 5. f. 24.

A singular form of the genus, having much of the aspect of a *Donax* externally. Length 1 inch 6 lines. Deep water, Broken Bay, Port Stephen, and Moreton Bay.

Fam. CHAMIDÆ.

84. CHAMA SPINOSA.

Chama spinosa, Brod. Trans. Zool. Soc. i. p. 305, pl. 38. f. 8, 9.

A pretty little species, concentrically frilled with rows of short, irregular, imbricate spines; white, tinged with brick-red. Found attached to rocks at low spring tides. Length 1 inch.

Order LUCINACEA.

Fam. LUCINIDÆ.

85. LUCINA SIMPLEX.

Lucina simplex, Reeve, Conch. Icon. pl. 3. f. 11.

A neat white species, finely concentrically ribbed, and cancellated with very fine longitudinal striæ. Botany Bay. Length 9 lines. In North Australia this species attains the size of 15 to 18 lines.

86. LUCINA (CODAKIA) RUGIFERA.

Lucina rugifera, Reeve, Conch. Icon. pl. 1. f. 1.

A solid elaborately sculptured species, allied to *L. tigrina* and *L. exasperata*, white within and without. Found at low water amongst the rocks at Watson's Bay and Middle Harbour, Port Jackson; and at Wollongong and other rocky places along the coast. Length $2\frac{1}{2}$ inches.

87. LUCINA (CODAKIA) PARVULA.

Lucina parvula, Gould, 'Otia,' p. 174.

This little species is somewhat produced anteriorly, concentrically ridged, and divaricately sculptured at the sides: yellowish white. Dredged in Port-Jackson and Botany Bays. Length 4 lines. The localities of Gould's types are China and Japan.

88. LORIPES TUMIDA.

Lucina tumida, Reeve, Conch. Icon. *Lucina*, pl. 5. f. 22.

An orbicular, swollen, thin shell of a dull white colour, superficially concentrically striated, and covered at the sides with a very fine epidermis radiately wrinkled here and there. Dredged in Port Jackson. Length 1 inch.

The *Lucina ovulum* of Reeve appears to be only the young state of this species.

89. LORIPES OVUM.

Lucina ovum, Reeve, Conch. Icon. *Lucina*, pl. 5. f. 21.

Less inflated than the preceding species, more truly orbicular in outline, and of a clear yellowish white. Dredged in Botany Bay. Length 11 lines.

90. LORIPES ICTERICA.

Lucina ictérica, Reeve, Conch. Icon. *Lucina*, pl. 10. f. 60 *a, b*.

A small white species, finely concentrically and (under the lens) radiately striated. The ligament, in this as well as in the following species, is situated in an oblique internal pit. Botany Bay; also in St. Vincent's Gulf, South Australia. Length 5 lines.

91. *LORIPES ASSIMILIS.

Loripes assimilis, Angas, *anted*, p. 910, Pl. XLIV. f. 8.

More solid and inflated than the preceding, with the concentric ridges stronger, and the radiate sculpture wanting. New South Wales and Port Phillip. Length 6 lines.

Fam. UNGULINIDÆ.

92. *MYSIA SPHÆRICULA*.

Diplodonta sphaericula, Deshayes.

A thin, smooth, globular species, very much swollen towards the umbones, pearly white, covered with a fibrous olive epidermis towards the margins. Dredged in the Parramatta River and mouth of Lane Cove, in black mud in 3 or 4 fathoms. Length $10\frac{1}{2}$ lines.

93. *MYSIA GLOBULOSA*.

Diplodonta globulosa, A. Adams, P. Z. S. 1855, p. 226.

A rounded species, of a dirty-white or horn-colour, not unlike *D. janeirensis*, Reeve. Dredged in Port Jackson. Length 7 lines.

94. **MYSIA (FELANIA) ADAMSI*.

Mysia (Felania) adamsi, Angas, *ante*, p. 910, Pl. XLIV. f. 9.

A depressed, orbicularly elongate, shining white species. Length 6 lines. Dredged in deep water. Port Jackson.

95. **MYSIA (FELANIA) JACKSONENSIS*.

Mysia (Felania) jacksonensis, Angas, *ante*, p. 910, Pl. XLIV. f. 10.

Of a pale rosy flesh-colour, covered with a light-greenish epidermis. Length 4 lines. Dredged in Middle Harbour.

Fam. LASEIDÆ.

96. *LASEA SCALARIS*.

Poronia scalaris, Phil.

A minute shell, broadly concentrically ribbed, having somewhat the aspect of a *Venus*. Length 2 lines. Gregarious, in crevices of rocks at low water in Port Jackson.

97. *LASEA AUSTRALIS*.

Poronia australis, Souv. Journ. de Conch. 1863, p. 287, pl. 12. f. 8.

Larger than the preceding, nearly smooth, and tinged with rose-violet at the margins. Length 3 lines. In crevices of rocks, at low water, Port Jackson; New Caledonia (Montrouzier).

98. *KELLIA ROTUNDA*.

Erycina rotunda, Desh. P. Z. S. 1855, p. 181.

A small, horny, triangularly orbicular species. Length 4 lines. Port Jackson; Newcastle, New South Wales; and Moreton Bay.

99. *KELLIA CYCLADIFORMIS*.

Erycina cycladiformis, Desh. Trait. Élém. pl. 11. f. 6-9.

More oblong than the preceding, pearly white, with a thin olivaceous epidermis. Length 5 lines. Port Jackson.

Fam. LEPTONIDÆ.

100. **LEPTON ADAMSI*.

Lepton adamsi, Angas, *anted*, p. 910, Pl. XLIV. f. 11.

A very beautiful species, triangularly ovate, of a pearly white, with the anterior and posterior sides finely shagreened and smooth in the middle; the posterior margin widely plicate. Length $6\frac{1}{2}$ lines. Port Jackson.

Fam. GALEOMMIDÆ.

101. *SCINTILLA STRANGEI*.

Scintilla strangei, Desh. P. Z. S. 1855, p. 181.

A thin, semipellucid, white, shining, transversely ovate shell. Found nestling under rocks and stones at very low spring tides in Port Jackson. Length 9 lines. This is one of the largest species of the genus *Scintilla*, which was founded by M. Deshayes, and now includes nearly fifty species.

102. *SCINTILLA ANOMALA*.

Scintilla anomala, Desh. P. Z. S. 1855, p. 181.

A small, rounded, and somewhat flattened, thin, shining, transparent white species. Found under stones at low water. Length 4 lines. M. Deshayes's types in the Cumingian collection are from Borneo.

Fam. ASTARTIDÆ.

103. **GOULDIA AUSTRALIS*.

Gouldia australis, Angas, P. Z. S. 1865, p. 459.

A little subtriangular shell of a purplish-fawn colour, sometimes faintly two-rayed, with the umbones darker, having externally the aspect of a minute *Venus*. Dredged in Port Jackson in 5 fathoms. Length 3 lines.

104. *MYTILICARDIA EXCAVATA*.

Cardita excavata, Desh. P. Z. S. 1852, p. 100, pl. 17. f. 1-3.

An elongately transverse shell, broadly radiately ribbed, the ribs armed with vaulted projecting scales. Found under stones at low water. Length 1 inch 2 lines.

Fam. MYTILIDÆ.

Subfam. MYTILINÆ.

105. *MYTILUS (AULACOMYA) HIRSUTUS*.

Mytilus hirsutus, Lam. Anim. sans Vert. vii. p. 38; Reeve, Conch. Icon. *Mytilus*, pl. 3. f. 8.

Dark brown, elevately radiately striated throughout, and clothed with a long fibrous epidermis, the shafts of which are beset with small prickly spines. Amongst rocks and under stones at low water. Length $2\frac{1}{2}$ inches. This species is found also in South Australia and New Zealand. The interior is iridescent green and purple.

106. MYTILUS DUNKERI.

Mytilus dunkeri, Reeve, Conch. Icon. *Mytilus*, pl. 5. f. 17.

? *Mytilus planulatus*, Lam.

This species is so like *M. galloprovincialis*, Lam., that it may be regarded as its southern analogue. Length $2\frac{1}{3}$ inches. New South Wales, Port Philip, and Tasmania.

Subfam. CRENELLINÆ.

107. CRENELLA (MODIOLARIA) STRIGATA.

Modiola strigata, Hanley, P. Z. S. 1844, p. 15.

A pretty species, of a greenish horn-colour, richly painted with zigzag purplish-brown markings, and radiately striated at the anterior and posterior sides. Length 6 lines. Dredged in sandy mud in Port Jackson. Mr. Reeve, in the 'Conch. Icon.' has erroneously given the description and figure of a totally distinct shell as representing Mr. Hanley's *M. strigata*; it is a species of *Volsella* from the Philippine Islands, for which I would propose the name *Volsella reevei*. *M. concinna*, Dunker, is probably a variety of *M. strigata*.

108. *CRENELLA (MODIOLARIA) BARBATA.

Modiolaria barbata, Angas, *anted*, p. 911, Pl. XLIV. f. 12.

A small oblong ovate species, with the epidermis long, thick, and fibrous posteriorly, having somewhat the aspect of *Modiola opifex*, Say, from Brazil. From the "Seven-mile" beach, Botany Bay. Length 5 lines.

109. PERNA AUSTRALIS.

Modiola australis, Gray, Appendix to King's Voy.; Reeve, Conch. Icon. pl. 5. f. 21.

Not unlike *M. tulipa*, Lam. The young shells are prettily tinted with yellow and crimson. Common on the Australian coasts generally. Length 3 inches.

110. PERNA GLABERRIMA.

Volsella glaberrima, Dunker, P. Z. S. 1856, p. 363.

Modiola glaberrima, Reeve, Conch. Icon. *Modiola*, pl. 8. f. 48.

A somewhat triangularly elongated, shining, thin, horny shell, banded and lined with bronze-purple and green. This species spins a sort of nidus, in which it dwells in black mud in Parramatta River. Dredged at 6 fathoms. Length 2 inches.

Fam. VULSELLIDÆ.

111. VULSELLA TASMANICA.

Vulsella tasmanica, Reeve, Conch. Icon. *Vulsella*, pl. 1. f. 3.

A rusty-brown species of irregular growth, covered with minute flattened scales arranged in concentric ridges. In sponges &c., Port Jackson. Length 1 inch.

Fam. MODIOLARCIDÆ.

112. MODIOLARCA SUBTORTA.

Modiolarca subtorta, Dunker, P. Z. S. 1856, p. 365.

Modiola subtorta, Reeve, Conch. Icon. pl. 10. f. 70.

A small, brown, trapezoid shell, with the valves unequal and slightly twisted. Cook's River, Botany Bay. Length 4 lines.

Fam. AVICULIDÆ.

113. AVICULA PULCHELLA.

Avicula pulchella, Reeve, Conch. Icon. *Avicula*, pl. 8. f. 22.

A semitransparent, horny species, painted with more or less interrupted reddish flames radiating from the umbones. Attached to sea-weed, in deep water, Botany Bay and Middle Harbour. Length 1 inch.

114. MARGARITIFERA FIMBRIATA.

Avicula fimbriata, Reeve, Conch. Icon. *Avicula*, pl. 9. f. 25.

A very variable species, both in colour and sculpture. Sometimes it is nearly smooth, at others broadly furbelowed towards the margin with long spout-shaped laminar scales. It is flattened, very broad at the upper part, and squarely ovate. The colour varies from dark horn or purple to whitish, more or less rayed with irregular purple bands and blotches. The interior is brilliantly nacreous. The *Avicula placunoides*, Reeve (Conch. Icon. pl. 17. f. 68), is probably only a variety of this species. Found under pieces of rock at low water, at Middle Harbour and Watson's Bay. Length 3 inches.

115. MALLEUS ALBUS.

Ostrea malleus-albus, Chem.

The ordinary "Hammer-oyster" of Australia, which ranges from Port Lincoln to Moreton Bay. It occurs on the sandy flats in Broken Bay; and I obtained a young specimen in Middle Harbour, Port Jackson.

116. PINNA ZEYLANICA.

Pinna zeylanica, Gray, Appendix to Dieffenbach's Travels.

This common Australian species is found at Brisbane Water.

Order PECTINACEÆ.

Fam. TRIGONIIDÆ.

117. TRIGONIA PECTINATA.

Trigonia pectinata, Lam. Ann. du Mus. iv. p. 355, pl. 67.

Trigonia lamarecki, Gray.

This beautiful shell, so remarkable for the brilliant purple, silver, or orange nacre of the interior of its valves, was at one time easily obtained by the dredge on the "Sow and Pigs" bank, in Port Jackson. The wreck of a coal-laden vessel has, however, interfered with its favourite resort, and it is now more difficult to procure than formerly. Length 1 inch 2 lines.

The valves both of this species and *T. margaritacea*, Lam. (from Bass's Straits), are manufactured into elegant brooches and ear-ornaments by the London jewellers.

118. TRIGONIA STRANGEI.

Trigonia strangei, A. Adams, P. Z. S. 1852, p. 91.

An extremely rare species, at once distinguished by the wart-like nodules which cover the ribs. It was dredged near the entrance to Port-Jackson Heads, in deep water, by the late Mr. Strange, whose name it bears. A few odd valves, much worn, have been washed ashore at Long Bay and on the beach at Wollongong. Length $1\frac{1}{2}$ inch.

Fam. ARCIDÆ.

Subfam. ARCINÆ.

119. BARBATIA FASCIATA.

Arca fasciata, Reeve, P. Z. S. 1844; Conch. Icon. pl. 15. f. 99.

A remarkably flattened species, rust-stained, and with an erect bristly epidermis at the posterior end. Found under stones and in the crevices of rocks at low water. Length 1 inch 9 lines.

120. BARBATIA (ACAR) PUSILLA.

Arca pusilla, Sow. P. Z. S. 1833.

A small whitish species, belonging to the same group as *A. divaricata*. Common under stones at low water about Watson's Bay and Middle Harbour. Length 6 lines.

121. ANOMALOCARDIA TRAPEZIA.

Arca trapezia, Desh. Mag. de Zoologie.

Arca lobata, Reeve, P. Z. S. 1844; Conch. Icon. pl. 3. f. 19.

This is the common "Mud-cockle" of the colonists. It is found abundantly half buried in the mud in most of the sheltered bays of Port Jackson, at low water, especially in Woolloomooloo and Rush-cutter's Bays, and along the Parramatta River. Length 3 inches.

Subfam. AXININÆ.

122. AXINIA HOLOSERICA.

Pectunculus holosericus, Reeve, P. Z. S. 1843; Conch. Icon. pl. 4. f. 18.

This species is covered with an olive epidermis of a peculiar close velvety softness. Dredged at Watson's Bay and inside the South Reef, &c. Length 2 inches.

123. AXINIA GRAYANA.

Pectunculus grayanus, Dunker, P. Z. S. 1856, p. 357.

Somewhat resembling the European *A. glycimeris* in character, but more globose, with the valves superficially longitudinally striated. Newcastle, Port Stephen, and cast ashore on the sands at the mouth of the Manning River. Length 1 inch 9 lines.

124. AXINIA (PECTUNCULUS) TENUICOSTATUS.

Pectunculus tenuicostatus, Reeve, P. Z. S. 1843; Conch. Icon. *Pectunculus*, pl. 6. f. 35.

The valves of this species are covered with thread-like ribs, the interstices of which are finely grooved, the roots of epidermis springing from them in rows. I have only hitherto met with young shells of this species in Port Jackson, my adult specimens being from Moreton Bay. Dredged off the "Sow and Pigs" reef. Length of adult examples 1 inch 4 lines.

Fam. NUCULIDÆ.

125. NUCULA STRANGEI.

Nucula strangei, A. Ad. Thes. Conch. pl. 229. f. 125.

A very oblique species, of a pale olive-green colour, smooth and shining. Dredged in Port Jackson and Port Stephen. Length 5 lines.

126. *NUCULA CONSOBRINA.

Nucula consobrina, A. Ad. & Angas, P. Z. S. 1863, p. 427. sp. 11.

Less oblique than the preceding, of a dull yellowish olive, with the valves more or less concentrically ridged and finely crenate. Dredged in Parramatta River and Port Stephen. Length $3\frac{1}{2}$ lines.

Fam. LEDIDÆ.

127. LEDA DOHRNI.

Leda dohrni, Hanley.

A pretty little horn-coloured species, with the valves nearly smooth anteriorly, and ridged, keeled, and birostrate posteriorly. Dredged on the "Sow and Pigs" bank. Length 3 lines.

Fam. PECTINIDÆ.

128. PECTEN TEGULA.

Ostrea tegula, Wood, Index Test. Supp. p. 7, pl. 2; Reeve, Conch. Icon. pl. 30. f. 136.

This fine species is distinguished by the irregular foliaceous scales that ornament the ribs. It varies considerably in colour, from yellowish orange, purplish grey, and dull red, to a fine rich chocolate-brown, with whitish scratch-like lines towards the umbones. Found amongst rocks and under stones at low water in Port Jackson. Length $2\frac{1}{4}$ inches. It is also met with at Moreton Bay and New Caledonia.

129. VOLA FUMATA.

Pecten fumatus, Reeve, Conch. Icon. *Pecten*, pl. 7. f. 32.

The right valve is very convex and broadly ribbed; and the left valve concavely flattened, rayed with twelve narrow, raised, rather distant ribs, and immersed in the right valve. The deep smoky-purple colouring and the produced recurved beak of the right valve are peculiar. Dredged in sandy mud in Lane Cove and Middle Harbour. Length $3\frac{1}{4}$ inches.

Fam. RADULIDÆ.

130. RADULA LIMA.

Ostrea lima, Linn.

Lima squamosa, Lam.; Sow. Thes. Conch. pl. 21. f. 17, 18.

This widely distributed species is not uncommon amongst rocks and under stones at low water in Port Jackson, and at Wollongong and Port Stephen, &c. Length 2 inches.

131. RADULA (LIMATULA) BULLATA.

Ostrea bullata, Born.

Lima fragilis (var. *b*), Lam.; Sow. Gen. of Shells, f. 3.

A narrow, inflated, nearly equilateral, white shell, longitudinally ridged, with the ears almost equal. Under large stones and slabs of rock at low water in Watson's Bay and Middle Harbour &c. Length $1\frac{1}{2}$ inch.

The animals of *L. bullata* form a sort of nest amongst the fragments of broken shells and corals in the rock-pools, where they dwell gregariously.

Fam. ANOMIIDÆ.

132. PLACUNANOMIA (MONIA) IONE.

Placunanomia ione, Gray.

This fine species differs from *P. macrochisma*, Desh. (from the Gulf of Tartary), in having the plug large and triangular. It is found attached to the under surface of rocks at low water near Port-

Jackson Heads. Length 2 inches 4 lines. The interior of the lower valve is of a peculiar horny green colour.

Fam. OSTREIDÆ.

133. OSTREA PURPUREA.

Ostrea edulis, var. *purpurea*, Hanley, Conch. Miscel. pt. 3.

This is the common "Mud-oyster," which supplies the Sydney markets. Mr. Hanley regards it as a variety of *Ostrea edulis*, Linn., a species that varies extremely according to its station in salt or brackish waters. On careful comparison of the Port Jackson shells (especially the young) with those of Europe, I am of opinion that the former may be separated as a distinct species under the name *purpurea*. The laminate scales are much larger, more regularly frilled, and the valves are dentate at the margins; the purple colouring prevails more or less throughout, and in the young shells exhibits a radiate style of painting. It occurs in various parts of Port Jackson and the other harbours of New South Wales. My largest specimen is from Johnson's Bay, and measures 6 inches across.

134. OSTREA MORDAX.

Ostrea mordax, Gould, Proc. Boston Nat. Hist. Soc. iii. p. 346; United States Exploring Expedition (Mollusca), pl. 43. f. 575 *a, b*.

The "Rock-oyster" of the colonists. "The horizontal digitations of the upper valve fitting into the erect canine teeth of the lower valve, together with the denticles within, and the black elevated cicatrice, may serve to identify this species."—*Gould*. The interior is white, stained with blackish purple towards the margins. It is excellent eating and of a delicious flavour. Common everywhere, attached to rocks between tide-marks. Length 2 inches; breadth 1 inch 7 lines.

135. OSTREA CIRCUMSUTA.

Ostrea circumscuta, Gould, Proc. Bost. Nat. Hist. Soc. iii. p. 346; United States Exploring Expedition, pl. 43. f. 576 *a, b*.

This is a species of rare occurrence; it is of a narrow elongated form, denticulated and tinged with violet around the margin. The interior is pearly white, with the scar of the adductor muscle violet. Botany Bay. Length 2 inches; breadth 1 inch.

136. *OSTREA VIRESCENS.

Ostrea virescens, Angas, *antèd*, p. 911, Pl. XLIV. f. 13.

A handsome species, very orbicular, frilled round the margins, with the cardinal area large, flat, and triangular, and the interior of a peculiar green hue. Attached to rocks and madrepores at low tides in Watson's Bay. Length $1\frac{1}{2}$ inch.

Class BRACHIOPODA.

Fam. TEREBRATULIDÆ.

Subfam. TEREBRATULINÆ.

137. WALDHEIMIA FLAVESCENS.

Terebratula flavescens, Lam. Anim. sans Vert. vii. p. 330.

T. australis, Quoy et Gaim.

This fine species varies considerably in form and sculpture. It is found gregarious, attached to the under surface of flat-shelving rocks at low tide, in many parts of Port Jackson, especially at that extremity of the Government domain known as "Lady Macquarrie's Chair," where I have obtained a large number of specimens. Length $1\frac{1}{2}$ inch.

Subfam. MAGASINÆ.

138. MAGAS CUMINGI.

Terebratella? cumingi, Davidson, P. Z. S. 1852, p. 78, pl. xiv. f. 10-16.

Dredged in deep water outside Port Jackson Heads. Length 5 lines. [New Zealand (Cuming).] An interesting recent analogue of a fossil form abundant in the sandstone cliffs of the Murray.

139. KRAUSSIA LAMARCKIANA.

Kraussia lamarchiana, Davidson, P. Z. S. 1852, p. 80, pl. xiv. f. 22, 23.

This pretty little species, which is strongly radiately ribbed, occurs attached to the under surface of stones in most parts of Port Jackson. Length 4 lines.

Fam. LINGULIDÆ.

140. LINGULA HIANIS.

Lingula hians, Swainson, Zool. Illus. ii. pl. 2.

This species may be distinguished by its sharply pointed, elevated, widely gaping beaks; the valves are semitransparent, horny, and of a bright pale green tinged with rust-colour. In sandy mud, Middle Harbour. Length $1\frac{1}{2}$ inch. It occurs also at the Figis, New Caledonia, China, and the Philippines.

7. On some New or imperfectly known Fishes of Madras.

By Surgeon FRANCIS DAY, F.Z.S., F.L.S., Principal Medical Storekeeper, Madras Army, &c.

Among the fishes lately brought to me here at Madras several appear to be new or imperfectly described species; and I accordingly beg permission to lay detailed descriptions of them before the Society.

APOGON NOTATA, sp. nov.

B. vii. D. $6\frac{1}{9}$. P. 13. V. $1\frac{1}{5}$. A. $2\frac{1}{16}$. C. 17. L. r. 20.

Length of specimens up to 3 inches.

Length of head $\frac{4}{13}$, of pectoral $\frac{1}{6}$, of base of first dorsal $\frac{1}{8}$, of base of anal $\frac{1}{4}$, of caudal $\frac{1}{6}$ of the total length. Height of head $\frac{1}{5}$, of body $\frac{1}{3}$, of first dorsal $\frac{1}{10}$, of second dorsal $\frac{1}{5}$, of ventral $\frac{1}{8}$, of anal $\frac{1}{8}$ of the total length.

Eyes circular, diameter $\frac{1}{2}$ of length of head; $\frac{1}{2}$ a diameter apart, $\frac{1}{3}$ of a diameter from end of snout.

Body rather elongated and compressed. Mouth moderately wide, lower jaw slightly the longest; the posterior extremity of the maxilla reaches to beneath the centre of the orbit. No spines around the margin of the orbit. Angle of præoperculum rather produced and rounded, lower limb with a single line of serrations just above the lower edge of the horizontal limb, which, however, is entire. Operculum without a spine, but ending in a soft prolongation.

Teeth villiform, in numerous closely set rows in both jaws, but smallest in the upper; a row of rather larger teeth in the palatines, and a small patch on the vomer.

Fins. First dorsal with very weak spines, the third of which is the longest, whilst the interspinous membrane is rather deeply emarginate. A short interspace exists between the two dorsal fins; the second dorsal highest anteriorly. First anal spine nearly half the length of the second, which is two-thirds that of the first ray.

Scales deciduous.

Lateral line nearly straight.

Colours. White, with a pink tinge along the abdomen and on the fins. A rather large black finger-mark on the lateral line at the root of the caudal fin. Opercles silvery.

In Malabar I never procured an *Apogon*, but the *Ambassis* abounds. In Madras, on the contrary, the former appear to be numerous, whilst the latter are comparatively rare.

PRISTIPOMA NEILLI, sp. nov.

B. vii. D. $12\frac{1}{14}$. P. 17. V. $1\frac{1}{5}$. A. $3\frac{1}{7}$. C. 19. L. l. 50. L. tr. $10\frac{1}{15}$.

Length of specimen 7 inches.

Length of head $\frac{1}{4}$, of pectoral $\frac{1}{4}$, of base of dorsal spines rather more than $\frac{1}{4}$, of base of dorsal rays $\frac{1}{5}$, of base of anal $\frac{1}{6}$, of caudal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{3}$, of body rather more than $\frac{1}{3}$, of dorsal spines $\frac{1}{7}$, of dorsal rays $\frac{1}{9}$, of ventral $\frac{1}{5}$, of anal spines $\frac{2}{15}$, of anal rays $\frac{1}{9}$ of the total length.

Eyes. Upper margin near the profile, diameter $\frac{1}{3}$ of length of head; $\frac{3}{4}$ of a diameter apart, nearly 1 diameter from end of snout.

Body ovoid, moderately compressed. A rather considerable rise from the snout to the base of the dorsal fin.

Jaws of about equal length, a deep groove under the symphysis of the lower jaw, with a small facet on either side of its anterior portion.

The posterior extremity of the maxilla extends nearly as far as to beneath the anterior margin of the orbit. The posterior limb of the intermaxillaries extends to opposite the anterior margin of the orbit. Præorbital two-thirds as wide as the orbit. Præoperculum a little emarginate, its angle slightly produced, serrated in its whole extent, but coarsest at the angle, the lower limb two-thirds as long as the vertical one, and with some few serrations along its posterior part.

Teeth villiform, in several rows anteriorly, becoming a single one posteriorly, some also on vomer and palate.

Fins. Dorsal spines strong, every alternate one broadest, inter-spinous membrane slightly emarginate; fourth spine the longest; last spine three-fourths as high as the first ray. Pectoral pointed. Ventral spine not very strong, its first ray with a short filamentous prolongation. First anal spine weak, and one-third as long as the second, which is strong and one-fourth longer than the third, which is striated anteriorly and laterally, and has a smooth keel anteriorly half the width of the spine. Caudal slightly lunated.

Scales in horizontal rows, except to the first seven dorsal spines, to which they ascend irregularly upwards and backwards. There are some fine scales between the dorsal and anal rays.

Lateral line follows the course of the back.

Colours. Greyish, becoming white along the abdomen. A brilliant yellow band passes along the centre of a row of scales from opposite to the centre of the orbit to the centre of the base of the caudal fin. A similar one passes a short distance along the centre of the row above it. Dorsal and caudal fins greyish, soft dorsal with a light margin. Pectorals, ventrals, and anal yellowish. Eye golden.

I have named this species after my esteemed correspondent A. C. B. Neill, Esq., F.Z.S.

PRISTIPOMOIDES AUROLINEATUS, sp. nov.

B. vi. D. 10/14. P. 19. V. 1/5. A. 3/12. C. 15. L. 1. 72. L. tr. 8/16.

Length of specimen $3\frac{5}{10}$ inches.

Length of head $\frac{4}{17}$, of pectoral $\frac{1}{5}$, of base of dorsal spines $\frac{1}{5}$, of base of dorsal rays $\frac{1}{5}$, of anal $\frac{2}{17}$, of caudal rather above $\frac{1}{5}$ of the total length. Height of head $\frac{1}{5}$, of body $\frac{2}{7}$, of dorsal spines $\frac{1}{5}$, of dorsal rays $\frac{1}{12}$, of ventral $\frac{1}{6}$, of anal spines $\frac{1}{10}$, of anal rays $\frac{1}{12}$ of the total length.

Eyes circular, upper margin close to the profile, diameter $\frac{1}{3}$ of length of head; $\frac{3}{4}$ of a diameter apart, $\frac{1}{2}$ a diameter from end of snout.

Body rather elongated and compressed; head slightly depressed.

Mouth anterior, lower jaw the longest; posterior extremity of the maxilla rather wide, extending to beneath the anterior third of the orbit; the posterior limb of the intermaxillaries likewise extends backwards in the central line to opposite to the same place. Præorbital long, narrow, and at least three times as long as wide, and with elevated striæ upon it. Præoperculum wide, its horizontal wider than its vertical limb; both striated at their edges, and irregularly serrated.

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Operculum with a moderately strong spine. Two rows of scales upon the cheeks. No pores on the lower jaw, but a long very shallow central groove under the symphysis.

Teeth villiform, in one or two rows, the outer being the largest and rather recurved, especially about the centre of both jaws; none in the centre of the upper jaw, nor on the vomer or palate.

Fins. Dorsal spines weak, third and fourth the longest; interspinous membrane very slightly emarginate; rays all about equal length. Pectoral rather pointed, reaching to opposite to the anus. Ventral pointed. First anal spine one-quarter the length of the second, which is of equal strength, but slightly shorter than the third. Caudal deeply lobed, the lower being the largest and longest.

Scales ctenoid; a few present along the base of the dorsal and anal fins, which have shallow grooves, also on the caudal almost to its termination.

Lateral line in the upper fourth of the body, following the curve of the back.

Colours. Above the lateral line a beautiful light lake, whilst from the eye to the root of the tail proceeds a brilliant shining golden band three scales deep near the head, decreasing in width to one at the base of the tail; below this band the colours are pinkish white. Ventrals white, the other fins pinkish white, the caudal being tipped with black.

UPENEOIDES GUTTATUS, sp. nov.

B. iv. D. $7\frac{1}{8}$. P. 15. V. $1\frac{1}{5}$. A. $2\frac{2}{7}$. C. 15. L. 1. 32. L. tr. $3\frac{5}{8}$.

Length of specimens to $4\frac{7}{10}$ inches.

Length of head rather above $\frac{1}{4}$, of pectoral $\frac{1}{7}$, of base of first dorsal $\frac{1}{7}$, of base of second dorsal $\frac{1}{9}$, of base of anal $\frac{1}{12}$, of caudal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{4}$, of first dorsal $\frac{1}{8}$, of second dorsal $\frac{1}{6}$, of ventral nearly $\frac{1}{4}$, of anal $\frac{1}{9}$ of the total length.

Eyes transversely oval, the upper margin near the profile, diameter $\frac{2}{7}$ by $\frac{1}{5}$ of length of head; $1\frac{1}{4}$ transverse diameter from end of snout, nearly 1 transverse diameter apart.

Body rather elongated, and with a considerable rise from the snout to above the orbits.

Snout rather obtuse; the posterior extremity of the maxilla extends to beneath the anterior margin of the orbit. The barbles extend to beneath the posterior margin of the præoperculum, which last is entire. Præorbital entire, its width equal to the transverse diameter of the orbit.

Teeth in five villiform rows in either jaw, on vomer and palate.

Fins. First dorsal triangular, the second spine the longest, interspinous membrane very slightly emarginate. Four rows of scales between the termination of the first and the commencement of the second dorsal fins, the latter of which is twice as high anteriorly as posteriorly, its spine half the height of the first ray. First anal spine minute; the second more than half as long as the first

ray; the fin twice as high anteriorly as posteriorly. Caudal deeply lobed.

Scales in parallel horizontal rows.

Lateral line follows the curve of the back, in the upper fourth of the body. It consists of a single tube in each scale, with branching roots, which are most distinct superiorly.

Air-bladder absent.

Colours. Chestnut along the back, becoming golden on the abdomen. Head reddish; a silvery stripe from the eye to the centre of the caudal fin, with a row of red spots above it, and another below it. Two reddish bars cross both the dorsal fins. Caudal with four oblique reddish bars across the upper lobe, whilst the lower is reddish and without bars. Pectorals, ventrals, and anal fins yellowish. Eye silvery.

OTOLITHUS ANEUS, Bloch.

B. vii. D. 10 $\frac{1}{24}$. P. 17. V. $1\frac{1}{5}$. A. $2\frac{2}{7}$. C. 17. L. 1. 52.
L. tr. $9\frac{1}{15}$.

Length of specimens up to $8\frac{5}{10}$ inches.

Length of head $\frac{2}{7}$, of pectoral $\frac{2}{9}$, of base of first dorsal $\frac{2}{11}$, of base of second dorsal $\frac{2}{7}$, of base of anal $\frac{1}{14}$, of caudal $\frac{1}{6}$ of the total length. Height of head $\frac{2}{9}$, of body nearly $\frac{2}{7}$, of first dorsal $\frac{1}{3}$, of second dorsal $\frac{1}{10}$, of ventral $\frac{1}{7}$, of anal $\frac{1}{10}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head; 1 diameter apart, 1 diameter from end of snout.

Body rather compressed, and about equally convex along both its dorsal and abdominal profiles.

Mouth oblique, the posterior extremity of the maxilla extending to beneath the centre of the orbit; interorbital region rather convex. Both vertical and horizontal margins of the præoperculum crenulated, angle slightly rounded. Two weak spines on operculum.

Teeth. An external row of ten or twelve conical and rather recurved teeth in the upper jaw, and an internal row of villiform teeth which are strongest in the posterior portion of the jaw. Also villiform teeth in the lower jaw with some conical ones intermixed, which are largest opposite to the symphysis. There are no large canines as in the *O. ruber*.

Fins. First dorsal somewhat triangular; the second dorsal parallel to the back. Pectoral pointed, extending to opposite to the third or fourth dorsal ray. The anal commences under the posterior third of the second dorsal. Caudal cut rather square. Dorsal spines weak, the first short, second and third the longest; interspinous membrane very slightly emarginate. Dorsal rays only branched in their upper third. Second anal spine the longest, but rather weak; it is two-thirds the length of the first ray.

Scales over head, opercles, cheeks, and præorbitals passing in rows backwards and upwards above the lateral line, and in much the same direction below it.

Lateral line in upper fourth of body, in single tubes with branching roots superiorly, and extending along the tail to its extremity.

Colours. Silvery grey, becoming dirty white along the abdomen. First dorsal tipped with black; second dorsal greyish, lightest along its centre. Pectorals, ventrals, and anal yellowish. Caudal tinged with grey.

I have referred this to Bloch's species, although he gives the dorsal formulary as follows:—D. $8\frac{1}{24}$; but his engraving shows D. $9\frac{1}{24}$, and the first short spine is evidently omitted. This would give D. $10\frac{1}{24}$, as I find to be the case at Madras. His specimen was received from Tranquebar.

Gobius brevifilis, C. & V.

B. iv. D. $6\frac{1}{8}$. P. 17. V. 6. A. $1/9$. C. 9. L. 1. 21. L. tr. 12.

Length of specimens to 4 inches.

Length of head $\frac{1}{4}$, of pectoral $\frac{1}{6}$, of base of first dorsal nearly $\frac{1}{7}$, of base of second dorsal $\frac{1}{6}$, of base of anal $\frac{1}{7}$, of caudal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{4}$, of first dorsal $\frac{1}{4}$, of second dorsal $\frac{1}{7}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{10}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head; $\frac{2}{3}$ of a diameter from end of snout, $\frac{1}{5}$ of a diameter apart.

Body rather compressed; profile from the snout to above the orbit forming almost one-fourth of a circle.

Gape of mouth rather wide, and cleft deep, the posterior extremity of the maxilla extending to beneath the anterior third of the orbit. Snout obtuse, rounded. Interorbital space very narrow, and slightly concave. Occipital crest indistinct. Posterior limb of præoperculum almost vertical, and not quite so long as the horizontal one; angle rounded and entire.

Teeth in several pointed villiform rows in both jaws; an external row of larger recurved teeth in the anterior third of either jaw.

Fins. Base of pectoral wide; all the rays branched, the central ones the longest. The second spine of the first dorsal elongated and filiform, as is also the third, but not to so great an extent; interspinous membrane moderately emarginate. Rays of the second dorsal fin of about equal height along its whole extent. Eight rows of scales between the posterior extremity of the second dorsal and the base of the caudal. Ventrals united. Anal low, its last ray slightly elongated; and seven rows of scales between its base and that of the caudal, which last is wedged-shaped, the central rays being the longest.

Scales finely ctenoid, none on the head.

Colours. Buff clouded with black; a large black blotch extending from between the two dorsals to the middle of the body, three more under or just beyond the second dorsal, and a large black blotch at the root of the tail. First dorsal with two rows of black spots; second dorsal with three rows. Caudal irregularly spotted, and with a dark margin. Pectorals buff-colour. Ventrals slate-colour. Anal buffy brown, edged with black.

APOCRYPTES PUNCTATUS, sp. nov.

B. iv. D. 5/25. P. 15. V. 6. A. 24. C. 15.

Length of specimens up to 6 inches.

Length of head $\frac{1}{5}$, of pectoral $\frac{1}{6}$, of base of first dorsal $\frac{1}{11}$, of base of second dorsal $\frac{2}{5}$, of base of anal $\frac{1}{3}$, of caudal $\frac{1}{6}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{5}$, of first dorsal $\frac{2}{5}$, of second dorsal $\frac{1}{9}$, or ventral $\frac{1}{9}$, of anal $\frac{1}{27}$ of the total length.

Eyes elevated, interorbital space concave; $1\frac{1}{2}$ diameter from end of snout, nearly 1 diameter apart.

Gape of mouth wide, cleft deep; the posterior margin of the maxilla extending to beneath the posterior margin of the orbit. Lower jaw broad, elevated at the symphysis. No crest on the head. Opercles unarmed. On either side of the snout the skin is extended into a slight lobe.

Teeth in a single row in the lower jaw, directed outwards and curved upwards at their extremities. A single row also in the upper jaw, with four to six canines in the centre, the external of which on either side is the largest.

Fins. Ventrals united, unattached to abdomen, except at their base; they arise under the middle of the operculum. Pectoral with a broad fleshy base; it commences posterior to the opercles; its outer rays are shorter than its central ones, which are the longest. The first dorsal consists of elongated, filiform spines, with a deeply emarginate interspinous membrane. The distance between the posterior end of the first dorsal and the commencement of the second dorsal equals the length of its base. The first five rays of the second dorsal shorter than the remainder; its last ray extends as far as the base of the caudal fin. Anal rays all branched and short. Caudal with very short external rays, its central ones being the longest.

Scales minute over head, and rather smaller in the anterior than in the posterior half of the body.

Colours. Greenish, with seven or eight black vertical bands descending from the back as low as the abdomen, which is of a reddish-brown colour. The whole of the body covered with opaque but bright blue spots, which are smaller and rounder on the head and at the base of the pectoral fins. Dorsal fins spotted in the same manner, those on the second dorsal being larger than those on the first. Pectoral orange, with a black edge. Caudal and anal blackish. Ventrals with a purplish tinge.

This fish climbs up rocks, and even on to pieces of wood; living in shallow estuaries, it is drowned in deep water. On land it progresses rapidly by means of its pectoral fins and tail, and snaps at anything which is placed near it. It is not uncommon.

PLATACANTHUS MACULATUS, sp. nov.B. iii. D. 3/27. P. $\frac{5}{1}$. V. 8. A. 3/6. C. 21.

Length of specimen 2 inches.

Length of head $\frac{2}{11}$, of pectoral $\frac{2}{11}$, of base of dorsal $\frac{1}{4}$, of base of

anal $\frac{1}{10}$, of caudal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{5}$, of body $\frac{1}{6}$, of dorsal $\frac{1}{6}$, of ventral $\frac{1}{9}$, of anal $\frac{1}{9}$ of the total length.

Eyes. Diameter $\frac{1}{6}$ of length of head; nearly 1 diameter apart, 2 diameters from end of snout.

Body elongated and slightly compressed, the upper profile ascends considerably from the snout to the commencement of the dorsal fin. No raised adipose keel along the back.

Mouth inferior, overhung by the snout. One pair of cirri on snout, as long as the orbit; two pairs on maxillæ, and two on the lower jaw. A free, bifurcated suborbital spine under the anterior third of the orbit. Anterior nostril tubular, divided by a valve from the posterior.

Fins. Pectoral arises under the operculum; it is as long as the head, and terminates at a distance equal to that from the snout to the posterior margin of the orbit from the commencement of the ventral, which does not quite reach the anal. Dorsal arises rather anterior to the termination of the pectoral, and ends just before the commencement of the anal. Dorsal fin highest anteriorly, with an elevation about its centre. Caudal nearly square, but with a slight emargination from its third to its sixth ray. Internal pectoral ray bony, with an enlarged extremity.

Scales minute, covering the body.

Colours. Greyish, becoming dirty white below the centre of the body. A dark line passes from the eye to the centre of the tail; along its first half are six black spots, whilst the whole extent of the back is irregularly lineated. Fins yellowish. Dorsal with four dark bands along it. Caudal with three bands, and a black margin. A black mark at the base of the tail, with a smaller one above and another below it.

This pretty little Loach was kept upwards of a month in a vase of water. When at rest it usually remained on the sand or rock-work supported by its two pectoral and its anal fins, its abdomen not touching the ground. When frightened it burrowed under the sand with great rapidity. It consumed animal or vegetable food indifferently, and grew considerably whilst in confinement.

8. Descriptions of some New Australian Freshwater Fishes,
By GERARD KREFFT, F.L.S., C.M.Z.S., Curator and
Secretary of the Australian Museum, Sydney, N. S. W.

Fam. PERCIDÆ.

MIONORUS, n. g.

Seven branchiostegals; all the teeth villiform, without canines; teeth on the vomer and on the palatine bones; tongue smooth. Two dorsals; the first with six, the anal with two spines. The leaves of the head without denticulation. Operculum without spines; scales moderate.

MIONORUS LUNATUS.B. 7. D. $6\frac{1}{9}$. A. $\frac{2}{8}$.

The height of the body is equal to one-third of the total length without caudal; cleft of mouth obliquely running upwards, as in the genus *Huro*; the length of the head is contained twice and one-half in the total length; the diameter of the eye is less than the length of the snout, and equal to the space between the eyes. The pectorals are rather narrow at the base, with eleven rays, situated just above the ventrals, which are furnished with one spine and five rays. The anal has two spines and nine rays. There are only six spines in the first dorsal, the first of which is the smallest, the last being about as long again as the first; the third spine is the longest, and is but slightly larger than the diameter of the eye. A short space, about the length of the last spine, divides the first from the second dorsal, which has one spine and nine rays. The scales are of moderate size, thirty on the lateral line.

Coloration uniform brownish; all the scales dotted with small black spots forming crescent-shaped and triangular marks on the sides. Caudalis truncated.

Hab. Cox's River, County Philip, New South Wales.

DULES VIVERRINUS.D. $\frac{11}{11}$. A. $\frac{3}{9}$. P. 15. V. $\frac{1}{5}$. L. lat. 58 to 60.

The height of the body is one-third of the total length (without caudal fin); the diameter of the eye is equal to the length of the snout, as long as the space between the eyes, and nearly one-fourth of the length of the head. There are two spines on the operculum, the lower one with two points. Caudalis truncated; the fourth and fifth dorsal spine longest.

Coloration uniform silvery on the sides; the lateral line divides the brownish and silvery hues; all the scales dotted with fine black spots, those of the sides having a free space in the centre. Fins black-dotted, and the first ray of the ventral fin tapering into a long filament, which is equal to the length of the head.

Hab. Murray River and its tributaries.

Fam. GALAXIE.**GALAXIAS WATERHOUSII.**

D. 11. A. 15. P. 13. V. 7.

Body stout, its depth in front of the dorsal fin being nearly one-eighth of the total length without caudal. The length of the head is one-sixth of the total without caudal, and equal to the height of the body. Eye of moderate size, one-fourth of the length of the head, and equal to the extent of the snout. The length of the pectoral fin is one-third of the space between its root and that of the ventral; the ventrals are of the same length, and almost in the middle between the vent and the root of the pectorals. The anal, if

laid backwards, does not reach the base of the caudal. The distance between the dorsal and caudal fin is much greater than the least depth of the tail.

Coloration uniform brownish ; back and sides finely black-dotted. Operculum with a golden tint.

Total length 7 inches.

Hab. Creeks in South Australia.

9. On the Geographical Range of *Semnopithecus entellus*.

By Capt. T. HUTTON, C.M.Z.S.

The particular species of Monkey to which the name of Hoo-noomaun now more especially and properly applies is known to naturalists as the *Semnopithecus entellus* ; and notwithstanding the frequent and dogmatic assertions of travellers as to its occurrence throughout all India, from Cape Comorin to the Himalaya, the species is entirely and absolutely restricted within narrow limits to the hot tropical plains of the south-western Gangetic provinces, where, from the degree of protection which its imputed " odour of sanctity " is so well calculated to cast around it, as well as from the numbers in which it frequently occurs, it becomes a perfect nuisance in those parts of the country where the superstitious veneration for it most strongly prevails. In many places, where the natives from religious motives are in the habit of feeding and protecting them, the roofs of the village huts are at certain hours of the day literally crowded with them, and the depredations committed in grain-shops, gardens, and among the neighbouring crops are most destructive and *unsaintlike*.

Mr. Blyth speaks of the frequent occurrence of troops of these Monkeys around Kishnagur in Lower Bengal, and observes that he never met with them eastward of the Hooghlee ; this is a slight error, as Kishnagur is itself to the eastward of that river. If he meant to say that they were not in their *natural habitat* to the eastward of the Hooghlee he would be correct, as the animal was purposely introduced into Kishnagur by devotees. The fact is that Mr. Blyth confounds the Hooghlee with the Jellinghee river, the former originating only in the junction of the Bhagiruttee and Jellinghee a little below Kishnagur, and thence proceeding to Calcutta and the sea. Kishnagur itself is situated on the left bank of the Jellinghee, which bounds the eastern side of the island of Cossimbazaar or Moorshedabad ; and the Bhagiruttee bounds the western side,—both these Gangetic offshoots forming a junction to the south of the island a little below Kishnagur, and about sixty miles or so above Calcutta. The Entellus having been purposely introduced into that locality some years ago proves that the animal is not a native of that side of the river, but is wholly confined by nature to the right banks of the Ganges and Hooghlee. Mr. Blyth likewise remarks with reference to the Entellus ;—" I know of one locality where the whole

numerous community of Bengal Hoonoomauns appears to consist of males only of different ages, from half-grown or less to adults; and the natives of that part say that furious battles are frequent among them; whereas the great majority are females in the other locality that has been spoken of, and it is understood that each male attached to a flock of females allows no other male, even half-grown, to approach them. Though a stream navigable for boats passes through the jungle inhabited by the latter community, or probably series of communities, with plenty of Hoonoomauns on each side of it, the natives of the place informed me that they had never known one to pass across, or, in fact, to enter the water”*.

There is in this an abundance of credulity on the one side, and of fiction on the other! Cross the water they will not—a proof that Nature restricts them to the range I have herein pointed out. But if all the males remain on one side of a stream and all the females on the other, as this statement would seem to imply, how does Mr. Blyth propose to carry on the great work of Nature? The story is evidently one of those tales in which native shortsightedness is clearly apparent; nay, it contradicts itself; for Mr. Blyth states that in one flock the majority were females, thus admitting the presence of several males, and yet alleges that each male attached to a flock will allow no other male, not even half-grown, to approach the females. The fact appears to be that the troop on one side has evidently been introduced to the locality, while the other is on its proper side, and is prevented by the stream from crossing to the bank where Nature never intended it to reside. The entire account as given by the natives is opposed to the habits and manners of the genus; for at Bindrabun, Muttra, and various other places where I have seen them the males and females are promiscuously intermixed; and although quarrels will sometimes occur, yet as a general rule the whole community lives together in peacefulness. With the Himalayan species the custom is the same, the males and females remaining together at all seasons, even when the females have young ones at the breast, or are followed by yearlings. The only approach to a separation at any season consists in the males of a troop keeping together and the females doing the same if there are very young ones among them; but the two divisions form but one troop; and I am not even yet quite sure that such a trifling division really takes place.

According to the same authority we learn that Dr. Jerdon, of the Madras Army, has stated of the Entellus that, on the western side of India, “it is peculiar to the dense forests of the western coast. It abounds at the base of the Nilghirries, in Malabar, Travancore, &c., living in small troops, and has the usual loud cry of the others of this genus. The true Entellus,” he adds, “I have found chiefly in the neighbourhood of large towns, frequenting groves—also, however, in forest in Goomsoor, and open jungle in the Deccan.” Colonel Sykes speaks of the animal as being common in the Western Ghauts, where the Mahrattas call it Mākar, and do not venerate it.

* J. A. S. B. vol. xii. p. 174.

As there can be no doubt but the forest is the natural haunt of this and other species, the fact of its being now so frequently found in groves in the vicinity of towns and villages is owing chiefly, if not entirely, to the veneration which often prompts the superstitious natives to introduce the creature into such places, where they are sure to be well fed and protected. This is clearly enough seen in the case of the Kishnagur Monkeys above mentioned by Mr. Blyth, which were introduced to that place many years ago by devotees, and have now increased and multiplied to such an extent as to have become a perfect pest. This fact was lately reported in 'The Delhi Gazette' of the 2nd of March, 1867, wherein a letter from a Calcutta correspondent states that a petition was presented by a large number of the native community praying that measures might be taken by the municipality to destroy some of the too numerous Monkeys that infested the station, causing fearful havoc amongst the fruit and grain. An order was issued, and five hundred Monkeys were killed. "There must be many thousands," continues the writer; "and all are descended from one pair originally brought to Kishnagur and let loose. This was soon succeeded by another petition from a different section of the native population, for the cancelment of the order to kill what they described as their long-deceased ancestors."

The true *Entellus* does not occur at all in Ceylon, although such has been stated to be the fact, but is entirely confined to the mainland, the name of *Hoonoomaun* being applied in Ceylon to another species, as it is on the continent of India to several others—and hence, in part, the confusion that prevails in regard to the true range of the *Entellus*.

Sir Walter Elliot gives the measurements of an adult male from the Southern Mahratta country as being, "from the muzzle to the insertion of the tail 1 ft. 10½ in.; length of the tail 3 ft. 2½ in.; height from heel to crown 3 ft. 2½ in.; weight 22 lbs." To this Mr. Blyth adds the colours as "constantly black hands and feet; the forearm, and leg externally, with the croup are of a pale *chocolat-au-lait* colour, extending more or less over the back, humerus, and thigh; and the rest is of a light straw-colour, or pale isabelline, with occasionally a tinge of ferruginous on the belly."

With regard to the distribution of the *Entellus*, the species is entirely restricted by nature to the right or southern banks of the Rivers Ganges and Jumna, the latter, as I think, bounding its northern range. It thus occupies parts of the southern Gangetic provinces, the Dukhun, and the Carnatic, down to the Malabar coasts, which form together a wide triangular geographical area. It has, indeed, been said to occur in Assam, which would carry it far across the Ganges to the eastward; but there is, I believe, no reliable instance on record of its having been procured from that eastern province. All that Mr. Blyth ventures to say on the subject is, that he has been "assured of its occurrence in Assam, though he never saw a specimen from that province." I am therefore inclined to think that some other species, probably *Semnopithecus pileatus*, has there been mistaken for it,

since there is among all these black-faced and long-tailed species so great a general resemblance, that it would be quite impossible, at any distance, for a mere casual observer to say with any degree of certainty what the animal seen might be. Moreover it is this very confounding of several distinct species in different parts of the country, under the long venerated title of Hoonoomaun, that has led compilers of works on natural history to declare that the range of that species extends from the sea-coast of the southern peninsula up to the northern ranges of the Cis-Himalaya. If, then, the Entellus has ever been seen in Assam, it is not because that province forms part of its natural range, but because, as elsewhere, it has been purposely introduced from religious motives; but, from all that recent writers on Assam and Bhotan have observed, I strongly doubt even whether any such introduction of the species has there occurred. The grounds on which its occurrence in Assam has been asserted I shall presently expose to view. How far up the country in a northerly direction the animal may be found is not easily determined, although I am inclined to doubt its occurrence indigenously higher than Allahabad, at the junction of the Jumna with the Ganges, through which point I would draw as nearly as possible a straight line across the country to the westward, as far as a little below Boondee, as the northern limit of its range. South of Boondee, and a few miles above Neemuch, the animal used to occur in a grove surrounding some Hindoo temples; but as I never heard of its occurrence elsewhere in the neighbourhood, I suspect it to have been introduced there from Muttra or Bindrabun.

That the Entellus has sometimes occurred abundantly at Bindrabun and also at Muttra does not militate against this view, inasmuch as, both being holy cities with hosts of bigoted devotees and fakirs, the animal has been purposely introduced to those localities, where it has always been held in great veneration, and has sometimes multiplied into many thousands in the gardens and groves surrounding the temples, while in the outlying neighbourhood it does not occur at all, except as an occasional straggler from the sacred band. That it is not indigenous there is proved by the fact that, although it has often been introduced, it never lives long in those localities, but from time to time dies out altogether. Johnson, in his 'Indian Field Sports,' tells us that when he visited Bindrabun there were then no monkeys of this species, but only the common brown Bunder or Rhesus. Here, then, we have a proof that the animal had been previously introduced and had died out; for Johnson's book was published in 1839; while in the spring of 1836, only three years before, when I passed a day at Bindrabun, they were numerous.

Turner in 1800 wrote that he had seen the Entellus at Muttra; in 1836 I also saw it at Bindrabun; yet in 1839, when Johnson's book was published, there were none left. In 1843 it was again brought into Muttra, and died out in a couple of years, while I am informed by a gentleman now residing in Muttra that at present, in the current year of 1867, while the Rhesus swarms there, the Entellus is altogether absent.

This clearly shows that the animal cannot bear even so slight a change of climate northward as Muttra and Bindrabun, and that it is certainly not indigenous in the neighbourhood; it accounts likewise for the difficulty of preserving the animal alive for any time in Europe.

These facts might be allowed to settle the question of range; for it is certain that the Entellus does not voluntarily cross the Jumna, or the Ganges, and therefore cannot wander up to the Himalaya mountains—besides that it could not live in such a climate, being seldom able even to round the Cape of Good Hope, and never long surviving its arrival in Europe.

The itinerant showmen from Meerutt declare that the Entellus may be seen at present in small parties between that place and Delhi, and that there are a few at Agra; but then, at the same time, they candidly acknowledge that the animal has been recently introduced there by fakirs and devotees.

In the extensive province of Oudh, stretching far along the left bank of the Ganges, the Entellus does not occur indigenous. This I have ascertained from several natives of that country, who declare that, if ever seen, it is near some temple where the fakirs have introduced them. One man informed me that, when he was quite a boy, he once saw one of these animals which was supposed to have crossed the Ganges accidentally on some boat or uprooted tree, the animal's advent being regarded by the natives as an auspicious event, and crowds assembling to see and to salaam to it. This appears to prove that the left bank of the Ganges is not the natural habitat of the species, since no notice would have been taken of the arrival of a single solitary individual had the species been common in the province. The long-tailed monkeys sometimes seen in the Nipal Terai are nothing more than the Himalayan Lungoor, a totally distinct species, known as *Semnopithecus schistaceus*; and, indeed, another native of Oudh informs me that, while the common Bunder is abundant throughout the province, the Entellus does not occur there, and that the long-tailed monkey sometimes seen in the Nipal Terai, or forest at the foot of the mountains, was the Hill Lungoor, and the only one of the genus to be met with.

There is, again, good reason to think that much of the confusion which prevails in regard to the geographical range of the species may have arisen from the fact that many of the natives have got into a habit of applying the name of Hoonoomaun to the common Rhesus, which actually does extend from Bengal, not exactly into the Himalaya, but up to the outer or southern boundary of the Dehra Doon, at perhaps a distance from the mountains of twenty-five to thirty miles.

In the Punjab, again, the Entellus does not occur; and I am inclined to restrict its range, somewhat loosely perhaps, to between 10° and 25° of north latitude, and 75° to 88° of east longitude, forming with the line drawn across the country from Allahabad to Boondee, a triangular range entirely south of the Rivers Jumna and Ganges. It does not, therefore, approach the foot of the Southern

Himalaya within 200 miles of their outlying ranges known as the Siwaliks.

With regard to its alleged occurrence in Ceylon, Cassell, in his 'Popular Natural History,' has been completely misled by trusting too implicitly to the lying legends of the Ramayau, in which the exploits of Hoonoomaun, in that island, are recounted. The species which in that locality bears this name is not, as we learn from the indefatigable labours of Mr. Blyth, the continental Entellus, but the *Semnopithecus thersites*, Elliot, a totally distinct species, which is restricted to that island; and the only other Monkeys there found, if we except those which may have been imported as captives, are the *S. cephalopterus*, *S. priamus*, *S. ursinus*, and *Macacus pileatus**.

Then, again, as to its alleged occurrence in Nipal and Bhotan, Cassell erroneously informs us (and not Cassell only, for Mr. Ogilby long since did the same before him) "that, though a native of the hot plains of India, it is able to sustain the rigors of a much colder climate."

I have shown, however, above, that it cannot bear even the slight change to Muttra and Bindrabun. "The monkeys of this species," continues Cassell, "ascend the Himalaya wherever wood is to be had; they are found in Nipal, a lofty mountain ridge, a great portion of which is always covered with snow, for its most elevated peaks are the highest mountains on the globe; and Turner even informs us that he met with these monkeys on the Alpine Plains of Bhotan."

Yet all this, although somewhat confident and high sounding, becomes in reality perfectly worthless when we call to mind the fact that Turner was no naturalist, and has evidently fallen into the fashionable error of confounding with the Entellus of the plains either the mountain Lungoor, or the *Semnopithecus pileatus*, or *S. barbei* (the two latter restricted to the south-eastern mountains)—an error from which Cassell evidently could not relieve him, and which has been repeated since Turner's day, by more competent observers, when the above-mentioned species had not, as now, been all recognized as distinct.

Now it was this very tenderness of constitution and inability of the Entellus to bear up against great changes of climate and temperature that made me, several years ago, contend in *epistolâ*, with certain naturalists, against supposing the mountain *S. schistaceus* to be identical with the lowland Hoonoomaun, as likewise that the Rhesus should, on the score of climate, be held to be distinct from the supposed diminutive Rhesus of the mountains. My reasoning was not then admitted as conclusive; and as my opponents were men of weight, I temporarily gave in and bided my time. Yet the Lungoor is now acknowledged to be distinct from the Entellus, and I have acquired the means of proving the Rhesus of the plains to be equally distinct from the Bunder of the mountains. Nipal, however, is not exactly "a mountain ridge, a great portion of which is always covered with snow," but is, on the contrary, a rather warm valley of no great elevation, situated far to the south of the snowy ridge,

* J. A. S. B. xvi. p. 1271; Cat. Mamm. Mus. As. Soc. Bengal.

with a wide belt of mountain-forests between them ; and the Entellus, as previously observed, being entirely restricted by nature to the warm lowland regions below Allahabad, and to the right or southern bank of the Ganges, cannot very well ascend to the snowy ranges.

The late Dr. Griffiths, who accompanied Captain Pemberton's mission to Bhotan in 1837-38, does not throw much light on this subject, as he merely says, speaking of the animals, "Monkeys, as usual, abound on the lower ranges, on which the Hoolock of Assam likewise occurs. Some long-tailed monkeys occurred above Bulphai, at 8200 feet above the sea ; and in January I likewise saw a flock of noble ones not far from Tongsa, at an elevation of 5800 feet ; these were white, and in form and size resembled the Lungoors"*..

This is all very loose writing, and not a single species is determined—besides that the name of Lungoor is applied to more than one species, although Dr. Griffith being a Madras officer may have had the Entellus in his mind. The matter is thus left in doubt, and we know not to what species he alludes, to say nothing of the fact that neither the Entellus nor the Lungoor of the north-west is "white"†, the colour of adults in the latter species being of a dark slate-colour, while the Entellus is of a rusty *chocolat-au-lait*. Moreover the north-western Lungoor is not by any means likely to occur in the hot regions where the Hoolock of Assam is common, especially when, in the latitude of 30° north, it does not descend lower than 2000 feet even in the depth of winter.

Dr. McClelland, who visited Assam in 1839, makes no allusion whatever to the Entellus, although he notices the Hoolock and a species of monkey allied to the Rhesus, under the name of *Macacus assamensis*.

All things considered, then, I am inclined to regard the species seen by Turner on the heights as neither the Entellus (which assuredly does not occur there) nor the mountain Lungoor, but a totally distinct animal, which Mr. Blyth has described in the 'Journal of the Asiatic Society of Bengal,' vol. xii., under the appropriate name of *Semnopithecus pileatus*, which "abounds on the skirts of the Tipperah hills, retiring far into the interior during the rains, and is common also on the Naga hills and mountainous regions of Sylhet and Chittagong." It is, therefore, by no means difficult to perceive that the next step would carry it to the adjacent region of Bhotan itself ; and as Turner was no naturalist, he would in all probability have been deceived by a general resemblance in colouring.

When speaking of the Entellus, Mr. Blyth remarks that M. Duvaucel observes, "that the appearance of that species in Lower Bengal takes place principally towards the latter end of winter ;" upon which, Mr. Martin notes that it appears to migrate from the upper to the lower provinces of this part of India. I can only state, continues Mr. Blyth, "that I have found them equally numerous in July and January in the particular locality adverted to, and I have seen them in June close to Calcutta on the opposite side of the river.

* J. A. S. B. viii. p. 722.

† *S. barbei* has shoulders and arms externally silvery !

With regard to the alleged migration of the Himalayan species also, Captain Hutton mentions that 'this species is found at Simla all the year through; but when the snow falls during the winter it seeks a warmer climate in the depth of the khuds, returning again to the heights as it melts away.' I have seen them, however, on a fine sunshiny day, even with the snow on the ground, leaping from tree to tree up and down the hill of Jákú at Simla, which is about 8115 feet. Royle is mistaken when he says that the Entellus alone ascends in the summer months as high as 9000 feet. I have seen them at Nagkunda in August at that elevation, and in winter on Háttú Mountain, which is 10,655 feet—and in winter at Simla, with snow 4 or 5 inches deep and hard frosts at night, as high as 8000 feet. The *Macacus rhesus* was also repeatedly seen during the month of February, when the snow was 5 and 6 inches deep, at Simla, roosting in the trees at night on the side of Jákú, and apparently regardless of the cold"*.

There is in all this a great deal of error, for part of which I am responsible, and which it is high time should be corrected.

In the first place, then, I am fully convinced, as Mr. Blyth also appears to be, that there is no true migration of the Entellus, in the proper sense of the word, from the upper to the lower districts of Bengal. The animal will vary in numbers at different seasons, according as food is scarce or plentiful; and wherever this is most abundant and most palatable, there it is probable will the Entellus be found in abundance also. I have already shown that the animal's constitution will not permit it to live long even at Muttra and Bindrabun, and consequently that its existence in the Himalaya is utterly impossible. At the time when I, and Dr. Royle before me, confounded the Entellus with the Himalayan Lungoor, the species were not admitted by naturalists to be distinct; for although I stated my own doubts of their identity, yet I had, in 1837, against me the weighty authority of Mr. Hodgson in Nipal and of Dr. J. E. Gray in England; so that, being myself but a tyro, I was compelled to give in. The same error arose also in regard to *M. rhesus*, which is not found within the mountains. My remarks, as it now appears, refer to more than one species of Bunder, which are distinct from the Rhesus and confined to the Himalaya.

It was necessary to say thus much regarding the Entellus in order to correct the erroneous notion that prevails respecting its occurrence in the Himalaya, the base of which it does not approach within several degrees. In the north-western portion of those hills it is replaced by the so-called Lungoor, while to the south-east occur the species now known as *Semnopithecus pileatus* and *S. barbei*, it being very doubtful, from what I can learn, whether the Lungoor extends its range so far to the eastward, or, indeed, beyond the eastern frontier of Nipal.

And now a word, in conclusion, as to the alleged occurrence of the Entellus in Assam. The error in this respect appears to have entirely originated in the unauthorized change of a name used by M.

* J. A. S. B. xii. p. 174.

Duvaucel. Mr. Ogilby, in his 'History of Monkeys,' when remarking upon M. Duvaucel's adventures with the Entellus, informs us that by "Gouptipara," the name of the place where the animal was shot, "he appears to mean the city of Goalpara." On the contrary, however, he appears to mean nothing of the kind; for he distinctly states that the city of Gouptipara, where he shot the animal, was a holy place with many temples, and situated on the river Hooglee, somewhere near Chandernagore in Lower Bengal, and therefore not far from Calcutta; whereas Goalpara is situated on the Burham-pooter river in Assam, about 200 miles away. The fact is that Mr. Ogilby, being better acquainted with menageries than with the geography of India, took upon himself to alter the names of the places, and by so doing gave rise to the erroneous idea that the Entellus occurs in Assam. But besides giving us the River Hooglee and Chandernagore as guides to the locality, M. Duvaucel likewise plainly speaks of his having been thwarted by "the Bengalese," who constantly scared away the monkeys; whereas, had he alluded to Goalpara, he would have called the people "Assamese."

Hence the error in this respect appears to be entirely owing to Mr. Ogilby's ignorance of the geography of the country, and to his unwarrantable alteration of the name furnished by M. Duvaucel.

The remarks now made, founded upon long and patient research into the history of the animal, will, I trust, not prove unacceptable to my brother naturalists in Europe.

December 12th, 1867.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

The following extract was read from a letter addressed to the Secretary by Dr. John Kirk, C.M.Z.S., dated Zanzibar, Sept. 7th:—

"In the collection of animals in spirits now ready for transmission to England by the first opportunity, I have placed several specimens of the *Galago* of the island of Zanzibar; which, I can now assure you, is very different from that of the opposite coast. I have kept specimens of both here: the colour, form of snout, size of ears, &c. are very distinct. The species of the coast is, no doubt, *G. crassicaudatus*, while I presume the island one is *G. agisymbanus*, of which there are no specimens in England.

"I am not satisfied regarding the little Antelopes of this island, whether there are not two species; the texture of the fur varies much, also the size of ears; but I have not had an opportunity of comparing a sufficient number of specimens to be certain.

"I have only three species of Bats from Zanzibar; this is singular,

as in Zambezia there are so many. Of Butterflies I have not collected above forty kinds; but some of these are very fine.

"From Mozambique I have a valuable collection of Snakes and Insects, perhaps nothing new, but representing rare species.

"This has not been to me a year productive in specimens of natural history; but I hope in two months to get off for a few days to Lamoo, where are the *Numida vulturina* and other nice things. A tame hen of this *Numida* lived for some time at the French Consulate here, but has been stolen lately; it was an extremely handsome bird. They seem to be common at Lamoo. When the 'Syria' was there the officers saw several in the market, and killed them for the table, keeping only the skin. I had asked them to look out for it; but they mistook the bird when they saw it, thinking they were to seek for something much more rare."

Dr. Peters communicated a note on the relation of the tympanic bone to the mandible in the Marsupials, stating that he had found in a young *Halmaturus bennettii* (85 millim. long without tail) and in a young *Didelphys*, that the former bone is inserted into the cavity formed by the angle of the latter. He considered that this temporary glenoid surface is to be compared with the permanent glenoid cavity in birds, or at least to a part of it, as it is well known that relations which are permanent in lower animals are often represented by a temporary condition during the period of evolution in higher classes. In the author's opinion this observation tends to confirm the view that so important and constant a bone as the tympanic is in the Mammalia does not disappear at once in other vertebrates. It also obviates one of the principal objections urged against the homology of the *os tympanicum* with the quadrate bone of birds and reptiles, viz. that it is never united to the lower jaw; at the same time it explains the peculiar form of the angle of the lower jaw in the Marsupials.

Mr. Sclater called attention to the important fact of a fat male Eland (*Oreas canna*), bred by Lord Hill, at Hawkstone, Shropshire, being exhibited at the cattle-show of the Smithfield Club, and being about to be offered for sale at the close of the show for the market—the first event that had ever happened of this kind. The animal was stated to be a male, aged six years and seven months, and to weigh alive 1760 lb.

In answer to some inquiries on the subject made last summer, Lord Hill had forwarded to Mr. Sclater the following communication:—

"I wish I could send you an account of the Elands I have bred and disposed of since I purchased the pair from the Zoological Gardens, as the return would be most satisfactory. Unfortunately I have kept no record, which I have often regretted; but I can state that I have not had a single case of disease among them, that the females have bred as regularly as possible, except on one occasion (when I used too young a male, about a year and a half old), and that the losses

by accident have been very trifling. The male I originally purchased at the Gardens I fattened and shot. Its meat I thought excellent. The female that came at the same time died in the park, from overeating dried leaves. Another male injured his shoulder, and I was obliged to make away with him. One calf also, this last year, broke its hind legs by some means; and another died soon after its birth about two years ago. These are all the casualties I can recollect, and I really am not able to tell you how many I have disposed of; but I have parted with several pairs to Zoological Societies on the Continent, and others in England. I have now five females remaining (all, I believe, in calf), and three others born last summer, with two males—the one I got from the Gardens about two years ago, and an older one which I shall be glad to dispose of; he is feeding well, and would either do for the butcher or for stock-purposes.

“It has long been a surprise to me that nobody else has taken a fancy to the Eland. It is unquestionably a noble animal, and requires no more attention than a cow, living well upon the same food, out the whole year with merely a shed to run under, and acclimatized as much as any animal can be. I am very sorry I cannot send you a more detailed statement; but any questions you may ask I shall be happy, if possible, to answer.”

The herd of Elands in the Society's Gardens was stated to consist at this time of seven individuals, namely:—

No.	Sex.		
1.	Female	Born in the Gardens.....	Dec. 20th, 1861.
2.	Female	Born in the Gardens.....	Feb. 22nd, 1866.
3.	Male	Born in the Gardens.....	Feb. 28th, 1866.
4.	Female	Presented by Lord Egerton.....	Oct. 24th, 1866.
5.	Male	Born in the Gardens.....	April 13th, 1867.
6.	Female	Born in the Gardens.....	May 8th, 1867.
7.	Female	Born in the Gardens.....	Dec. 5th, 1867.

The following papers were read:—

1. Notes on the Visceral Anatomy of *Hyomoschus aquaticus*.

By W. H. FLOWER, F.R.S. &c., Conservator of the Museum of the Royal College of Surgeons.

Of the aberrant family of the *Tragulidæ*, situated on the confines of the great order RUMINANTIA, and leaning strongly in the direction of the ARTIODACTYLA OMNIVORA, the African genus *Hyomoschus* has generally been considered the most aberrant and pig-like form. This opinion has been founded chiefly upon the structure of the extremities, as the visceral anatomy is at present entirely unknown. It was with much interest, therefore, that I availed myself of the opportunity of investigating certain points connected with the organization of this animal, afforded by the acquisition, by the Museum

of the Royal College of Surgeons, of the body of a young female *Hyomoschus aquaticus*, which died in June last, in the Gardens of this Society.

The animal was not quite full-grown, the milk-teeth being still in place, with the first and second permanent molars. The various organs were compared during the examination with those of a specimen of *Tragulus javanicus* of the same age and sex.

The tongue is $3\frac{1}{4}$ inches long, and $\frac{3}{10}$ inch in average breadth, rather fleshy, with sides nearly parallel, flat above, and obtusely pointed at the tip. Along the anterior half is a median linear depression. Numerous white, flat-topped, circular, circumvallate papillæ are scattered irregularly over all parts of the surface, those at the hinder part being rather larger than the others. Quite at the root is a group of large, closely set, sharp-pointed, conical papillæ. These seem to be of the same class as the minute pointed papillæ with which the entire surface of the organ is beset developed to an unusual degree. On each side of the upper surface, near the posterior end, is a long, narrow, and deep groove, $\frac{3}{10}$ inch in length, placed obliquely, so that the posterior end inclines towards the middle line. The edges of this groove are thickened, white, and free from papillæ; and within it is a linear papillary elevation, with a faintly notched free border, projecting slightly above the level of the surrounding parts. This, which appears to be a modification of a circumvallate papilla, occurs also in *Tragulus javanicus*.

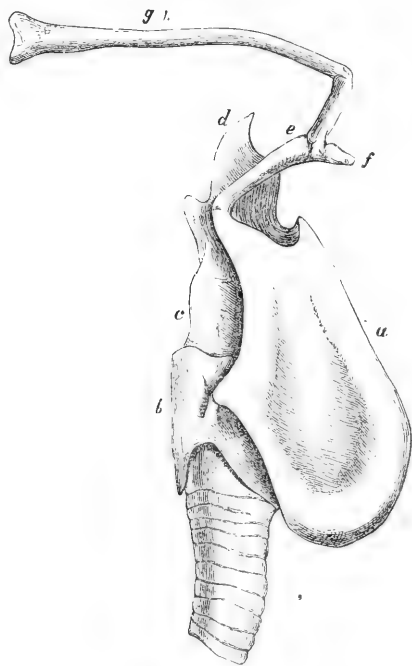
The larynx presents a peculiarity in its construction which is not met with in *Tragulus*, or, as far as my knowledge extends, in any other ruminant. The whole organ is remarkably large and prominent—a circumstance mainly caused by the extraordinary development of the thyroid cartilage (*a*, fig. 1, p. 956). This is formed as usual, by two broad lateral plates united at a very salient angle in front. The entire length of the cartilage in the middle line is $1\frac{7}{10}$ inch. Its upper border has three distinct triangular projections—one in the middle line, broader and shorter than the others, and one on each side, attached to the inferior cornua of the hyoid. The lateral margins, $\frac{3}{10}$ inch in length, are gently and regularly excavated, and terminate below in a short, pointed triangular process for articulation with the cricoid cartilage. Below this point the thyroid is continued downward; and instead of being open below as usual, its sides are united across the middle line, so as to form a considerable, rounded, compressed pouch, placed in front of the commencement of the trachea.

In *Tragulus javanicus* the whole vertical depth of the thyroid is but $\frac{3}{10}$ inch, and it is widely open below, and presents no anterior prominence. In the larynx of the Sheep there is a well-marked projection of the anterior edge of the thyroid rather below the middle, but offering only a slight indication of that which is so remarkably developed in *Hyomoschus*.

The cricoid cartilage (*b*) forms a strong shield behind, $\frac{7}{10}$ inch in length, and the same in breadth. Its thickened upper margin is hollowed in the middle line, and on each side presents a large oblique

articular surface for the corresponding arytenoid cartilage. The lower border has a long pointed median prolongation. From each side stands out a short triangular process for articulation with the lateral processes of the thyroid; and from the same part descends, very obliquely downwards and forwards, a long, rather slender prolongation of the cartilage, which, meeting its fellow in the middle line in front, completes the ring.

Fig. 1.

Side view of larynx of *Hyomoschus aquaticus*. Nat. size.

a. Thyroid cartilage. *b.* Cricoid cartilage. *c.* Arytenoid cartilage. *d.* Epiglottis. *e.* Thyrohyal. *f.* Basihyal. *g.* Stylohyal.

The arytenoid cartilages (*c*) are flattened plates almost quadrilateral in figure, $\frac{4}{10}$ inch in diameter; the aryteno-epiglottidean ligament is attached to the middle of their upper margin, the thyro-arytenoid ligament (vocal cord) to the antero-inferior angle; and they are articulated to the cricoid cartilage by their posterior inferior angle.

The cavity in the interior of the larynx may be divided into two parts—a direct uninterrupted passage to the trachea posteriorly, and in front of this a capacious but laterally compressed pouch or diverticulum, situated within the expanded thyroid cartilage. Owing to

the great antero-posterior breadth of the base of the arytenoid cartilages and their distance apart, the vocal cords are placed nearly vertically in the sides of the larynx, and thrown unusually far from its posterior wall, so that when they are brought into contact a cylindrical tubular air-passageway remains open behind them, but the communication between that passageway and the thyroid pouch is shut off. These cords are exactly $\frac{1}{2}$ inch in length, and tolerably prominent.

There are no lateral membranous pouches or sacs connected with the larynx.

Knowing little of the habits of the animal during life, I am unable to throw any light upon the mode in which this singular modification of the vocal organ is related to its economy.

Each lung consists of a single lobe, of general triangular form, with a flattened tongue-shaped projection arching forwards from the apex. This projecting lobule is much larger on the right side than on the left, and has a distinct bronchial branch from the trachea, given off $\frac{1}{2}$ inch above the bifurcation, wanting on the left side. The right lung has, moreover, a small accessory lobule projecting forwards from the internal border just below the root of the lung.

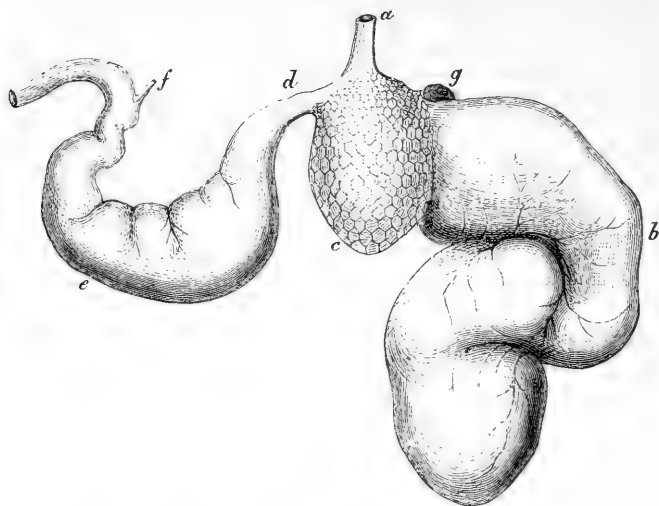
The lungs thus conform in the general principle of their construction with those of *Tragulus javanicus*; but in the latter they are rather more subdivided by notches, and the upper and lower accessory lobules of the right lung are relatively larger and more distinct.

The heart presents nothing unusual: the great vessels arise from the arch of the aorta as in *Tragulus*: viz., the first, nearly $\frac{3}{4}$ inch long, gives off the right subclavian, and then divides into the right and left common carotid; the second branch, arising close to the last, is the left subclavian.

The stomach (fig. 2, p. 958) consists of three principal compartments, as in *Tragulus*. The œsophagus (*a*) opens directly into the middle compartment or *reticulum* (*c*), which is a pyriform or egg-shaped sac, with the small, obtusely pointed end turned forwards and to right. When moderately distended it is 4 inches long and $2\frac{3}{4}$ inches wide at the base. The honeycomb-like reticulations are distinctly seen all over this compartment, from the exterior, as faint white lines forming hexagons, very much larger at the pointed free end than near the base. The broad end or base is directly continuous with the rumen (*b*), being only marked off from it by a slight constriction. The last-named cavity is a long cæcal pouch, having a sigmoid flexure, and being partially divided, by constrictions at the concavities of the bends, into three compartments. Its greatest length (in this folded state) is 9 inches. $\frac{3}{4}$ inch to the right of the entrance of the œsophagus the true digestive stomach or *abomasus* (*e*) commences by a very constricted tube not more than $\frac{1}{8}$ inch in diameter. This speedily dilates into an elongated tubular sac, largest near its proximal end, and gradually narrowing towards the pylorus. In its natural state this stomach is sharply curved upon itself, and puckered at its upper border or lesser curvature; but when the membranes are detached this curvature and all the foldings disappear,

except one natural rectangular bend upwards near the pyloric end. The length of this compartment when straightened is 7 inches, its greatest diameter $2\frac{1}{4}$ inches.

Fig. 2.



Anterior surface of stomach of *Hyomoschus aquaticus*. One-fourth of nat. size.

a. Œsophagus. b. Rumen. c. Reticulum. d. Rudiment of psalterium.
e. Abomasus. f. Biliary duct. g. Spleen.

On opening the cavities the villi on the internal surface of the rumen were seen to be long and narrow, especially towards the base of the compartment; they measured mostly $\frac{2}{10}$ inch in length. In the reticulum the villi are very sharp-pointed, as usual. The passage along the top of the reticulum from the Œsophagus to the orifice leading to the true stomach is smooth, $\frac{3}{4}$ inch long, and bounded by thick but not very prominent folds of membrane. This orifice is $\frac{1}{4}$ inch in diameter. The part which immediately follows the orifice (d), though it cannot be called a distinct compartment as in ordinary ruminants, is $\frac{6}{10}$ inch in length, slightly dilated and marked off by a faint constriction from the remainder of the abomasus, from which, moreover, it is most distinctly separated by a thick opaque epithelium with short villi, like those covering the laminae of the psalterium in other ruminants; there are also indications of longitudinal plications of the mucous membrane. The remainder of the last cavity has (as usual) a smooth soft lining membrane, free from villi.

There is thus a decided indication of rudimentary condition of the psalterium or third compartment of the ruminant's stomach; and contrasting this with the statement by Alph. Milne-Edwards, in his valuable monograph on the Chevrotains, that in the genus *Tra-*

gulus, "Ce dernier estomac [the abomasus] naît directement du bonnet [reticulum] sans qu'il y ait à son origine, dans aucune des quatre espèces que j'ai disséquées, le moindre indice de l'existence d'une partie comparable au feuillet [psalterium] des Ruminants ordinaires"*; it might be inferred that in the structure of the stomach *Hyomoschus* formed a link between *Tragulus* and the true ruminants, instead of inclining in the opposite direction as commonly supposed. But the *Tragulus javanicus*, which I dissected for comparison with the present animal, showed precisely similar indications of a rudimentary psalterium; and the same may be observed in a preparation of the stomach of a *Tragulus kanchil* in the College Museum, No. 554, Physiological Series, thus correctly described in the Catalogue†:—"The passage leading from the œsophagus to the third cavity is bounded by two low parallel ridges; the longitudinal lamellæ, which are the characteristics of this cavity in other ruminants, are wanting; but as it appears to have had a cuticular lining, we may regard it as a rudimentary form of this cavity, and distinct from the fourth cavity, from which it is partially separated by a semilunar fold."

The stomach of *Hyomoschus* presents, therefore, no obvious character by which it can be distinguished from that of a member of the allied genus *Tragulus*. The same may be said to be the case with all the other portions of the alimentary canal.

The small intestine is about 16 feet in length; the large intestine 6 feet, not sacculated, scarcely wider than the small intestine, averaging rather less than $\frac{1}{2}$ inch in diameter when fully distended. In the last foot of its length it gradually widens, attaining nearly 1 inch. The cæcum is perfectly simple, $3\frac{1}{2}$ inches long.

The spleen lies on the diaphragmatic surface of the stomach, in the groove which divides the reticulum from the rumen (fig. 2, *g*). It is flattened and pyriform, the largest end being turned forwards and to the right. Its length is 2 inches, its greatest breadth $\frac{3}{4}$ inch. On the left margin, rather behind the middle, is a deep notch; the portion behind this is thinner and flatter than that in front.

The liver presents a smooth upper surface, irregularly oval in outline, the broadest end to the right, $4\frac{1}{4}$ inches long from side to side and $2\frac{3}{4}$ inches in greatest antero-posterior width, undivided, except by a notch on the anterior border separating a smaller left from a larger right lobe. On the under surface the left lobe has no further subdivisions. The right lobe has two accessory lobes:—the smaller, but most distinct, pointed and tongue-like, close to the longitudinal fissure, near the centre of the organ; the other, broader and with the free extremity more obtuse, close to the right lateral margin. The transverse fissure lies between these. The gall-bladder is large, and projects freely beyond the anterior margin of the right lobe.

* 'Recherches Anatomiques, Zoologiques, et Paléontologiques sur la famille des *Chevrotains*,' Paris, 1864, p. 62.

† 'Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy contained in the Museum of the Royal College of Surgeons,' London, vol. i. 2nd edit. 1852, p. 168.

The liver is thus formed on the same general principle as that of *Tragulus*, but it is rather more simple; the fissure between the right and left lobe and that for the gall-bladder are less deep. The middle accessory lobe is broader and shorter and less distinctly marked off from the rest of the organ; and, especially, the right accessory lobe is relatively larger.

[*Postscript*.—Since these notes were communicated to the Society, I have had an opportunity, through the kindness of Professor Huxley, of examining the body of an adult female *Hyomoschus*, sent to him in spirit from the west coast of Africa. In all its principal anatomical characters it agreed perfectly with the specimen above described. The larynx was of the same form and dimensions. In the stomach the rudimentary psalterium, as distinguished from the abomasus by the different character of its lining membrane, was equally distinct. The vagina was 5 inches in length; the uterus $3\frac{1}{2}$ inches to the point of bifurcation, sharply bent back on itself near the upper end, and terminated in a pair of rather short, closely curled cornua.—February 1st, 1868.]

2. Additional Notes on the Osteology of the *Lemuridæ*. By ST. GEORGE MIVART, F.L.S., Lecturer on Comparative Anatomy at St. Mary's Hospital.

When, in November 1864, I had the honour of laying before the Zoological Society my notes on the crania and dentition of the *Lemuridæ**, I regretted my inability to determine certain points, owing to the want of the requisite specimens.

During a recent visit to Paris I have had, through the kindness of Professor Milne-Edwards and of his son M. Alphonse Milne-Edwards, the opportunity of supplying some of these omissions by an examination of the specimens preserved in the National Collections at the Jardin des Plantes. In addition to this, since my return, M. Alphonse Milne-Edwards has had the great kindness to have extracted from the skin and sent to me the bones of a specimen of the *Cheirogaleus fuscifer* of Isid. Geoff. St. Hilaire, including the tarsus—a part I so much regretted, three years ago, not being able then to examine.

The specimen in question forms part of the extremely valuable collection lately brought from Madagascar by M. Alfred Grandidier, a gentleman to whom science is very much indebted already, but who, in spite of the attractions of a Society he is so well calculated to adorn, has just again set out for three years' more labour in the same interesting field of biological research.

Amongst the zoological rarities preserved at Paris, and as yet absent from our own collections, is the skeleton of *Hapalemur*. This

* P. Z. S. 1864, p. 611.

I found to exhibit all those cranial and dental characters detailed in my former paper, except certain trifling differences resulting from the immature condition of the specimen. This immature condition, however, enables me now to affirm that there *is* no interparietal bone, and that the præmaxilla *is* exceedingly small.

The cervical region is elongated, and the dorsal region is short; but the neural laminae of the cervical vertebræ do not exceed those of the dorsal vertebræ in antero-posterior extent. The atlas has but one continuous posterior articular surface for the axis; its transverse processes are not large; and it has no neural spine.

The axis vertebra has a considerable spinous process, but it is not produced backwards. All the other cervical vertebræ have small neural spines.

There are twelve dorsal and seven lumbar vertebræ, and these much resemble the corresponding vertebræ of *Lemur*.

The scapula closely resembles that of the last-named genus; the carpus is provided with an os intermedium; and the fourth digit of the manus is the one extending furthest forwards.

The ilium is very much like the ilium of *Lemur*; its posterior inferior (the inferior anterior of Man) spinous process is well marked.

The femur has a slight indication of a third trochanter, and the patella is elongated.

The tarsus is short, and decidedly less than one-third the length of the tibia, showing no approximation to the structure presented by *Microcebus pusillus*, still less to that of *Galago*.

The fourth digit of the pes projects most.

	inches.
Length of the femur.....	4·70
—— of the tibia	4·30
—— of the os calcis.....	·93
—— of the cuboides.....	·41

At the Jardin des Plantes are also preserved the skeletons of *Cheirogaleus milii* and of *Microcebus pusillus*.

The former is the typical specimen of the genus *Cheirogaleus*; and the latter is the type of the genus *Microcebus*, being the specimen which was ultimately named *Microcebus rufus* by Geoffroy St. Hilaire*.

In my former paper I expressed a doubt as to whether the genus *Microcebus* would not have to be merged altogether in the older genus *Cheirogaleus*†. The examination, then, of these two typical specimens should go far to decide this question; for if they show well-marked and not inconsiderable differences, then the generic distinction may be provisionally retained, unless some other species be found to exhibit so completely intermediate a structure as to do away with the value of the differential characters.

Now, on comparing these two specimens, I find that not only is

* Cours de l'Hist. Nat. Mamm. leçon vi. p. 26, 1828. That author had, however, previously named it *pusillus* (see Mag. Encyc. i. p. 48, 1776).

† P. Z. S. 1864, p. 619.

it true that there is in *C. milii*, as De Blainville remarks*, a certain elongation of the astragalus as compared with the other tarsal bones, but the naviculare is quite short comparatively, instead of being much elongated as it is in *M. pusillus*. Indeed, in the latter species, the naviculare is absolutely as well as relatively longer, although in it (*i. e.* in *M. pusillus*) the length of the dorsal and lumbar regions together is only 2·75 inches, while the same part in *C. milii* is 5 inches in length.

	<i>C. milii.</i> inch.	<i>M. pusillus.</i> inch.
Length of cuboid	·21	·16
—— of os calcis	·52	·36
—— of dorsum of naviculare	·17	·20
—— of astragalus	·35	·20

The dimensions of the tarsal bones of *M. myoxinus* are almost the same as those of *M. pusillus*†. In addition to this distinction in the tarsus, the palate has no defects of ossification in *C. milii*; the fifth cusp of the hindmost lower molar is rudimentary, instead of being distinct; there is a small malar foramen, while in *M. pusillus* there is none. The carotid foramina on the *basis cranii* are also very conspicuous, instead of being almost hidden by the auditory bullæ; the pterygoid fossæ are also larger; and, lastly, the first upper premolar is slightly caniniform and considerably longer than the second one, instead of being smaller and slightly shorter than the second one as in *M. pusillus*.

On the other hand, *C. milii* agrees with *M. pusillus* in having the palate prolonged, the posterior palatine foramina large, a distinct interparietal bone, in the absence of any enlargement of the mastoidal region of the periotic, and in the other characters before assigned to *Microcebus*‡.

In both skeletons there are thirteen dorsal and seven lumbar vertebrae; but neither the axial nor the appendicular skeletons present any noteworthy characters in either specimen.

The close affinity of the *M. myoxinus* of Peters§ to *M. pusillus* being as unquestionable as is their specific distinctness, it is desirable to know if it presents any characters tending to bridge over the gap separating the last-named species from *C. milii*.

Now *M. myoxinus* differs from *M. pusillus*, besides external characters (as has been pointed out by Dr. Peters||), in its shorter and less-pointed muzzle, in the greater production forwards of the præmaxillæ, the larger size of the openings in the palate, and also, possibly, in the somewhat longer symphysis of the mandible. Moreover the contour of the anterior nares, viewed in profile, is less concave, and the palate is less prolonged backwards. Again, the first premolar is quite as extended, vertically, as is the second, instead of

* Ostéographie, *Lemur*, p. 12.

† Professor Peters has been kind enough to send me the exact length of the tarsal bones of his *M. myoxinus*.

‡ P. Z. S. 1864, p. 640.

§ Reise nach Mossambique, p. 14.

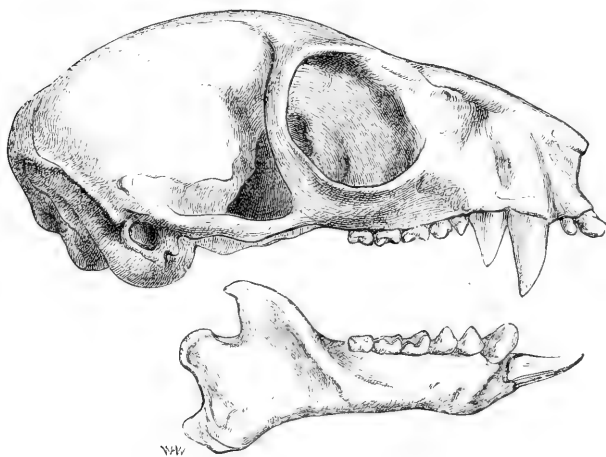
|| Ibid. p. 19.

being somewhat less so, as is the case in *M. pusillus*. This shortness of the first premolar is not the effect of immaturity, as I before thought might be the case, as the typical specimen of *M. pusillus* is fully adult. The predominance in size, on the other hand, of the first over the second upper incisor is greater in *M. myoxinus* than in *pusillus*. Finally, the tarsus, which, in *M. pusillus*, is only as 11·7 to the length from the snout to the root of the tail, taken at 100, is in *M. myoxinus* 14·6 to the same dimensions similarly estimated.

Thus in the greater inequality of size between the two upper incisors on each side, and in the greater equality of length of the first two upper premolars, *M. myoxinus* is intermediate between *M. pusillus* and *C. milii*; but these differences are slight in comparison to the points of resemblance between it and *M. pusillus*, its tarsal structure (as has been said) agreeing, in size and the proportions of its parts to one another, altogether with that of the last-named animal.

With regard to *Cheirogaleus furcifer*, part of the skeleton of which, as I before said, has been so kindly transmitted to me by M. Alphonse Milne-Edwards, I find that its skull and dentition agree (as far as the worn condition of the grinders permits comparison) with the imperfect specimen in the British Museum as to the characters enumerated in my former paper*, except that there is a small malar

Fig. 1.



Cheirogaleus furcifer. Scale twice nat. size.

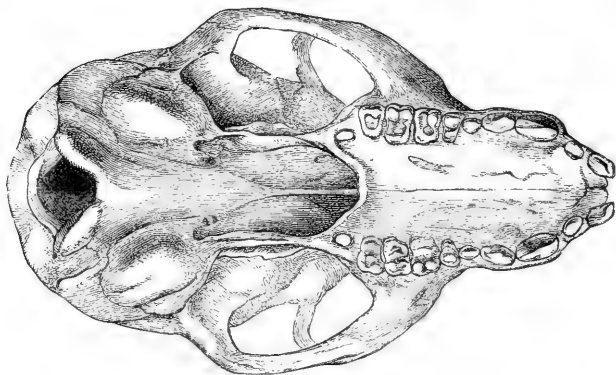
foramen on each side, that the angle of the mandible is decidedly produced downwards as well as backwards, and that there is no trace of a fifth cusp to the last inferior molar.

I find also conspicuous carotid foramina placed, as in *C. milii*, near

* P. Z. S. 1864, p. 622.

together, and not at all hidden by the auditory bullæ. The pterygoid fossa also is much elongated from behind forwards, but very narrow from side to side, the true pterygoids extending back much more nearly to the same distance, as do the ectopterygoid plates, than is the case in the smaller species (*M. minor*). Compare fig. 2 with the figure of the latter species in P. Z. S. 1864, p. 615.

Fig. 2.

*Cheirogaleus furcifer*. Scale twice nat. size.

The extent of the præmaxilla cannot be ascertained, the suture being completely obliterated. As regards the skull, then, *C. furcifer* agrees altogether with *C. milii*, and even carries still further those characters (length of first upper premolar and smallness of last lower molar) in which the latter species differs from *M. pusillus* and *M. myoxinus*.

Fig. 3.

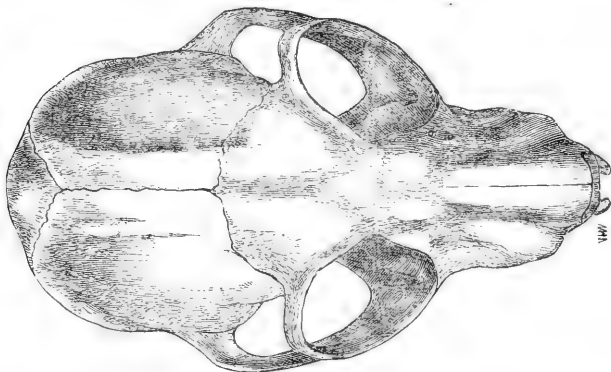
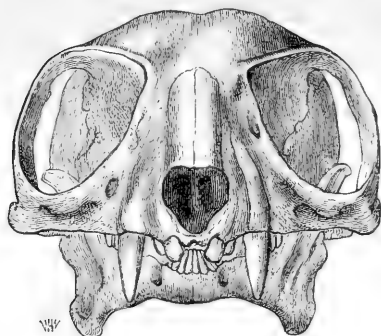
*Cheirogaleus furcifer*. Scale twice nat. size.

Fig. 4.

*Cheirogaleus furcifer*. Scale twice nat. size.

As regards the tarsus, however, there is a great difference, as the following dimensions show:—

	inches.
Extreme length of the tibia	2·40
Extreme length of the cuboides	0·27
Extreme length of the os calcis	0·74
Length of dorsum of naviculare	0·36
Length from proximal end of calcis to distal end of naviculare	0·90
Length of astragalus	0·37
Breadth of os calcis and naviculare, measured across their narrowest part	0·22

Thus, instead of the dorsum of the naviculare being a little less than half the extreme length of the astragalus, it nearly equals it; while the latter bone is only half the length of the os calcis, instead of being equal to about two-thirds of its length; moreover the cuboid is considerably shorter than the dorsum of the naviculare, instead of being somewhat longer than the latter. In all these respects the tarsus of *C. furcifer* closely resembles that of *M. pusillus**, and differs widely from the tarsus of *C. milii*. The distinction therefore between *Cheirogaleus* and *Microcebus*, based upon tarsal structure, falls to the ground, unless *C. furcifer* be placed (as I placed in 1864†) in the latter genus along with *M. pusillus* and *M. myoxinus*. But since I have examined the skin and skeleton of *C. milii* I can no longer be satisfied with such an association, as there can, I think, be no doubt but *C. milii* and *C. furcifer* are very closely allied forms.

It will nevertheless be possible (and perhaps even useful) still to retain, provisionally at least, the distinction between *Cheirogaleus*

* As I anticipated that on investigation it would turn out to do (P. Z. S. 1864, p. 623).

† Guided by its apparently elongated foot, as seen in the mounted skin in the British Museum.

and *Microcebus*, though reposing mainly, if not exclusively, on a few cranial and dental characters. Perhaps, however, the newly described species *M. coquereli** may furnish grounds for the abandonment of this distinction.

I find in *C. fuscifer* a distinct os intermedium and the ulnar condyle of the humerus perforated.

There remain to be noticed the three forms described by Dr. Gray under the names (1) *Galago minor*† (or *Lepilemur murinus*‡), (2) *Cheirogaleus smithii*§, and (3) *Cheirogaleus typicus*||.

The first of these, the skull of which has been figured in the 'Proceedings of the Zoological Society'¶, agrees completely with Dr. Peters's *M. myoxinus*, except in the reduplication of the palatal defects of ossification, and in a slightly less degree of backward prolongation of the palate. It also agrees with *M. myoxinus* in points by which that species differs from *M. pusillus*, and which have been enumerated above.

The tarsus I have not been able to examine; but it, no doubt, is also similar.

The two skins of *Galago minor* (my *Microcebus minor*) in the British Museum agree with *M. myoxinus*, and differ from *M. pusillus*, in the greater size of the ears; and Dr. Gray remarks**, "The figure of Dr. Peters agrees pretty well with our specimen; but the whole colour of the fur is rather darker, and the ears are larger." The latter difference is trifling indeed, considering the contraction of the ears in drying—a distortion the frequent occurrence of which, as also of its converse "stretching," Dr. Gray proceeds almost immediately afterwards to notice.

M. minor, however, is very much less red than *M. myoxinus*, being a "pale grey," whereas the usual colour in the last-named species, according to Dr. Peters, is rusty brown; and this difference is so striking that for the present it will be better to treat these forms as specifically distinct.

As regards *Cheirogaleus smithii*, the typical specimen (which is in the British Museum) differs from *M. myoxinus* and agrees with *M. pusillus* in the following points:—in the smaller size of the ears, and in having the first upper premolar rather less vertically extended than the second. It may therefore be the case that *C. smithii* is nothing else than *M. pusillus* (*Le Rat de Madagascar*)—and the more probably so, as Dr. Gray himself remarks†† that Buffon's figure of that animal well represents his (Dr. Gray's) *C. smithii*. On the other hand, in *C. smithii* the upper incisors are as unequal as in *M. minor* or as in *M. myoxinus*.

Dr. Gray describes the type of his *C. smithii* as being "pale bay,"

* Recherches sur la Faune de Madagascar, par M. H. Schlegel et M. François P. L. Pollen, (Leyden, 1867) p. 12, pl. 6.

† Ann. and Mag. Nat. Hist. 1842, x. p. 257.

‡ P. Z. S. 1863, p. 143.

§ P. Z. S. 1863, p. 142.

¶ 1860, p. 144, and 1864, p. 615.

** P. Z. S. 1863, p. 144.

§ P. Z. S. 1863, p. 143.

†† P. Z. S. 1863, p. 143.

whereas the usual colour of *M. pusillus* is a very red brown. But all the specimens in the Paris Museum are not alike in colour, and one especially is very pale. The difference in colour alone should not, therefore, I think, prevent the union of *C. smithii* with *M. pusillus*; but, on account of the incisors, I think it better to keep the two forms distinct for the present, till it is proved that the proportions of the incisors are subject to a certain individual variation as they are in *Indris breviceaudatus**.

The specimen in spirits in British Museum, which was named by Mr. Waterhouse "*Microcebus pusillus*" † (but which is now labelled *Cheirogaleus smithii*, and has been described by Dr. Gray under that name ‡), has the upper incisors subequal, and in all probability was rightly named at first.

The third form, *Cheirogaleus typicus*, the typical specimen of which is also in the British Museum, agrees with *C. milii* of Geoffroy in the caniniform first upper premolar, in the great predominance in size of the first over the second upper incisor, also to all appearance in the relative shortness of the tarsus, and, finally, in the short ears. It is described by Dr. Gray § as "reddish brown; cheeks, throat, and beneath white."

The Paris specimens, on the other hand, have the underparts white, but the back is of a delicate fawn-brown; but the difference does not seem to me of such moment as to render it other than probable that *C. typicus* and *C. milii* are one and the same species. The fact that the typical specimen of *C. typicus* is not quite adult should not be forgotten, as age may produce some change in the colour. In size it very nearly indeed equals the specimens of *C. milii* of Paris.

Thus it may be that the seven species which I before enumerated (but which separate enumeration I stated to be only provisional, and by no means intended to imply my conviction of their specific distinctness ||) will have to be reduced in number if the approximations above indicated turn out to be really necessary. Taking *M. pusillus* as the type of *Microcebus*, *M. minor* and *M. myoxinus* will be the second and third species of that genus.

C. fuscifer, on the other hand, will range itself side by side with *C. milii* in the genus *Cheirogaleus*, where it was placed by Isidore Geoff. St.-Hilaire ¶—an approximation evidently natural when the two skins are viewed side by side, and not to be disputed by any one unprepared to erect *C. fuscifer* into a new and distinct genus, on the ground of its very elongated first upper premolar and its before described tarsal structure. But even *M. pusillus* and *M. myoxinus* differ from each other as to these points (though in a less degree); so that if the new species (*M. coquereli* of Pollen) presents another

* See P. Z. S. 1866, p. 154, note *.

† The specimen came from the Museum of the Zoological Society, and while there was so labelled by Mr. Waterhouse (see Cat. of Mus. of Zool. Soc. 2nd edit. p. 12. no. 89).

‡ *Loc. cit.* p. 143.

|| P. Z. S. 1864, p. 637.

§ *L. c.* p. 142.

¶ Cat. des Primates. p. 77.

intermediate condition, then those who would make *C. furcifer* the type of a new genus on such grounds may find themselves logically compelled to make a separate genus of each species.

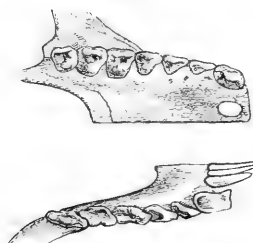
This new form has recently been described and figured by MM. H. Schlegel and François P. L. Pollen (in the first number of their *Recherches sur la Faune de Madagascar*, 1867, p. 12, pl. 6). The authors remark that it is "plus voisine du *Microcebus typicus* de Smith que des autres espèces;" but add that Dr. Peters found it, although similar in size, to differ from the latter species by its tail washed with black, by the absence of the black circles about the eyes, and by the length of its ears, which are one-third longer than those of the so-called *M. typicus*. The skull, unfortunately, is not yet figured; and in the absence of any description of it, or of the dentition, it is impossible to say definitively whether it should be placed in the genus *Cheirogaleus* or in *Microcebus*. Its resemblance to the British-Museum specimen, however, would suggest its location in the former genus; and, as before said, it may be that its characters may justify (if they offer a certain intermediate structure) the fusion of the two genera into one by the abolition of the term *Microcebus* altogether.

The next form to be noticed is one of great interest, namely *Lepilemur*, a genus still absent (as far as I know) from all the collections in this country. In Paris there is a skin (the type of the genus and species) of *L. mustelinus*, also the skull extracted from it, and a skull of the new species (*L. ruficaudatus*) recently characterized* by M. Alfred Grandidier.

Lepilemur mustelinus has recently been described and figured by Messrs. Schlegel and Pollen (in their work above referred to, at p. 10, pl. 4). *L. ruficaudatus* is as yet unfigured.

In the skulls of both these species there is no trace of any upper incisor; and the specimens show the correctness of M. Gervais's

Fig. 5.



Lepilemur mustelinus.

Copied from Gervais's 'Hist. Nat. des Mammifères.'

* Rev. Zool. July 1867, p. 256.

Cinereo-rufescens, capite nigrescente; artubus posterioribus pallide cinereis. Cauda rufa. Jugulo fulvescente, abdomineque albido.
Long. tot. 56", corp. 31", caud. 25".

figure* as regards the large fifth tubercle to the last lower molar, the shortness of the palate, and the inconspicuousness of the posterior palatine foramina. But not only do they differ from *Microcebus* and *Cheirogaleus* as regards the two points last mentioned; they differ also both from *Lemur* and *Hapalemur* in that the mastoidal region of the periotic is enlarged and inflated.

As in *Microcebus* and *Cheirogaleus*, each upper premolar has but one external cusp†; but the third upper premolar is relatively larger than in those genera, so that each upper dental series increases in size from before backwards to the penultimate molar in a more gradual manner.

The skull, when viewed from above, is seen to be broadest between the outer margins of the orbits, and the cranium proper to be so just behind the posterior roots of the zygomata.

The muzzle is longer than the antero-posterior extent of the anterior margin of the wide orbit. The upper surface of the skull is concave between the orbits; there is a more or less marked sagittal ridge; and a rather deep depression exists on each side of the muzzle immediately in front of the lachrymal foramen‡, which last is placed well upon the cheek.

The sphenoidal fissure and the foramen rotundum are together represented by a single opening. There is no carotid foramen in the *basis cranii*; and the malar foramen is very minute. The posterior palatine foramina are small, and there are no defects of ossification on the palate; but the anterior palatine foramina are large. The posterior margin of the palate extends but little backwards, its middle being in a line with the anterior end of the posterior third of the upper penultimate molar. The postglenoid process is large, and behind it is a postglenoidal foramen.

The præmaxilla is (as might be expected from the absence of upper incisors) very small, and quite, or all but, invisible when the skull is viewed in profile; yet it sends up a small process which joins the nasal; and the latter bone is separated, on each side, from the lachrymal by an ascending process of the maxilla. There is no paroccipital process. The mandible has a lofty coronoid process, and the angle is produced downwards as well as backwards.

The dentition may be expressed by the formula:—

$$I. \frac{0}{2-2}, C. \frac{1-1}{1-1}, P.M. \frac{3-3}{3-3}, M. \frac{3-3}{3-3} = \frac{14}{18} = 32.$$

The upper canine is very large, with a strongly marked vertical internal groove and a posterior basilar process. The three upper premolars decrease (from before backwards) in vertical extent, but increase in breadth. Each of the first two upper molars consists of two well-marked external cusps, of a very large antero-internal cusp, connected with the postero-external one by an oblique ridge, and of

* Hist. Nat. des Mammifères, p. 170.

† As noticed by Messrs. Schlegel and Pollen, *l. c.* p. 11.

‡ A similar depression exists in *C. milii* and *C. fuscifer*, and is relatively deeper and still more sharply defined in *M. minor*.

a rudimentary postero-internal cusp. There is also an external cingulum. Perhaps, however, the molars may be better described as consisting each of three cusps (one internal and two external) connected by ridges, and supplemented externally by a cingulum, and internally, except the last one, by an internal cingulum placed behind the internal cusp and resembling a postero-internal one.

In the lower jaw the incisors and canines have the form and arrangement common in the *Lemuridæ*. The first lower premolar is very large and caniniform, but with a strongly marked process projecting from its anterior margin. The second and third lower premolars are exceedingly like the second lower premolar of *Indris laniger* (see P. Z. S. 1866, p. 157. f. 4). Each has only one external cusp.

The first two lower molars consist each of two internal and two external cusps, with a rudiment of a median fifth posterior cusp. The antero-external cusp is considerably larger than, but not so high as, the antero-internal cusp. The postero-internal cusp is much smaller than the external one.

The last lower molar is nearly similar to the two teeth in front of it; only the fifth cusp has become very large and distinct.

Its tarsal structure is unknown to me; but the tarsus appears to be but little elongated.

As to the affinities of *Lepilemur*, it is, I think, impossible to say that it has any marked relationship to any other genus. Perhaps, as MM. Gervais, Schlegel, and Pollen concur in remarking, it rather approximates to *Hapalemur* than to any other form. The production of the anterior margin of the first lower premolar, as also the form of the two following teeth, recalls to mind (as has been said) the teeth of *Indris laniger*.

The structures exhibited on the one hand by *Lepilemur*, and on the other by *C. fuscifer*, render necessary some slight changes in the characters before given of the groups to which they are allied. Thus, if the genus *Lepilemur* is to form part (as I think it must) of the subfamily *Lemurina*, it will be necessary to expunge from the characters of that group *the non-inflation of the mastoidal region**, and the characters of *Lepilemur*, *Cheirogaleus*, and *Microcebus* will be as follows:—

LEPILEMUR†.

$$I. \frac{0}{4}, C. \frac{1-1}{1-1}, P.M. \frac{3-3}{3-3}, M. \frac{3-3}{3-3} = \frac{14}{18} = 32.$$

Tail shorter than the body; muzzle longer than the orbit; first upper premolar more vertically extended than the others; premolars with only one external cusp; last lower molar with a large fifth cusp; præmaxillæ very small; an interparietal bone; palate very short;

* P. Z. S. 1864, pp. 638 & 639.

† Isid. G. St.-Hil. Cat. des Prim. p. 75; Dahlb. Studia Zool. p. 220; Gray, P. Z. S. 1863, p. 144; Wagner, Schreber, Supp. v. p. 147; St. Geo. Mivart, P. Z. S. 1864, pp. 623 & 642; A. Grandidier, Rev. Zool. July 1867, p. 256; Pollen and Schlegel, Rech. sur la Faune de Madagascar, p. 10, pl. 4.

posterior palatine foramina small; a small malar foramen; sphenoidal fissure and foramen rotundum together represented by a single opening; no conspicuous carotid foramen on the basis cranii; angle of mandible produced downwards as well as backwards; mastoidal region of periotic inflated; tarsus short; number of dorsal and lumbar vertebræ — ?

Hab. Madagascar.

1. *L. mustelinus*. From the north-west of Madagascar. Native name "Fitoliki."

2. *L. ruficaudatus**. Native name "Bovenghé."

CHEIROGALEUS†.

$$\text{I. } \frac{2-2}{4}, \text{ C. } \frac{1-1}{1-1}, \text{ P.M. } \frac{3-3}{3-3}, \text{ M. } \frac{3-3}{3-3} = \frac{18}{18} = 36.$$

Upper incisors very unequal, the anterior pair much the larger; third upper premolar very much smaller than the first molar, and with only one external cusp; first upper premolar decidedly, sometimes very greatly, exceeding the second in vertical extent; upper molars with an oblique ridge from the postero-external to the large internal cusp, the postero-internal cusp being very small or absent; fifth cusp of last lower molar obsolete or rudimentary; palate much prolonged beyond the last molars, with no defects of ossification; præmaxillæ largely developed, joining the nasals for more than a quarter of their (the nasals') extent; an interparietal bone; a small malar foramen; carotid foramen conspicuous on *basis cranii*; pterygoid fossæ elongated; ectopterygoid plates subparallel; angle of mandible bent downwards, or not so bent; seven lumbar vertebræ.

Hab. Madagascar.

1. *C. milii*‡. First upper premolar decidedly, but not very greatly, exceeding the second in vertical extent; lower incisors not as long as the mandibular symphysis; angle of mandible not produced downwards; muzzle not much elongated; length of dorsum of naviculare less than half the length of the astragalus; astragalus about two-thirds the length of the os calcis; cuboides somewhat longer than the dorsum of the naviculare.

From the east coast of Madagascar.

2. *C. furcifer*§. First upper premolar exceedingly long, like a shorter second canine; lower incisors as long as the mandibular

* Rev. Zool. July 1867, p. 256.

† Geoff. St.-Hil. Ann. du Mus. d'Hist. Nat. t. xix. p. 171; Isid. G. St.-Hil. Cat. des Prim. p. 76; Wagner, Schreber, Suppl. i. p. 273, and v. p. 147; Dahlb. Studia Zool. p. 221; Gray, P. Z. S. 1863, p. 142; St. Geo. Mivart, P. Z. S. 1864, p. 642.

‡ Geoff. St.-Hil. Cours sur les Mamm. 1828, p. 25; Isid. G. St.-Hil. Cat. des Prim. p. 77; Gray, P. Z. S. 1863, p. 142; St. Geo. Mivart, P. Z. S. 1864, p. 642. *Cheirogaleus typicus*? A. Smith, S. Afr. Journ. ii. p. 50; Gray, P. Z. S. 1863, p. 142.

§ Isid. Geoff. St.-Hilaire, Cat. des Prim. p. 77. *Lepilemur furcifer*, Gray, P. Z. S. 1863, p. 145. *Microcebus furcifer*, St. Geo. Mivart, P. Z. S. 1864, pp. 621 & 642; Pollen and Schlegel, loc. cit. p. 8, pl. 5.

symphysis; angle of mandible produced downwards; muzzle elongated; dorsum of naviculare nearly equal in length to the astragalus; astragalus only half the length of the os calcis; cuboides considerably shorter than the dorsum of the naviculare.

From the west of Madagascar. One native name "Walouwy."

3. *C. coquereli**. From the forests of Congony, inside the bay of Passandava. Called by some of the natives "Sietui."

MICROCEBUS†.

$$\text{I. } \frac{2-2}{4}, \text{ C. } \frac{1-1}{1-1}, \text{ P.M. } \frac{3-3}{3-3}, \text{ M. } \frac{3-3}{3-3}, = \frac{18}{18} = 36.$$

Upper incisors unequal, the anterior pair the larger; third upper premolar very much smaller than the first molar, and with only one external cusp; first two upper premolars of subequal vertical extent; upper molars with an oblique ridge from the postero-external to the large internal cusp, the postero-internal cusp being rudimentary or absent; fifth cusp of last lower molar distinct; palate more or less prolonged beyond the last molars; posterior palatine foramina very large; palate with defects of ossification; præmaxillæ largely developed, joining the nasals for more than a quarter of their (the nasals') length; an interparietal bone; no malar foramen; carotid foramen not very conspicuous, but more or less hidden by the eustachian process of the auditory bulla; pterygoid fossæ very short; ectopterygoid plates diverging widely backwards; angle of mandible not bent downwards; seven lumbar vertebræ; tarsus always with the naviculare more elongated than the cuboides.

Hab. Madagascar.

1. *M. pusillus*‡. First pair of upper incisors very slightly larger than the second pair; first upper premolar not quite so extended vertically as the second; defects of ossification in palate very small; snout much produced; profile of anterior nares very concave. Colour bright red-brown.

From the east coast of Madagascar.

2. *M. smithii*§. First upper incisor much larger than the second. Colour pale bay.

3. *M. myoxinus*||. First upper incisor much larger than the second; first upper premolar quite as vertically extended as the

* Pollen and Schlegel, *loc. cit.* p. 12, pl. 6.

† Geoff. St.-Hil. Cours sur les Mamm. 1828, leç. vi. p. 26; Isid. Geoff. St.-Hil. Cat. des Prim. p. 79, &c.

‡ *Lenur pusillus*, Geoff. St.-Hil. Mag. Encey. 1796, i. p. 48. *Microcebus rufus*, Geoff. St.-Hil. Cours de l'Hist. Nat. leçon vi. p. 26; Isid. Geoff. St.-Hil. Cat. des Prim. p. 80. *Galago madagascariensis*, Gray, P. Z. S. 1863, p. 149. *M. pusillus*, Waterhouse, Cat. of Mus. of Zool. Soc. 2nd edit. p. 12. no. 89; and St. Geo. Mivart, P. Z. S. 1864, p. 641.

§ *Cheirogaleus smithii*, Gray, Ann. & Mag. N. H. 1842, x. p. 257, and P. Z. S. 1863, p. 143.

|| Peters, Reise nach Mossambique, p. 14, and St. Geo. Mivart, 1864, p. 640. *Lepilemur myoxinus*, Gray, P. Z. S. 1863, p. 144.

second; defects of ossification in the palate large, one on each side; profile of anterior nares only slightly concave. Colour rusty brown.

From the south-west coast of Madagascar. Native name "Tsitsihi."

4. *M. minor**. First upper incisor much larger than the second; first upper premolar quite as vertically extended as the second; defects of ossification in the palate large, two on each side; profile of anterior nares only slightly concave. Colour grey.

In addition to the foregoing, it may also be remarked that the distinctness of the Galagos from the *Lemurinae* is somewhat lessened by the discovery of a genus of the latter family (namely *Lepilemur*) in which the mastoidal region of the periotic is inflated, also by the fact that the foot in *Cheirogaleus furcifer* has such an elongated navicular and os calcis that the length of these bones compared to their breadth differs but little from the proportions in some Galagos. Still the proportion of the cuboides both to the *os calcis* and to the *naviculare* in *C. furcifer* is greater than even in *Galago crassicaudatus*, a species in which the navicular is relatively less elongated than in the species before selected for comparison with *Microcebus*.

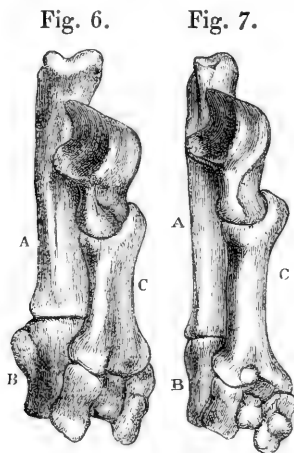


Fig. 6. Tarsus of *C. furcifer*.

7. Tarsus of *G. crassicaudatus*.

A. Calcaneum. B. Cuboides. C. Naviculare. The calcaneum and cuboides are together represented of the same total length, and also of the same length as the tarsi of *Microcebus* and *Galago* formerly figured (P. Z. S. 1864, p. 624).

Moreover, even in *C. furcifer*, the *os calcis* does not exceed one-third of the length of the tibia, as it appears constantly to do in

* *Galago minor*, Gray, Ann. & Mag. N. H. 1842, x. p. 257. *Lepilemur murinus*, Gray, P. Z. S. 1863, p. 143. *Microcebus minor*, St. Geo. Mivart, P. Z. S. 1864, p. 640.

Galago. I find in *G. crassicaudatus* the dimensions to be as follows:—

	inches.
Length of tibia	3·40
— of tarsus	1·65
— of os calcis	1·25
— of cuboides	0·40
— from proximal end of os calcis to distal end of cuboides	1·50
— of astragalus	0·59
— of dorsum of naviculare	0·71
Least transverse dimensions of both os calcis and na- viculare	0·33

I am not disposed to consider the elongated tarsus of *C. furcifer* a sign of any really close affinity between that form and *Galago*; for a still more elongated tarsus distinguishes the genus *Tarsius* (remote enough from either *Cheirogaleus* or *Galago*), and the *Cheirogalei*, so closely allied in other respects, differ greatly in the proportions of this part. Moreover the distinction as to geographical distribution between *Cheirogaleus* and *Galago* is very striking, although it may be remarked that *C. furcifer* is an inhabitant of the west coast of Madagascar. Finally, the difference which, according to Dr. Peters, exists in the position of the gall-bladder must not be forgotten.

It is interesting to note the great variation as to tarsal structure exhibited by these nearly allied species from Madagascar, compared with which the differences exhibited by the various species of *Galago* are quite trivial. There are overwhelming reasons for believing that in Madagascar we are near (or at least probably nearer than in any other land now above the sea-level) to the locality where the original forms of the whole suborder Lemuridea first arose. Subsequent modifications, however, such as the exaggerated tarsus now found only in Africa on the one hand, or in Borneo and Celebes on the other, might have arisen in some more or less remote locality. The co-existence, however, of closely allied forms, in Madagascar, differing so much from one another in tarsal structure, seems to me to indicate that this peculiar conformation of the tarsus (unknown in any other group of animals) also took its rise in the same region, and that modified descendants, diverging east and west, there carried still further this remarkable peculiarity, which culminates, and is accompanied by the maximum of lemurine abnormalities, in the most remote region to which any species of the Lemuroidea has, as far as yet known, ever extended.

The inflation of the mastoidal region of the periotic, which causes *Lepilemur* to differ from the other *Lemurinae*, and assimilates it to *Galago*, is not, I think, a character of any great importance. It exists in the *Nycticebinæ* as well as in *Galago*; and in the genus *Indris* an enlargement above the posterior root of the zygoma (which seems to answer to the mastoidal swelling of *Galago*) is present in *I. laniger*, while it is absent in *I. brevicaudatus**.

* P. Z. S. 1866, p. 160.

Before concluding this paper I wish to call attention to the new and fourth species of *Indris*, lately discovered by M. A. Grandidier*, and described and figured by him, under the name *Propithecus verreauxi*, in a publication entitled 'Album de l'île de la Réunion,' 1866-67. It is from the arid south and south-west coasts of Madagascar, and is called by the natives "Sifak."

A fine specimen of this animal has been recently acquired by the British Museum from Paris. Its anterior teeth (the only ones visible) agree with those of the other *Indrisinae*, especially with those of *I. diadema*, the anterior pair of upper incisors being considerably larger than the posterior pair. That agreement I fully expect will be found to extend through its whole organization; but before long M. Alphonse Milne-Edwards will supply us with full information on the subject. The more I have of late considered the species of *Indris*, the more I am disposed to think that the great peculiarities of the dentition, the remarkable structure of the carpus (without an os intermedium), and of the pelvis and vertebral column may hereafter be found to accompany other differences, together warranting the elevation of the group to the rank of a distinct family of the Lemuroidea. But on this question we shall be able soon to form a well-grounded judgment, as amongst the treasures lately brought by M. A. Grandidier from Madagascar is a specimen of the group preserved in spirit. It is a matter of congratulation that so interesting an object should have fallen into the able hands it has; and thus a form closely allied to that originally described by Bennett under the name *Propithecus diadema*† will, like *Cryptoprocta ferox* (also originally described and named by the same naturalist‡), receive its full elucidation from the labours of M. Alphonse Milne-Edwards§.

3. On the Australian Genus *Climacteris*, with a Description of a New Species. By JOHN GOULD, F.R.S. &c.

Few of the genera constituting the avifauna of Australia are more distinct and remarkable than that named *Climacteris*, the members of which, like the *Certhia familiaris* of our own island, are especially adapted for creeping over the surfaces of large trees; they are, however, as structurally distinct from our well-known Creeper as they are from the *Sittæ* or Nuthatches, of both of which genera no species has yet been found in Australia. Their food principally consists of insects, which they procure among the interstices in the bark of the trees, or on the ground around the base of their boles.

* I have now (February 1868) received letters from M. Alphonse Milne-Edwards and from M. A. Grandidier, informing me of the discovery by the latter gentleman of a new Lemuroid, which has been named by him *Cheirogaleus samati*. The species is remarkable for an immense accumulation of fat in the tail,—recalling to mind the well-known African Sheep.

† P. Z. S. 1832, p. 20.

‡ Trans. Zool. Soc. vol. i. p. 137, pl. 21.

§ Memoir by Messrs. A. Milne-Edwards and A. Grandidier, Ann. des Sc. Nat 1867, vol. vii. series 5, p. 321.

The species are :—

CLIMACTERIS SCANDENS.

Generally distributed over the south-eastern portions of Australia.

CLIMACTERIS RUFA.

Inhabits the neighbourhood of Swan River, Western Australia.

CLIMACTERIS ERYTHROPS.

The interior of New South Wales.

CLIMACTERIS MELANOTA.

The Gulf of Carpentaria.

CLIMACTERIS MELANURA.

The north coast of Australia.

CLIMACTERIS LEUCOPHÆA.

New South Wales.

Thus every colony of that vast country, with the exception of Tasmania, is inhabited by a species of this singular form. When I commenced the study of the Australian birds, now nearly thirty years ago, only two species were known, namely *C. scandens* and *C. leucophæa*. In the interval the four others above named have been discovered; and I now give the description of a fifth, from a skin sent to me two years since by Mr. E. P. Ramsay of Dobroyde, in New South Wales, and which I should have characterized earlier, but for an impression that it was an example of *C. leucophæa* in an abnormal state of plumage; I now venture to do so in consequence of a second inquiry from Mr. Ramsay as to what I have called the red-rumped *Climacteris*.

The name I propose for it is

CLIMACTERIS PYRRHONOTA.

Crown, forehead, and wings brown, the feathers of the former edged with a lighter tint of the same colour; some longitudinal teardrop-like streaks of buffy white on the scapularies; wings crossed by a band of light buff; rump and upper tail-coverts rust-red, forming a conspicuous mark; throat and chest white; on the hinder part of the cheeks a patch of rust-red; centre of the abdomen buffy white; flanks deep brown, with the centre of each feather greyish white; under tail-coverts fawn-white, each feather crossed by two irregular lines of black; tail grey, the five outer feathers on each side centred with black and tipped with greyish white.

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

In favour of its being distinct, I may remark, first, that I found the *C. leucophæa* very common in New South Wales, and killed many examples of both sexes without finding a trace of red on their rump-feathers; secondly, that we rarely find rust-red to be the precursor of the fine blue-grey of a subsequent change; and thirdly, that rust-red is a prevailing tint in some of the other species of the genus. It assimilates in size and general appearance (except in the

rust-red of the lower part of the back, rump, and upper tail-coverts) to the female of *C. leucophæa*, even to the rusty spot on the cheeks.

Mr. Ramsay's specimen has "Springfield, Jan. 1, 1865," marked on the label attached to it.

An apparently immature example of this bird is in the collection at the British Museum.

4. List of Birds collected at Pebas, Upper Amazons, by Mr. John Hauxwell, with Notes and Descriptions of New Species. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.Z.S.

(Plate XLV.)

After several years of inaction as regards zoological pursuits, Mr. Hauxwell has again transmitted to this country one of his beautifully prepared series of bird-skins from the Upper Amazons. Having been recently engaged on Mr. Bartlett's collections from the same neighbourhood, it has been of great interest to us to examine Mr. Hauxwell's series, which embraces examples of 135 species. These are all from the vicinity of Pebas, a town situated on the north bank of the main Amazons, some way below the mouth of the Napo. Four of them appear to be new to science, namely *Oryzoborus melas*, *Tyranniscus gracilipes*, *Pernostola fortis*, and *Porzana fasciata*.

The following is a complete list of the species, the nomenclature adopted, where no additional reference is given, being that of Sclater's 'American Catalogue,' except in the case of the *Trochilidæ*, which have been determined by Mr. Gould, and are named according to the catalogue in the Introduction to his Monograph of that family:—

TROGLODYTIDÆ.

1. *Microcerculus marginatus*.
2. *Thryothorus coraya*.

HIRUNDINIDÆ.

- 3.† *Hirundo æquatorialis*.

VIREONIDÆ.

4. *Vireosylvia agilis*.

CÆREBIDÆ.

5. *Dacnis cayana*.
6. — *melanotis*.
7. — *flaviventris*.
8. *Chlorophanes atricapilla*.
9. *Cæreba cæreula*.
10. — *nitida*.

TANAGRIDÆ.

11. *Procnias occidentalis*.

12. *Euphonia melanura*.

13. — *rufiventris*.

14. *Calliste yeni*.

15. — *schranksi*.

16. — *xanthogastra*.

17. — *boliviana*.

18. *Ramphocælus jacapa*.

19. — *nigrogularis*.

20. *Tachyphonus cristatellus*.

21. *Nemosia pileata*.

22. *Saltator magnus*.

23. — *azaræ*.

24. *Cissopis media*.

FRINGILLIDÆ.

- 25.† *Oryzoborus melas*, sp. nov.

26. — *torridus*.

27. *Spermophila castaneiventris*.

28. *Coturniculus peruanus*.

ICTERIDÆ.

29. *Ostinops cristatus*.
 30. *Cassiculus solitarius*.
 31. *Xanthosomus icterocephalus*.
 32. *Cassidix oryzivora*.

CORVIDÆ.

33. *Cyanocorax violaceus*.

DENDROCOLAPTIDÆ.

34. *Furnarius torridus* (?)*.
 35. *Leptoxyura cinnamomea*.
 36. *Philydor pyrrhodes*.
 37. *Dendroornis ocellata*†.

FORMICARIIDÆ.

38. *Cymbilanius lineatus*.
 39. *Thamnophilus melanurus*.
 40. — *radiatus*.
 41. *Dysithamnus schistaceus*§.
 42. *Cercomacra cinerascens*||.
 43.† *Percnostola fortis*, sp. n.
 44.† *Myrmelastes plumbeus*.
 45. *Myrmotherula cinereiventris*¶.
 46. — *axillaris*.
 47. — *pygmæa*.
 48. *Hypocnemis cantator*.
 49. — *myiotherina***.
 50. *Grallaria brevicauda*.

TYRANNIDÆ.

51. *Fluvicola albiventris*.
 52. *Arundinicola leucocephala*.
 53. *Todirostrum maculatum*.
 54. *Mionectes oleagineus*.
 55.† *Tyranniscus gracilipes*, sp. n.
 56. *Tyrannulus elatus*.
 57. *Elainea pagana*.
 58. — *caniceps*.
 59. —, sp. ign.
 60. *Myiozetetes cayennensis*.
 61. *Pitangus sulphuratus*.

62. *Rhynchocyclus megacephalus*.

63. —, sp. ign.
 64. *Myiodynastes solitarius*.
 65.† *Muscivora castelnaudi*.
 66. *Pyrocephalus rubineus*.
 67.† *Empidochanes fuscatus*.
 68. *Myiarchus*, sp. ign.
 69. *Tyrannus melancholicus*.
 70. *Milvulus tyrannus*.

COTINGIDÆ.

71. *Pachyramphus niger*.
 72. — *atricapillus*.
 73. *Pipra auricapilla*.
 74. — *cyaneocapilla*.
 75. *Machæropterus striolatus*.
 76. *Chiromachæris manacus*.
 77. *Phænicocercus nigrigularis*.
 78. *Cotinga cayana*.

ALCEDINIDÆ.

79. *Ceryle torquata*.
 80. — *amazona*.
 81. — *americana*.
 82. — *superciliosa*.

GALBULIDÆ.

83. *Galbula tombacea*.
 84. — *leucogastra*.
 85. *Brachygalba inornata*.
 86. *Galbalecyrhynchus leucotis*.

BUCCONIDÆ.

87. *Monasa nigrifrons*.

TROGONIDÆ.

88. *Trogon melanurus*.

CAPRIMULGIDÆ.

89. *Podager nacunda*.
 90. *Nyctidromus albicollis*‡‡.
 91. *Hydropsalis trifurcata*§§.

* See Scl. & Salv. P. Z. S. 1866, p. 183.

§ See anteà, p. 756.

¶ See anteà, p. 756.

‡‡ See Sclater, P. Z. S. 1866, p. 144.

§§ Cf. Sclater, P. Z. S. 1866, p. 141.

‡ See anteà, p. 575.

|| See P. Z. S. 1866, p. 186.

** See anteà, p. 757.

TROCHILIDÆ.

92. *Glaucis affinis*.
 93. *Threnetes cervinicauda*.
 94. *Phaëthornis osergi*.
 95. — *malaris*.
 96. — *nigricinctus*.
 97. *Campylopterus equatorialis*.
 + 98. *Lampornis mango*.
 99. *Iolæma schreibersi*.
 100. *Thalurania nigrofasciata*.
 101. *Florisuga mellivora*.
 102. *Polemistria verreauxi*.
 103. *Gouldia langsdorfi*.
 104. *Heliothrix auritus*.
 105. *Clytolæma aurescens*.
 + 106. *Helimaster longirostris*.
 107. *Leucippus chlorocercus**.
 108. *Thaumantias fluviatilis*.
 109. *Chrysuronia josephinae*.
 110. *Eucephala cærulea*.
 111. *Hylocharis sapphirina*.
 112. *Chlorostilbon napensis*.

CUCULIDÆ.

113. *Piaya melheri*.
 114. — *rutila*.
 115. *Coccyzus melanocoryphus*.

CAPITONIDÆ.

116. *Capito amazonicus*.

PICIDÆ.

117. *Chrysoptilus speciosus*.

PSITTACIDÆ.

- 118.† *Ara severa*.
 119. *Brotoperys xanthopterus*.

ACCIPITRES.

120. *Ibycter ater* (Vieill.).
 121. *Urubitinga schistacea* (Sund.).
 122. *Harpagus bidentatus* (Lath.).
 123. *Gampsonyx swainsoni*, Vig.

HERODIONES.

124. *Ardea cocoi* (Linn.).
 125. *Nycticorax pileatus* (Lath.).
 126. *Tigrisoma brasiliense* (Linn.).

RALLI.

127. *Eurypyga helias* (Pall.).
 128.† *Porzana fasciata*, sp. n.
 129. *Heliornis fulica* (Bodd.).

LIMICOLÆ.

130. *Hoplopterus cayanus* (Lath.).
 131. *Actiturus bartramius* (Wils.).
 132. *Tringites rufescens* (Vieill.).
 133. *Totanus solitarius* (Wils.).

LARIDÆ.

134. *Sterna magnirostris*, Spix.

ANSERES.

135. *Cairina moschata* (Linn.).

The following notes refer to the species marked with an †.

3. *HIRUNDO ÆQUATORIALIS*, Lawr. Ann. L. N. Y. viii. p. 400.

Several examples of this form of *H. albiventris* are in the collection. As far as we can tell from specimens before us, it appears to be readily distinguishable. We should doubt, however, whether it really occurs near Quito, as stated by Mr. Lawrence.

—25. *ORYZOBORUS MELAS*, sp. nov.

Nitenti-niger: speculo alari, tectricibus subalaribus et rectricum duarum mediarum macula basali albis: rostro albo: pedibus fuscis: long. tota 6 poll. Angl., alæ 2·7, caudæ 2·4. ♀. Cincrascenti-fusca, subtus fulvescentior, gula albicante: rostro et pedibus fuscis.

Hab. in Peruv. orient. Pebas (*Hauvwell*).

* Cf. Gould, P. Z. S. 1866, p. 194.

Obs. Affinis *O. crassirostri*, sed rostro multo minus crasso; crissi plumis intus non albo notatis et speculo alari latiore.

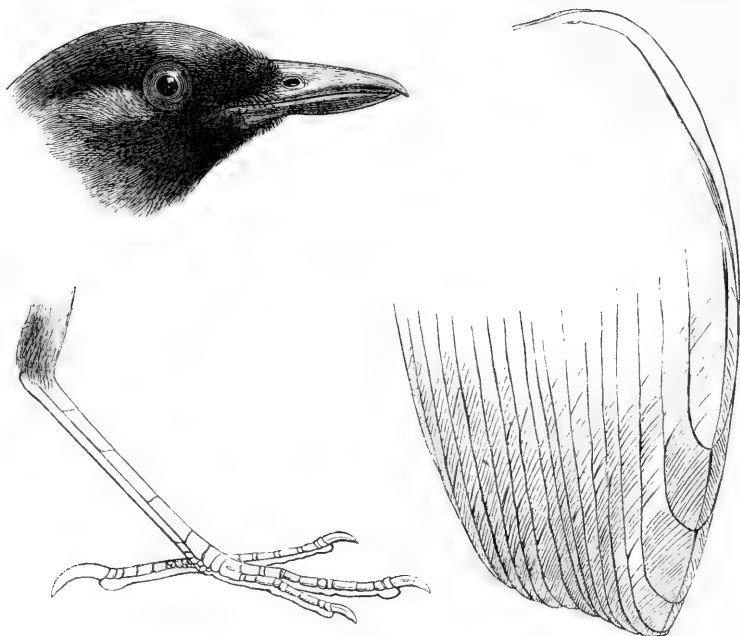
†43. PERCNOTOLA FORTIS, sp. nov. (Pl. XLV.)

Nigricanti-cinerea, fere unicolor, pileo subcristato et corpore subtus ad medium pectus nigris: campterio alari albo: long. tota 7·3, alæ 3·3, caudæ 2·7, tarsi 1·4, rostri a rictu 1·15.

♀. *Obscure cinerea, pileo alis et cauda extus ferrugineis, dorso et hypochondriis fulvescentibus: campterio albicante.*

Hab. in Peruvia orient. Pebas (*Hauxwell*); Chyavetas (*Bartl.*).

Obs. Forma et habitu *P. funebri* affinis, sed differt statura majore et alis extus immaculatis.



Percnostola fortis.

Two skins, those of an adult male and young male, of this species are in the collection, and have enabled us to make out the female of this species which was in Bartlett's last collection, and which we were previously unable to determine. The form is more nearly that of *Percnostola funebris* than any other bird of the group with which we are acquainted, but it is larger and stronger. The wings are short and rounded, the fourth, fifth, sixth, seventh, and eighth primaries being nearly equal, and forming the wing-end. The tarsi are not quite so strong as in typical *Thamnophili*, and are proportionally longer.

44. MYRMELASTES PLUMBEUS.

Recent researches have convinced us that Gould's *Thamnophilus hyperythrus* is the female of this species. As, however, the term *hyperythrus* is only applicable to one sex, it will be more convenient to use the more recent name. A pair of this species are in the present collection, procured on the same day, and with the sex of each marked.

+55. TYRANNISCUS GRACILIPES, sp. nov.

Tyranniscus gracilipes, Sclater, MS.

Olivaceus, pileo obscure cinereo : loris albidis : alis nigris, secundariis et tectricibus flavo marginatis : cauda nigricante, olivaceo extus marginata : subtus pallide flavus : rostro nigricante, pedibus plumbeis : long. tota 4·3, alæ 2, caudæ 1·9, tarsi 55.

Hab. in Peruv. orient. Pebas (*Hauxwell*).

Three specimens of this species agree with an indifferent skin in Sclater's collection (No. 1317 of his 'American Catalogue'), said to be from Venezuela. Two of them are somewhat shorter in the wing than the described specimen, which is marked *male*. The nearest described species seems to be *T. parvus*, Lawrence (*Ibis*, 1862, p. 12), which is of about the same size, but has the throat and breast white.

65. MUSCIVORA CASTELNAUDI.

Onychorhynchus castelnaudi, Deville, R. Z. 1849, p. 57.

A single specimen of this bird is in the collection, but does not appear quite adult. It presents some of the distinctive characters pointed out by M. Deville; but we should prefer to see further specimens before guaranteeing the species as distinct from *M. regia*.

+128. PORZANA FASCIATA, sp. nov.

Corethrura, sp., Scl. & Salv. P. Z. S. 1866, p. 200.

Castanea : dorso et alis extus brunnescenti-olivaceis : ventre toto cum hypochondriis et subalaribus nigro transfasciatis : rostro nigro, pedibus rubellis : long. tota 6·8, alæ 3·8, caudæ 9, tarsi 1·6, rostri a rictu 9.

Hab. Peruvia orient. Pebas et Chamicurros (*Hauxwell*); fl. Ucayali (*Bartlett*).

Obs. Similis *P. castaneæ*, Cuv., sed ventre fasciato diversa.

A single specimen of this Rail was in Mr. Bartlett's Ucayali collection and is now in the British Museum. In the same collection is a second example, obtained some years ago by Mr. Hauxwell at Chamicurros.

The species appears to be unnamed, but it is a very distinct one, and belongs to the group *Rufirallus* of Bonaparte. We propose to give a figure of it in a forthcoming number of our 'Exotic Ornithology.'

5. On Peruvian Birds collected by Mr. H. Whitely. By
P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT
SALVIN, F.Z.S.—Part I.

(Plate XLVI.)

The present paper contains an account of the first collection of birds formed by Mr. Henry Whiteley, junior, during his new expedition to South-western Peru.

The following are extracts from several of Mr. Whitely's letters, relating to his journey and the countries visited:—

(Letter I., Islay.) "I left Southampton April 2nd of the present year, and, after a fine voyage, arrived at Islay, *viâ* Panama, on the evening of the 6th of May. I went out on the following day and shot my first bird in Peru, which in habits was very similar to our Wheatear*. In a few days I intend to make some excursions to the hills after Humming-birds, as the Gulls and Terns are all away from here at this season. From the residents of Islay I have received the greatest kindness and assistance.

"I have made two trips to the 'Lomas.' These 'Lomas' are hills about six miles from Islay. Between them are valleys in which there are running streams of water. In these valleys there is plenty of vegetation, small flowering shrubs, fir trees, olive-trees, &c., which are frequented by numerous species of birds. Here also I obtained nearly all the specimens of Humming-birds sent in the first collection."

(Letter II., Arequipa.) "I left Islay for Arequipa at 12 A.M. on the 19th, being accompanied part of the way by some good friends from Islay. We parted company at a house on the hills, and I then went on with my guide. I had two horses with me for the journey. My luggage will be sent up on mules.

"After making a gradual ascent up the hill for about 3000 feet, we came to a large plain, which extends for about forty-five miles. As soon as you get on this plain you can see the volcano of Arequipa, which is covered with snow at the top—and also some of the high peaks of the Andes, which are also covered with snow.

"In the centre of the plain there is a very respectable sort of an inn, kept by an Englishman. We arrived here at 6 o'clock in the evening; I had some refreshments, and then went to bed and slept five hours, and left the inn at half-past one in the morning. We galloped along the plain until we got to the foot of the hills, which we reached at half-past three A.M. I then slept until six o'clock, and started for Arequipa. In the plain there are some most peculiar mounds of sand in the shape of a horseshoe, which must have been blown from a considerable distance, as there is no sand of the same colour anywhere on the plains. The colour of the sand on the mounds is a dark lead, whilst the sand of the plains is of a reddish colour.

"After ascending and descending several times, we at last caught

* It was *Muscisaxicola mentalis* (Lafr. et D'Orb.).—P. L. S.

a glimpse of Arequipa. What a glorious sight it was, with its white stone houses, and the green fields extending for miles round the city. Arequipa is 7800 feet above the sea, and a distance of ninety miles from Islay. The journey took me twenty-four hours, and I was rather tired when I arrived."

(Letter IV., Arequipa.) "On the 15th of July Mr. Gibson and myself started for a trip to Salinas, a salt-lake at an elevation of 14,000 feet. We had three servants with us and two pack-mules. At some distance from Islay we commenced to ascend, and arrived the first day at the village of Chihuata, at an elevation of 9000 feet. Here we were hospitably received in the house of one of the residents, and slept the night. The next morning we started early; and now commenced the worst part of the journey, the road being a gradual ascent of mountains for 5300 feet. The way, however, was enlivened by the sight of numerous birds, and especially, for some 2000 feet, by the movements of the Giant Humming-bird (*Patagona gigas*).

"On arriving at the highest part of our journey, a glorious sight burst on our view, the volcano being in active eruption, and vast volumes of smoke coming up from the crater and spreading over the country. We had now to descend about 300 feet, and came upon the lake, which was nearly all dried up, and was quite dazzling to the sight, the whole surface being covered with layers of salt. After a ride of about six miles round the lake, we came to some Indian huts, and also a small chapel, where we intended to sleep. By this time it was getting dark and very cold. The next day we had some shooting, and got some Ducks and also three Flamingos, but unfortunately they had the hind toe*. I will not trouble you with all details; it is sufficient to say we shot altogether ninety-five birds, out of which I selected the best for preserving.

"We stayed here two days, and then returned to Chihuata, slept there the night, and the next morning I was out early and shot a large Humming-bird (*Patagona gigas*), the dark one with the patch of green upon the throat (*Metallura cupreicauda*), and the one with the green throat and chestnut patch on the belly (*Oreotrochilus estella*). We returned the same day to Arequipa."

The specimens of birds collected by Mr. Whitely at Islay and Arequipa and during the above-mentioned excursion to Salinas belong to fifty-eight species, of which a list is subjoined. Although mostly species of great interest and some rarity, there is little actually new to science amongst them.

They are mostly species described in D'Orbigny's well-known 'Voyage,' and in Tschudi's 'Fauna Peruana.' Many Chilean species also extend thus far north; and the general aspect of the avifauna of Western Peru is decidedly Chilean, having no features in common with the eastern wood-region of Peru. We reserve, however, our general remarks on this subject until the receipt of further collections, which will give us more materials for forming a judgment on it.

* I had particularly requested Mr. Whitely to look out for *Phænicopterus andinus*, which has no hind toe.—P. L. S.

1. *TURDUS CHIGUANCO*, D'Orb. et Lafr.

Islay and Arequipa, May and June, several specimens varying a little in size. "Bill bright yellow; eye reddish hazel; legs, toes, and claws bright yellow."

2. *TROGLODYTES TESSELLATUS*, Lafr. et D'Orb. Mag. de Zool. 1836, p. 25; D'Orb. Voy. Ois. p. 232.

Arequipa, several examples.

3. *ANTHUS RUFUS* (Gm.); Baird, Rev. A. B. i. p. 156.

Two specimens from Islay.

4. *HIRUNDO ANDICOLA*, Lafr. et D'Orb. Syn. Av. in Mag. de Zool. 1837, p. 69.

Two examples from Arequipa, May. These skins are the first we have seen of this distinct species. The feet are proportionally small, and the middle toe adheres to the outer fully to the end of the basal joint. The nostrils are lateral, and partially overhung. The tarsi are quite nude. The tail is very nearly square, the middle rectrices being barely shorter than the outer. The species does not appear to fit any of the subdivisions given by Baird, R. A. B. p. 271.

5. *ATTICORA CYANOLEUCA* (Vieill.); Baird, R. A. B. p. 310.

Petrochelidon cyanoleuca, Sclater, Cat. A. B. p. 40.

Two specimens of this widely distributed species from Arequipa.

6. *CONIROSTRUM CINEREUM*, D'Orb. et Lafr. Mag. de Zool. 1838, p. 25; D'Orb. Voy. Ois. p. 374, t. 59. f. 1; Cassin, Pr. Acad. Phil. 1864, p. 272.

Arequipa, many specimens of both sexes. The females are of a browner and more olivaceous tinge. The bird figured by D'Orbigny appears to be a male. We cannot quite agree with Mr. Cassin in considering Sclater's *C. fraseri* identical with this bird. *C. fraseri* has the superciliaries and body below of a pale rufous, and the head is much darker. But the two species are certainly near allies. The irides of this species are noted "dark hazel."

7. *DIGLOSSA BRUNNEIVENTRIS*, Lafr. Rev. Zool. 1846, p. 318; Des Murs, Icon. Orn. t. 43; Cassin, Proc. Acad. Ph. 1864, p. 274.

Chihuata, alt. 9000 feet; one example, July 1867, marked male. See Sclater's remarks upon Des Murs's incorrect locality for this bird, *anteà*, p. 322.

8. *TANAGRA DARWINI*, Bp.

Several examples of this species from Arequipa. "Eyes pinkish hazel."

9. *PHEUCTICUS CHRYSOGASTER* (Less.).

Two examples, from Arequipa and Islay (May and June), apparently immature male and female, of this species.

10. *PHRYGILUS ATRICEPS* (Lafr. et D'Orb.).

One example from Chihuata, in the plumage figured by D'Orbigny, but marked *female*.

11. *PHRYGILUS FRUTICETI*, Kittl.

Specimens of both sexes of this species, from Chihuata and Arequipa. D'Orbigny has already recorded its occurrence in La Paz under the name *Emberiza luctuosa* (Syn. Av. in Mag. de Zool. 1837, p. 80).

12. *PHRYGILUS ALAUDINUS* (Kittl.).

Several specimens from Islay and Arequipa (May and June), with the head striated, as in the female, perhaps a seasonal variation. "Bill yellowish brown; eyes dark brown; legs and toes light chrome-yellow."

13. *PHRYGILUS SPECULIFER* (Lafr. et D'Orb.).

Diuca speculifera, Sclater, C. A. B. p. 111.

Four specimens from Salinas. "Eye dark hazel."

14. *ZONOTRICHIA PILEATA* (Bodd.).

Many specimens from Islay and Arequipa.

† 15. *CHRYSOMITRIS CAPITALIS*, Cab. J. f. Orn. 1866, p. 160.

Many examples (from Islay and Arequipa) of this western form of *C. icterica*, agreeing with Sclater's examples from Ecuador.

16. *STURNELLA BELLICOSA*, De Filippi.

Many specimens from Arequipa. MM. Philippi and Landbeck have lately redescribed this bird as *Leistes albipes* (Wieg. Arch. 1863, p. 128).

17. *GEOSITTA CUNICULARIA* (Vieill.).

Islay, May. Two examples, agreeing with specimens from Chili.

18. *CINCLODES FUSCUS* (Vieill.).

A single skin of this species from Chihuata, rather whiter below than others in Sclater's collection, but not otherwise different. A skin, belonging to the Smithsonian Institution, from Conchitas, Buenos Ayres, is also undistinguishable, which shows that Azara's bird is the same.

19. *CINCLODES NIGRIFUMOSUS* (Lafr. et D'Orb.).

Two specimens from Islay, September. "Eye dark hazel."

20. *SYNALLAXIS EGITHALOIDES* (Kittl.).

Two examples from Islay. "Legs and toes black; bill black; eye dark hazel."

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21. *SYNALLAXIS ORBIGNII* (Reich.).

Synallaxis humicola, Lafr. et D'Orb. Mag. de Zool. 1836, p. 24; D'Orb. Voy. Ois. p. 245, t. 17. f. 2.

Bathmidurus d'orbignyi, Reich. H. d. Sp. Orn. p. 163.

Synallaxis crassirostris, Landb. J. f. O. 1865, p. 401.

This species has been wrongly referred by Lafresnaye and D'Orbigny to the *S. humicola* of Kittlitz. It is readily distinguishable on comparison by its thicker bill, rufous throat-spot, and the clear rufous colour of the outer webs of the external tail-feathers. D'Orbigny's specimens were from the ravine of Falca, Western Bolivia. Those described by Landbeck as *S. crassirostris* were obtained by Leybold in the vicinity of Mendoza. Mr. Whitely sends us two examples from Arequipa. Sexes (as marked) alike.

22. *OCTHOËCA LEUCOPHRYS*.

Fluvicola leucophrys, Lafr. et D'Orb. Syn. Av. in Mag. de Zool. 1837, p. 60; D'Orb. Voy. p. 345, t. 38. f. 1.

Octhoëca leucophrys, Sclater, P. Z. S. 1856, p. 28; Cab. et Hein. Mus. Hein. ii. p. 48.

Two examples of this fine species from Islay and Chihuata. "Eyes dark hazel; bill and feet black." In Sclater's 'Catalogue' *Fluvicola leucophrys* is wrongly referred to a very different bird—the *Tyrannula setophagoides* of Bonaparte.

23. *MUSCISAXICOLA ALBIFRONS*.

Ptyonura albifrons, Tsch. F. P. p. 167, t. 12. f. 2.

Muscisaxicola albifrons, Ph. et Landb. Wieg. Arch. 1865, p. 78.

One example of this bird from Salinas shows that Sclater has been in error in uniting it to *Tænioptera alpina*, Jard., of Ecuador*. The present species is much larger in size, in fact the giant of the genus†. The upper coloration is also paler, and the head slightly rufescent, instead of being darker than the back. The front is white in *M. albifrons*, which is not the case in *M. alpina*; and the outer webs of the outer tail-feathers are distinctly edged with white. The species from Ecuador will therefore stand as *M. alpina* (Jard.). The eyes of *M. albifrons* are noted as "dark hazel."

24. *MUSCISAXICOLA MENTALIS* (Lafr. et D'Orb.).

Skins from Islay. "Female: eye dark hazel; legs, toes, and claws black."

25. *MUSCISAXICOLA RUBRICAPILLA*, Ph. et Landb. (Pl. XLVI.)

Muscisaxicola albilora, Lafr. Rev. Zool. 1855, p. 60 (?).

Muscisaxicola rubricapilla, Ph. et Landb. Wieg. Arch. 1865, p. 90; Sclater, Ibis, 1866, p. 58.

Supra fuscescenti-cinerea, lorix et regione oculari albescentibus;

* See P. Z. S. 1860, p. 78, and Ibis, 1866, p. 57.

† *M. albifrons*: long. tota 9·0, alæ 6·0, caudæ 3·8.

M. alpina: " 6·8, " 5·0, " 3·1.

vertice obscure rubro : alis extus dorso concoloribus, remigibus obscurioribus : caudæ tectricibus superioribus fuliginosis : cauda nigra, rectricibus duabus externis albo extus marginatis : subtus grisescenti-alba fere unicolor ; tectricibus subalaribus albis : rostro et pedibus nigris : long. tota 7·0, alæ 4·6, caudæ 3·1, tarsi 1·15, rostri a rectu 0·8.

Hab. in mont. Peruviae occident. merid. et reipubl. Chilensis.

Two examples of this species of *Muscisaxicola* were obtained at Salinas in July 1867. The eye is noted as "dark hazel." The species is nearly related to *M. rufivertex* of Lafresnaye, but is evidently distinct, and forms a second species of the red-head section. See Sclater's synopsis of the genus, 'Ibis,' 1866, p. 57.

We are inclined to consider that Lafresnaye's *M. albilora* is probably identical with this species.

26. CENTRITES NIGER (Bodd.).

One example, male, from Salinas. "Eyes dark hazel."

27. PYROCEPHALUS RUBINEUS (Bodd.).

Several specimens, obtained in the Catarindos valley, a little south of Islay. These are quite as large as some eastern examples of *P. rubineus*, and induce us to believe that the supposed western form *P. nanus* is not really different.

28. ANÆRETES ALBOCRISTATUS (Vig.).

Two examples from Arequipa, agreeing well with D'Orbigny's figure of *Culicivora reguloides*. Eyes marked "dark hazel."

29. ANTROSTOMUS ÆQUICAUDATUS (Peale); Sclater, P. Z. S. 1867, p. 342.

A single skin of this species from Islay, obtained September 13th.

30. OREOTROCHILUS ESTELLE (D'Orb. et Lafr.); Gould, Mon. ii. t. 70.

One example from Chihuata, alt. 9000 feet, July 19th, ♂.

31. MYRTIS FRANCESCÆ (Less.); Gould, Mon. iii. t. 151.

Two examples, a female and a young male, from Islay.

32. THAUMASTURA CORÆ (Less.); Gould, Mon. iii. t. 153.

Many specimens from Islay and Arequipa.

33. RHODOPIS VESPER (Less.).

Many examples from Islay and Arequipa, and two from Chihuata. Eyes in one marked "dark hazel."

34. METTALLURA CUPREICAUDA, Gould, Mon. iii. t. 191.

Two specimens of this fine species, from Chihuata (alt. 9000 feet). "Eyes dark hazel."

35. *PETASOPHORA IOLATA*, Gould, Mon. iv. t. 226.

A young bird, probably referable to this species, from Arequipa.

36. *PATAGONA GIGAS* (Vieill.); Gould, Mon. iv. t. 232.

Three skins from Arequipa.

37. *CONURUS AURIFRONS* (Less.).

One example from Chihuata, of a nearly uniform green, apparently a young female of this species.

+38. *CATHARTES AURA*.

Arequipa, one skin. "Eyes white."

39. *MILVAGO MEGALOPTERUS*, Meyen.

Adult and young bird in change, of this species, agreeing well with D'Orbigny's figure and description of *Phalcobænus montanus*. We have compared them with Chilian specimens alluded to by Sclater (*ante*, p. 329), and cannot distinguish them in any way. The points of distinction given by Von Pelzeln between his proposed new species *M. crassirostris* and *M. montanus* are very slight, and they do not appear to hold good with our specimens. For example, in Mr. Whitely's adult specimen the first primary is decidedly shorter than the sixth. This is given by Von Pelzeln as a distinguishing characteristic of the Chilian "*M. crassirostris*."

40. *BUTEO ERYTHRONOTUS* (King).

One skin in the immature plumage, called by Gould *Buteo varius*, from Arequipa. "Female, eyes white."

+41. *HYPOTRIORCHIS FEMORALIS* (Temm.).

Arequipa, a single female. "Eyes dark hazel."

42. *TINNUNCULUS SPARVERIUS* (Linn.).

Arequipa, one skin belonging to the variety without the red patch on the crown. "Eyes chocolate-colour."

43. *CIRCUS POLIOPTERUS*, Tsch. F. P. *Aves*, p. 113, t. 3; Schlegel, Mus. d. P.-B. *Circi*, p. 6.

A single skin of an adult female. "Eyes bright yellow." Obtained near Arequipa. Schlegel (Mus. de P.-B. *Circi*, p. 6) suggests that *C. megaspilus*, Gould, may be the young of this species; but by a recent inspection of the type specimen in the British Museum we have ascertained that such is not the case, and that *C. megaspilus* is a long-winged bird, probably referable to the young dress of the *C. macropterus*.

44. *STRIX PERLATA*, Vieill.

Arequipa. "Eyes dark hazel, nearly black."

45. *PHOLEOPTYNX CUNICULARIA* (Mol.).

Catarindos valley. "Eye light yellow."

+46. *GLAUCIDIUM INFUSCATUM* (Temm.).

Arequipa, one specimen, marked *female*.

47. *ZENAIDA AURICULATA*, Gray; Bp. Consp. ii. p. 82.

A single example from Arequipa, marked "male: eyes dark brown."

48. *METRIOPELIA AYMARA*, Knip et Prev.; Bp. Consp. ii. p. 76.

One skin of this scarce species, from Salinas.

49. *CHAMÆPELIA ERYTHROTHORAX* (Meyen).

Two specimens from Arequipa. "Eyes dark blue." We believe that this species, which has been hitherto called *Chamæpelis anais* (Less.)*, has an older name in *Columba erythrothorax*, Meyen, Acta Leopoldino-Car. vol. xvi. Suppl. p. 98, t. 16 (*Chamæpelis monticola*, Tsch. F. P. pp. 45, 276; *Columbula erythrothorax*, Bp. ii. p. 80). The only discrepancy to be discovered is that Meyen's figure does not show the naked eye. Meyen's specimen is stated to have been obtained from the Andes above Arequipa.

50. *CHAMÆPELIA CRUZIANA* (Knip et Prev.); Slater, P. Z. S. 1866, p. 100.

Columbula cruziana, Bp. Consp. ii. p. 80.

Several examples of both sexes from Arequipa.

51. *TINAMOTIS PENTLANDI*, Vigors, P. Z. S. 1836, p. 79; Gray & Mitch. Gen. of B. t. 138.

One skin of this remarkable bird from Arequipa.

52. *OREOPHILUS RUFICOLLIS* (Wagl.).

Charadrius ruficollis, Wagler, Isis, 1829, p. 653.

Oreophilus totanirostris, Jard. & Selb. Ill. Orn. iii. p. 151.

A single male specimen in adult plumage, from Islay.

53. *THINOCORUS RUMICIVORUS*, Eschscholtz.

A specimen of this bird from Islay is much smaller in dimensions than Chilean and Argentine examples, and agrees in this respect with a skin recently received by Slater from Lima (Prof. Nation). It is also rather paler in colouring.

54. *THINOCORUS ORBIGNYANUS*, Geoffr. et Less. Cent. Zool. p. 137, t. 48, 49.

Three examples of this species, from Salinas. Eyes of male specimen marked "dark hazel."

* Cf. Slater, P. Z. S. 1866, p. 100.

Tschudi has described a *Thinocorus ingæ* (Av. Consp. p. 387, et Faun. Per. pp. 48, 279), from the highlands of Peru, which we believe to be the same as the present species. We are not able to distinguish Mr. Whitely's skins from other examples from Chili and La Plata. Tschudi lays stress upon the presence of a black breast-band in his *T. ingæ*; but this band is also present in southern specimens. He also states that the white throat is peculiar to *T. d'orbignyianus*; but this is also present in one of Mr. Whitely's specimens.

55. RALLUS RYTHIRHYNCHUS, Vieill.

Rallus rythirhynchus, Vieill. N. D. xiii. p. 521, et E. M. p. 1060 (ex Azara, sp. 372).

Aramides rythorhynchus, Burm. La Plata-Reise, ii. p. 504.

Rallus cæsius, Tsch. F. P. *Aves*, pp. 52, 301; Schlegel, Mus. d. P.-B., Ralli, p. 8; Cassin, Gilliss's Exp. ii. p. 194.

Rallus sanguinolentus, Sw. An. in Men. p. 335; Bridges, P. Z. S. 1843, p. 118; Darwin, Zool. Voy. Beagle, iii. p. 133; Sclater, P. Z. S. 1867, p. 333.

Rallus bicolor, Guy, Faun. Chil. *Aves*, p. 434.

Aramides zelebori, Pelzeln, Novara-Reise, Vög. p. 133 (?).

After comparing Mr. Whitely's example of this Rail with specimens of *Rallus sanguinolentus* of Chili, and skins of the *Rallus rythirhynchus* of Buenos Ayres, we have come to the conclusion that they all belong to one rather variable species. The present example is shorter-billed than Mr. Salvin's specimen from Leybold, alluded to P. Z. S. 1867, p. 333. We suspect that Von Pelzeln's *A. zelebori* is the same species from Southern Brazil.

Rallus rythirhynchus must, however, be carefully distinguished from *R. nigricans* (= *R. cæsius*), with which some authors have confounded it, being at once recognizable by its incurved bill and the red spot at the base of the lower mandible.

56. ANAS CRISTATA (Gm.).

Anas pyrrhogaster, Meyen, Nov. Act. xvi. Suppl. p. 119, t. 25.

Several skins of both sexes of this fine species, which are coloured alike, obtained at Salinas (alt. 14,000 feet).

57. QUERQUEDULA OXYPTERA.

Anas oxyptera, Meyen, Nov. Act. xvi. Suppl. p. 121, t. 26.

Querquedula oxyptera, Tsch. F. P. pp. 55, 309.

Querquedula angustirostris, Ph. et Landb. Wieg. Arch. 1863, p. 202.

One example from Salinas, the receipt of which has enabled us to clear up the confusion alluded to by Sclater in his notes on Chilean birds, *antea*, p. 335. There are two closely allied species of *Querquedula*—the present bird and *Q. flavirostris* (Vieill.). Messrs. Philippi and Landbeck have correctly pointed out the differences between them; but they have renamed the present species, not under-

standing that it is the true *oxyptera* of Meyen, who obtained his specimens in the highlands of Southern Peru, the same locality as that of Froben's specimens, and of the bird now before us. *Q. flavirostris* is the oldest name for the species better known as *Q. crecoides* (King). Its synonyms are correctly given by Burmeister (*La Plata-Reise*, ii. p. 516), if we strike out "*Anas oxyptera*, Meyen."

58. *LARUS BELCHERI*, Vigors.

Leucophæus belcheri, Bp. *Consp.* ii. p. 232.

Skins of this species from the coast near Islay. A female is marked "bill at the base light yellow, at the point black tipped with red; eyes dark hazel; legs and feet yellowish green."

6. Notice of an Egg of the Great Moa (*Dinornis gigantea*), containing remains of an embryo, found in the province of Otago, New Zealand. By Dr. HECTOR, F.R.S., Government Geologist.

This highly interesting specimen was discovered last year by a party of workmen when excavating the alluvium of the Upper Chitha Plains, near the township of Cromwell in Otago, and was secured by Mr. Charles O'Neal, who transmitted it to the Colonial Museum.

When found the egg is reported to have been perfect, but was accidentally broken in the process of removal from the sandy loam in which it was imbedded at a depth of 2 feet below the surface.

At about 1 foot distant and 3 inches deeper was discovered another egg of equal size, but too far decomposed to admit of its removal.

Many of the fragments, both of the shell and of the contained bones, were unfortunately lost in consequence of the friable nature of the specimens, not more than half the shell having been preserved. The fragments, about twenty in number, when fitted together, comprised nearly one complete side of the egg. Its dimensions (as restored) are as follows:—

Long diameter 8·9 inches, short diameter 6·1 inches.

The texture of the shell is chalky and pulverable, the external surface having been a good deal eroded by the solvents in the soil, so that it has a rough granular surface, but still showing distinctly the characteristic linear pores of the Moa egg-shell.

A portion of the shell was analyzed, and was found to contain only 0·9 per cent. of organic matter, while a fragment of a recent Emu's egg-shell analyzed at the same time gave 7·89 of organic matter, thus showing approximately the changes which the Moa's egg has undergone in the soil.

The bones of the chick, which were contained in the egg, are of a rich brown colour, and have an extremely light spongy texture; they adhere to the tongue, and are completely free from traces of membranes, ligaments, or other attached organic matters.

In the Museum there is a specimen of an Emu's egg containing the chick-bones at about the same stage of development.

On comparing these two specimens, the principal difference consists in the dense brittle character and white colour of the Emu bones as compared with those of the Moa chick, and in the enormous disproportion in the massiveness and form of the bones of the extremities in the latter case, with the very slight difference in the size of the cranium and total relative height of the embryos.

The specific gravities of these bones are respectively—

Moa chick	1·538
Emu chick	1·577
Bone of old Moa	1·700 to 1·979

The comparative length of the principal bones of these chick-skeletons are as follows:—

	Moa chick. inches.	Emu chick. inches.
Cranium	2·1	2·0
Pelvic bones	2·6	1·6
Femur	1·7	1·2
(Diameter of shaft ·35 in.)	(Diameter of shaft ·28 in.)	
Tibia	3·0	2·1
(Diameter of shaft ·35 in.)	(Diameter of shaft ·16 in.)	
Fibula	2·0	1·5
Tarso-metatarsus	1·9	1·8

Probable total length of Moa chick 14·5 inches.

Probable total length of Emu chick 13·0 inches.

Weight of bones of extremities and pelvis—

In the Moa chick 167·0 grains.

In the Emu chick 40·5 grains.

Or in the proportion of 4 to 1.

7. Description of *Ateles bartlettii*, a New Spider Monkey from the River Amazons. By Dr. J. E. GRAY, F.R.S., V.P.Z.S. &c.

(Plate XLVII.)

One of the most important zoological results of Mr. Edward Bartlett's exploring excursion up the River Amazons has been the discovery of a new Spider Monkey*, which differs from all the species of this usually lugubrious genus in the brightness and beautiful disposition of its colours. Mr. Wolf has made a beautiful drawing of this specimen, which is now in the British Museum collection.

ATELES BARTLETTII, sp. nov. (Pl. XLVII.)

Fur abundant, long, and soft. Black; the cheeks white; a band across the forehead over the orbits bright reddish yellow; the chest,

* See Mr. Bartlett's notice of the discovery of this species, P. Z. S. 1867, p. 2.

belly, inner side and front and back part of the limbs, and the side and under surface of the tail yellow.

Hab. Eastern Peru, near Xeberos (*E. Bartlett; Brit. Mus.*).

The black part of the hands and legs near the yellow colour is varied with more or less abundant yellow hairs.

I have named this fine species after Mr. A. D. Bartlett, the Superintendent of the Society's Gardens, and his son Edward (who discovered it).

8. Notes on *Catillus*, Humphrey, or *Navicella*, Lamarck, with Descriptions of Two New Genera. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

Linnæus and Bory St. Vincent referred this shell to the genus *Patella*. Chemnitz properly removed it to *Nerita*; and De Roissy considered it a species of *Crepidula* of Lamarck. Other authors have regarded it as the type of a genus. Thus Humphrey called it *Catillus*, Schumacher *Sandalium*, Férussac *Septaria*, and Lamarck *Navicella*.

Lamarck and Férussac divided their shells into two or three species:—the one having an oval, convex, more or less thick, solid shell, and more or less acute spire, which was called *N. elliptica*, Lamk., and *Septaria borbonica*, Férussac; the other a narrow oblong thin shell, more or less rounded at each end, called *N. lineata*, Lamk., and *Septaria navicula*, Férussac. These two species are the types of two forms, each of which has been divided into several species. The forms are generally distinctly marked; but there are a few specimens which seem to be more or less completely intermediate between them.

Mr. Lovell Reeve, in his 'Conchologia Iconica,' has divided the specimens into thirty-three species, or pseudo-species (most, if not all, of them figured from specimens in Mr. Cuming's collection), separated from each other by slight modifications in the form of the shell and of the inner lip, and in the distinctness and distribution of the colours. I think I may state, without any fear of contradiction, that it is utterly impossible to distinguish a large proportion of the species proposed in this work by the specific characters, or even by the figures given. Such characters and figures are merely to satisfy the rule that a species is not established unless it is characterized; but surely that implies that it shall be characterized so that it may be distinguished; otherwise, as in this case, it is a mere pretence, and therefore best avoided.

Mr. Reeve does not give figures of or describe the operculum of any of the species, which is the less excusable as Mr. Cuming's collection, from which the figures are taken, contains the opercula of more than a third of the shells which he has regarded as species; and the opercula of the different specimens present such modifica-

tions of form and structure that they at once distinguish the species, and serve to divide them into most natural groups. The non-attention to such particulars greatly diminishes the value of the 'Conchologica Iconica,' and removes it from the category of scientific works. It is the less excusable, as the opercula could in this and in very many cases have been added with scarcely any appreciable additional trouble. The fact is that I suppose Mr. Reeve intended it for a mere shell-dealer's catalogue, and not a scientific conchological and malacological work.

The species that are in a perfect condition (that is to say, that are accompanied by their opercula) in Mr. Cuming's collection may be arranged as in this essay. An operculated shell without its operculum is in a very imperfect condition, as the operculum is most important in the organization and economy of the animal, and it often affords most important characters for the distinction of the species and the determination of the genus to which the animal and shell is to be referred; so that an operculated shell not accompanied by its operculum must be regarded as wanting one of its most important organs.

Messrs. H. & A. Adams, in their 'Genera' (p. 386), divide *Navicella* into three subgenera, according to the position of the nucleus of the spire:—I. Apex of spire straight, on the edge of shell. II. *Septaria*: Apex of spire submarginal, entire, as *N. cookii*. III. *Eluna*: Apex slightly elevated above the edge, and recurved laterally, as *N. lapeyrousii*. These characters appear to me of very slight importance; and the form of the apex of the spire varies in specimens from the same locality, which I should be inclined to regard as the same species. The operculum of the genus is described by them as quadrangular. This would exclude *Navicella lineata*, which these authors referred to the second subgenus. These subgenera are adopted by Chenu in his 'Manual' (p. 338).

Adams figures the animal of *Catillus lineatus* (t. 42. f. 4) and the shell and operculum of *Catillus porcellanus* (t. 42. f. 4 a, b, c).

The family NERITINIDÆ may be thus divided into two tribes:—

- I. NERITININA. Aperture of shell moderate; spire conical; operculum the size of the aperture of the shell, horny, with a shelly plate nearly of the same size as the horny operculum.
- II. CATILLINA. Aperture of the shell very large, ovate; spire rudimentary; operculum small, horny, with a shelly plate produced beyond the edge of the horny operculum, which with the operculum is much smaller than the aperture of the shell.

The operculum of *Catillina*, as in other shells which are said to have a shelly operculum, consists of two parts:—1, the horny plate, which is affixed to the hinder part of the foot of the animal; 2, the shelly part, which is on the outer side of the horny plate, or *true operculum*, and which, as it increases in size, is produced beyond the end of the foot; the free end is generally bifid, with a produced

marginal process. The outer surface of the shelly part of the operculum is generally radiately and concentrically striated, and furrowed with two more or less distinct ribs radiating from the nucleus to the outer edge; the ribs across the middle of the plate generally end in a rounded lobe; that on the right margin of the plate is much more distinct, narrow, linear, and ends in a projecting spine. The inner surface of the plate is smooth, or with a few concentric marks showing how the shelly matter was deposited as the plate increased in size and thickness. The shelly plate of the operculum in the larger number of species is more or less quadrangular, with the horny operculum oblong, occupying the broadest part of the base and forming a fringe to that edge. In others the shelly plate is oblong elongate, with the horny operculum triangular, and occupying one of the halves of the lower half of the entire operculum.

Tribe I. CATILLINA. *Operculum subquadrangular; the horny (true) operculum oblong, transverse, occupying the broader end; the other more or less dilated, two-lobed, the marginal lobe acute, linear. Shell elliptical, mouth wide.*

1. CATILLUS.

Shell elliptical, mouth wide; inner lip flat, shelving, transverse, or slightly regularly arched; operculum shelly plate subquadrangular.

A. *The operculum as broad as long; the right rib well marked, separated from the margin by a granular space, which is broader near the nucleus; the right edge near the base denticulated; the nucleus rugose, granular; the terminal lobes unequal—one broad, the other linear, spine-like.* (Figs. 1a, 1b.)

Fig. 1a.

Fig. 1b.



Fig. 1a. Outer surface. Fig. 1b. Inner surface.

* *Operculum large, thick, dark coloured.*

1. CATILLUS JANELLI, Reeve, Icon. f. 1. (Operculum, Fig. 1.)

Hab. Philippines.

** *Operculum moderate, thin.* Eiana.

2. CATILLUS CLYPEOLUM, Reeve, Icon. f. 24.

Catillus affinis, Reeve, Icon. f. 15.

Hab. Philippines.

3. CATILLUS COOKI., Récluz ; Reeve, f. 14.

Hab. Philippines.

4. CATILLUS ORBICULARIS, Sowerby ; Reeve, f. 5.

Hab. Philippines.

5. CATILLUS LAPEYROUSII, Récluz.

Hab. —?

6. CATILLUS SUBORBICULARIS.

Hab. —?

7. CATILLUS BOUGAINVILLII, Récluz ; Reeve, Icon. f. 30.

Catillus ornatus, Adams and Angas.

Hab. New Ireland.

8. CATILLUS VARIABILIS.

Hab. —?

9. CATILLUS MACROCEPHALUS, Reeve, f. 28.

Hab. Feejee Islands.

10. CATILLUS DEPRESSUS, Lesson ; Reeve, f. 3.

Hab. Tahiti.

11. CATILLUS MAGNIFICUS, Reeve, f. 16.

C. scarabæus, Reeve, f. 12.

——? *capuloides*, Reeve, f. 19.

Hab. Australian Seas ; Harmond's Islands.

12. CATILLUS HAUSTRUM, Reeve, f. 18.

Hab. New Caledonia.

13. CATILLUS SANGUISUGA, Reeve, f. 17.

Hab. New Caledonia.

14. CATILLUS PORCELLANUS, Reeve, Icon. t. 2. f. 6.

Patella porcellana, Linn.

Septaria borbonica, Férussac.

Sandalium pictum, Schum.

Navicella bimaculata, Reeve, Icon. t. 1. f. 2.

N. elliptica, Lamk.

Hab. Mauritius ; Isle of France, Bourbon.

- B. *Operculum moderate, as long or longer than broad, thick ; upper lobes subequal, obtuse or acute ; the right rib indistinct and separated from the margin by a granular space, which is widest in the middle of the edge ; nucleus obscure, punctured.* Laodia. (Figs. 2 a, 2 b.)

Fig. 2 a.

Fig. 2 b.

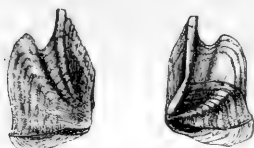


Fig. 2 a. Outer surface. Fig. 2 b. Inner surface.

15. CATILLUS CUMINGIANUS. (Operculum, Fig. 2.)

Navicella cumingiana, Récluz; Reeve, f. 7.*N. luzonica*, Schlegel; Reeve, f. 11.*Hab.* Philippines.

The opercula of this species are very variable in shape: some are much longer than broad, and have very acute lobes; this is especially the case in the smaller specimens.

There are several other species figured by Mr. Reeve that probably belong to this species; but as they are destitute of opercula it is not possible to determine their true place in the system, or their affinity to the other species. Like other fluviatile shells, they are liable to great variations in size, form, and colour.

2. PARIA, n. g.

Shell elliptical, mouth wide; inner lip flat, shelving upwards, produced and truncated in the middle, with a roundish notch on each side near the margin of the cavity; operculum—shelly plate subquadrangular, lower edge straight, transverse, with a flexible flap, the upper edge with two lobes, the marginal lobe elongate, linear.

* *Shelly plate of operculum broad, flat, thin.*

1. PARIA FREYCENETI.

N. freyceneti, Récluz; Reeve, Icon. t. 1. f. 4.*Hab.* New Hebrides.

** *Shelly plate of operculum narrow, high, solid, thick.*

2. PARIA PSITTACEA.

N. psittacea, Récluz; Reeve, Icon. f. 23.*Hab.* Australian Islands.

Tribe II. STENOPOMINA. *The operculum oblong elongate, narrow; the horny (true) operculum triangular, very oblique as regards the axis of the shelly plate (occupying the triangular right half of the hinder half of the entire operculum), acute near the nucleus, and rounded at the end; shelly plate of the operculum elongate, thin, with two elongated ridges on the upper end, the marginal one produced into a spine, with a*

notch on its left margin (Figs. 3 a, 3 b). Shell elongate, mouth elongate, narrow.

Fig. 3 a.

Fig. 3 b.



Fig. 3 a. Outer surface. Fig. 3 b. Inner surface.

The operculum has a very thin brittle shelly plate, which is separated from the horny (or true) operculum by a distinct straight line running from the centre of the right side of the operculum to the outer side rather above the base. The outer surface of the shelly plate is slightly convex, smooth, very finely concentrically striated, with a diverging rib from the nucleus to the upper edge, and with another more distinct linear rib on the right margin, which ends in a slender spine; the space between the diverging ribs is depressed and striated, like the rest of the surface. According to the figure of the animal in Adams's 'Genera' (p. 386, t. 42. f. 4), the end of the operculum is produced beyond the end of the foot.

STENOPOMA, n. g.

STENOPOMA LINEATUM. (Operculum, Fig. 3.)

Navicella lineata, Lamk. E. M. t. 456. f. 2; Reeve, t. 8. f. 31.

N. tessellata, Lamk.; Reeve, t. 6. f. 27.

Septaria navicula, Férussac, Bull.

Hab. Philippine Islands.

Lamarck divided these shells into two species, according to the coloration, calling one *lineata* and the other *tessellata*; but the two systems of coloration gradually pass into each other in the different specimens; and some specimens present the two kinds of coloration each well marked: for example, one was *C. lineata* when young, and became *C. tessellata* afterwards; so that the upper part of the shell is of one species, and the margin of the other.

The specimens from the same locality present considerable variation in the general form of the shell, some being much narrower and more convex than others, and also in the form, position, and extent of the hinder lip.

These shells have a general external resemblance to the compressed Limpets (*Patellæ*), that live in the cavities which they eat out at the base of the roots of *Algæ*, or on the cylindrical stems of those plants. They do not appear to derive their form, like those shells, from adapting themselves to the form of the body to which they happen to be attached; and, indeed, Mr. Cuming states that the specimen which he procured in the Philippines lived on stones, like the *Catilli*. Though they are compressed and oblong, the base of the cavity is flat and even, as much so as the circumference of

the cavity of the ovate *Catilli*; while the compressed Limpets have the base arched; that is to say, the side of the shell that embraces the cylindrical stem, or fits into the concavity in the roots of the large *Fuci*, is produced to fit the form of the body to which it is attached. The Limpets, when placed on a flat board, rock from end to end.

The small thin shell of the small species that lives in Calcutta differs from the others in having the side of the cavity rather produced, like the Limpet above described. They are said to have been obtained in the Botanic Gardens and in the ditches near the city; but it is not stated if they live on stones, or if they live on the stems of the plants; if the latter, that may explain the peculiarity of their form.

The following species probably belong to this or the following genus; but their opercula have not been observed or kept:—

1. NAVICELLA ENTRECASTEAUXII, Récluz, Rev. Zool. 1841, p. 380; Reeve, t. 8. f. 32.

Hab. Australia, Point Entrecasteaux, King George's Harbour.

2. NAVICELLA ORIENTALIS, Reeve, Icon. t. 8. f. 33.

Navicella cærulescens, Reeve, Icon. t. 7. f. 29.

Hab. India: Calcutta, in the Botanic Gardens (on plants?).

3. NAVICELLA EXIMIA, Reeve, Icon. t. 6. f. 26.

Navicella reticulata, Reeve, Icon. t. 5. f. 20.

Hab. Ceylon (*F. Layard*).

Tribe III. ORTHOPOMINA. *Operculum oblong, rather elongate; horny (true) operculum triangular, rather oblique as regards the axis of the horny plate; shelly plate half oblong, rather narrowed above and rounded at the upper edge, with a very slight fold diverging from the nucleus to the left upper margin; the anterior cartilaginous flap large, broad (Figs. 4a, 4b).*

Fig. 4a.

Fig. 4b.



Fig. 4a. Outer surface. Fig. 4b. Inner surface.

ORTHOPOMA, n. g.

Shell —?

This form is described from a single operculum which was found separated from the shells in the drawer of *Navicella* in Mr. Cuming's collection. I have no doubt it belongs to some shell in the collection, and most likely one named and figured by Mr. Reeve.

Mr. Cuming, fortunately, in some instances attached an operculum

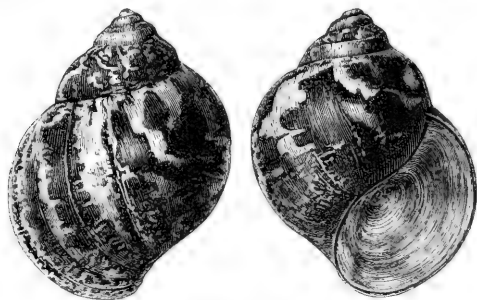
(and sometimes two or three) to the cavity of one or more shells of a species, so that there is no doubt of the operculum belonging to that species; but in general, as he kept his shells lying loose on cotton-wool, so he placed the opercula on the cotton-wool under the shells to which they belonged. Unfortunately, under these circumstances, an operculum becomes easily separated from its shell, as must have occurred in this case. Sometimes he preserved more opercula than specimens of the shell; but in this case there is only one operculum of the form in the drawer. The operculum is no accidental variation of either of the other forms; it is destitute of the two diverging rays which are so characteristic of each of them. In the angularity of the lower edge, compared with the rest of the shelly plate, it is between the two forms before described. In its very wide cartilaginous flap it is like the second form, or that of the genus *Stenopoma*.

9. Description of *Saulea*, a New Genus of *Ampullariade* from Sierra Leone. By DR. J. E. GRAY, F.R.S., V.P.Z.S., &c.

The British Museum has received a specimen of *Ampullaria* from Sherboro, near Sierra Leone, where it was collected. It differs from all the species of the family in being beautifully variegated, and more like a terrestrial *Bulinus* than a freshwater shell. It is, at the same time, peculiar for the thinness of the shell and operculum, these not being thicker than thin writing-paper.

The regularity of the colouring shows that it is not an accidental variation, but a normal state of the species.

The species is also well marked by its form, having a more produced conical spire than most of the species of the genus, and the upper whorls of the spire are peculiar for being obscurely keeled. The keel gradually becomes less visible, and the later ones regularly rounded.



Saulea vitrea.

SAULEA.

Shell ovate, subglobose, very thin, parchment-like, elastic, dark-coloured, covered with a very thin, hard, olive periostraca. Spire

conical, whorls rapidly enlarging; upper whorls minutely keeled, the others rounded; axis imperforate. Aperture ovate, periostraca thin. Opercles ovate, size of the aperture, shelly, thin, elastic like the shell, concentrically striated externally, nucleus near the margin of the middle of the columella side.

Hab. Africa.

This shell differs from all the other *Ampulariadae* in its extreme thinness and elasticity, in the keeled upper whorls, and in the surface being variegated. The substance of the shell contains so much animal matter that when bruised a depression, and not a hole, is formed in the surface.

I have named this genus of beautiful shells after my friend Miss J. Saul, who has the finest private collection of shells in the country.

SAULEA VITREA.

Shell ovate, subglobose, very thin and light, smooth, blackish brown, variegated with bright yellow blotches from interrupted flexuous transverse bands; spire conical, about two-thirds the length of the aperture; apex rounded; upper whorls obscurely keeled; last whorls regularly rounded; axis imperforate; peristome thin; operculum shelly, very thin, with the nucleus near the middle of the inner or columellar margin.

Helix vitrea, Born, Mus. 383, t. 15. f. 15, 16; Chemn. xi. 282, t. 210. f. 2072, 2073.

Ampullaria vitrea, Reeve, Conch. Icon. f.

Hab. River Sherboro, Sierra Leone.

B.M.

10. Observations on Dr. Bowerbank's Paper on *Hyalonema lusitanicum*. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

Dr. Bowerbank read a paper at the Society's Meeting on the 28th of November in which he concludes, "from microscopical examination, that *Hyalonema lusitanicum*, which has lately been elevated to the rank of a genus by Dr. Gray, and proposed to be called *Hyalothrix*, is not even specifically distinct from *H. mirabile* of Japan."

When Dr. Bowerbank prepared and read that paper, he had not seen, much less microscopically examined, the specimen on which my genus *Hyalothrix* was established, which is the only specimen of *Hyalonema lusitanicum* in this country.

It appears that he had examined a part of the sponge that was found attached to one out of the twelve specimens of this coral that M. Bocage had obtained. Finding that sponge very similar to that attached to the Japanese *Hyalonema*, he pronounced the two corals to be of the same species.

Admitting that the sponge, the twisted axis, and the polypes are one sponge, which Dr. Bowerbank believes, though it is against the universal opinion of all other zoologists, it surely is a very rash

proceeding to pronounce that the specimens from Lisbon and from Japan are the same, after simply examining and comparing one part of the specimens, viz. the sponges attached to their bases, more especially since M. Bocage has shown that the spicules of which the rope-like axis is formed, and the palythoid animal on the bark, are differently constructed.

It is to be observed that my genus *Hyalothrix* was established on characters quite independent of the sponge examined by Dr. Bowerbank; for at the time it was proposed no specimen of the coral with a sponge attached to it had been obtained; and the similarity or non-similarity of the sponge of the Portuguese and Japanese specimens can have no influence on the generic or specific characters of the two corals, part of the characters being the difference in the number and disposition of the tentacles (that Dr. Bowerbank will not see), characters sufficient to separate the animal into genera, whether the animal is a parasitic *Palythoa*, or is the animal that forms the rope-like siliceous axis. They are characters observed not by me, but by M. Bocage; so that, in fact, Dr. Bowerbank's attempt, in which he says "he has smashed me," does not bear very heavy on my head.

I have seen *Palythoa* affixed on shells containing Bernhard Crabs, from several localities at a distance from each other; I have never seen these *Palythoa* on any other habitat. No one can believe that the three were one animal, as is Mr. Bowerbank's theory with regard to *Hyalonema*.

The *Palythoa*, the shell, and the Bernhard Crab (*Pagurus*) from each locality are peculiar, and always of the same species—the shell, crab, and *Palythoa* being the species peculiar to the locality, viz. Great Britain, United States, Sierra Leone, and Australia; so that the fact of animals living in the same communities and circumstances in different countries is no proof they are of the same species.

Dr. Bowerbank, when he came to see the specimen of *Hyalonema lusitanicum* the day after the paper was read, observed that he had not been able to find one kind of spicula in the Portuguese sponge that is found in the Japan one; so that probably the result of Dr. Bowerbank's paper will be to show that there are two species of sponges belonging to the genus *Carteria*, one Portuguese and the other Japanese, instead of proving that the Japanese and Portuguese *Hyalonema* are of one species. That is, if we can place reliance in Dr. Bowerbank's microscopical examinations; for, as, when he heard that a sponge had been found attached to one of the Portuguese specimens, he had predicted that it would be found to be the same as the Japanese one, he is as desirous to find that it is so, for fear he may lose his character as a prophet, as he is not to see the tentacles and gonidia in the animal of *Hyalonema*, which, therefore, he does not see! though Brandt, Schultze, and Bocage have seen, described, and figured them, and many other microscopical observers have seen them at the late soirée of the Microscopical Society. Such capricious faculties of seeing and not seeing make one lose one's faith in Dr. Bowerbank's later observations.

Mr. Lee has kindly shown me the specimen of *Hyalonema sie-*

boldii on which Dr. Bowerbank made his observations, stating that the bark was smooth and the polypes of an oblong form as in *H. lusitanicum*. It is simply a specimen of the Japanese coral from which the bark has been stripped off, and then again artificially attached to the axis, the bark having lost its external granular coat in the process, so that only the smooth inner layer of the bark is shown. The external form of the polypes has been altered in the manipulation; and I am convinced, from the irregular form that they exhibit, that if the specimen were soaked in water the animal would assume its regular circular form, and be exactly like the animal of the other Japanese specimen. I have seen some others similarly artificially altered. They are very unlike the close, regular, oblong-shaped animal of *H. lusitanicum*; and I am convinced that if Dr. Bowerbank had seen the type specimen of the latter before he wrote his paper he would not have made such a mistake.

11. Observations on the Preserved Specimens and Skeletons of the *Rhinocerotidæ* in the Collection of the British Museum and Royal College of Surgeons, including the Descriptions of Three New Species. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

The *Rhinoceroles* of Asia and Africa are known by the conformation of their jaws. The African species are easily distinguished by the form of the head and of their nose-horns. The species of Asia, on the other hand, are very difficult to separate from each other by any external character, and are only to be characterized by the form of their skulls and the locality which they inhabit, each zoological district having a peculiar species; and very probably there are yet species to be described, as the Rhinoceroses of China, of Beloochistan, and other countries have not been examined by zoologists.

The British Museum contains a good series of preserved specimens of this family, and a large series of skeletons, skulls, and horns; and there is also a very rich collection of skulls from different localities in the Museum of the Royal College of Surgeons,—the two collections affording good materials for the revision of the species of this group. I have to thank the Council of the College of Surgeons, and Mr. Flower, the energetic Curator of their Museum, for their kindness in allowing me to examine the skulls in their collection.

In the British Museum there are specimens of five species, viz. one *R. unicornis* and two *R. javanicus* from Asia, and four specimens from Africa (viz. two *R. bicornis*, one *R. simus*, and one *R. keitloa*), the three latter species being the animals that were collected and preserved under the superintendence of Sir Andrew Smith.

The Indian species (*R. unicornis*) has been often figured from life, amongst others by Dr. Parsons, in the 'Phil. Trans.' 1742, 1743, t. 1, 2; *R. sumatranus* by Mr. Bell from life in the 'Philoso-

phical Transactions;’ and *R. javanicus*, by Dr. Horsfield; and the two latter also by Solomon Müller, in his ‘Verhandlung,’ who gives good figures of the adult and young.

Three African species have been well figured by Dr. Andrew Smith, in his ‘Illustrations of the Animals of South Africa,’ and two of them by Capt. Cornwallis Harris, in his ‘Portraits of the Wild Animals of South Africa,’ t. 16 & 19; so that the external appearances of these animals are well known.

The osteology of the species has been well represented by Camper, by Pallas (in ‘Nov. Com. Petrop.’ 1777), by Cuvier (in the second volume of his ‘Ossements Fossiles’), and further illustrated in De Blainville’s valuable ‘Ostéographie.’

In the British Museum there are three skeletons and ten skulls of the Asiatic species, and four skulls of the African *Rhinoceros*.

The osteological collection in the British Museum is quite a modern creation, and has been made under great difficulties and with very limited funds. The Trustees at first objected to have any skulls or other bones; but it was proved to them that mammalia and other vertebrates could not be studied without a collection of skulls. The fact was, one of the Trustees, Sir R. Inglis, was also a Trustee of the Hunterian Collection (certainly offices that are not incompatible with each other; for my uncle, Dr. E. W. Gray, one of my predecessors in my present office, was, on the purchase of the Hunterian Collection, named one of the Trustees); and he stated to me that he was urged to prevent the collection of osteological specimens in the British Museum, as being a rival and injurious to the collection at the College of Surgeons. The difficulty was to a great extent removed when Mr. Bryan Hodgson offered the Museum his very large collections of skins and skeletons from the Himalayas, which were to be accepted together or declined together. Since that time the collection has rapidly increased, and, though it was much depreciated by Professor Owen in his evidence before the Royal Commissioners on the affairs of the British Museum, was then, and I believe is now, the best-determined and largest osteological collection in Europe. As to the rivalry, if any exists, it is to the benefit of both collections, for it is conducive to the activity of the Curator of each; but I have always felt, and the present Curator of the Museum of the College of Surgeons believes, that they are able greatly to assist each other. I only know that I take almost as much interest in the collection of the College as in that under my own care.

In the British Museum there is a skull belonging to the Indian one-horned type; it is the skull of a young animal with premolars of the milk series and the first permanent grinder appearing. It is considerably larger than the skulls of the Indian species of the same age, and therefore indicates a species fully as large as that animal. The skull is so different from that species in its compressed form and proportion that there can be no doubt that it belongs to a very distinct species, which has not before been observed. There are also two skulls from Borneo, which belong to a distinct and hitherto undescribed species.

The Museum of the College of Surgeons contains two skeletons and thirteen skulls of the Asiatic and three skulls of the African *Rhinocerotēs*. One of these skulls is very interesting; it belongs to the one-horned Indian group, and is much like that of *R. unicornis* in general characters. It is an adult skull, with all the permanent teeth; and it is so much smaller than the skull of the adult or even a half-grown animal of that species, that it indicates an animal not more than half, or perhaps one-third, of the size of the common Indian *Rhinoceros*.

There are generally one or more skulls of the animals of the genus to be seen in the larger local museums, as, for example, at Manchester, Leeds, and York. If these skulls could be collected together and compared, they would form a most interesting collection for study; unfortunately they are generally without any certain history as to habitat &c.

Cuvier, in his essay above quoted, has given an excellent *résumé* of the history of the former knowledge of the animals; and I have only to observe that he did not discover that the skull figured by Camper, which he copied (t. 2. f. 7) and regarded as the skull of the adult *Rhinoceros bicornis*, is the skull of the *Rhinoceros keitloa*. He mentions *R. sinus* as a distinct species, from M. de Blainville's note on the animal (from Mr. Burchell's MS.) in the 'Journal de Physique.'

The horns of these animals attracted the attention of Dr. Parsons, who figured several of them in a paper in the 'Philosophical Transactions' for 1742 and 1743, among the rest the horns of some African species, which have, since Cuvier's time, been determined, chiefly by the form of the horn, to be distinct species. Some of these horns are still in the British Museum.

t. 3. f. 4, 5. *Rhinoceros bicornis*, in B. M.

t. 3. f. 6. *Rhinoceros sinus*, in B. M.

t. 3. f. 7. *Rhinoceros oswellii*, in B. M.

t. 3. f. 8, 9. *Rhinoceros keitloa*?

In the British Museum and in the Museum of the College of Surgeons there is a large series of the horns of both the Asiatic and African species.

Fam. 3. RHINOCEROTIDÆ.

Nose simple. Upper lip subprehensile, with one or two horns on the central line. Toes three or five, united into a broad clavate foot, each with a separate broad nail-like hoof. Teeth:—Incisors variable or wanting, C. $\frac{1-1}{0-0}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$, = 28. Molar teeth with distinct roots.

Rhinocérina, Gray, Ann. Phil. 1825; Cat. Mamm. B. M. 186.

Rhinocerotēn, Giebel, Säugeth. 191.

Rhinocerotidæ, Owen, Odont. 587; Schinz, Syn. Mamm. ii. 332, 1845.

Rhinocerotina, Bonap. Prodr. Mast. 11.

Rhinocerosidæ, Lesson, N. Tab. R. A. 1858.

SYNOPSIS OF THE GENERA.

I. *The skin divided into shields by well-marked folds. Skull with the intermaxillary free, elongate; upper cutting-teeth long; nasal bones produced, conical. Asiatic Rhinocerotæ.*

1. RHINOCEROS. Horn single, anterior. Lumbar- and neck-folds of the skin well developed. Part of the occipital bone, near the occipital condyle, and the condyles themselves prominent.
2. CERATORHINUS. Horns two, one behind the other. Lumbar and neck-folds of the skin rudimentary. Occipital end of the skull flat. Condyle not prominent.

II. *Skin uniform, not divided into shields. Horns two. Skull:—internasal cartilaginous; intermaxillary free, very small; upper cutting-teeth none; nasal bones broad, rounded. African Rhinocerotæ.*

3. RHINASTER. Head short, compressed; upper lip with a central prominence. Skull short behind; occiput erect; nasal bones rounded in front; lower jaw thick in front; grinders small, in arched series.
4. CERATOTHERIUM. Head elongate, truncated; upper lip square. Skull elongate and produced behind; occiput erect, produced above; nasal bones broad, convex, truncated, and sharp-edged in front; lower jaw tapering in front; grinders large, in straight lines.

III. *Skin uniform, not divided into shields. Horn single. Skull:—internasal bony; nasal, internasal, and intermaxillary all united into one mass. Asia and Europe.*

5. CÆLODONTA.

- I. *THE ASIATIC RHINOCEROTES. Skin divided into shields, separated by distinct folds. Nose-horn single, or with a small second hinder one; nasal bones produced, conical, acute; internasals cartilaginous; intermaxillary well developed, free; upper cutting-teeth two, compressed, well developed. Lower jaw attenuated in front, with a straight lower edge. Teeth*
 $34 : - I. \frac{1-1}{2-2}. C. \frac{0-0}{0-0}. P.M. \frac{4-4}{4-4}. M. \frac{3-3}{3-3}.$

Rhinoceros § 2, Giebel, 205.

Rhinoceros, Gray, List of Mamm. B. M. 1840.

Rhinoceros munis de dents incisives, Cuvier, Oss. Foss. ii. 89.

The British Museum has a series of skulls of the four Asiatic species, showing the form of the skull in the different ages of the animal, from the just born to the adult or senile state.

There is a considerable difference in the form of the skull between the species which has one and that which has two horns, especially in the form of the occipital end of the skull and in the size of the occipital condyles. The difference is well represented in Bell's figure of the skull of the Sumatran animal.

I at first had a difficulty in distinguishing the difference between the skulls of the Javan and Sumatran species; but this arose from the British Museum having received from the Leyden Museum, through M. Franks, a skeleton of the *Javan* species under the name of *R. sumatranus*. But when I received a skull of the two-horned species from Pegu, the mistake in the name of the skeleton was soon discovered.

Some of the specimens of skulls of *R. unicornis* and *R. javanicus* in the British Museum have the foramen in the front of the eye over the front and others over the hinder edge of the second premolar. In both the specimens of *R. sumatranus* it is over the back edge of the first premolar.

The first premolar in the three adult specimens of *R. unicornis* is smaller than the same tooth in *R. javanicus*, and appears to be earlier shed; for in two of the skulls it has entirely disappeared with the alveolus that contained it, and in the other one the tooth is there, but it is nearly rootless and the alveolus is nearly absorbed.

The two large lateral lower cutting-teeth have a sharply keeled inner edge; but the teeth often wear almost entirely away, so that this form is lost.

The grinders of the milk or first series have much larger and more equal folds on the outer side than those of the permanent set; in the latter the front fold is linear and near the front margin of the tooth.

The teeth in some specimens appear to be rather smaller than in others, but there is a difference in the comparative size of the teeth with regard to each other in the series.

The presence or absence of small central lower incisor-teeth seems to be liable to considerable variation. In one adult skull from India there are two incisor-teeth; and in another there are two holes, but they are crowded together and are closing up.

In three specimens of *R. javanicus* there are no central lower incisor teeth, nor space for them; between the two large ones in the two other skulls, which are from younger animals, the central lower incisor teeth are well developed and cylindrical, being much the largest in the smaller and younger specimen.

The lachrymal bone varies in the different species, and is very characteristic. In *R. javanicus* and *R. nasalis* it is large, roundish, nearly as wide as high. In *R. unicornis* and *R. stenocephalus* it is narrow, oblong, erect, about twice as high as wide. In *Ceratorhinus sumatranus* it is very large, rather irregular-shaped, forming a considerable part of the cheeks of the skull. It differs a little in size and form in the specimens of the same species, but retains its general and distinctive forms.

There is a considerable variation in the size and form of the cavity under the zygomatic arch in the skulls that appear to belong to the same species. Thus in the four specimens of *R. unicornis*, which are nearly adult, two of them have the cavity short and broad, and two long and narrow. The same may be observed in the skulls of *R. javanicus* and *R. nasalis*. The aperture is widest, compared with its length, in the oldest specimens. This may probably be a sexual distinction. One of the skulls with a short wide opening is known

to have belonged to a male. The size and form of the cavity is, no doubt, greatly influenced by the age of the animal. The masseter muscle becomes thicker and shorter as the animal increases in age, the transverse width of the skull under the muscles becoming less as the animal becomes more aged (see some measurements, showing the fact, under *R. javanicus*). The same is shown to be the case in the series of skulls of *R. unicornis*.

Mr. Edward Blyth has published a memoir on the living Asiatic species of Rhinoceros, with figures of some of the skulls in the Museum of the Society, which may be consulted with advantage (see Journal of the Asiatic Society of Bengal, xxxi. 1862, p. 151); but unfortunately I have not had the power of comparing the skulls with those in the London collections:—

Rhinoceros indicus: narrow type of skull, t. 1. f. 1, t. 2. f. 1.

R. sondaicus: broad type of skull, t. 1. f. 2, t. 2. f. 2, from the Bengal Sundarbans, and Tenasserim; t. 1. f. 3, t. 2. f. 3, aged, from Java.

R. sumatranus, t. 3. f. 1, 2, male; t. 3. f. 3, female.

R. sumatranus, Tavoy, t. 4. f. 1-4.

The figures are from photographs, and they show the form of the occiput in the three species, confirming the fact that the occiput of the two-horned species is always flat and erect.

1. RHINOCEROS.

Skin divided into distinct shields by deep folds. Lumbar fold well marked, and extending from the groin to the back. Horn one, short, conical. Upper lip with a central prominence. Skull:—forehead broad, flat, or only slightly rounded; the occipital end shelving from the occipital condyle to the occipital crest; the occipital condyles large, oblong, very prominent; lachrymal bone moderate.

The skulls of the larger number of species of this genus have the forehead and the upper surface of the nose flattened; this is seen in the living animal. But one species, of which there is only a single skull of a young animal in the British Museum, has the forehead and nose subcylindrical (that is, high on the central line and arched on the sides), as is the case with the Sumatran and the African Rhinoceroses. This character, I have no doubt, is equally visible in the living animal.

A. Forehead and nose behind the horn flat.

Nose square on the sides above; nasal short. *R. javanicus*.

Nose shelving on the sides above; upper jaw slightly contracted before the grinders.

Nasal broad, elongate *R. unicornis*.

Nasal narrow, short *R. nasalis*.

Upper jaw much contracted before the grinders; nasal narrow, short *R. floweri*.

B. Forehead and nose subcylindrical, shelving on the sides above; nasal elongate *R. stenocephalus*.

A. *The forehead and the nose behind the base of the horn flat, both in the living animal and skull.* Eurhinoceros.

* *Upper jaw slightly contracted in front of the grinders.*

1. RHINOCEROS JAVANICUS. Javan Rhinoceros. B.M.

Skull broad; forehead behind the horn broad, flat, or slightly concave, obscurely keeled on the sides near base of horn; intermaxillary bone elongate, slender, straight, without any upper process; lachrymal bone roundish, nearly as wide as high; nasal bones not quite two-fifths of the entire length of the nose and crown.

Rhinoceros javanicus, F. Cuv. et Geoff. Mam. Lith.; Gray, Cat. Mamm. B. M.; Solom. Müller, Verh. t. 33, ♂ ♀.

R. javanus, Blainv. Ostéogr. t. 1 (skeleton), t. 2 (skull, adult and jun.), t. 7 (teeth).

R. sondaicus (*R. unicolorne de Java*), Cuvier, Oss. Foss. ii. 33, t. 14. f. 2 (skull), t. 17, 18 (skeleton); Raffles, Trans. Linn. Soc. xiii.; Horsf. Zool. Java, t. (animal); Blyth, Journ. Asiatic Soc. Bengal, xxxi. 1862, p. 151, t. 1. f. 2, 3, t. 2. f. 2, 3 (skull?).

Hab. Java. Skull of type from Mus. Leyden.

In the British Museum there are three skulls belonging to this species:—

1. A skeleton of an adult animal with a skull, purchased from the Leyden Museum, from Java.

2. An adult skull, received from the Zoological Society.

3. A skeleton with the skull of a half-grown animal, received from the Leyden Museum through M. Franks as *R. sumatranus*, from Sumatra. The skull agrees in all particulars, especially in the form of the occiput and the concavity and breadth of the forehead and nose, with the adult skull of *R. javanicus* from Java; so that there must have been some mistake in the name and habitat; perhaps the wrong skeleton was sent.

There is also an adult skull which has had the nasal bone cut off (722 h), which was received from the Zoological Society under the name of *R. unicornis*; but I have little doubt it is a *R. javanicus*, perhaps from Sir Stamford Raffles.

In the oldest skull (723 d) the aperture under the zygoma is 3 inches 7 lines wide in the widest part and 4 inches 9 lines long. In the adult skull 723 a, the aperture is 3 inches wide and 6 inches 1 line long. In the skull of the young specimen (723 e) the aperture is 2 inches 2 lines wide and 4 inches 7 lines long. The greater width is produced by the skull under the zygoma becoming so much narrower as the animal becomes aged. In 723 d this part is only 4 inches 7 lines, and in 723 a it is 5 inches 9 lines wide.

In the Museum of the Royal College of Surgeons there are five skulls that appear to belong to this species, but one or two of them are in a bad condition (nos. 2970 and 2971, the rest are not numbered).

Camper, who paid great attention to this species of Rhinoceros, in a letter to Pallas, printed in the 'Neue Nord. Beyträge' (vii. 249),

first pointed out that there were two Asiatic one-horned Rhinoceroses with upper incisors. His specimen, by the misfortunes of war, fell into the hands of Cuvier, and was described by him in the 'Ossemens Fossiles' (ii. 26). Cuvier regards the height of the occipital arch and the want of the apophysis on the upper edge of the intermaxillary as the chief character of the Javan species; but the apophysis is generally absent in the Indian species, it appears only to be found in the skulls of the very old males of that kind.

2. RHINOCEROS UNICORNIS. Indian Rhinoceros. B.M.

Skull:—forehead broad, flat, concave; nose behind the horn convex, subcylindrical, rounded at the sides; lachrymal oblique, longitudinal, oblong, rather four-sided; intermaxillary bones broad, thick, with a bony process on the middle of the upper edge; nasal bones short, broad, about two-fifths of the entire length of the nose and crown; zygomatic arch of the adult rather convex.

Rhinoceros unicornis, Linn. S. N. i. 104; Gray, List Mamm. B. M. 186; Gerrard, Cat. Bones B. M. 286; Cuvier, Oss. Foss. ii. t. 4. f. 1; Blainv. Ostéog. t. 2 (skull, adult).

R. asiaticus, Blumenb. Handb. 10, Abbild. t. 7 B.

R. indicus, Cuv. Mém. Mus. t. ; Oss. Foss. ii. 5, t. 1-4 (bones); F. Cuv. Mamm. Lithogr. t. ; Schinz, Syn. 333; Owen, Cat. Osteol. R. C. S. 513, nos. 2975 to 3074.

Indian Rhinoceros, Parsons, Phil. Trans. 1742-43, p. 525, t. 1, 2 (from life).

Rhinoceros inermis, Lesson, Cat.

Hab. India.

The skull figured by Cuvier and by De Blainville for the skull of *R. unicornis*, probably from the same skull in the Paris Museum, has a broad bony process on the middle of the upper edge of the intermaxillary bones. The skeleton and skull in the British Museum (722 g), from an adult male specimen that lived for several years in the Zoological Gardens, has this bony process well marked; so that it seems common in the species, if not a peculiar character of it.

Mr. Blyth thinks that "the adult male *Rhinoceros* that lived in the Zoological Gardens for several years, stated to have been captured in *Arakan*, was *R. sondaicus*." He proceeds, "The two Asiatic one-horned species, indeed, resemble each other a great deal more nearly in external appearance than the published figures of them would lead to suppose; certainly no sportsman or ordinary observer would distinguish them apart, unless attention had been specially called to the subject."—*Journ. Asiatic Soc. Bengal*, xxxi. 1862, p. 132. This explains how the species, now described for the first time, may have been overlooked.

In the British Museum there is the skeleton (722 g) with the skull of an adult animal that lived for several years in the Zoological Gardens, referred to by Mr. Blyth, and a skull from a just born animal, which was presented by Mr. Bryan Hodgson from Nepal.

There are in the British Museum other skulls which have been

received from various persons without any special habitat that can be relied on, which appear to belong to this species. They are all without the process on the upper edge of the large thick intermaxillary bones.

1. A fully adult skull (722 *d*), marked "India?".

2. An adult skull (722 *f*) that was purchased of a dealer, without any specified locality.

In the Museum of the Royal College of Surgeons there is the skeleton of an adult animal (no. 2969 *a*) that formerly had the long front horns of an African Elephant placed on its nasal bones, which Mr. Flower, the present Curator, has properly removed.

There are also skulls of half-grown or female animals, with the seventh grinder just showing itself, of this species (nos. 2975, 2976), with a large oblong erect lachrymal.

All these skulls have thick intermaxillaries, and the front of the upper jaw, at the base of the intermaxillaries, is not suddenly contracted. In the three adult skulls it is 3 inches 9 lines wide; in the younger skull in the College of Surgeons (no. 2975) it is 3 inches 3 lines. The width of the diastema between the cutting-teeth and the front premolar is 2 inches 6 lines in all the specimens.

There is a stuffed specimen and a mounted skeleton of a young animal, just showing the horn, in the Free Museum at Liverpool, and the skull of a second of the same age. These two animals died on the voyage from Calcutta to Liverpool, were named *R. sondaicus* by Mr. Blyth, and preserved by Mr. Moore, the energetic Curator of that Museum. Mr. Blyth informs me there is a skeleton of *R. sondaicus* in the Anatomical Museum of Guy's Hospital, called *R. indicus*.

The Indian Rhinoceroses are long-lived. Mr. Blyth speaks of a pair that lived about forty-five years in captivity in Barrackpoore park: they were exactly alike in size and general appearance; they never bred; there is no difference in the horns or form of the skulls in the two sexes (Blyth, J. A. S. B. xxxi. 155).

The fœtal skull of *R. unicornis* (no. 722 *D*) in the British Museum, received from Mr. Bryan Hodgson, is short; the brain-case is oblong, ovate, swollen, and convex behind; the nasal bones are about as long as they are broad at the hinder edge, transversely convex above in the middle of their length and in the deep central groove in front above; the nasal cavity is long, high, and wide; the nasal bones are three-eighths of the entire length to the occipital crest; the length of the skull from the nasal to the front of the orbit is two-fifths of the entire length to the occipital condyles. The intermaxillaries are well developed, rather thick and short; they each bear two blunt teeth, scarcely raised above the alveolus, the first on each side is much larger and thicker than the hinder one, which is small and conical. There are three grinders developed on each side, the second and third being rather more developed than the small front one. There appears to have been a fourth tooth on each side more or less developed; but it and the cavity have been lost. The palate is narrow and deeply concave, nearly of equal width, but the sides are less

erect and more expanded behind than in front; the front edge of the hinder nasal aperture is narrow, and rather in front of a line even with the hinder edge of the third grinder; the length of the palate from the front edge of the intermaxillaries is rather longer than from the end of the palate to the suture between the basal sphenoid and the basal occipital bone. The vomer is compressed, and forms a well-marked broad ridge, which is much higher in front, and divides the internal nostrils. The lower jaw has the incisors just developed, and slightly projecting beyond the alveolus; they are oblong, with a rather sharp edge on each side. There are cavities for four grinders on each side; the small first ones are lost; the second and third are equally developed, just projecting and with smooth enamel edges; and the fourth are being developed, the crown being sunk rather below the alveolar edge.

Rhinoceros cucullatus (Wagner, Schreb. Säugeth. vi. 317; Giebel, Säugeth. 202), described from a specimen in the Munich Museum, appears to be only a specimen of *R. unicornis*, with a second horn added by the preserver.

3. RHINOCEROS NASALIS. (Figs. 1, 2.)

B.M.

Skull elongate, the forehead and nose flat above, nose rounded on the sides in front; the nasal bones narrow, tapering, short, about two-fifths of the entire length of the skull from the nasal to the occipital crest; the zygomatic arch flat; lachrymal bone narrow, oblong, erect; the upper jaw only slightly contracted in front of the grinders ($3\frac{1}{4}$ inches wide).

Hab. Borneo.

There are two not quite adult skulls in the British Museum (nos. 723*b* and 723*c*) which appear to belong to this species. They slightly differ from each other; but this may be sexual. They agree with *R. unicornis* in the flatness of the crown, forehead, and nose, and in the nose being rounded on the sides, and also in the slight contraction of the upper jaw in front of the grinders, and in the comparative flatness of the zygomatic arch. They chiefly differ from the skull of that species of the same age,—1, in the greater length of the skull; 2, in the breadth and flatness of the forehead; 3, in the line of the forehead not being so concave; 4, in the comparative slenderness and shortness of the nasal bones, they are only two-fifths of the entire length of the skull from the end of the nasal to the occipital crest, while in the skull of *R. unicornis*, nearly of the same age, in the College of Surgeons (no. 2975) the nasal bones are at least four-ninths of the entire length. The nasal bones are narrower and more tapering, being about once and one-half the length of the breadth of the base. The upper jaw behind the internasal is only slightly contracted. They are at once known from *R. javanicus* by the greater length and narrowness of the skull, and the rounded form of the upper part of the nose, but they agree with the non-adult skull of that species in the shortness of the nasal bones.

The two specimens rather vary from each other in the width of the nasal. 723*b* is a not quite adult animal; it is just showing

Fig. 1.

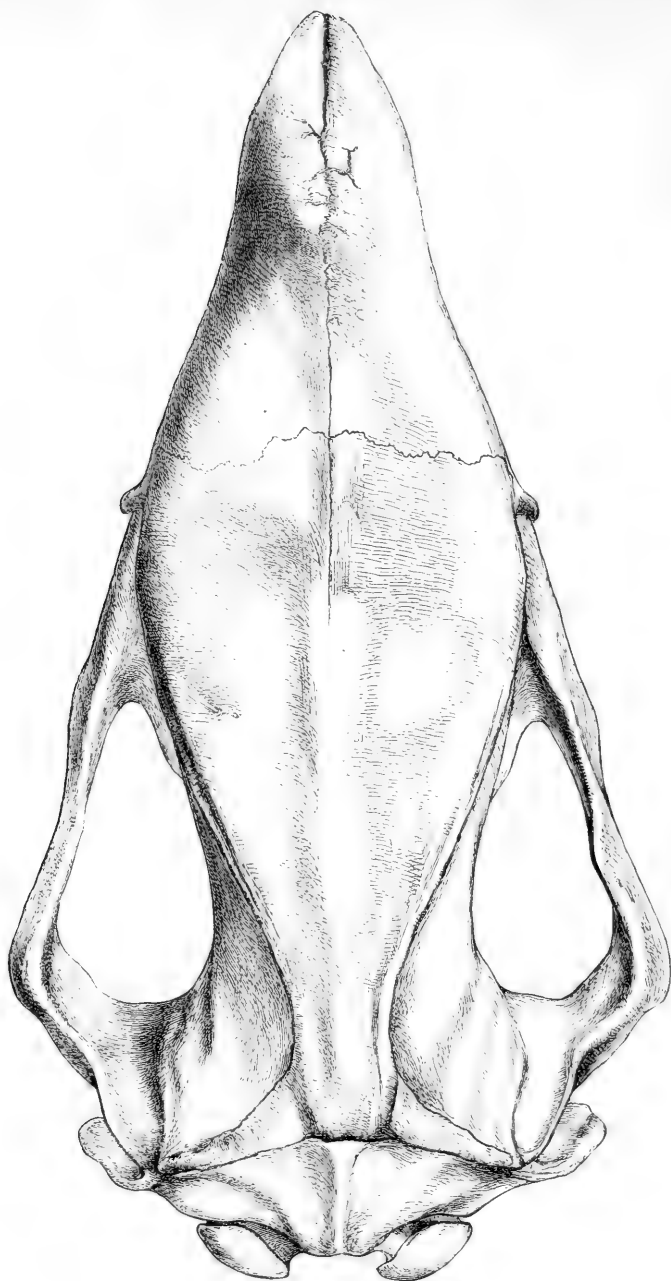
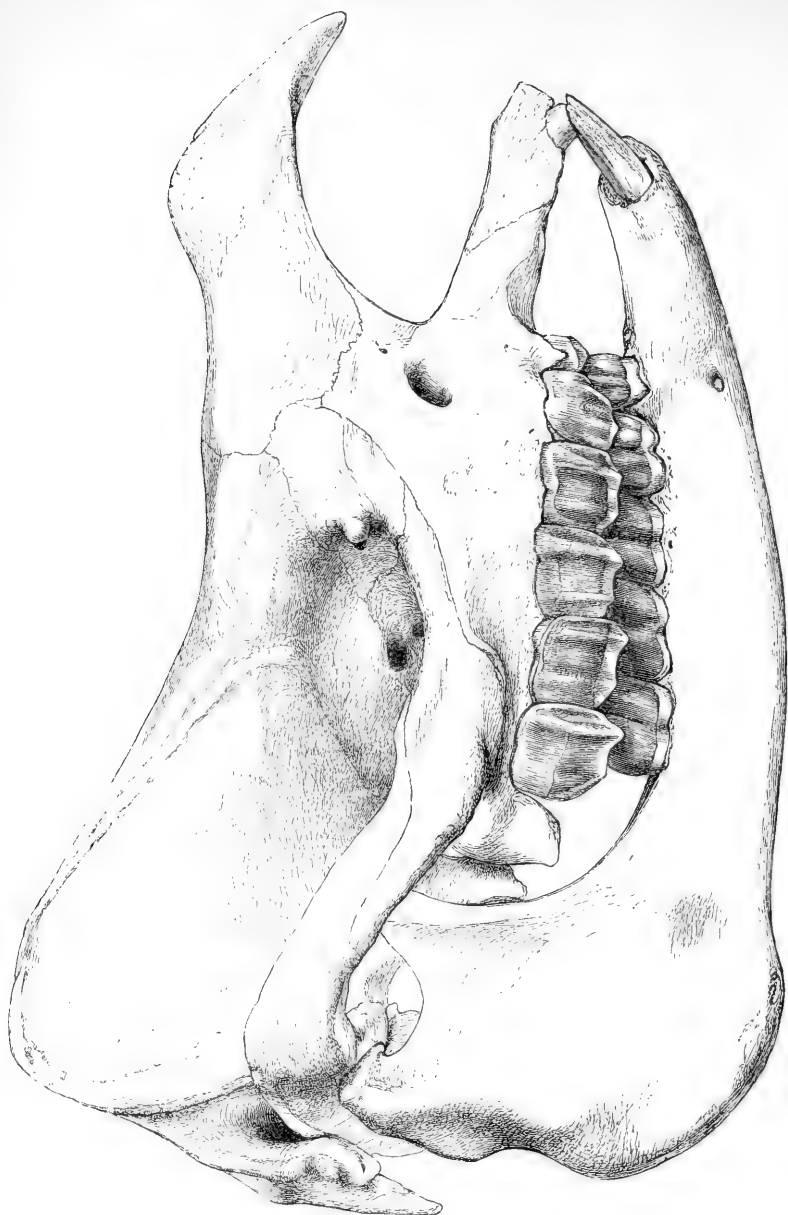
Skull of *Rhinoceros nasalis*.

Fig. 2.

Skull of *Rhinoceros nasalis*.

the last or seventh grinder, but it wants the intermaxillaries. It was purchased of a dealer, and has been marked "*R. sondaicus*, Cuvier, Java," by some previous possessor. The habitat may depend on the person having decided it to be *R. sondaicus*. The skull differs from 723c in the nasal being broader and more gradually tapering.

723c is nearly in the same state of dentition, as the seventh molar is just appearing. This was purchased of a dealer, who said that he received it direct from Borneo. The forehead, nose, and especially the nasal bones are narrower than in the preceding.

These skulls, from their size, indicate a species about the size or rather smaller than *R. unicornis*.

** *Upper jaw much contracted and very narrow in front of the grinders.*

4. RHINOCEROS FLOWERI. (Figs. 3, 4.)

Skull:—the forehead and nose flat above, the nose rounded on the sides in front; the nasal bones very slender, rather more than two-fifths of the entire length of the nose and crown; the zygomatic arch convex, arched outwards, having a very large roundish cavity for the temporal muscles; lachrymal bone elongate, expanded on the cheeks; the upper jaw suddenly contracted and very narrow (only $2\frac{1}{2}$ inches wide) in front of the grinders; the diastema very long, longer than in the adult *R. unicornis*, being $2\frac{3}{4}$ inches long.

Rhinoceros sumatrensis, Owen, Cat. Osteol. Prep. Mus. Coll. Surg. 506, no. 2934.

Tennu, Raffles, Linn. Trans. xiii. 164.

Hab. Sumatra (*Raffles*). Skull, Mus. Coll. Surgeons, no. 2934.

A skull of this species is in the Museum of the Royal College of Surgeons, described by Professor Owen as above cited, who calls it the cranium of a male Sumatran Rhinoceros (presented by Sir Stamford Raffles, P.Z.S.), observing that "the cranium offers no indication of the short hinder horn of this two-horned species." It is so distinct in form and size that I have no doubt of its belonging to a most distinct species. I propose to designate it after the energetic Curator of the Museum of the College of Surgeons, who in the few years that he has had charge of the collection has wonderfully improved it and increased its usefulness, not only to the zoological student, but for professional studies.

The skull is at once known from all the others I have examined by the convex prominent form of the zygomatics, and the contraction of the front of the upper jaw behind the cutting-teeth. It indicates a small species, not more than half the size of the common Indian Rhinoceros (*R. unicornis*).

The skull no. 2934 is that of an adult animal with all its permanent teeth. It was named *R. sumatrensis* by Professor Owen: but it certainly is not a skull of that species; for the occipital end of the skull is projected and the condyle produced, and, though the skull is that of an adult animal, there is no mark of the root of the second

Fig. 3.

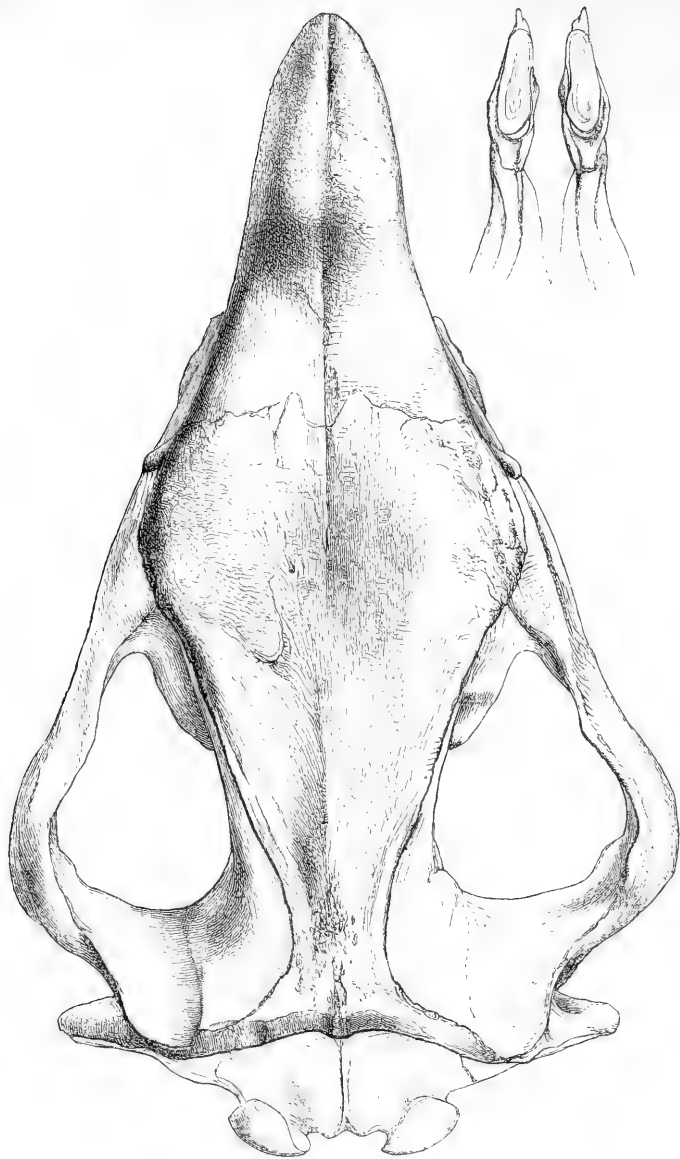
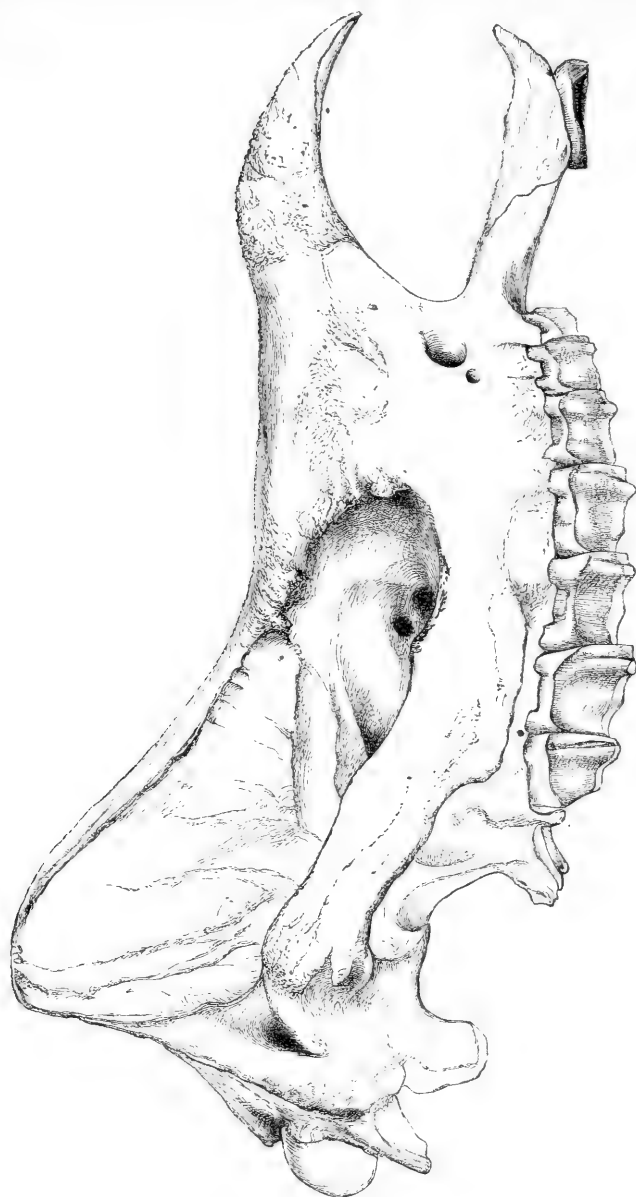
Skull of *Rhinoceros floweri*.

Fig. 4.

*Rhinoceros floweri.*

PROC. ZOOLOG. SOC.—1867, No. LXV.

horn, which is always well marked in the adult skull of that species. It is also distinguished from that species, as it is from *R. unicornis* and *R. javanicus*, by the convexity of the zygomatic arch and the size of the cavity for the temporal muscles.

It has been suggested that this skull may have belonged to an Indian Rhinoceros that had been kept in a menagerie, and so very poorly fed that it never arrived at its full growth. The skull shows no sign of disease of any kind; the teeth are well worn down, as if it had had abundant food. Starvation is not likely to produce any such change in the proportions of the parts as this skull presents, when it is compared with the skull of the adult *R. unicornis*, or even when compared with the skull of a young *R. unicornis* of nearly the same size. Starvation is not likely to have decreased the growth, and at the same time to have extended the size and thickness of the temporal muscles, which is so characteristic of this interesting species.

This skull having formed part of the collection of Sir Stamford Raffles renders it probable that the animal was a native of Sumatra. Sir Stamford had in his collection a few specimens from other localities—some obtained from Singapore, that being the general entrepot for the productions of the Malay peninsula and islands. There being in this collection only the upper jaw preserved, goes far to prove that it is not the skull of a menagerie specimen as has been suggested.

The skull has no character in common with the species to which Professor Owen has referred it, except its small size and probable habitat. It is to be regretted that, as well as writing a technical description of it, describing what every one can see in the specimen, he did not give more particulars of its history, and show by comparison the peculiarity of the skull as compared with others in the collection; but this would have required careful study. The want of more accurate details of the origin and history of the specimens is the general defect of this series of catalogues.

Sir Stamford Raffles observes, "There is another animal in the forests of Sumatra never yet noticed, which in size and character nearly resembles the Rhinoceros, and which is said to bear a single horn. The animal is distinguished by having a narrow whitish belt encircling the body, and is known to the natives of the interior by the name of *Tennu*. It has been seen at several places; and, the description given of it by several persons unconnected with each other corresponding generally, no doubt can be entertained of the existence of such an animal" (see Linn. Trans. xiii. 269; Blyth, l. c. 164). I have little doubt that the skull here described is that of the *Tennu*.

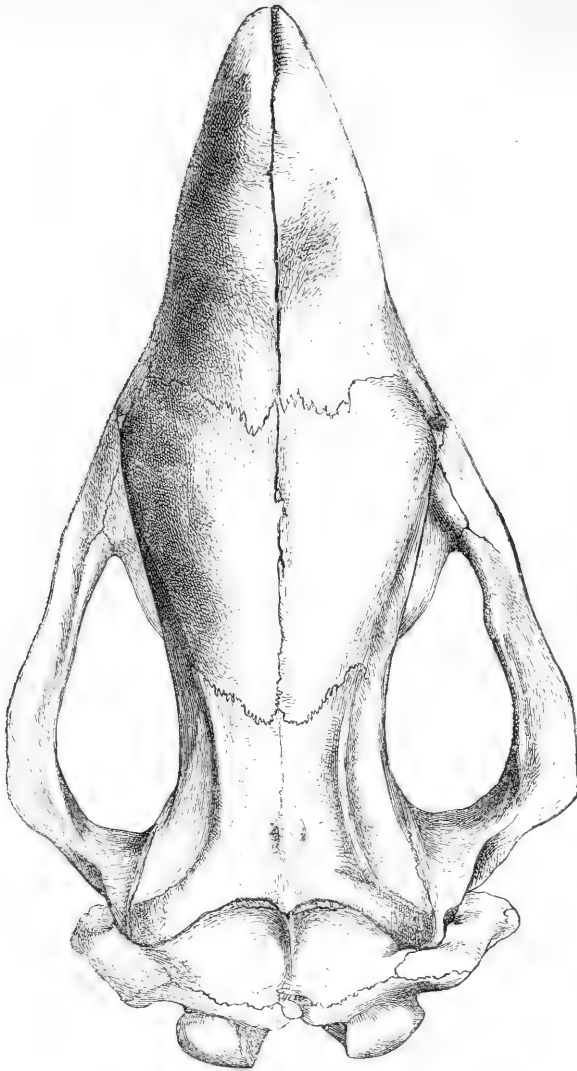
B. *The forehead and nose subcylindrical, rounded on the sides.*
Rhinoceros.

5. RHINOCEROS STENOCEPHALUS.

B.M.

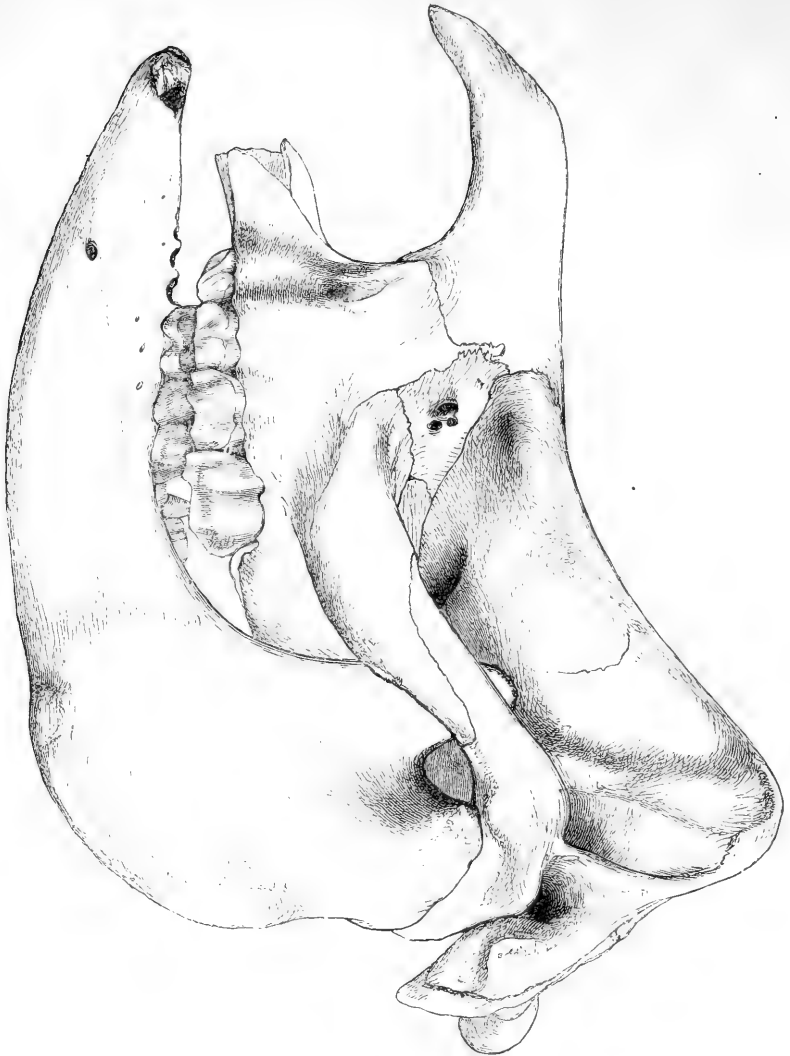
Skull (half-grown) like that of *R. unicornis* of the same age, but

Fig. 5.

*Rhinoceros stenocephalus.*

narrower and compressed : the forehead is narrow and subcylindrical ; the nose much narrower and more slender ; the nose is semicylindrical at the base of the horn ; the nasal bones narrow, gradually tapering in front, more than twice the length of the width at the base of the

Fig. 6.

*Rhinoceros stenocephalus.*

nasal, more than four-fifths of the length of the forehead from the internasal suture to the occipital crest; lachrymal narrow, oblong, erect, about twice as high as wide.

Hab. Asia.

There is a single skull of a half-grown animal of this species in the British Museum (722 e), which was received from the Zoological Society, without any special habitat. In the roundness of the nose it shows some affinity to the skull of *R. sumatrensis*; it is different from that species in many particulars, in the prominence of the occipital portion of the skull, and especially of the occipital condyles. When placed by the side of a *R. unicornis* of the same size and condition of teeth it stands rather higher, and is immediately known by the length and slenderness of the nose and nasal bones.

The following fossil species probably belong to this genus:—

1. RHINOCEROS LEPTORHINUS, Cuvier, Oss. Foss. ii. 71, t. 9, 10, 11; Blainv. Ostéogr. t.

Rhinoceros cuvieri, Desm. Mamm. 402.

Hab. Fossil.

2. RHINOCEROS INCISIVUS, Cuvier, Oss. Foss. ii. 89, t. 6. f. 9, 10; Blainv. Ostéogr. 1.

Hab. —?

Cuvier (Oss. Foss. ii. 71, t. 9. f. 7) figures a fossil skull of a species of this genus from a drawing made at Milan by M. Adolphe Brongniart. See also an imperfect skull figured by Blainville (Ostéographie, t. 14, figure at left upper corner of the plate).

2. CERATORHINUS.

Skin divided into shields by deep folds, the lumbar fold rudimentary, short, only occupying the middle of the space between the groin and the back. Horns two: front longer, curved backwards; hinder small, conical. Skull:—forehead narrow, flat; the upper part of the nose on each side of the horns narrow, rounded, subcylindrical; the occipital region erect, the part near the condyles rather concave, the occipital condyle short, broad, oblong, placed obliquely inferior, scarcely prominent; lachrymal bone very large, irregular-shaped.

1. CERATORHINUS SUMATRANUS.

B.M.

R. bicorné de Sumatra, Cuvier, Oss. Foss. ii. 27, t. 4, iii. 42, t. 78. f. 8 (from Bell, skull).

Rhinoceros sumatrensis, Cuvier; Blainv. Ostéogr. t. 2 (skull ♀), t. 7 (teeth).

Rhinocéros de Java, F. Cuvier, Mam. Lithog. t. (not good).

Sumatran Rhinoceros, W. Bell, Phil. Trans. 1793, p. 3, t. 2, 3, 4; Home, Phil. Trans. 1821, p. 270, t. 21, 22.

Rhinoceros sumatranus, Raffles, Linn. Trans. xiii. 268; Blainv. Ostéogr. t. (skull); Gerrard, Cat. Bones B. M. 282; Müller, Verhand. t. 35 (old and young); Blyth, P. Z. S. 1861, p. 306, 1862, p. 1; Journ. Asiat. Soc. Bengal, xxxi. 1862, p. 151, t. 3. f. 1, 2, 3.

Rhinoceros crossii, Gray, P. Z. S. 1854, p. 270 fig. (horns); Gerard, Cat. Bones B. M. 282.

Hab. Sumatra (*Bell*); Tavoy, near Siamese frontier (*Blyth*); Pegu (*Theobald*, B. M.).

There are two skulls of this species in the British Museum:—
1. Adult, with a roughness on the forehead and nose made by the roots of the horns, from Pegu. 2. A skull of a two-thirds-grown animal, with the seventh grinder just appearing; it has the forehead and nose smooth. This was received from the Zoological Society, and is probably from Sir Stamford Raffles's collection from Sumatra.

The horn in the British Museum named *R. crossii*, I have no doubt, from the figure that Mr. Blyth gives of the skull (*Journ. Asiat. Soc. Bengal*, 1862, t. 4), he is right in referring to this species.

When I described this horn I was told by several persons that it was only the horn of an African *Rhinoceros* that had been artificially prepared and bent back after being boiled; but the colour and structure of the horn showed that that could not be the case, and that it was the horn of a *Rhinoceros* which I had not before seen.

In the Museum of the Royal College of Surgeons there is a beautiful skeleton (no. 2938) of this species, received from Sir Stamford Raffles. There are also three skulls of adult or nearly adult age,—viz. nos. 2935, 2936, and 2938; the latter is cut open longitudinally to show the brain-cavity. From the roughness on the forehead in the adult skull, the hinder horn must be situated further back in this species than in the African *Rhinoceros*; the centre of the roughness is over the orbit. One of the skulls shows a rudimentary canine on one side of the upper jaw, placed in the front edge of the intermaxillary suture; this animal was just obtaining its first permanent molar.

The skull figured by Bell, and copied by Cuvier, represents the erect form of the occipital plane, as also does De Blainville's figure of the skull of a female. Mr. Blyth, who has seen these animals alive, thinks the horn that I provisionally described as *R. crossii* is the horn of an adult male *C. sumatranus*. He says that the horns of the females are smaller than those of the males—observing, at the same time, that there is no difference in size in the horns of the two sexes of *R. unicornis* of India. In Bell's figure of the skull the intermaxillaries are represented as curved downwards. This may have been an individual peculiarity; they are more or less bent down obliquely in the skulls I have seen, but always straight.

The *Rhinoceros de Java* of M. F. Cuvier (*Mamm. Lithogr.*) is only a better figure of the *R. sumatrensis*.

M. Cuvier, in the first edition of the 'Règne Animal,' says the *Rhinoceros de Java* is smaller than the *R. sumatranus*; but in the second edition he refers to his brother's figures in the 'Mamm. Lithogr.,' and alters his description; so that both *R. sumatrensis* and *R. javanensis* are established on the Sumatran *Rhinoceros*.

This species is erroneously called by Jardine, in the 'Naturalist's Library,' "*R. sumatrensis*, the Lesser one-horned *Rhinoceros*."

The horns of the Rhinoceros are exceedingly difficult to procure ; they are eagerly bought up at high prices by the Chinamen, who not only value them as medicine, but carve them into very elegant ornaments (Blyth, *l. c.* 158).

2. CERATORHINUS MONSPELLIANUS.

R. de Montpellier, Marcel de Serres.

R. monspellianus, Blainv.

Rhinoceros megarhinus, De Cristol ; Gervais, Zool. et Paléont. Frang. ii. 43, iii. t. 2.

Fossil, Hérault, France.

This species chiefly differs from *R. sumatranus* in the nose behind the base of the front horn being prolonged and subcylindrical. This species has been mixed up with *R. tichorhinus* (see Gervais, *l. c.*).

THE AFRICAN RHINOCEROTES. *The skin uniform, without any strong fold, except at the junction between the head and body. Nose with two horns, one behind the other, front longest. Skull:—occiput and condyles not produced. Nasal bones free, produced, broad, rounded in front. Intermaxillaries rudimentary, very small. Upper cutting-teeth none. Lower jaw arched below, thick. Teeth 28:—I.* $\frac{0-0}{0-0}$. *C.* $\frac{0-0}{0-0}$. *P.M.* $\frac{4-1}{4-4}$. *M.* $\frac{3-3}{3-3}$.

Rhinaster, Gray, List Mamm. B. M. 1840 ; Gerrard, Cat. Bones B. M. 281.

I am not aware that any adult African Rhinoceros has been seen living in this country ; and the external appearance of the species is chiefly known by the excellent figures given by Dr. Andrew Smith, in his 'Illustrations of the Zoology of South Africa,' who figures *Rhinoceros bicornis*, *R. simus*, and *R. keitloa*. The specimens of these three species, which he collected and had stuffed by M. Verreaux under his own superintendence, are in the British Museum.

There are two well-marked forms of these animals, characterized by the shape of the head and skull. The first (or short, blunt-headed, narrow-nosed group) includes two, and the second (or long-headed, broad, square-nosed group) includes one well-marked species, and probably another distinguished by the form of the horns, of which only the horns are known.

There is a not quite adult skull of *R. bicornis*, and two adult skulls and two very young skulls of *R. simus*, in the British Museum ; but the skull of *R. keitloa* is only known from the description and figure of Camper. Cuvier figured two of these skulls, but considered them the adult and young of the same species. Unfortunately, *R. oswellii* is only known from the horns ; I am not aware that any skin or bones of the species have been brought to Europe. There is a large number of the horns of each of the species in the Museum collection ; and they were known to Parsons, who figured them in the

'Philosophical Transactions' for 1742 and 1743; and the specimens which he figured are now in the British Museum.

There is considerable divergence of opinion among travellers respecting the horns of the African *Rhinoceros*. Sir Andrew Smith observes, "I do not think that the horns of the same species of African Rhinoceroses are subject to any great variations in respect to relative length."—*A. Smith*.

Capt. Cornwallis Harris, on the contrary, after describing the horns of *C. bicornis* as unequal, says "the horns are sometimes nearly of the same length." Further on he observes "that sometimes accident or disease renders the front horn the shortest of the two." Perhaps Capt. Harris had not such a good knowledge of species as Sir Andrew Smith.

"The relative length of the horns varies a little in different individuals of *R. bicornis*; but the hindmost one in both sexes is invariably much the shortest, and in young specimens it is scarcely visible when the other is several inches in length."—*A. Smith*.

"In *R. keitloa* the young have horns of equal length."—*A. Smith*.

3. RHINASTER. Black Rhinoceros.

Head short, high; forehead convex; nose rounded in front. Upper lip with a central conical process. Horns two, unequal. Skin smooth, not divided into shields by plaits. Skull short, high; the portion of the skull behind the hinder edge of the last or seventh grinder not so long as the portion in front of it, the occiput erect, the upper margin only slightly produced over it; forehead concave, shelving; nasal bones on the sides convex, subspherical above, rounded in front. Tooth-line curved, bent up at each end. Lower jaw thick in front. Shoulder with a more or less developed hunch.

"Living in herds; a 'browser,' feeding on leaves and young shoots of trees. It frequents forest and bush country, avoiding grassy plains."—*Kirk, P. Z. S.* 1864, p. 655.

- A. *Horns cylindrical, conical, front recurved, hinder short; head short and high, swollen in front; upper lip subtruncate; shoulder-hump rudimentary.* Rhinaster.

I. RHINASTER BICORNIS. Bovili.

B.M.

Horns unequal, cylindrical at the base, and conical, blunt, the hinder smaller, front recurved; shoulder-hunch rudimentary, neck-grooves well marked. "Pale brown;" upper lip truncated, scarcely produced in the centre.

Rhinoceros horn, Parsons, Phil. Trans. 1742, 1743, t. 3. f. 3, 4.

Rhinoceros bicornis, Linn. S. N. i. 104; Sparrm. K. Vet. Akad. Handl. 1778, t. 9; A. Smith, Ill. Z. S. Africa, t. 2.

Rhinoceros bicornis du Cap, part., Giebel, 200; Cuvier, Oss. Foss. ii. 29, t. 4. f. 7, t. 16. f. 10; Blainv. Ostéogr. Onguligrades, t. 3, 4 (skull &c.).

R. africanus, Desm. Mamm. 400 ; Harris, Portraits of Wild Animals of S. A. 81, t. 11 (horns at p. 85) ; Duvernoy, Arch. du Mus. vii. t. 8.

R. brucei, Blainv.

R. niger, Schinz, Syn. Mamm. 335.

Rhinaster bicornis, Gray ; Gerrard, Cat. Bones B. M. 282.

In the British Museum there is the skull of a nearly adult animal.

In the Museum of the Royal College of Surgeons is a very fine skull of an adult of this species (no. 2941), and the upper jaw covered with skin (no. 2942) and with the two horns attached to it. The horns are both circular at the base, and regular, conical, and blunt at the tip.

Schinz, who compiled a Monograph of this genus, in his Synopsis named a species *R. niger*, after Capt. Alexander's description of the *Black Rhinoceros* in his 'Travels into the Interior of South Africa.'

- B. *Nose rounded in front ; upper lip acute in the middle. Skull :— face short—that is, from front of orbit to nasal, not so long as from same point to occipital condyle ; nasal rounded in front.*
 Keitloa.

2. RHINASTER KEITLOA. The Keitloa or Ketloa.

B.M.

Upper lip with a central prominence, acute ; horns elongate, hinder compressed, sharp-edged, often as long as the front one, front one rather compressed, recurved ; shoulder without any hunch ; skin pale yellow brown ; skull short ; face short from front edge of the orbit to the end of the nasal, not so long as from the front edge of orbit to occipital condyle.

Var. 1. *Keitloa*. The horns of nearly equal length ; the hinder compressed, sharp-edged before and behind ; the front one rather compressed, broad and flat in front.

Rhinoceros horn, Parsons, Phil. Trans. lvi. 32, t. 2. f. 8, 9. B.M.

Rhinoceros ketloa or *keitloa*, A. Smith, Cat. S. A. Mus. p. 7, 1837 ; Illust. Zool. S. A. t. 1 ; Schinz, Syn. Mam. 337.

Rhinaster keitloa, Gray, List Mamm. B. M. ; Gerrard, Cat. Bones B. M.

Var. 2. *camperi*. The horns both compressed and sharp-edged in front and behind, the front one twice as long as the hinder ; upper lip with acute central prominence.

Rhinoceros bicornis capensis, P. Camper, Act. Petrop. 1777, ii. 193, t. 3, 4, 5, 6 (copied Blumenbach, Abbild. t. 7. f. a).

Rhinoceros bicornis (adult), Cuvier, Oss. Foss. ii. t. 4. f. 5 (skull copied from Camper).

Rhinoceros —, Sparrman, Voy. ii. t. 3.

R. camperi, Schinz, Syn. Mamm. ii. 335 ; Monogr. t. 1.

Black Rhinoceros, Baker, Albert Nyanza, ii. 275 ; Nile Tributaries, fig. at p. 365 (head and horns).

Hab. South Africa (*Dr. A. Smith's type in B. M.*).

I have not seen the skull of this species, nor do I know any specimen existing in museums, unless the one described by Camper still exists.

"The length of the head of *R. keitloa*, in proportion to the depth, is very different from that of *R. bicornis*. Upper lip distinctly produced; inside of the thigh black. The horns are of equal length and development in the young animal."—*A. Smith*.

This species is peculiar for the length of the hinder horn; but Schinz describes the front horn as very long, and the hinder short, conical.

Peter Camper, in 'Act. Petrop.' (1777, part 2, p. 193), described the head of a two-horned Rhinoceros which he received from the Cape of Good Hope. He figures the head and the skull in great detail. The upper lip has a distinct central process, or prehensile lobe; and the horns are both compressed and sharp-edged before and behind, the front one is the longest and regularly curved, the hinder well developed and elongate. The end of the nose of the head and skull is rounded and not square, and the nasal bones are not truncate, as in the skulls of *R. simus* in the British Museum. I believe Camper's to be the first description of *R. keitloa* of Dr. A. Smith.

Schinz gave the name of *R. camperi* to a species which he says is *R. bicornis* of authors, and which is figured by A. Smith under that name in the 'Illustrations of South Africa;' but he describes the front horn as very long and recurved, and the hinder horn as small, triquetrous, *compressed*; while the hinder horn of *R. bicornis* is always conical, subcylindrical, with a circular base. Schinz's *R. camperi* appears to be a compilation from the figures of Sir A. Smith's *R. bicornis* and Camper's description and figure of the head of *R. keitloa*.

P. Camper, in giving the figures of this species, properly made the drawings like a diagram, without attending to the rules of perspective, so that the compass can be applied to any part. He gives a particular name to these figures, and calls them Catograph.

In Camper's figure the length from the back edge of the seventh molar to the front edge of the small intermaxillary is considerably greater than the distance behind the hinder edge of the last molar to the occipital condyle. In De Blainville's figure of *R. simus*, and in the two specimens in the British Museum, the length from the hinder edge of the seventh molar to the front edge of the small intermaxillary is rather less, or about the length behind the hinder edge of the seventh molar to the outer part of the occipital condyle.

The *Keitloa* is recognized as a species distinct from *R. bicornis* by the tribes of natives; they have a different name for the two species.

If Cuvier had had a series of the skulls of *R. bicornis*, or had seen a preserved specimen of the two animals, he would never have thought that the skull figured by Camper was the adult of *R. bicornis*. The skulls of the different species alter very little in form during the growth of the animal, when they have passed the very youngest, nearly foetal, state.

4. CERATOTHERIUM.

Head elongate, produced behind; forehead flat; nose very broad, square at the end; upper lip bovine, rounded. Horns two, very unequal, hinder small. Skin smooth, not divided into shields. Shoulder with a well-marked hunch. Skull elongate; the portion of the skull behind the hinder edge of the last or seventh grinder as long as the one in front of it; occiput erect, the upper margin much produced behind the condyle; forehead concave; nose straight, rounded; nasal bones very broad, convex above, truncated, with a sharp edge in front; lower jaw thick, tapering in front; molars large; teeth-line straight.

The skull of the very young animal has a very convex, nearly hemispherical prominence on the nasals, and is broad and rounded in front; but the prolongation of the hinder part of the skull is shown in the fetal skull in which the milk-grinders are only just appearing, the proportion of the hinder and anterior portion being nearly the same as in the adult skulls; the occiput is erect, without any marked projecting crest.

"The first animal that disappears before firearms."—*Kirk*, *P. Z. S.* 1864, p. 655.

"Gentle and a 'grazer;' living in open plains, feeding on grass."—*A. Smith*.

1. CERATOTHERIUM SIMUM. Mahoohoo.

B.M.

The front horn very long, slender, subcylindrical, recurved; hinder very small, conical; nose broad, high, square. "Pale grey brown; shoulder, buttocks, and belly darker." The face of the skull from the front edge of the orbit longer than the portion of the skull behind this place.

Rhinoceros horn, Parsons, *Phil. Trans.* 1742, 1743, t. 3. f. 6 (front horn).

Rhinoceros simus, Burchell; *Blainv. Journ. de Phys.* lxxi. 163, t. (head, horns bad); *Cuvier, Oss. Foss.* ii. 28; *Burchell, Travels*, ii. 75; *A. Smith, Zool. S. A.* t. 19 (animal); *Cat. S. A. Mus.* 9, 1837; *Blainv. Ostéogr. Onguligrades*, t. 4 (skull &c.); *Duvernoy, Arch. du Mus.* vii. t. 2, 3 (skull), t. 8 (skull, junior); *Sclater, P. Z. S.* 1864, p. 100.

R. burchellii, *Desm. Mamm.* 401.

R. simus (*Chicore*), *A. Smith, Rep.* 68, 1836; *Harris, Sports in S. Africa*, p. 371.

R. camus, *Ham. Smith; Griffith, A. K.* v. 746.

Rhinaster simus, *Gray, List Mam. B. M.* 1840; *Gerrard, Cat. Bones B. M.* 282.

? *Rhinoceros gordonii*, *Blainv.*

The Square-nosed or White Rhinoceros (R. simus), *Harris, Portraits of Wild Animals of S. A.* 97, t. 19 (horns at p. 101).

White Rhinoceros or Witte Rhinaster, *Colonists, Cape G. H.*

Chickore or Mohoohoo, *Bukeiana and Matabite.*

Hab. South Africa (*Burchell; Dr. A. Smith, type spec. B. M.*); Central Africa (*Kirk*).

There is a well stuffed young specimen of this species in the British Museum, and two skulls of adult and two of very young animals.

In the Museum of the Royal College of Surgeons is a very fine adult skull of this species (no. 2960 *a*) with the two horns attached to the skin. It was obtained from Mr. Gordon Cumming's collection. It is 35 inches long from the end of the nasal to the occipital crest. The front horn is very long, slender, straight, and recurved; the front edge of the horn is worn by the animal rubbing it on the ground.

De Blainville obtained, when he was in London, from Mr. Burchell the drawing of the head of this species (engraved in the 'Journ. de Physique'); but the horns were added after it passed out of Burchell's hands, and are not the horns of the species.

In the British Museum there are two skulls of very young animals of this species that were received with the adult skulls in the collection; the milk-grinders are being formed, but could only just have been seen through the gums. The skulls are elongate, subcylindrical, and have a rounded nose, with a large nearly hemispherical prominence near the end of the upper surface for the support of the front horn. The grinders are very large compared with the size of the skulls, and occupy a great part of the cavity of the mouth; the hinder one is placed in the centre of the length of the underside of the skull from the nose to the condyles. The larger of these young skulls (1003 *b*) is very like the smaller one, but there is a fourth grinder being developed behind the third one; it is not elevated above the edge of the alveolus, and has no smooth enamelled edge. The small first grinder is only very little more developed than in the smaller skull. The line of grinders occupies $6\frac{1}{2}$ inches. The intermaxillary bones are deficient. The palate ends, as in the smaller skull, in a line even with the back edge of the third grinder. The hinder part of the skull has lengthened more rapidly than the part in front of the edge of the palate. The nasal is slightly longer compared with the length of the skull than in the smaller specimen; they are $4\frac{1}{6}$ inches long, the entire length being very nearly 14 inches—that is to say, nearly three-tenths of the entire length. The front of the nasal is more dilated on the sides, and becoming broader and more truncated as in the adult skulls.

The lower jaw of this specimen is considerably longer than the other; and there is little difference in the state of the teeth, except that the second and third grinders on each side are higher out of the gums, rather more worn on the edge, and the first and fourth grinders are rather more developed and larger, the first on the two sides not being quite equally developed, but one more exposed than the other.

The smaller specimen (1003 *c*) has three grinders appearing; the smallest front one is least developed, hardly raised above the alveoli, and not showing any smooth enamel; the second and third grinders are nearly equally developed, the ridges being high and edged with enamel, the rest of the teeth are minutely rugulose; the hinder edge of the third grinder is on a line even with the front edge of the

hinder nasal opening. The skull is 12 inches from the intermaxillary to the convexity of the condyle; the teeth-line is $4\frac{1}{8}$ inches long. The facial portion (that is, the skull from the front of the intermaxillary to the front edge of the internal nostril) is only two-fifths of the entire length; it is the same length as from the front edge of the internal nostril to the suture between the basisphenoid and the basioccipital bone. Length from intermaxillary to front edge of internal nostril or end of palate 4 inches 7 lines, from end of palate to convexity of occipital condyle $7\frac{1}{2}$ inches. The intermaxillary of one side is lost; the other has a narrow lower edge, not showing any appearance of cutting-teeth. The nearly hemispherical prominence on the nose is hollow, with thin even parietes; the cavity extends far back, and is open behind. The face, from end of nasal to the front edge of the orbit, is shorter than the part of the skull behind it, being from front end of nasal to front edge of orbit 5 inches 4 lines, from front edge of orbit to occipital crest 7 inches 2 lines. Nasal bones short and broad, being about two-sevenths of the entire length of the skull to the occipital crest.

The lower jaw shows four grinders and a cavity behind the fourth; the second and third grinders are most developed, raised above the alveolus, and furnished with a smooth enamel edge; the first small grinder is just showing, as is also the case with the fourth grinder, which is rather more developed than the front one; neither of these teeth is raised above the edge of the alveolus. The front edges marked with two or three series of small circular pits; but no cutting-teeth are visible.

In the Free Museum at Liverpool is the head of a large specimen, collected by Mr. Burke in Lord Derby's exploring party. The skin of the head is stuffed, and the skull kept separate.

An adult skull without the lower jaw is in the Museum of the London Missionary Society in Bloomfield Street, London, E.C., that was obtained by the Rev. John Campbell.

The Rev. John Campbell gives a figure of the head of this animal before the skin was removed in his work entitled 'Travels in South Africa, Second Mission' (2 vols. 8vo, London, 1822), where it is called the "head of a Unicorn killed near the City of Mashow" (plate at p. 294 of the second volume). The artist has added a regular series of nearly equal-sized square teeth all along both jaws.

This figure is copied in Froriep's 'Notizen' for 1822, at vol. ii. p. 98; and a notice of the skull is given at p. 152 of vol. i. of the same journal.

2. CERATOTHERIUM OSWELLII. Kobaaba.

B.M. (horn).

The front horn very long, thick at the base, bent back and then forward at the end, the front of the tip worn flat.

Très-grande corne de Rhinocéros, Buffon, N. H. x. t. 8. f. 5.

Rhinoceros horn, Parsons, Phil. Trans. 1742, 1743, t. 3. f. 6.

Rhinoceros oswellii, Gray, P. Z. S. 1853, p. 46, f. (horn); Ann. and Mag. N. H. xv. 145.

Rhinoceros oswelli, Andersson, Lake Ngami, p. 386, f. (head), p. 388, f. (horn).

Kobaaba, Baines, Land and Water, July 28, 1866, f.

Hab. South Africa.

I have not seen the skull of this species, and I do not believe there is one in any European Museum.

Camper probably knew *R. oswellii*. He observes, "Cornu antcrius A D in hoc specimene incurvum adeo fuit ut alterum E F H, tamquam inutile reddiderit. Verum non ita in omnibus; possideo alterius cranii partem, cujus cornu antcrius rectum, et antrorsum inclinaturn est."—*Camper*, l. c. 186.

Mr. Baines gave a fœtus of the *Kobaaba* to the Royal College of Surgeons (killed 3rd of June, 1862). He has shown me a series of drawings of the recently killed *Kobaaba*. One group represents the *R. sinus* and *R. oswellii* side by side. The horns of the two are very different in appearance.

Mr. Baines says Mr. Chapman was informed by the natives that they had never seen a young *Kobaaba* = *R. oswellii*. Mr. Baines says that it is possible that the horn, being worn away at the end by the constant friction on the front as it passes through the bushes, may bend forward in the older specimens. The Kaffirs make the horns of the cattle bend by scraping them on the sides towards which they wish them to turn.

Schinz gives the name of *niger* to the *Rhinoceros* horn figured by Andersson; but he describes it as curved back, in the same words as he described the horns of the other African species.

Camper compares the labial process to a finger, and says it is not unlike the lobe at the end of the trunk of the Elephant.

See M. F. Fresnel's "Sur l'existence d'une espèce unicorne de Rhinocéros dans la partie tropicale de l'Afrique" (*Comptes Rendus*, xxvi. 1848, p. 281). See also A. Smith's 'Illust. Zool. S. A.' t. 1, where he says the natives mention a one-horned African species.

III. *Skin smooth, even. Skull* —? *Internasal bony, short; the nasal, internasal, and the intermaxillaries united into one mass.* Asia and Europe, fossil.

5. CÆLODONTA.

Nose with two horns. Skull elongate; face rather produced; nasal bones broad, rounded in front; cutting-teeth none; intermaxillaries very short; internasal bony, uniting the nasals, the intermaxillary, and maxillæ into one mass. Asia, Europe, Africa.

Rhinocéros à narines cloisonnées, Cuvier, Oss. Foss. ii. 64.

Cælodonta, Brown, 1831.

CÆLODONTA PALLASII.

Rhinoceros, Pallas, Acta Acad. Petrop. 1777, ii. 210, t. 9; Nov. Com. Petrop. xiii. 447, t. 9, 10.

Rhinoceros tichorinus, Cuvier, Oss. Foss. ii. 64, t. 7. f. 1 (skull), t. 8, 9, 11, 14 (bones); Blainv. Ostéogr. t. 13 (from Pallas).

R. pallasii, Desm. Mam. 402.

R. antiquitatis, Blainv.

Rhinoceros de Sibérie, Cuv. Ann. Mus. xii. 19, t. 1, 3, 4.

Hab. Siberia, in the ice; Fossil, Himalaya &c.

The following measurements are given in inches and lines, taken by a pair of callipers; so they are a straight line (or chord) from point to point indicated, and not a line over or along the surface. I believe they are sufficient for all zoological purposes; but it is the fashion of some zoologists and comparative anatomists to give measurements with three, and sometimes even four places of decimals, this arising from their taking a metre, about 39 inches, for the *unit*, which requires one decimal place for any measured or part of a measured inch or space under 39 inches, two for any similar measurement under 4 inches, and three for any under 5 lines. Others, to avoid this evil, write of 20 or 130 *mm.* (millimetres); but this is as inconvenient, as the latter *unit* is as much too small as the other is too large.

On pointing out this evil to a naturalist, who has published long tables with such admeasurements, he replied, did it not look very scientific? I fear, unfortunately, there is a desire to mystify general readers, and a quackery in natural history as in other less ennobling studies.

I have never yet met with a naturalist, even German or French, that could show me the size of a bone marked in the French metrical system; few cannot do this with considerable accuracy when marked in inches or feet. The having a measurement of well-known different lengths, as yards, feet, inches, or lines, which bear a relation to some parts of our own bodies, is a great advantage not found in the metrical system.

	<i>R. javanicus.</i>			<i>R. unicornis.</i>						<i>R. florenti.</i>			<i>R. nasalis.</i>			<i>R. sennoc-phalus.</i>		<i>R. sumatra-nus.</i>				<i>R. bicornis.</i>				<i>R. sinus.</i>				<i>R. ketion.</i> Camper's figure.	
	723 a.	723 d.	723 e.	722 f.	722 d.	722 b.	2975.	2934.	723 b.	723 c.	722 e.	1461 a.	1461 b.	1365 a.	1003 c.	1003 d.	1003 a.	1003 b.	1003 c.	1003 d.	1003 a.	1003 b.	1003 c.	1003 d.	1003 a.	1003 b.	1003 c.	1003 d.			
Length from end of nasal to centre of occipital condyles..	24	9 24	3 18	0 26	3 26	6 26	0 21	0 22	0 23	6 22	3 21	3 21	6 19	3 21	9 3	21	9	28	9	12	0	14	9	29	9	28	9	27	0	in. 1.	in. 1.
Length from end of nasal to oc- cipital crest	21	0 20	3 15	9 23	0 24	6 23	9 18	6 19	3 20	9 19	3 18	9 21	0 18	6 19	6	11	0	31	3	11	0	14	0	31	3	28	3	28	6	in. 1.	in. 1.
Length from end of nasal to front of orbit	11	0 10	3 7	6 11	6 11	9 11	9 3	9 9	10 0	9 0	9 0	10 9	9 6	8 9	5	3	6	14	6	5	3	6	14	6	14	0	10	3	in. 1.	in. 1.	
Length from end of nasal to condylar cavity	20	3 20	3 15	6 22	3 22	3 22	3 18	0 19	0 19	9 19	0 17	6 17	9 16	9 17	6	11	9	22	6	9	6	11	9	22	6	22	3	22	3	in. 1.	in. 1.
Length of teeth-line of grinders..	9	9 10	3 7	0 11	0 10	6 11	0 7	9 9	6 10	3 9	6 7	8 3	7 6	9 0	4	6	7	0	12	3	4	3	7	0	12	3	..	14	0	in. 1.	in. 1.
Length of nasal, centre	6 9	8 3	..	8 0	7 6	8 6	..	7 3	6 0	3	0	4	3	in. 1.	in. 1.
Length of lower jaw to upper parts of angle	17	9 18	6 14	9 20	3 20	6 20	3 17	3 17	17	9 17	0 17	3 17	15	3	17	6	9	11	9	21	0	22	0	22	0	22	0	22	0	in. 1.	in. 1.
Height of skull and lower jaw from angle to occipital crest..	17	9 16	6 12	3 20	6 21	0 20	6 16	0 16	0 14	6 16	0 16	..	13	3	15	9	8	0	9	0	24	6	21	3	21	3	21	3	in. 1.	in. 1.	
Height of ramus of lower jaw to condyle	8	9 9	0 6	6 11	0 11	0 11	3 8	9 9	9 0	7 3	9 0	..	6 9	7 6	3	3	3	6	11	6	11	3	10	0	10	0	10	0	in. 1.	in. 1.	
Width of occipital end	11	6 11	9 8	9 11	6 12	0 11	0 8	9 10	6 10	6 9	0 8	9 7	9 3	9 0	5	0	5	9	10	6	10	0	10	0	9	0	9	0	in. 1.	in. 1.	
Width of hinder part of zygoma- tic arch	14	0 13	9 10	6 16	0 15	9 14	6 12	3 13	6 13	6 9	6 11	9 11	3 10	6 12	6	9	13	0	13	6	13	6	13	6	13	6	13	6	in. 1.	in. 1.	
Width of wide part of forehead over orbits	8	9 7	9 6	0 8	9 9	3 8	3 7	0 7	3 7	0 6	3 6	3 6	3 6	3 6	4	0	5	3	7	3	4	0	5	3	7	3	4	0	in. 1.	in. 1.	
Width of nose at base of nasal opening	4	6 4	9 3	6 5	6 5	6 5	0 4	6 3	6 4	6 4	3 4	0 4	4 6	4 0	3	3	6	6	6	6	6	6	6	6	6	6	6	6	in. 1.	in. 1.	

The measurements are from the nasal bones; the intermaxillaries are sometimes wanting. The measurements have been made by Mr. Edward Gerrard. The measurements of the skull of *R. ketiloo* are from the skull given in Camper's plates.

APPENDIX.

LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE

DURING THE YEAR

1867.

- Jan. 4. 1 Indian Civet. *Viverricula indica* (Geoff.). Purchased.
 1 Ocelot. *Felis pardalis*, Linn. Purchased.
 2 Mexican Guans. *Penelope purpurascens*, Wagl. Purchased.
 5. 1 Serval. *Felis serval*, Schreb. Presented by Mrs. Duncan Campbell.
 8. 1 Common Badger. *Meles taxus* (Schreb.). Presented by Henry Elwes, Esq., F.Z.S.
 1 Emu. *Dromæus novæ-hollandiæ*, Vieill. Presented by Money Wigram, Esq., F.Z.S.
 9. 1 ♂ Upland Goose. *Chloëphaga magellanica* (Gm.). Purchased.
 14. 1 St. John's Monkey. *Macacus sancti-johannis*, Swinhoe. Purchased.
 17. 1 Formosan Pig. *Sus taivanus*, Swinhoe. Presented by — Gregory, Esq., H.M. Vice-Consul at Tamsuy.
 23. 1 pair of Black-winged Peafowl. *Pavo nigripennis*, Sclater. Presented by Charles Clifton, Esq., F.Z.S.
 1 pair of White Peafowl. *Pavo cristatus*, Linn., var. *alba*. Presented by Charles Clifton, Esq., F.Z.S.
 1 pair of Common Peafowl. *Pavo cristatus*, Linn. Presented by Charles Clifton, Esq., F.Z.S.
 24. 1 Vulpine Phalanger. *Phalangista vulpina* (Shaw). Born.
 25. 1 Common Bittern. *Botaurus stellaris* (Linn.). Presented by the Rev. Benjamin Ruck Keene.
 28. 1 Regent Bird. *Sericulus chrysocephalus*. Presented by Dr. Mueller, C.M.Z.S.
 1 ♂ Formosan Deer. *Cervus taivanus*, Blyth. Purchased.
 1 Turtle. *Chelonia imbricata*, Schw. Purchased.
 29. 1 Common Bittern. *Botaurus stellaris* (Linn.). Presented by the Rev. R. Smith.
 1 ♂ Emu. *Dromæus novæ-hollandiæ*, Vieill. Received in exchange.
 30. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by Mrs. Smith.

- Feb. 1. 1 Long-eared Owl. *Otus vulgaris*, Flem. Presented by Edward Greay, Esq., F.Z.S.
2. 1 Pig-tailed Monkey. *Macacus nemestrinus* (Linn.). Presented by Douglas Marsh, Esq.
3. 2 Yellow-footed Rock-Kangaroos. *Petrogale xanthopus*, Gray. Born.
5. 1 Naked-throated Cotinga. *Chasmorhynchus nudicollis* (Vieill.). Presented by Dr. John A. Palin, C.M.Z.S.
- 1 Kagu. *Rhinocetus jubatus*, Verr. et Des Murs. Purchased.
- 2 Green-tailed Lories. *Lorius chlorocercus*, Gould. Purchased.
6. 1 Grey-cheeked Monkey. *Cercocebus albigena* (Gray). Presented by Capt. James Erskine, R.N., of H.M.S. 'Speedwell.'
- 1 Mangabey Monkey. *Cercocebus æthiops* (Kuhl). Presented by Capt. James Erskine, R.N., of H.M.S. 'Speedwell.'
- 1 Viverrine Cat. *Felis viverrina*, Bennett. Purchased.
8. 1 Cinereous Sea-Eagle. *Haliaëtus albicilla* (Linn.). Presented by A. Pryor, Esq.
9. 1 Vervet Monkey. *Cercopithecus lalandii*, Is. Geoff. Received in exchange.
21. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by W. W. Cowslade, Esq.
- 1 Mooruk. *Casuarus bennettii*, Gould. Presented by Commander Sir W. S. Wiseman, R.N., H.M.S. 'Curaçoa.'
- 2 Australian Cranes. *Grus australasiana*, Gould. Presented by Commander Sir W. S. Wiseman, R.N., H.M.S. 'Curaçoa.'
- 2 Bronze-winged Pigeons. *Phaps chalcoptera* (Lath.). Presented by Commander Sir W. S. Wiseman, R.N., H.M.S. 'Curaçoa.'
- 2 Spotted-eared Owls. *Bubo maculosus* (Vieill.). Presented by Commander Sir W. S. Wiseman, R.N., H.M.S. 'Curaçoa.'
- 1 Chacma Baboon. *Cynocephalus porcarius* (Bodd.) Presented by J. Gurney Hawes, Esq.
13. 1 Kangaroo Rat. *Bettongia* —? Presented by C. J. Foljambe, Esq.
15. 2 Senegal Parrots. *Paeocephalus senegalensis* (Linn.). Presented by Capt. Maule.
16. 1 Banded Ichneumon. *Herpestes fasciatus*, Desm. Presented by Mrs. Keep.
21. 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by Col. Clinton.
22. 1 pair of Russian Bullfinches. *Pyrrhula rubicilla*, Pall. Purchased.
25. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by W. Burney Wood, Esq.
26. 1 pair of Yarrell's Curassows. *Craz carunculatus*, Temm. Received in exchange.
28. 1 Great Kangaroo. *Macropus giganteus* (Shaw). Born.
- 1 Barred Owl. *Syrnium nebulosum* (Forst.). Presented by A. Downs, Esq., C.M.Z.S.
- 1 Canada Jay. *Perisoreus canadensis* (Linn.). Presented by A. Downs, Esq., C.M.Z.S.
- 1 Dusky Duck. *Anas obscura*, Gm. Presented by A. Downs, Esq., C.M.Z.S.
- 1 Rose-breasted Grosbeak. *Hedymeles ludovicianus* (Linn.). Presented by A. Downs, Esq., C.M.Z.S.
- 1 Lineated Buzzard. *Buteo lineatus* (Gm.). Presented by E. C. Newcombe, Esq.
- 1 Common Kestrel. *Tinnunculus alaudarius*, Briss. Presented by E. C. Newcombe, Esq.

- Mar. 3. 3 Common Boas. *Boa constrictor*, Linn. Presented by Robert Goodwin, Esq., of Pernambuco.
4. 1 Vervet Monkey. *Cercopithecus lalandi*, Is. Geoff. Purchased.
1 Black-faced Spider Monkey. *Ateles ater*, F. Cuv. Purchased.
1 Kaleege. *Euplocamus melanotus* (?). Received in exchange.
5. 1 Love-bird Parakeet. *Agapornis pullaria* (Linn.). Presented by Miss Armitstead.
6. 1 Barbary Ape. *Inuus sylvanus* (Linn.). Purchased.
1 Moustache-Monkey. *Cercopithecus cephus*, Erxl. Purchased.
2 Mona Monkeys. *Cercopithecus mona*, Erxl. Purchased.
2 Prairie Marmots. *Arctomys ludovicianus*, Ord. Purchased.
1 Boatbill. *Cancroma cochlearia*, Linn. Purchased.
1 Superb Tanager. *Calliste fastuosa* (Less.). Purchased.
1 Black Lemur. *Lemur niger*, Geoff. Purchased.
1 Black-fronted Lemur. *Lemur nigrifrons*, Geoff. Purchased.
1 Yellow-fronted Lemur. *Lemur flavifrons* (Gray). Purchased.
7. 1 Cuvier's Podargus. *Podargus cuvieri*, Vig. et Horsf. Purchased.
8. 1 ♂ African Sheep. *Ovis aries*, Linn., var. Born.
9. 1 Crested Guan. *Penelope cristata*, Gm. Presented by Lady Cust.
1 Greater Sulphur-crested Cockatoo. *Cacatua galerita* (Lath.). Deposited.
11. 1 Concave-casqued Hornbill. *Buceros bicornis*, Linn. Purchased.
1 Grey Crow. *Strepera anaphonensis* (Temm.). Purchased.
1 Carpet-Snake. *Morelia variegata*, Gray. Purchased.
1 Hawfinch. *Coccothraustes vulgaris* (Briss.). Purchased.
15. 1 ♂ Cashmere-shawl Goat. *Capra hircus*, Linn., var. Born.
17. 1 ♂ Giraffe. *Camelopardalis giraffa*, Gm. Born.
18. 1 ♀ Cashmere-shawl Goat. *Capra hircus*, Linn., var. Born.
1 Peruvian Boa. *Boa eques*, Eyd. et Soul. Presented by Prof. Wm. Nation, of Lima, C.M.Z.S.
19. 1 Ursine Dasyure. *Dasyurus ursinus* (Harr.). Purchased.
1 Nutcracker. *Nucifraga caryocatactes*, Briss. Purchased.
20. 1 Short-headed Phalanger. *Belideus breviceps* (Waterh.). Born.
2 Raccoons. *Procyon lotor* (Linn.). Presented by Henry Jubber, Esq., F.Z.S.
- 1 Iceland Falcon. *Falco islandicus*, Brünn. Purchased.
22. 3 Wood-Pigeons. *Columba palumbus*, Linn. Presented by Robert H. Mitford, Esq.
2 Turtledoves. *Turtur auritus*, Ray. Presented by Robert H. Mitford, Esq.
2 Hybrid Turtledoves. *Turtur auritus* and *T. risorius*. Presented by Robert H. Mitford, Esq.
23. 1 Seychellean Tortoise. *Sternotherus subniger*, Gray. Presented by Edward Newton, Esq., C.M.Z.S.
25. 1 White-headed Sea-Eagle. *Haliaëtus leucocephalus* (Linn.). Presented by — Whittle, Esq.
1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by Mrs. Lea.
1 Australian Thick-knee. *Ædicnemus grillarius* (Lath.). Received.
26. 1 Wanderoo Monkey. *Macacus silenus* (Linn.). Presented by General Sir Henry G. A. Taylor, F.Z.S.
3 Wild Turkeys. *Meleagris gallopavo*, Linn. Purchased.
29. 1 Talapoin Monkey. *Cercopithecus talapoin*, Erxl. Presented by the Rev. Dan. Greatorex.

- Mar. 29. 1 Pallas's Paradoxure. *Paradoxurus pallasii*, Gray. Presented by R. R. Liddle, Esq.
 1 Masked Paradoxure. *Paradoxurus larvatus*, Gray. Purchased.
 1 young male Orang-Utan. *Simia satyrus*, Linn. Deposited.
 1 pair of American Bisons. *Bison americanus* (Gm.). Deposited.
 30. 1 Lesser Sulphur-crested Cockatoo. *Cacatua sulphurea* (Gm.). Presented by Miss Atkinson.
 1 pair of Goosanders. *Mergus merganser*, Linn. Purchased.
- April 2. 2 Wood-Pigeons. *Columba palumbus*, Linn. Presented by Thomas Worthington, Esq.
 1 Turtledove. *Turtur auritus*, Ray. Presented by Thomas Worthington, Esq.
 1 White Dove. *Turtur risorius* (L.), var. *alba*. Presented by Thomas Worthington, Esq.
 3. 1 ♂ Yak. *Bos grunniens*, Linn. Born.
 1 Coati (Red variety). *Nasua nasica* (Linn.). Presented by the Earl of Dundonald.
 1 Spotted Eagle. *Aquila naevia* (Gm.). Purchased.
 1 Chestnut-bellied Squirrel. *Sciurus castaneiventris*. Purchased.
 4. 4 Common Adders. *Felias berus*, Merr. Presented by Dr. Brushfield.
 8. 3 Moorhens from the Island of St. Denis, Seychelles. *Gallinula chloropus*, Linn. Presented by Edward Newton, Esq., C.M.Z.S.
 1 Painted Dove. *Turtur picturatus* (Temmin.). Presented by Edward Newton, Esq., C.M.Z.S.
 1 Praslin Parrakeet. *Coracopsis barklyi*, Newton. Presented by Swinbourne Ward, Esq., Civil Commissioner of Seychelles.
 9. 1 Lyre-Bird. *Menura superba*, Day. Purchased.
 2 Varied Hemipodes. *Turnix varia* (Lath.). Purchased.
 10. 2 Brush Turkeys. *Talegalla lathamii*, Gray. Presented by F. J. Owen, Esq.
 1 Yellow-shouldered Weaverbird. *Pentheria macroura* (Gm.). Purchased.
 11. 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by Miss Lockhart.
 2 White Rats. *Mus decumanus*, Linn. Presented by — Vaudrey, Esq.
 12. 2 Kingfishers. *Alcedo ispida*, Linn. Purchased.
 13. 1 ♂ Eland. *Oreos canna* (Pall.). Born.
 2 ♂ Formosan Deer. *Cervus taëvanus*, Blyth. Purchased.
 15. 1 Pig-tailed Monkey. *Macacus nemestrinus* (Linn.). Presented by W. D. Garside, Esq.
 3 Green-winged Doves. *Chalcophaps indica* (Linn.). Presented by W. D. Garside, Esq.
 1 Marimonda Spider Monkey. *Ateles belzebuth* (Briss.). Received in exchange.
 1 Leadbeater's Cockatoo. *Cacatua leadbeateri* (Vig.). Received.
 16. 1 ♀ Japanese Pig. *Sus leucomystax*, Temmin. Presented by Messrs. Vanner, Prest, and Syth.
 17. 2 Proteus. *Proteus anguinus* (Shaw). Presented by Major R. H. H. Jary, F.Z.S.
 21. 2 Stump-tailed Lizards. *Trachydosaurus rugosus*, Gray. Purchased.
 24. 1 Bennett's Wallaby. *Halmaturus bennettii*, Waterh. Born.
 25. 1 Boatbill. *Cancroma cochlearia*, Linn. Received in exchange.

- Apr. 25. 2 Ka-Ka Parrots. *Nestor hypopolius* (Forst.). Presented by the Acclimatization Society of Canterbury, New Zealand.
27. 1 Dingo Dog. *Canis dingo*, Blumenb. Presented by James Anderson, Esq.
- 2 Seed-eaters. *Crithagra* —. Presented by Miss Charlotte Boyle.
- 1 West-African Lark. Presented by Miss Charlotte Boyle.
- 3 West-African Weaverbirds. Presented by Miss Charlotte Boyle.
- 1 Caracal. *Felis caracal*, Schreb. Purchased.
- 39 Mud-Frogs. *Pelobates fuscus*. Received in exchange.
29. 4 Maja Finches. *Munia maja* (Linn.). Purchased.
- 4 Javan Maja Finches. *Munia ferruginea* (Sparrm.). Purchased.
- 4 pairs of Unauled Parrakeets. *Melopsittacus undulatus* (Shaw). Purchased.
- 12 Common Teal. *Querquedula crecca* (Linn.). Purchased.
- 1 Garganey Teal. *Querquedula circia* (Linn.). Purchased.
- 12 Fournier's Capromys. *Capromys pilorides*, Say. Presented by Francis Fesser, Esq., of Havana, Cuba.
- 1 Frugivorous Bat. *Pteropus argentatus*, Gray. Purchased.
30. 1 Markhoor. *Capra megaceros*, Hutton. Born.
- 1 Viscacha. *Lagostomus trichodactylus*, Brookes. Born.
- 1 Marmoset Monkey. *Hapale jacchus* (Linn.). Presented by Miss Amy Chester.
- 2 pairs of Black-bellied Sand-Grouse. *Pterocles arenarius*, Pall. Presented by Capt. R. C. Beavan, H.M.I.A., C.M.Z.S.
- 1 Spur-winged Goose. *Plectropterus gambensis* (Linn.). Presented by Mrs. Compton Robert.
- 2 pairs of Many-coloured Parrakeets. *Psephotus multicolor* (Brown). Purchased.
- 6 Spotted Salamanders. *Salamandra maculosa* (Linn.). Presented by F. Coleman, Esq.
- 4 Green Tree-Frogs. *Hyla viridis*. Presented by F. Coleman, Esq.
- 1 Natterjack Toad. *Bufo calamita*, Laur. Presented by F. Coleman, Esq.
- May 1. 1 Black Rat. *Mus rattus*, Linn. Presented by Miss Smee.
2. 1 Green Monkey. *Cercopithecus callitrichus*, Is. Geoff. Presented by Henry M. Spalding, Esq.
- 2 Virginian Colins. *Ortyx virginianus* (Linn.). Presented by L. H. Smith, Esq.
- 1 St. Helena Seed-eater. *Crithagra butyracea* (Linn.). Presented by Capt. R. C. Beavan, H.M.I.A., C.M.Z.S.
- 1 Red-headed Weaverbird. *Euplectes madagascariensis* (Linn.). Presented by Capt. R. C. Beavan, H.M.I.A., C.M.Z.S.
- 4 Indian Siskins. *Chrysomitris spinoides* (Vig.). Presented by Capt. R. C. Beavan, H.M.I.A., C.M.Z.S.
3. 1 Napu Musk-Deer. *Tragulus javanicus* (Pall.). Purchased.
- 7 Swinhoe's Pheasants. *Euplocamus swinhoii*, Gould. Hatched.
4. 2 Yarrell's Curassows. *Crac carunculatus*, Temm. Presented by Ed. Thornton, Esq., H.B.M. Minister, Rio de Janeiro.
- 1 Razor-billed Curassow. *Pauxi mitu* (Linn.). Presented by Ed. Thornton, Esq., H.B.M. Minister, Rio de Janeiro.
- 2 Cayenne Lapwings. *Vanellus cayennensis*, Gm. Presented by George Wilkes, Esq.

- May 4. 1 Indian Civet Cat. *Viverricula indica* (Geoff.). Presented by H. Morgan, Esq.
 1 Common Wolf. *Canis lupus*, Linn. Presented by — Bolckow, Esq.
 4 Fishes from Calcutta. Presented by Capt. Gideon.
 5. 3 Variegated Sheldrakes. *Casarca variegata* (Gm.). Hatched.
 1 Chestnut-bellied Squirrel. *Sciurus castaneiventris*, Gray. Purchased.
 6. 1 Common Adder. *Pelias berus*, Merr. Presented by Edgar E. Larking, Esq.
 1 ♂ Ground-Hornbill. *Bucorvus abyssinicus* (Gm.). Presented by Charles B. Mosse, Esq.
 1 Spur-winged Goose. *Plectropterus gambensis* (Linn.). Presented by Charles B. Mosse, Esq.
 7. 1 Bennett's Wallaby. *Halmaturus bennettii* (Waterh.). Born.
 1 Black Rat. *Mus rattus*, Linn. (from Jamaica). Presented by W. T. Hearn, Esq.
 1 pair of Saffron Finches. *Sycalis brasiliensis* (Gm.). Purchased.
 2 Common Hares. *Lepus timidus*, Linn. Presented by Dr. R. R. Sewell.
 8. 1 ♀ Eland. *Oreos canna* (Pall.). Born.
 2 Indian Porcupines. *Hystrix leucura*, Sykes. Born.
 2 Common Adders. *Pelias berus*, Merr. Presented by Dr. Brushfield.
 9. 1 Black-necked Swan. *Cygnus nigricollis* (Gm.). Hatched.
 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by C. E. Gill, Esq.
 1 Slow Loris. *Nycticebus tardigradus* (Linn.). Presented by John R. Forrester, Esq.
 10. 5 Dusky Ducks. *Anas obscura* (Gm.). Hatched.
 1 Young Chacma Baboon. *Cynocephalus porcarius* (Bodd.). Presented by Thomas Lancaster, Esq.
 1 Turtledove. *Turtur auritus* (Ray). Presented by Dr. Page.
 11. 1 ♀ Banksian Cockatoo. *Calyptorhynchus banksii* (Lath.). Deposited.
 2 Eyton's Tree-Ducks. *Dendrocygna eytonii* (Gould). Presented Dr. Geo. Bennett, F.Z.S.
 1 ♀ Australian Bustard. *Otis australis*, Gray. Presented by Dr. Geo. Bennett, F.Z.S.
 2 Beautiful Parrakeets. *Psephotus pulcherrimus*, Gould. Purchased.
 1 Yellow-fronted Lemur. *Lemur flavifrons*, Gray. Purchased.
 1 Boa. *Boa* — ? Presented by Dr. John A. Palin, C.M.Z.S.
 2 Wedge-tailed Eagles. *Aquila audax*, Lath. Presented by the Commissioners of South Australia to the French Exhibition.
 1 Australian Thick-knee. *Ædicnemus grallarius* (Lath.). Presented by the Commissioners of South Australia to the French Exhibition.
 1 Black-faced Kangaroo. *Macropus melanops*, Gould. Presented by the Commissioners of South Australia to the French Exhibition.
 1 Derbyan Wallaby. *Halmaturus derbianus*, Gray. Presented by the Commissioners of South Australia to the French Exhibition.

- May 11. 1 pair of Hairy-nosed Wombats. *Phascolomys latifrons*, Owen. Presented by the Commissioners of South Australia to the French Exhibition.
13. 2 Common Crowned Pigeons. *Goura coronata* (Linn.). Presented by Mrs. Bacon.
- 1 pair of Common Sheldrakes. *Tadorna vulpanser*, Flem. Purchased.
14. 1 Jelarang Squirrel. *Sciurus bicolor*, Sparrm. Presented by Mrs. Williams.
- 3 Leaf-green Tree-Frogs. *Hyla phyllochroa*, Günther. Purchased.
- 2 Hooded Night-Herons. *Nycticorax cucullatus* (Licht.). Purchased.
- 1 Himalayan Bear. *Ursus tibetanus*, F. Cuv. Deposited.
15. 1 pair of Egyptian Geese. *Chenalopex ægyptiacus* (Briss.). Presented by Frederick Powell, Esq.
- 1 pair of Common Geese. *Anser ferus*, Linn., var. *domestica*. Presented by Frederick Powell, Esq.
- 1 ♂ Cuvier's Gazelle. *Gazella cuvieri*, Ogilby. Presented by Rear-Admiral Sir William Hall.
- 1 Common Sturgeon. *Acipenser sturio*, Linn. Presented by Thomas Grove, Esq.
17. 2 Grey Ichneumons. *Herpestes griseus*, Geoff. Presented by S. H. Browne, Esq., 77th Regiment.
- 1 Ourebi Antelope. *Oreotragus scoparius* (Schreb.). Presented by Charles B. Mosse, Esq.
18. 1 ♂ Cashmere-shawl Goat. *Capra hircus*, Linn., var. Born.
- 3 Ruddy-headed Geese. *Chloëphaga rubidiceps*, Sclater. Hatched.
- 7 Ruddy Sheldrakes. *Casarca rutila* (Pall.). Hatched.
19. 1 ♀ Barbary Deer. *Cervus barbarus*, Benn. Born.
21. 2 Spotted Hyænas. *Hyæna crocuta*, Erxl. Presented by José Manuel de Freitas Branco, Esq.
22. 2 Black Squirrels. *Sciurus niger*, Linn. Presented by C. Leveson Lane, Esq., Royal Fusiliers.
- 1 Grey Squirrel. *Sciurus cinereus*, Linn. Presented by C. Leveson Lane, Esq., Royal Fusiliers.
23. 1 Gray's Jerboa Kangaroo. *Bettongia grayi*, Gould. Born.
- 3 Ashy-headed Geese. *Chloëphaga poliocephala*, Gray. Hatched.
- 2 Palm-Squirrels. *Sciurus palmarum*, Linn. Presented by Mrs. Tytler.
- 12 Green Lizards. *Lacerta viridis*, Linn. Presented by — Tollemache, Esq.
24. 13 American Turkeys. *Meleagris gallopavo*, Linn. Hatched.
25. 1 Silky Monkey. *Hapale rosalia* (Linn.). Presented by Colin A. Campbell, Esq.
26. 8 Lineated Pheasants. *Euplocamus lineatus* (Lath. MS.). Hatched.
- 7 Pallas's Eared Pheasants. *Crossoptilon auritum* (Pall.). Hatched.
- 1 Purple Kaleege. *Euplocamus horsfieldii*, Gray. Hatched.
- 1 Chacma Baboon. *Cynocephalus porcarius* (Bodd.). Deposited.
27. 1 Yellow-rumped Parrakeet. *Platycercus flaveolus*, Gould. Purchased.
- 1 Long-winged Kite. *Milvus isurus*, Gould. Purchased.
- 2 Tasmanian Jerboa Kangaroos. *Bettongia apicalis*, Gould. Purchased.
- 1 Spotted-tailed Dasyure. *Dasyurus maculatus* (Shaw). Purchased.

- May 27. 1 Young Brown Howler. *Mycetes ursinus* (Humb.). Purchased.
 2 Red-billed Tree-Ducks. *Dendrocygna autumnalis* (Linn.).
 Presented by Capt. J. M. Dow, C.M.Z.S.
28. 2 Land-Tortoises. Presented by C. A. Fairbridge, Esq.
 3 Allen's Porphyrios. *Porphyrio alleni*, Thomp. Purchased.
29. 1 Egyptian Lizard. *Uromastix spinipes* (Daud.). Presented by
 John D. Carmichael, Esq.
31. 2 Rufous Tinamous. *Rhynchotus rufescens* (Temm.). Hatched.
 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented
 by Francis N. Smith, Esq.
- 1 Blue-crowned Conure. *Conurus hemorrhous*, Spix. Deposited.
- June 1. 4 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Hatched.
3. 1 ♀ Sambur Deer. *Cervus aristotelis*, Cuv. Born.
 2 Chimpanzees from the Congo. *Troglodytes niger*, Geoff. Purchased.
 1 Weeper Capuchin. *Cebus capucinus*, Geoff. Received in exchange.
4. 4 Ruddy-headed Geese. *Chloëphaga rubidiceps*, Sclater. Hatched.
 3 Mauge's Doves. *Geopelia maugei* (Temm.). Purchased.
 1 Quebec Marmot. *Arctomys empetra* (Schreb.). Received in exchange.
 1 Kinkajou. *Cercoleptes caudivolvulus* (Pall.). Presented by
 Capt. A. Ruck Keene.
5. 1 Black Francolin. *Francolinus vulgaris*, Steph. Received in exchange.
6. 1 Burchell's Zebra. *Equus burchellii*, Gray. Born.
 1 ♂ Canadian Beaver. *Castor canadensis*, Kuhl. Purchased.
 1 Demoiselle Crane. *Anthropoides virgo* (Linn.). Purchased.
 1 Trumpeter Swan. *Cygnus buccinator*, Rich. Purchased.
 2 Fulvous Tree-Ducks. *Dendrocygna fulva* (Gm.). Purchased.
 1 Rosy-billed Duck. *Fuligula peposaca* (Vieill.). Purchased.
 2 White-backed Bateleur Eagles. *Helotarsus ecaudatus* (Daud.),
 var. *leuconota*. Purchased.
 2 Waxwings. *Ampelis garrulus* (Linn.). Purchased.
 1 Arabian Bustard. *Otis arabs*, Less. Purchased.
 1 Senegal Bustard. *Otis senegalensis*, Vieill. Purchased.
 2 Ring-necked Parrakeets. *Palæornis torquata* (Linn.). Deposited.
7. 1 Bahama Duck. *Pæcilonetta bahamensis* (Linn.). Deposited.
8. 1 ♂ Japanese Deer. *Cervus sika*, Temm. Born.
 6 Summer-Ducks. *Aix sponsa* (Linn.). Hatched.
10. 5 Australian Wild Ducks. *Anas superciliosa*, Gm. Hatched.
11. 7 Black-backed Kaleeges. *Euplocamus melanotus* (Blyth). Hatched.
 1 Japanese Pheasant. *Phasianus versicolor*, Vieill. Hatched.
 3 Common Chameleons. *Chamæleon vulgaris*, Daud. Presented
 by E. W. Underwood, Esq.
12. 9 Wild Turkeys. *Meleagris gallopardo*, Linn. Hatched.
 6 Great Cyclodus Lizards. *Cyclodus gigas* (Bodd.). Born.
 1 Peregrine Falcon. *Falco peregrinus*, Linn. Presented by the
 Rev. J. Climensson.
 1 Hobby. *Hypotriorchis subbuteo* (Linn.). Purchased.
14. 9 Pallas's Eared Pheasants. *Crossoptilon auritum* (Pall.). Hatched.
 1 pair of Bennett's Wallabies. *Halmaturus bennettii*, Waterh.
 Presented by William Euduby, Esq.

- June 14. 1 pair of Black Swans. *Cygnus atratus*, Lath. Presented by John P. Gassiot, Esq., jun., F.Z.S.
- 1 pair of Formosan Deer. *Cervus taëvanus*, Blyth. Presented by John Fleming, Esq., F.Z.S.
- 2 Common Kingfishers. *Alcedo ispida*, Linn. Presented by Capt. C. A. Delmar.
- 1 Long-billed Butcherbird. *Barita destructor*, Temm. Purchased.
- 1 Pennant's Parrakeet. *Platycercus pennantii* (Lath.). Presented by Dr. Mueller, C.M.Z.S.
15. 1 Fitzinger's Snake. *Oxyrrhopus fitzingeri*. Presented by Prof. Nation, of Lima, C.M.Z.S.
17. 1 Black-fronted Spider Monkey. *Ateles frontatus*, Gray. Purchased.
- 1 Dorsal Squirrel. *Sciurus dorsalis*, Gray. Purchased.
- 1 Common Cormorant. *Phalacrocorax carbo*, Linn. Presented by Capt. Salvin.
18. 2 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Hatched.
- 1 Levaillant's Amazon. *Chrysotis levaillantii*, Gray. Presented by C. M. Jones, Esq.
- 7 Green Woodpeckers. *Picus viridis*, Linn. Purchased.
19. 1 pair of Equine Deer. *Cervus equinus*, Cur. Purchased.
- 1 Capybara. *Hydrochærus capybara*, Erxl. Purchased.
- 1 Golden Tiger-Cat. *Felis aurata*, Temm. Purchased.
- 1 ♂ Ganga Cockatoo. *Callocephalon galeatum* (Lath.). Purchased.
- 1 Blue-fronted Amazon. *Chrysotis amazonica* (Gm.). Purchased.
- 2 Blue-headed Pigeons. *Starnænas cyanocephalus* (Linn.). Purchased.
- 2 Rufous Pigeons. *Columba rufina*, Temm. Purchased.
- 1 Tyrantbird. *Megarhynchus pitangua* (Linn.). Purchased.
- 1 Cow-bird. *Molothrus pecoris* (Gm.). Purchased.
- 1 Black Tanager. *Tachyphonus melaleucus* (Sparrrn.). Purchased.
20. 1 Grison. *Grisonia vittata* (Schreb.). Purchased.
21. 1 Hybrid Lemur. Born.
- 1 Kite. *Milvus niger*, Briss. Hatched.
- 2 Cinereous Eagles. *Haliaëtus albicilla* (Linn.). Presented by His Grace the Duke of Athole.
22. 1 Javan Peafowl. *Pavo muticus*, Horsf. Hatched.
- 5 Bahama Ducks. *Pacilonetta bahamensis* (Linn.). Hatched.
- 1 pair of Barred-tailed Pheasants. *Phasianus reevesii*, Gray. Purchased.
- 1 Oystercatcher. *Hæmatopus ostralegus*, Linn. Presented by J. B. Williams, Esq.
23. 3 Cheer Pheasants. *Phasianus wallichii*, Hardw. Hatched.
- 2 Lineated Pheasants. *Euplocamus lineatus* (Lath. MS.). Hatched.
- 3 Swinhoe's Pheasants. *Euplocamus swinhoei*, Gould. Hatched.
24. 5 Cape Doves. *Ena capensis* (Linn.). Presented by Mrs. Ross.
- 2 pairs of Nonpareils. *Cyanospiza ciris* (Linn.). Purchased.
- 1 Barraband's Parrakeet. *Polytelis barrabandii* (Sw.). Purchased.
- 2 Carolina Conures. *Conurus carolinensis* (Linn.). Purchased.
- 1 pair of White-breasted Doves. *Peristera jamaicensis* (Linn.). Purchased.
- 1 Mona Monkey. *Cercopithecus mona*, Erxl. Purchased.
25. 1 Greater Sulphur-crested Cockatoo. *Cacatua galerita* (Lath.). Presented by Mrs. Tanqueray.

- June 25. 1 Long-eared Owl. *Otus vulgaris* (Linn.). Presented by Howard Saunders, Esq., F.Z.S.
 1 Ocelot (from Buenos Ayres). *Felis pardalis*, L. Received in exchange.
26. 1 Smooth Snake. *Coronella lævis*, Lacép. Presented by — Penny, Esq.
27. 10 Japanese Pheasants. *Phasianus versicolor*, Vieill. Hatched.
 1 Mona Monkey. *Cercopithecus mona*, Erxl. Purchased.
 4 Hawk's-billed Turtles. *Caretta imbricata* (Schw.). Presented by Capt. Cooper.
 1 Angola Vulture. *Gypohierax angolensis* (Gm.). Purchased.
 1 Blue-rumped Parrakeet. *Psittinus malaccensis* (Lath.). Purchased.
 1 Red-footed Squirrel. *Xerus erythropus*, Geoff. Purchased.
28. 6 Rufous Tinamous. *Rhynchotus rufescens* (Temm.). Hatched.
 3 Rattlesnakes. *Crotalus durissus* (Daud.). Purchased.
 2 American Black Snakes. *Coluber guttatus*, Linn. Purchased.
 1 Nightingale. *Philomela lusciniæ* (Linn.). Presented by — Boswell, Esq.
- July 1. 1 pair of Chinese Geese. *Anser cygnoides*, Linn. Presented by Charles Shaw, Esq.
 1 Mortier's Waterhen. *Tribonyx mortieri*, Dubus. Purchased.
 2. 1 Greater Sulphur-crested Cockatoo. *Cacatua galerita* (Lath.). Presented by J. R. Cameron, Esq.
 3. 1 New-Zealand Owl. *Athene novæ-seelandiæ* (Gm.). Presented by — Arminger, Esq.
 4. 7 Getulian Ground-Squirrels. *Xerus getulus* (Linn.). Presented by Sir John H. Drummond-Hay, K.C.B., C.M.Z.S.
 5. 1 Black Rat (from a Manilla ship). *Mus* — ? Presented by Frederick Bond, Esq., F.Z.S.
 8. 2 Black Rats (from a Manilla ship). *Mus* — ? Presented by R. McLachlan, Esq.
 1 Coquette Antelope. *Cephalophus rufilatus*, Gray. Purchased.
10. 1 Kingfisher. *Alcedo ispida*, Linn. Presented by Capt. C. A. Delmar.
11. 2 Common Seals. *Phoca vitulina*, Linn. Purchased.
 2 Chestnut Cuckoos. *Centropus rufipennis*, Ill. Purchased.
 1 Rat-Snake. *Ptyas mucosa* (Linn.). Purchased.
13. 4 Turtles. Presented by Henry Jones, Esq.
14. 2 Varied Hemipodes. *Turnix varia* (Lath.). Hatched.
15. 2 Hybrid Goats, ♂ & ♀. Between Markhor and Cretan (*Capra megaceros*, Hutt., and *C. bedu*, Forsk.). Born.
 3 Andaman Pigs. *Sus andamensis*, Blyth. Born.
 1 Sun-Bittern. *Eurypyga helius*, Pall. Hatched.
 2 Cheer Pheasants. *Phasianus wallichii*, Hardw. Hatched.
 2 Common Seals. *Phoca vitulina*, Linn. Purchased.
 1 Ringed Seal. *Phoca fatida*, Müll. Purchased.
16. 1 ♂ Japanese Deer. *Cervus sika*, Temm. Born.
 2 Stock-Doves. *Columba ænas*, Linn. Hatched.
 1 Black Rat. *Mus rattus*, Linn. Presented by Mortimer Allfrey, Esq.
 3 Weaverfish. *Trachinus draco*, Don. Presented by Robert Elwes, Esq.
 3 Soles. *Solea vulgaris*, Cuv. Presented by Robert Elwes, Esq.
 1 Flounder. *Platessa fletus* (Linn.). Presented by Robert Elwes, Esq.

- July 16. 2 Long-spined Cottus. *Cottus bubalis*. Presented by Robert Elwes, Esq.
 1 Pipefish. Presented by Robert Elwes, Esq.
 17. 4 Black-fronted Lemurs. *Lemur nigrifrons*, Geoff. Purchased.
 18. 1 Common Cassowary. *Casuarius guleatus* (Vieill.). Hatched.
 1 Black-crested Cardinal. *Gubernatrix cristatella* (Vieill.). Hatched.
 1 White-crowned Pigeon. *Columba leucocephala*, Linn. Hatched.
 1 Crested Pigeon. *Ocyphaps lophotes* (Temm.). Hatched.
 1 Vinaceous Turtledove. *Turtur vinaceus* (Gm.). Hatched.
 1 Common Zebra. *Equus zebra*, Linn. Purchased.
 1 Common Magpie. *Pica caudata*, Flem. Presented by F. S. Hoblyn, Esq.
 1 Dingo. *Canis dingo*, Blumenb. Presented by Dr. Mueller, C.M.Z.S.
 19. 2 Bahama Ducks. *Paeilonetta bahamensis* (Linn.). Hatched.
 1 Common Otter. *Lutra vulgaris*, Linn. Presented by the Hon. Rowland Hill.
 7 Noisy Frogs. *Rana clamata*, Daud. Presented by A. Downs, Esq., C.M.Z.S.
 1 White Rat. *Mus decumanus*, Linn., var. *alba*. Presented by Lady Cust.
 20. 1 Rufous Tinamou. *Rhynchotus rufescens* (Temm.). Hatched.
 1 Common Cuckoo. *Cuculus canorus*, Linn. Presented by R. L. Bristow, Esq.
 1 White-fronted Capuchin Monkey. *Cebus albifrons*, Geoff. Purchased.
 1 Jackal Buzzard. *Buteo jacob* (Daud.). Purchased.
 4 Red-bellied Waxbills. *Estrela rubriventris* (Vieill.). Purchased.
 22. 1 Indian Crocodile. *Crocodylus bombifrons*, Gray. Presented by Edmund Penning, Esq.
 23. 1 Vulpine Phalanger. *Phalangista vulpina* (Shaw). Born.
 1 young ♀ Giraffe. *Camelopardalis giraffa* (Gm.). Purchased.
 2 Common Seals. *Phoca vitulina*, Linn. Purchased.
 2 Black-headed Buntings. *Emberiza melanocephala*, Scop. Purchased.
 25. 1 Anaconda. *Eunectes murinus* (Linn.). Purchased.
 1 Downy Owl. *Athene torquata* (Daud.). Purchased.
 26. 1 Bartlett's Pigeon. *Phlogoenas crinigera*, Puch. Hatched.
 1 Common Cuckoo. *Cuculus canorus*, Linn. Presented by the Rev. J. B. Sweet.
 27. 7 Sæmmering's Pheasants (3 ♂, 4 ♀). *Phasianus sæmmeringii*. Presented by Lieut. Duncan Stewart.
 2 pairs of Japanese Pheasants. *Phasianus versicolor*, Vieill. Presented by Lieut. Duncan Stewart.
 1 Chinese Lark. *Melanocorypha mongolica* (Gm.). Presented by Lieut. Duncan Stewart.
 1 Ariel Toucan. *Ramphastos ariel*, Vig. Purchased.
 28. 1 West-African Riverhog. *Potamocheerus penicillatus*, Gray. Born.
 29. 1 Palm-Squirrel. *Sciurus palmarum*, Linn. Presented by Christian G. Wraz, Esq.
 2 Rose-breasted Grosbeaks. *Hedymeles ludovicianus* (Linn.). Purchased.
 1 Nutmeg-bird. *Munia undulata* (Lath.). Purchased.
 1 Crimson Finch. *Estrela phaeton*, Homb. et Jacq. Purchased.

- July 29. 1 Chestnut-eared Finch. *Amadina castanotis*, Gould. Purchased.
 1 Chestnut-breasted Finch. *Donacola castaneothorax*, Gould. Purchased.
30. 2 Short-headed Phalangers. *Belideus breviceps*, Waterh. Born.
 6 Japanese Pheasants. *Phasianus versicolor*, Vieill. Hatched.
31. 3 Toads (from Russia). *Bufo*, sp. Presented by H. Poole, Esq.
 1 Frog (from Russia). *Rana*, sp. Presented by H. Poole, Esq.
 1 Common Jackal. *Canis aureus*, Linn. Presented by Edmund A. Ankers, Commander of the ship 'Pandora.'
- Aug. 1. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by Jas. R. Thompson, Esq.
5. 1 Iguana. *Iguana* — ? Presented by Robert H. Macaulay, Esq.
- 1 Ursine Colobus. *Colobus ursinus*, Ogilb. Purchased.
 1 Mangabey Monkey. *Cercocebus æthiops* (Kuhl). Purchased.
 1 Diana Monkey. *Cercopithecus diana* (Linn.). Purchased.
 1 Moustache-Monkey. *Cercopithecus cephus*, Erxl. Purchased.
 3 Malbrouck Monkeys. *Cercopithecus cynosurus*, Desm. Purchased.
- 1 Gambian Pouched Rat. *Cricetomys gambianus*, Waterh. Purchased.
- 2 Brazilian Hangnests. *Icterus jamacai*. Purchased.
6. 1 ♂ Persian Deer. *Cervus maral*, Gray. Born.
 2 Tibetan Wolves. *Canis laniger*, Hodgs., var. *nigra*. Presented by Lieut. A. A. Kinloch and Lieut. J. Biddulph.
 1 Indian Badger. *Arctonyx collaris*, Hodgs. Presented by Dr. J. Anderson, C.M.Z.S.
 1 Slow Loris. *Nycticebus tardigradus* (Linn.). Presented by Dr. J. Anderson, C.M.Z.S.
 1 Panolia Deer. *Cervus eldi*, McClell. Presented by A. Grote, Esq., C.M.Z.S.
 8 Water-Tortoises. *Emys*, sp. var. Presented by Dr. J. Anderson, C.M.Z.S.
- 2 Indian Pelicans. *Pelecanus mitratus* (Licht.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 4 Demoiselle Cranes. *Anthropoides virgo* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 2 ♀ Peacock Pheasants. *Polyplectron chinquis*, Temm. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Bronze Pigeon. *Carpophaga ænea*, Jerd. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Singing Pigeon. *Treron sphenura* (Vig.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 White Fruit-Pigeon. *Carpophaga luctuosa* (Temm.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Entellus Monkey. *Sennopithecus entellus* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Slow Loris. *Nycticebus tardigradus* (Linn.). Presented by A. Grote, Esq., C.M.Z.S.
- 1 Fighting Hemipode. *Turnix pugnax* (Temm.). Presented by A. Grote, Esq., C.M.Z.S.
7. 1 ♀ Blessbok Antelope. *Damaïs albifrons*, Burch. Born.
 1 Coati. *Nasua nasica* (Linn.). Presented by William Archibald, Esq., jun.
 1 Vervet Monkey. *Cercopithecus talandii*, Is. Geoff. Deposited.

- Aug. 8. 1 ♀ Gayal. *Bos frontalis*, Lambert. Presented by the Babu Rajendra Mullick, C.M.Z.S.
 1 ♀ Gayal. *Bos frontalis*, Lambert. Presented by William Dunn, Esq., C.M.Z.S.
 1 Bengal Fox. *Canis bengalensis*, Shaw. Presented by E. Fane, Esq.
 9. 3 Common Chameleons. *Chamæleo vulgaris*, Daud. Presented by Miss H. E. Gautrez.
 3 Silk Fowls. *Gallus domesticus*, Linn., var. Presented by Mrs. Wambey.
 10. 4 Barred-tailed Pheasants. *Phasianus reevesii*, Gray. Hatched.
 5 Superb Tanagers. *Calliste fastuosa* (Less.). Purchased.
 1 Common Chameleon. *Chamæleon vulgaris*, Daud. Presented by J. W. Howard, Esq.
 11. 5 Rufous Tinamous. *Rhynchotus rufescens* (Temm.). Hatched.
 12. 1 Turquoise Parrakeet. *Euphema pulchella* (Shaw). Hatched.
 1 Rufous-necked Weaverbird. *Hyphantornis textor* (Gm.). Hatched.
 1 Common Peafowl. *Pavo cristatus*, Linn. Presented by Mrs. Wambey.
 1 Coati. *Nasua nasica* (Linn.). Presented by Arthur George Walker, Esq.
 13. 1 Marmoset Monkey. *Hapale jacchus* (Linn.). Deposited.
 14. 1 River-Jack. *Clotho rhinoceros*, Schl. Purchased.
 1 Pinche Monkey. *Hapale ædipus* (Linn.). Deposited.
 1 Ceram Lory. *Lorius garrulus* (Linn.). Deposited.
 15. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by Francis Lambert, Esq.
 16. 5 Black-backed Porphyrios. *Porphyrio melanotus*, Temm. Presented by the Acclimatization Society of Canterbury, New Zealand.
 1 New Zealand Owl. *Athene novæ-seelandiæ* (Gm.). Presented by the Acclimatization Society of Canterbury, New Zealand.
 17. 1 Black Rat. *Mus rattus*, Linn. Presented by Mortimer Allfrey, Esq.
 19. 1 pair of Reeves's Muntjacs. *Cervulus reevesii*, Ogilby. Deposited.
 1 White-faced Paradoxure. *Paradoxurus larvatus* (Gray). Purchased.
 1 West-African Hornbill. *Buceros elatus*, Temm. Purchased.
 20. 1 Hyacinthine Maccaw. *Ara hyacinthina* (Lath.). Purchased.
 21. Two Scemmering's Antelopes. *Gazella scemmeringii* (Cretzsch.). Purchased.
 1 Spotted Cavy. *Cælogenys paca* (Linn.). Presented by Miss M. Shaw Lefevre.
 22. 2 White-crowned Pigeons. *Columba leucocephala*, Linn. Hatched.
 1 Vinaceous Turtledove. *Turtur vinaceus* (Gm.). Hatched.
 24. 2 Indian Wild Pigs. *Sus indicus*, Gray. Presented by Capt. Gildea, 21st Fusiliers.
 27. 1 Marimonda Spider Monkey. *Ateles belzebuth*, Linn. Purchased.
 29. 2 Pinche Monkeys. *Hapale ædipus* (Linn.). Presented by William Leir, Esq.
 30. 1 Black Leopard. *Felis leopardus*, Linn., var. *nigra*. Presented by Major John Pearse.
 31. 4 Rufous Tinamous. *Rhynchotus rufescens* (Temm.). Hatched.
 2 Garden Dormice. *Myoxus nitela*, Schreb. Presented by John Lee, Esq.

- Sept. 3. 1 Brush Turkey. *Talegalla lathamii*, Gray. Hatched.
 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by J. Conolly, Esq.
 2 Great Eagle-Owls. *Bubo maximus* (Aldrov.). Presented by — Nerdrum, Esq.
4. 1 pair of Greek Partridges. *Caccabis saxatilis*, Bechst. Presented by G. Jackson Eldridge, Esq.
5. 1 Goliath Heron. *Ardea goliath*, Temm. Presented by F. G. Mercer, Esq.
 1 Common Adder. *Pelias berus*, Merr. Presented by W. R. Tate, Esq.
7. 1 ♂ Brahmin Calf. *Bos indicus*, Linn., var. Born.
 8. 1 ♀ Wapiti Deer. *Cervus canadensis*, Briss. Born.
 3 Crested Ground-Parakeets. *Calopsitta novæ-hollandiæ* (Gm.). Hatched.
9. 1 Grey Ichneumon. *Herpestes griseus* (Geoff.). Presented by G. P. Coffin, Esq.
10. 1 ♀ Cashmere-shawl Goat. *Capra hircus*, Linn., var. Born.
13. 3 Rufous Tinamous. *Rhynchotus rufescens* (Temm.). Hatched.
 1 Kinkajou. *Cerculeptes caudivolvulus* (Pall.). Presented by Lewis Joel, Esq.
 1 Kinkajou. *Cerculeptes caudivolvulus* (Pall.). Presented by H.E. the Hon. A. Gordon, Governor of Trinidad.
14. 1 Hairy-eared Bear. *Ursus piscator*, Puch. Presented by W. Scott Stonehewer, Esq.
 1 Malayan Bear. *Ursus malayanus*, Raffl. Presented by T. Pandorf, Esq.
 1 Black Rat. *Mus rattus*, Linn. Presented by C. P. Jerocold, Esq.
16. 2 Indian Porcupines. *Hystrix leucura*, Sykes. Born.
17. 1 ♂ Coati. *Nasua nasica* (Linn.). Presented by Reginald G. Tootal, Esq.
18. 1 pair of Black-backed Geese. *Sarcidiornis regia* (Gm.). Purchased.
 2 Madagascar Tree-Ducks. *Dendrocygna major*, Jerdon. Purchased.
 1 Houbara Bustard. *Otis houbara*, Gm. Purchased.
 1 Indian Porcupine. *Atherura fasciculata*. Purchased.
 1 White-lipped Peccary. *Dicotyles albirostris*. Presented by Wm. Summerhayes, Esq.
 1 Marmoset Monkey. *Hapale jacchus* (Linn.). Purchased.
19. 1 Humboldt's Lagothrix. *Lagothrix humboldtii* (Geoff.). On approval.
21. 1 Moustache-Monkey. *Cercopithecus cephus*, Erxl. Presented by J. J. Monteiro, Esq.
23. 5 Common Dormice. *Myoxus muscardinus* (Linn.). Presented by J. Dorey, Esq.
24. 1 Indian Antelope. *Antelope cervicapra*, Linn. Presented by the Officers of the 51st Light Infantry.
 1 Formosan Deer. *Ursus formosanus*, Swinhoe. Presented by Robert Swinhoe, Esq., F.Z.S., H.B.M. Consul at Amoy.
 1 ♀ Swinhoe's Deer. *Cervus swinhoii*, Sclater. Presented by Robert Swinhoe, Esq., F.Z.S., H.B.M. Consul at Amoy.
 2 pairs of Japanese Teal. *Querquedula formosa* (Gm.). Purchased.
25. 2 Nuthatches. *Sitta cæsia*, Meyer. Purchased.
 2 Red-backed Shrikes. *Enneactonus collurio* (Linn.). Purchased.

- Sept. 25. 3 Wagtails. *Motacilla alba*, L. Purchased.
27. 1 Poë Honey-eater. *Prothemadura novæ-hollandiæ* (Gm.). Presented by William Saunders, Esq.
- 1 Rose-crested Cockatoo. *Cacatua moluccensis* (Gm.). Presented by Miss Ann E. Wimbolt.
28. 3 Common Sheldrakes. *Tadorna vulpanser*, Flem. Presented by Lord Francis Conyngham.
- Oct. 1. 1 Coypu. *Myopotamus coypus* (Mol.). Presented by Capt. Leeke.
- 1 West-Indian Snake. Presented by G. R. Waterhouse, Esq., F.Z.S.
2. 1 ♂ Wapiti Deer. *Cervus canadensis*, Briss. Born.
4. 1 Great Anteater. *Myrmecophaga jubata*, Linn. Presented by Dr. J. A. Palin, C.M.Z.S.
- 2 young Wood-Pigeons. *Columba palumbus*, Linn. Presented by John Gould, Esq., V.P.Z.S.
9. 1 Lanner Falcon. *Falco lanarius*, Schl. Purchased.
10. 6 Puff-Adders. *Clotho arietans*. Presented by F. G. Clark, Esq.
11. 1 ♂ Cashmere-shawl Goat. *Capra hircus*, Linn., var. Born.
- 3 Tyrantbirds. *Megarhynchus pitangua* (Linn.). Purchased.
12. 4 Formosan Pigs. *Sus taivanus*, Swinhoe. Born.
14. 1 pair of Red-crested Cardinals. *Paroaria cucullata* (Lath.). Purchased.
16. 1 Gray's Jerboa Kangaroo. *Bettongia grayi* (Gould). Presented by the family of the late Rev. Ed. Selwyn.
- 1 Chameleon. *Chamæleon vulgaris*, Daud. Presented by Miss Stedolph.
17. 1 Dingo. *Canis dingo*, Blum. Presented by Wm. Tucker, Esq.
19. 1 Piping Crow. *Gymnorhina leuconota*, Gould. Deposited.
21. 1 Black-fronted Spider Monkey. *Ateles frontatus*, Gray. Presented by Capt. Acklom, 6th Regiment.
- 1 Lesser Black-backed Gull. *Larus fuscus*, Linn. Presented by A. K. Dale, Esq.
23. 1 Barbary Ape. *Macacus inuus* (Linn.).
25. 1 Gray's Jerboa Kangaroo. *Bettongia grayi* (Gould). Born.
26. 1 Black-footed Penguin. *Spheniscus demersus* (Linn.). Purchased.
28. 1 Mauge's Dasyure. *Dasyurus maugei*, Geoff. Presented by J. T. Luce, Esq.
- 1 Laughing Kingfisher. *Dacelo gigantea* (Lath.). Presented by J. T. Luce, Esq.
- 1 Young Crocodile. *Crocodylus* —? Presented by Robert Barter, Esq.
- 3 Siamese Pheasants, 2 ♂, 1 ♀. *Euplocamus praelatus* (Bonap.). Received in exchange.
- 6 Axolotls. *Siredon mexicanus* (Shaw). Received in exchange.
29. 1 St. John's Monkey. *Macacus sancti-johannis*, Swinhoe. Presented by T. J. Fawcett, Esq.
- 1 ♂ Hog Deer. *Cervus porcinus*, Zimm. Presented by Capt. H. T. Thompson, 57th Light Infantry.
- 1 Canadian Beaver. *Castor canadensis*, Kuhl. Presented by Sir Charles M. Lampson, Deputy-Governor, Hudson's Bay Company.
- 2 Skunks. *Mephitis mephitis*. Presented by the Hudson's Bay Company.

- Oct. 29. 2 Cape Crowned Cranes. *Balearica regulorum*, Licht. Purchased.
30. 1 Molucca Deer. *Cervus moluccensis*, Müll. Born.
 1 Yellow-footed Rock-Kangaroo. *Petrogale xanthopus*, Gray. Born.
 1 ♀ Sambar Deer. *Cervus aristotelis*, Cuv. Presented by Capt. Clinck, ship 'Petunia.'
 1 Black-headed Partridge. *Caccabis melanocephala* (Rüpp.). Purchased.
 1 pair of Crested Colins. *Eupsychortyx cristatus* (Linn.). Purchased.
 1 Bourke's Parrakeet. *Euphema bourkii*, Mitch. Purchased.
 2 Red-billed Hornbills. *Trogon erythrorhynchus*, Temm. Purchased.
31. 1 Varying Hare. *Lepus timidus*, Linn. Purchased.
- Nov. 1. 1 ♂ Walrus. *Trichechus rosmarus*, Linn. Purchased.¹
 2. 1 Redwing. *Turdus iliacus*, Linn. Presented by Mrs. Mears.
 1 Russian Frog. *Rana*, sp. ign. Purchased.
 4. 1 Suricate. *Suricata zenk* (Gm.). Presented by D. P. Blaine, Esq.
 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by Geo. Marshall, Esq.
 5. 1 Egyptian Fox. *Canis niloticus*, Geoff. Presented by W. Taylor, Esq.
 6. 1 Cinereous Vulture. *Vultur cinereus*, Linn. Presented by G. F. Moss, Esq.
 1 Short-eared Owl. *Brachyotus palustris* (Bonap.). Presented by Dr. Bree.
 1 South-African Porcupine. *Hystrix africa-australis*, Peters. Presented by Capt. Samuel Loram.
 8. 1 Great Anteater. *Myrmecophaga jubata* (Linn.). Presented by Percy Brandon, Esq.
 2 Common Chameleons. *Chameleon vulgaris*, Daud. Presented by J. K. Lord, Esq., F.Z.S.
 1 Rough-legged Buzzard. *Archibuteo lagopus* (Gm.). Presented by Charles Gordon, Esq.
 1 Common Rhea. *Rhea americana*, Vieill. Purchased.
 9. 1 Rattle-Snake. *Crotalus durissus* (Daud.). Born.
 1 Chacma Baboon. *Cynocephalus porcarius* (Bodd.). Presented by J. P. Spring, Esq.
 1 Chacma Baboon. *Cynocephalus porcarius* (Bodd.). Presented by Lieut. Booth.
 11. 5 Indian Siskins. *Chrysomitris spinoides* (Vig.). Received in exchange.
 12. 1 Red Fox. *Canis fulvus*, Desm. Presented by Capt. David Herd, H.B.C.S., C.M.Z.S.
 1 Virginian Eagle-Owl. *Bubo virginianus* (Gm.). Presented by Capt. David Herd, H.B.C.S., C.M.Z.S.
 1 St. John's Buzzard. *Archibuteo sancti-johannis* (Gm.). Presented by Capt. David Herd, H.B.C.S., C.M.Z.S.
 14. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by Major Hutchinson, Bengal Staff Corps.
 1 Common Rhea. *Rhea americana*, Vieill. Purchased.
 15. 12 Pewets. *Vanellus cristatus*, Meyer. Purchased.
 16. 1 Common Seal. *Phoca vitulina*, Linn. Purchased.
 2 Little Grebes. *Podiceps minor*, Lath. Presented by Lieut.-Col. C. T. Cox.

- Nov. 16. 1 Western Night-Parrakeet. *Geopsittacus occidentalis*, Gould. Presented by Dr. Mueller, C.M.Z.S.
19. 1 Cinereous Vulture. *Vultur cinereus*, Linn. Presented by Sir S. Lakeman.
- 1 Griffon Vulture. *Gyps fulvus* (Gm.). Presented by Sir S. Lakeman.
22. 1 Viscacha. *Lagostomus trichodactylus*, Brookes. Born.
23. 1 White-headed Parrot. *Pionus senilis* (Spix). Purchased.
- 1 Guinea-Baboon. *Cynocephalus papio*, Desm. Presented by Mrs. Wilson.
26. 1 Squirrel Monkey. *Callithrix sciureus* (Linn.). Presented by F. Forrome, Esq.
28. 1 Peregrine Falcon. *Falco peregrinus*, Linn. Presented by C. H. Akroyd, Esq.
- 1 Montagu's Harrier. *Circus cineraceus* (Mont.). Presented by Geo. Dawson Rowley, Esq.
- 1 Cross-Fox. *Canis fulvus*, Desm., var. *decussata*. Presented by Capt. David Herd, H.B.C.S., C.M.Z.S.
- 1 Springbok. *Gazella euchore* (Forst.). Deposited.
30. 1 Douroucouli. *Nyctipithecus trivirgatus*. Purchased.
- 1 Ring-necked Parrakeet. *Palæornis torquata* (Linn.). Presented by the Rev. T. K. Gaskell.
- Dec. 5. 1 ♀ Eland. *Oreas canna* (Pall.). Born.
6. 1 Fraser's Barn-Owl. *Strix poënsis*, Fraser. Purchased.
- 1 Crested Honey-Buzzard. *Pernis cristatus*, Cuv. Purchased.
- 2 Common Boas. *Boa constrictor*, Linn. Presented by J. Lennon Hunt, Esq., H.B.M. Consul, Rio de Janeiro.
9. 2 Musquash. *Fiber zibethicus* (Linn.). Presented by F. W. Grant, Esq.
- 2 American Thrushes. *Turdus migratorius*, Linn. Presented by F. W. Grant, Esq.
- 1 Water-Rail. *Rallus aquaticus*, Linn. Presented by the Rev. G. B. Davies Cooke.
10. 3 Young Common Sturgeons. *Acipenser sturio*, Linn. Purchased.
12. 1 Wood-Pigeon. *Columba palumbus*, Linn. Presented by W. B. Tegetmeier, Esq., F.Z.S.
14. 1 ♀ Temminck's Tragopan. *Cerionis temminckii* (Gray). Received in exchange.
- 1 Elegant Galidia. *Galidia elegans*, Is. Geoff. Purchased.
16. 3 Pallas's Eared Pheasants. *Crossoptilon auritum* (Pall.). Presented by the late Sir Eric R. Townsend Farquhar, Bart.
17. 1 Mauduyt's Crested Eagle. *Spizaëtus ornatus* (Daud.). Purchased.
19. 1 Yellow-footed Rock-Kangaroo. *Petrogale xanthopus*, Gray. Born.
- 1 Gray's Jerboa Kangaroo. *Bettongia grayi* (Gould). Born.
- 1 Spotted Owl. *Bubo maculosus* (Vieill.). Presented by Lieut. D. H. Jackson, 88th Regiment.
20. 1 Leopard (from Zanzibar). *Felis leopardus*, Linn. Presented by Dr. E. Perceval Wright, F.Z.S.
- 1 Seychelles Copsychus. *Copsychus sechellarum*, Newton. Presented by Dr. E. Perceval Wright, F.Z.S.
- 1 ♂ Cheer Pheasant. *Phasianus wallichii*, Hardw. Received in exchange.

- Dec. 21. 1 Douroucouli. *Nyctipithecus trivirgatus* (Gray). Deposited.
23. 2 Crested Guinea-fowl. *Numida cristata*, Pall. Presented by William M'Coskey, Esq.
- 2 Black Oystercatchers. *Hæmatopus niger*, Cuv. Presented by E. L. Layard, Esq., F.Z.S.
- 1 ♀ Sing-sing Antelope. *Kobus sing-sing* (Benn.). Purchased.
24. 1 Crested Pigeon. *Ocyphaps lophotes* (Temm.). Hatched.
- 1 White-crowned Pigeon. *Columba leucocephala*, Linn. Hatched.
- 2 Hairy-nosed Wombats. *Phascodomys latifrons*, Owen. Presented by the Governor of the Botanic Gardens, Adelaide.
- 2 Vulpine Phalangiers. *Phalangista vulpina* (Shaw). Presented by the Governor of the Botanic Gardens, Adelaide.
- 1 Dingo. *Canis dingo*, Blumenb. Presented by the Governor of the Botanic Gardens, Adelaide.
- 1 Wedge-tailed Eagle. *Aquila audax* (Lath.). Presented by the Governor of the Botanic Gardens, Adelaide.
- 1 Mallee Bird. *Leipoa ocellata*, Gould. Presented by the Governor of the Botanic Gardens, Adelaide.
- 4 Black-backed Porphyrios. *Porphyrio melanotus*, Temm. Presented by the Governor of the Botanic Gardens, Adelaide.
28. 1 Caracal. *Felis caracal*, Schreb. Presented by N. C. Smith, Esq.

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THE END.



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J. SMITH

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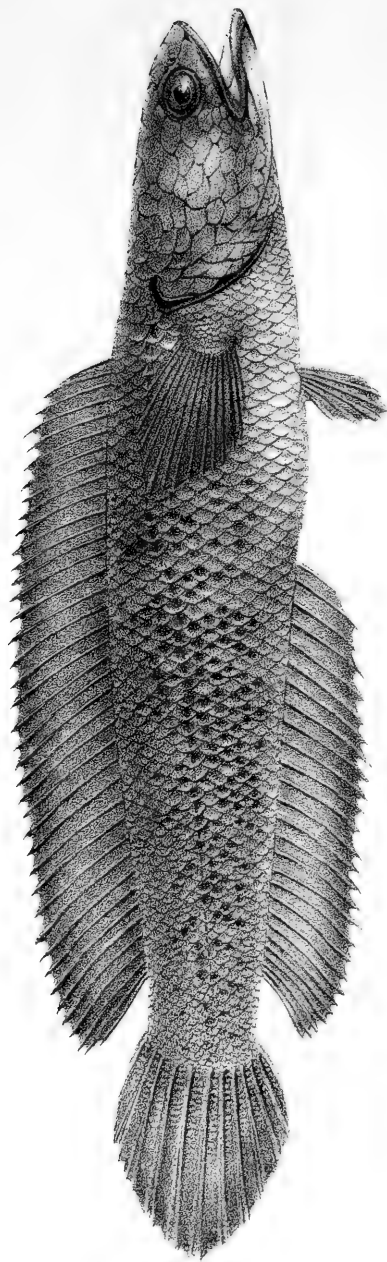
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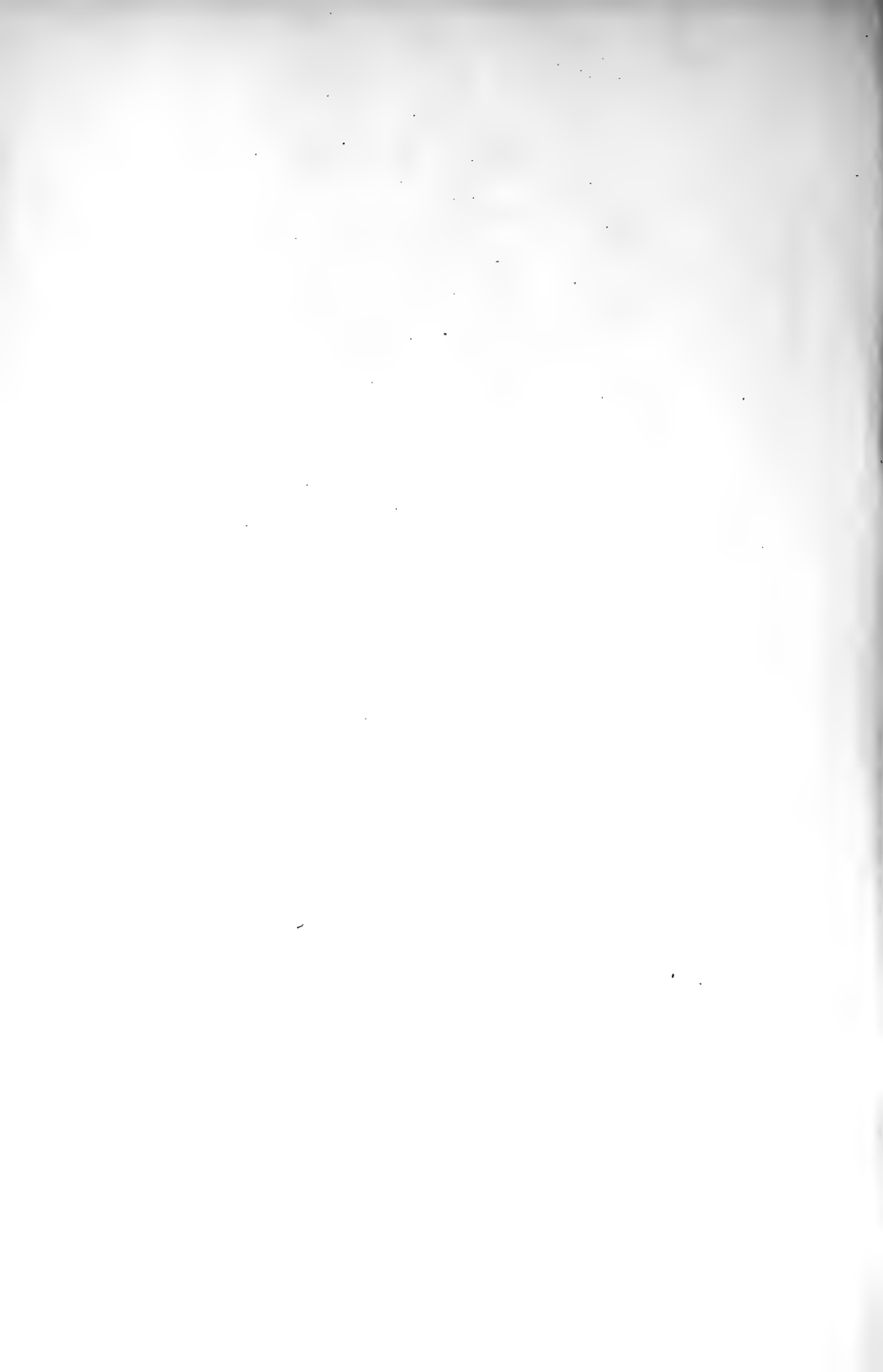


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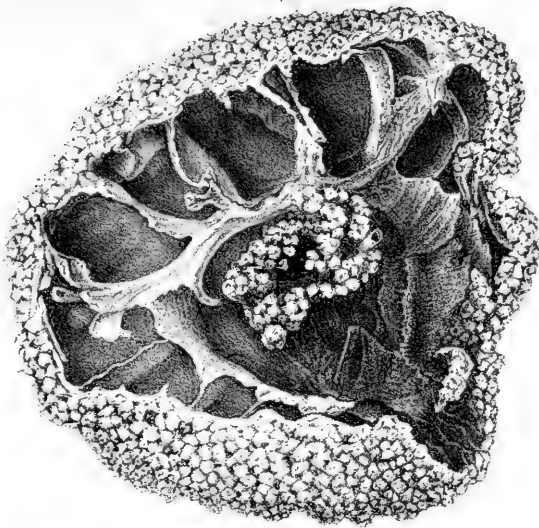




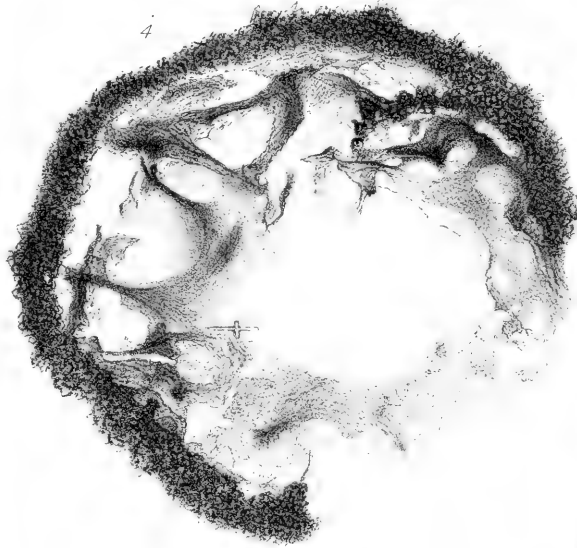
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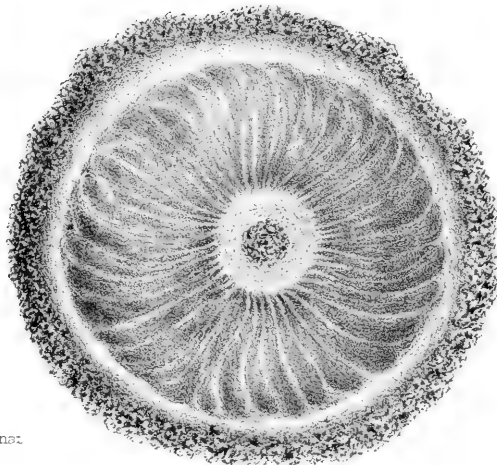
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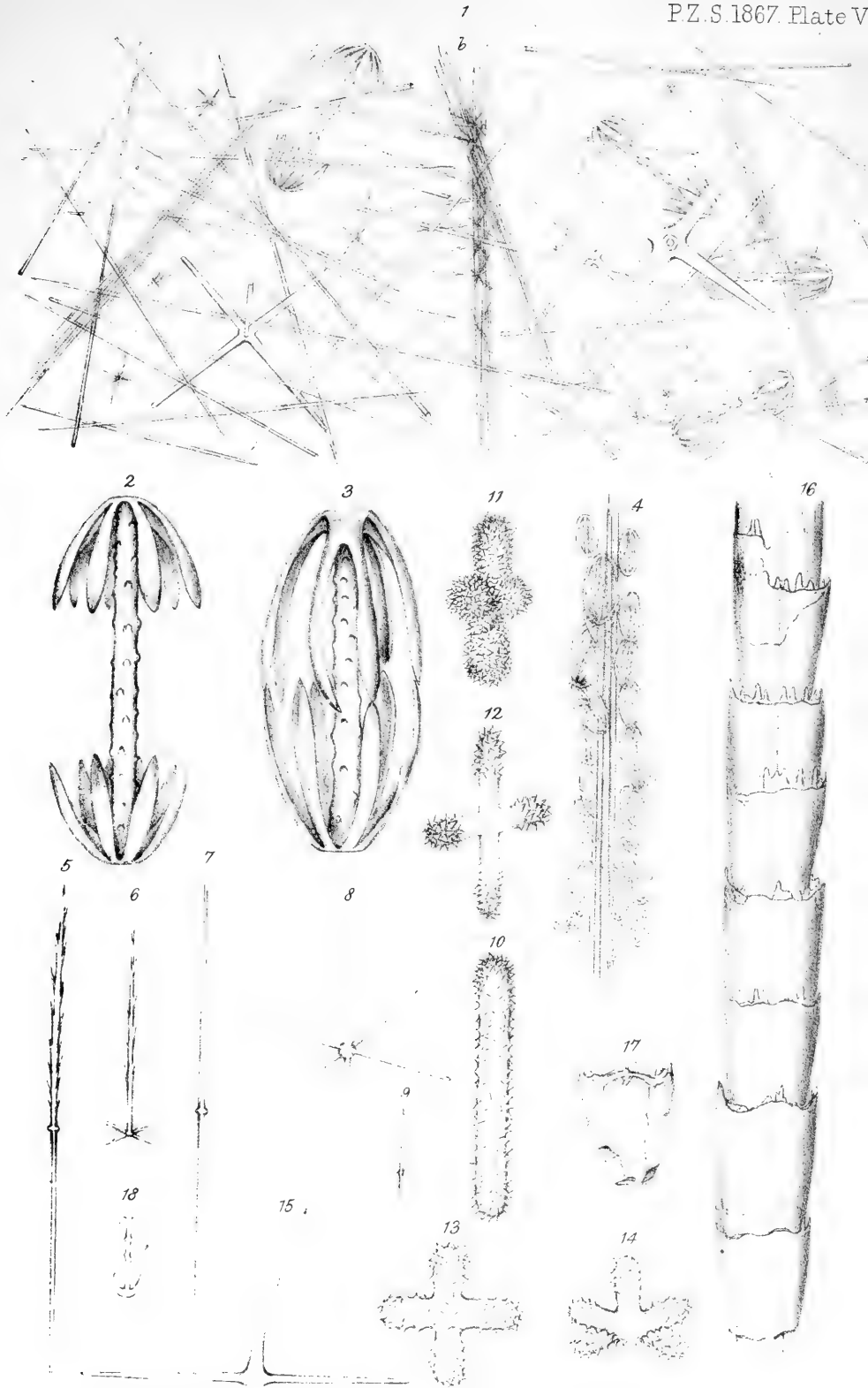
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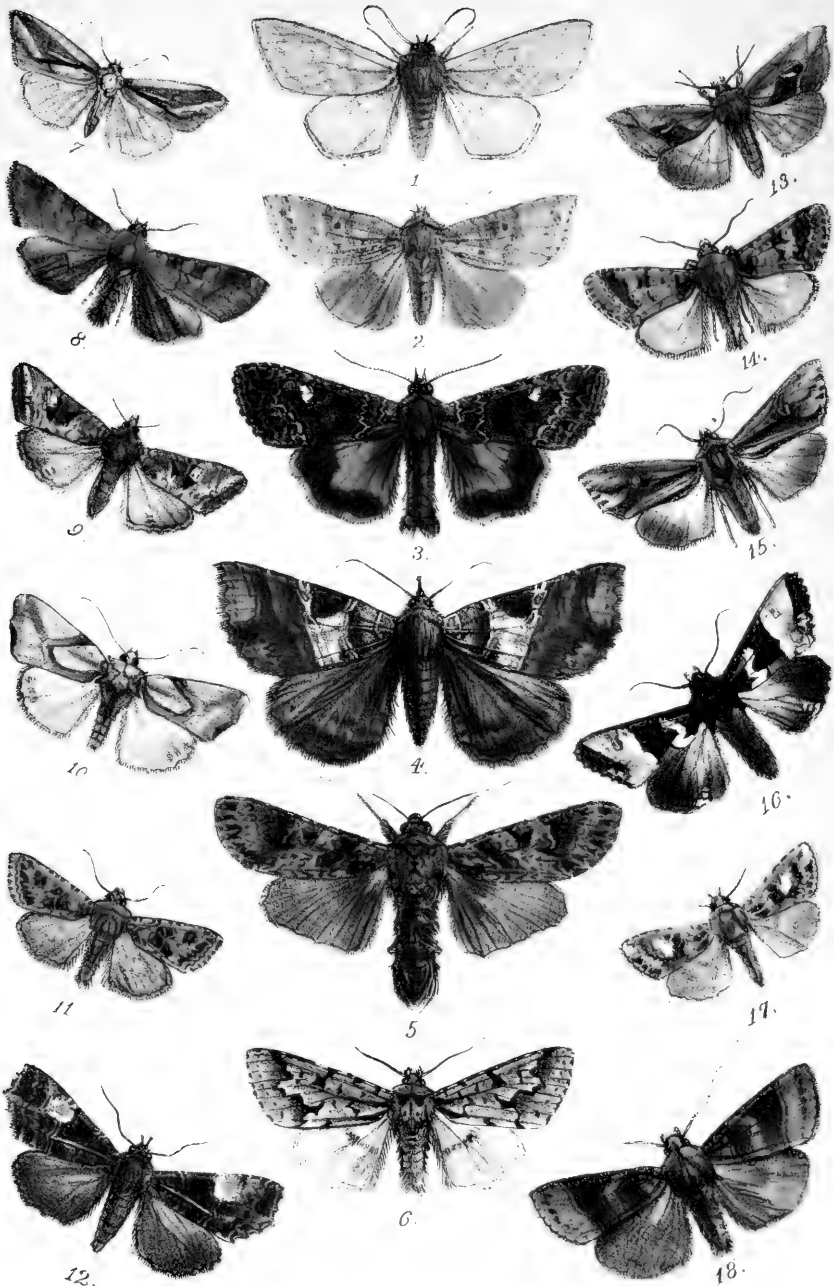
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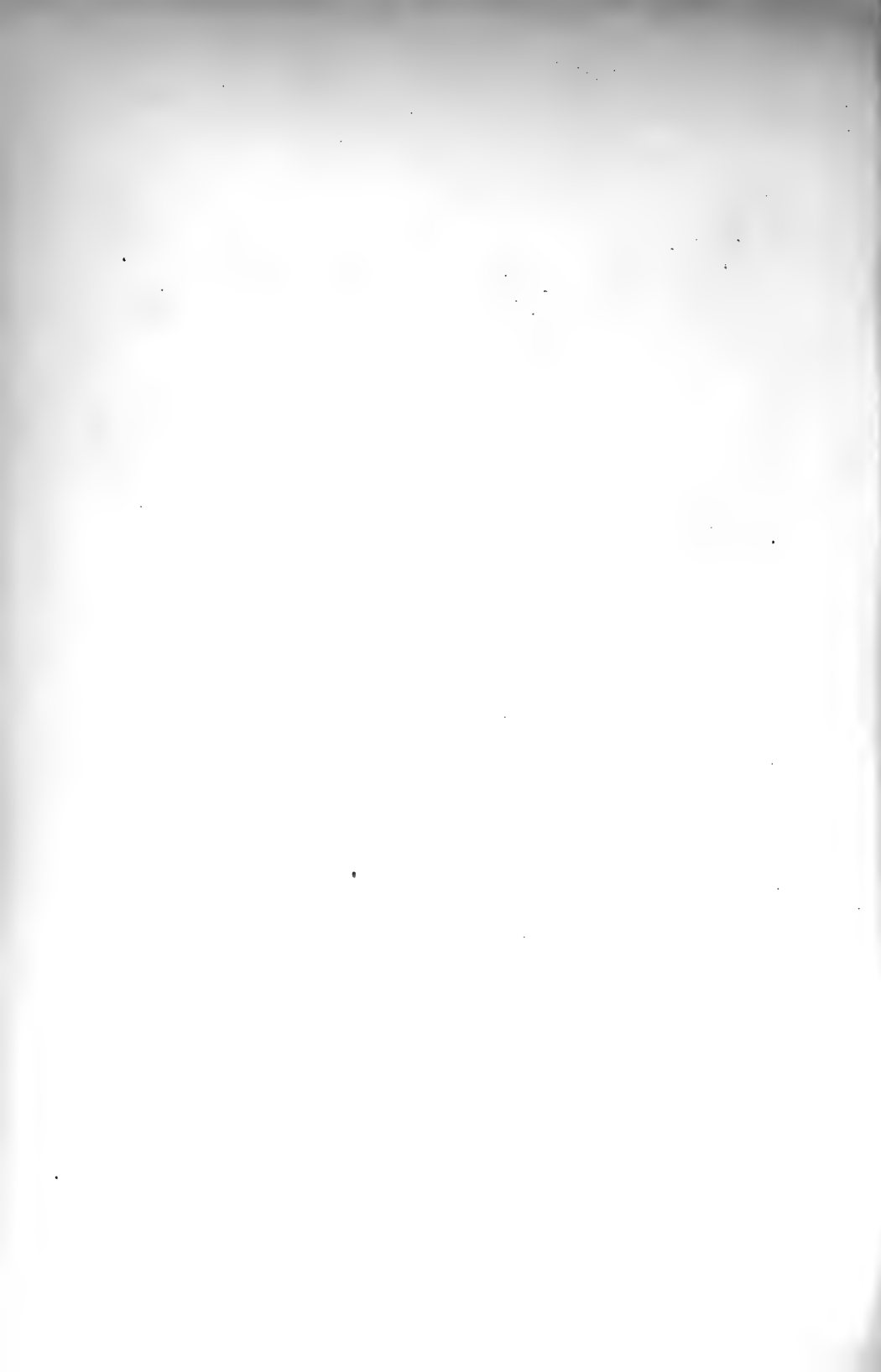


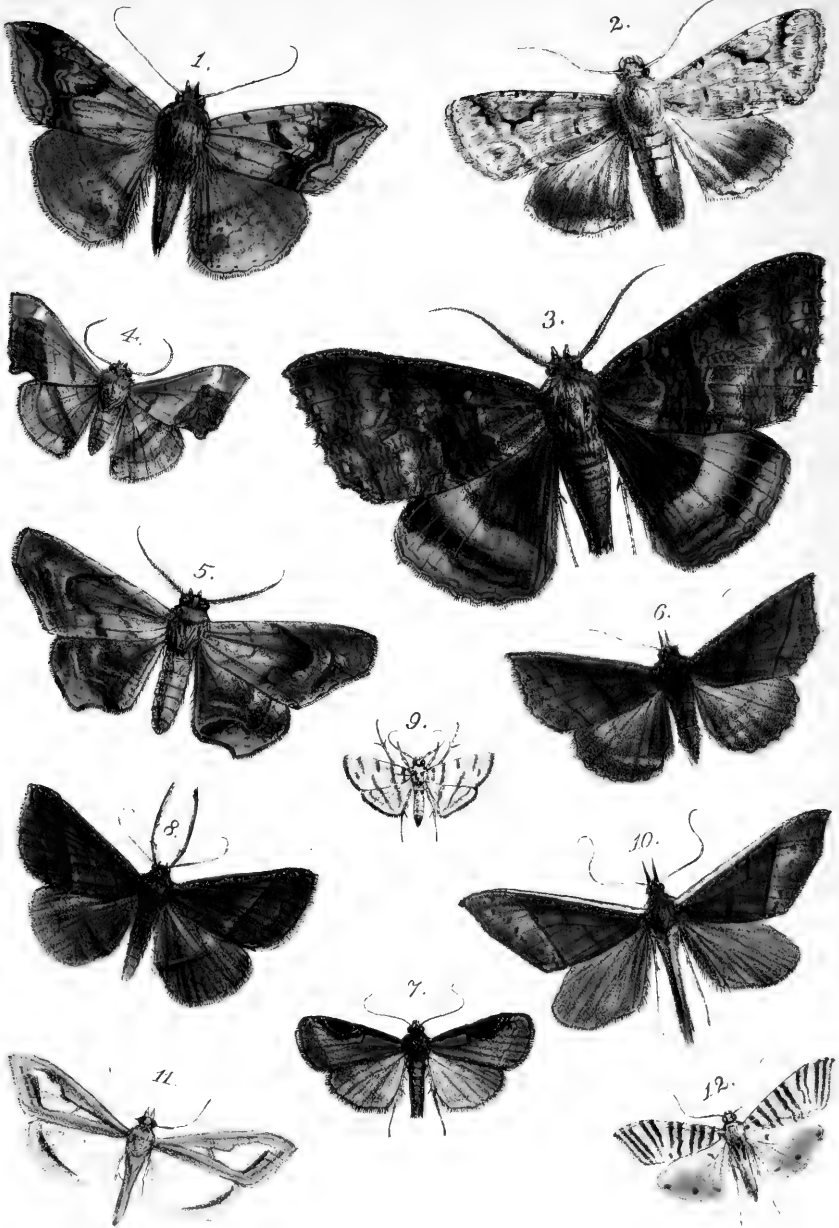




A. C. Butler del.

M. & N. Hanhart imp.

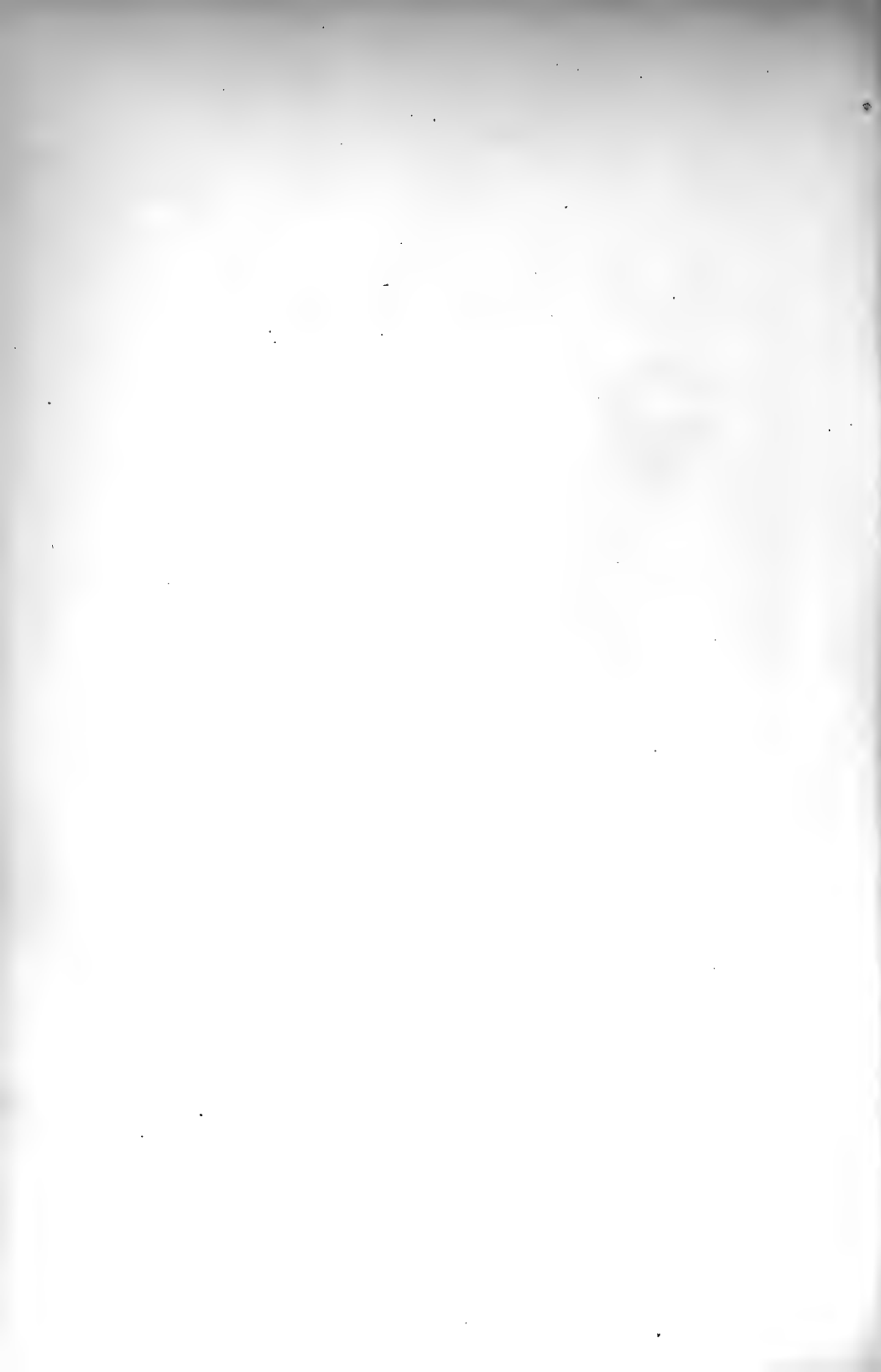




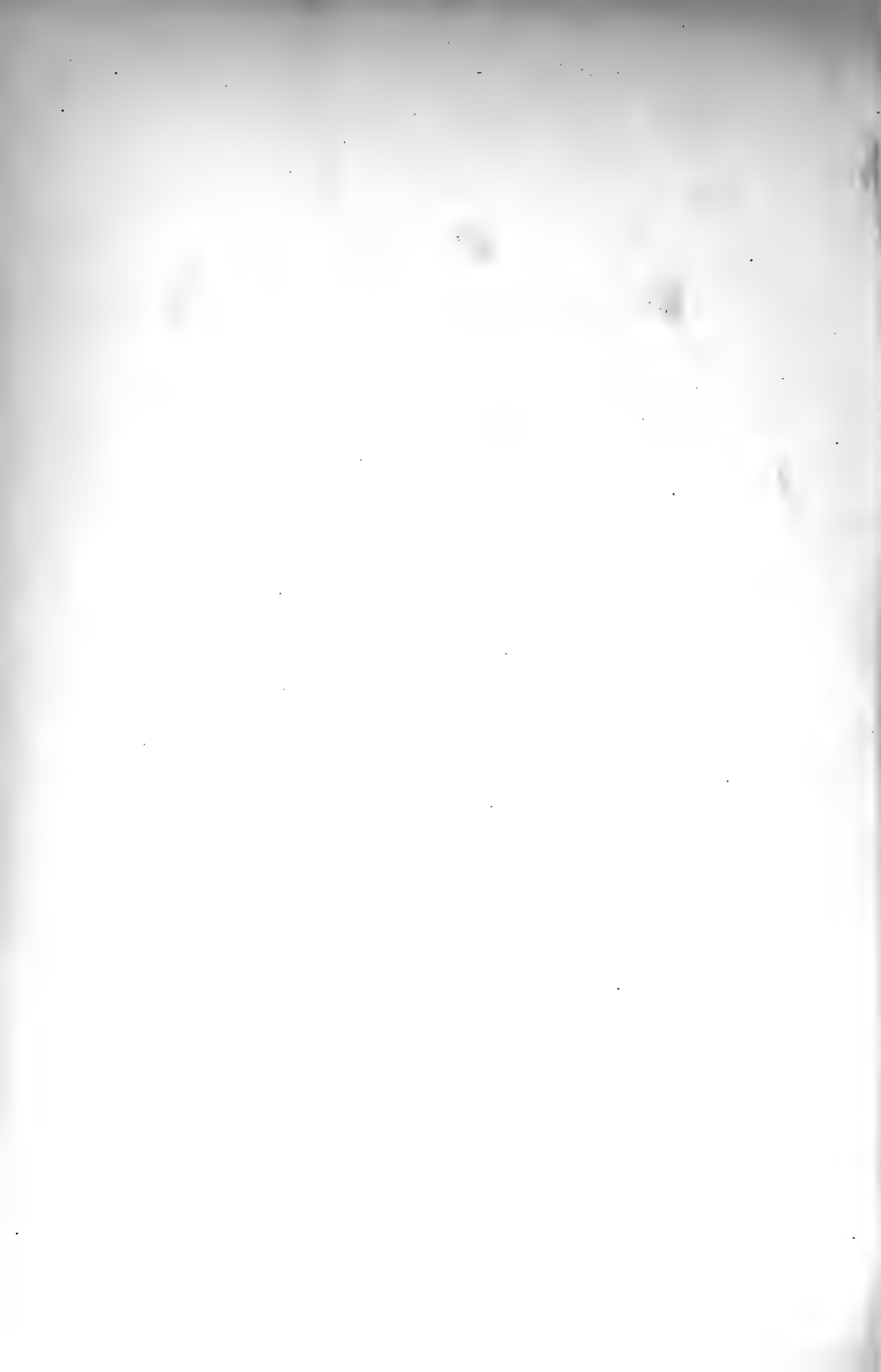
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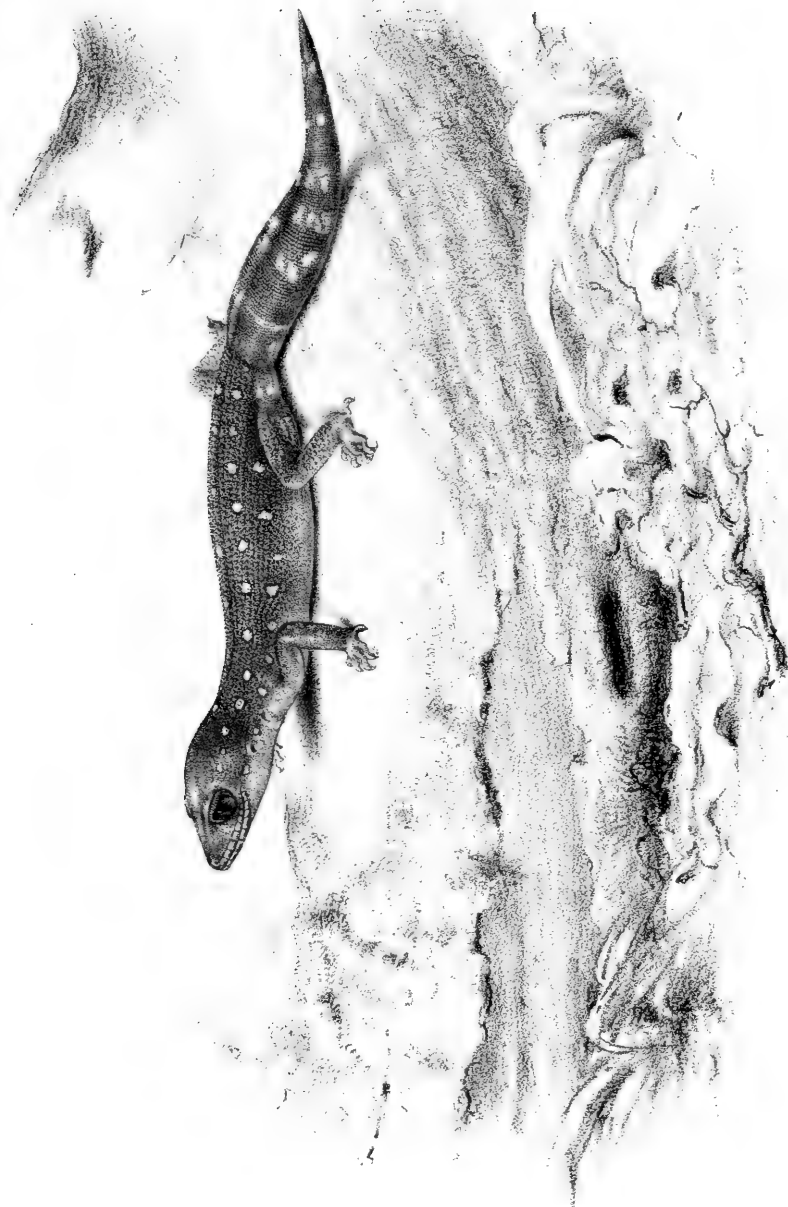
W. HANBURY.

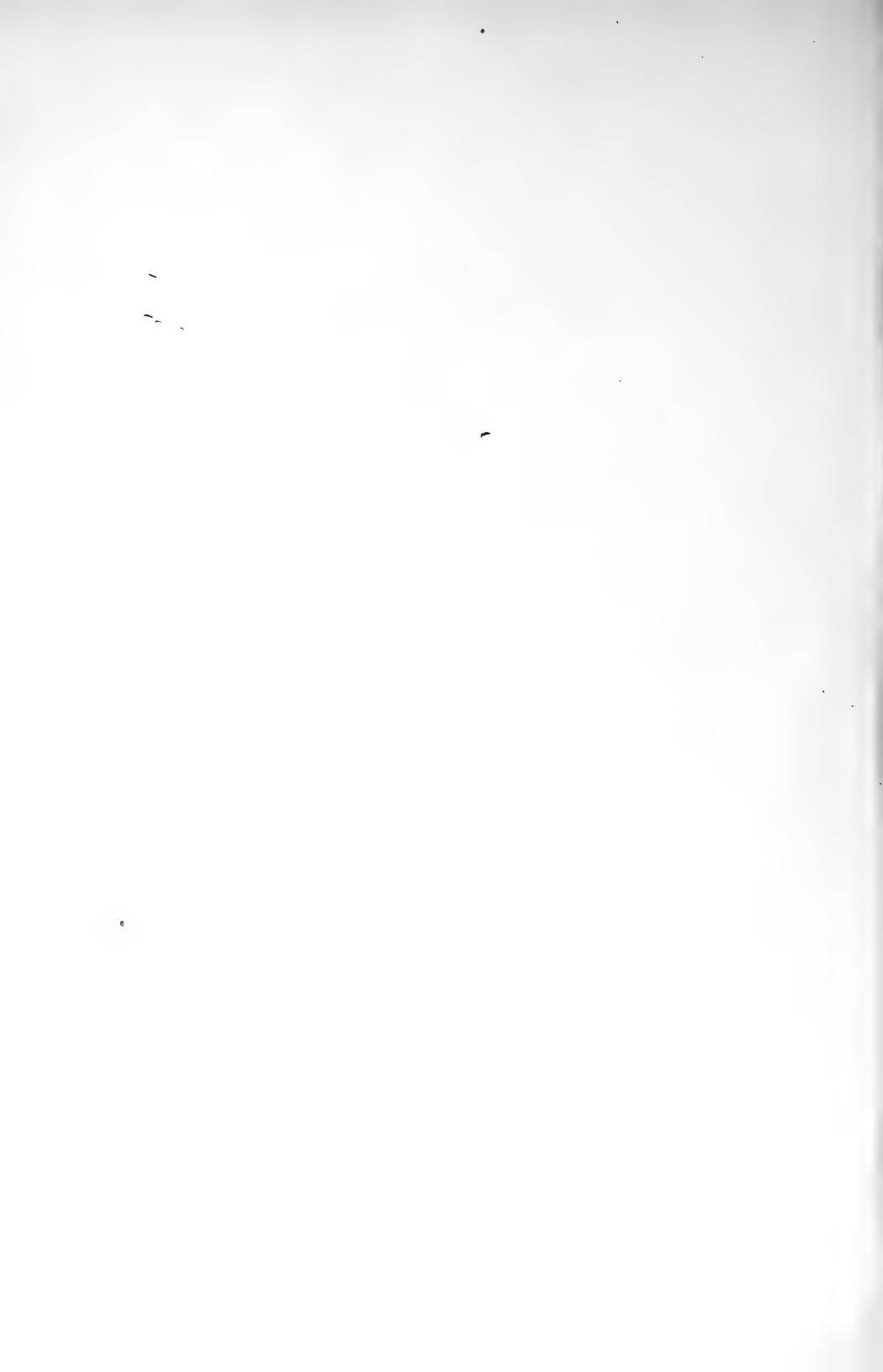
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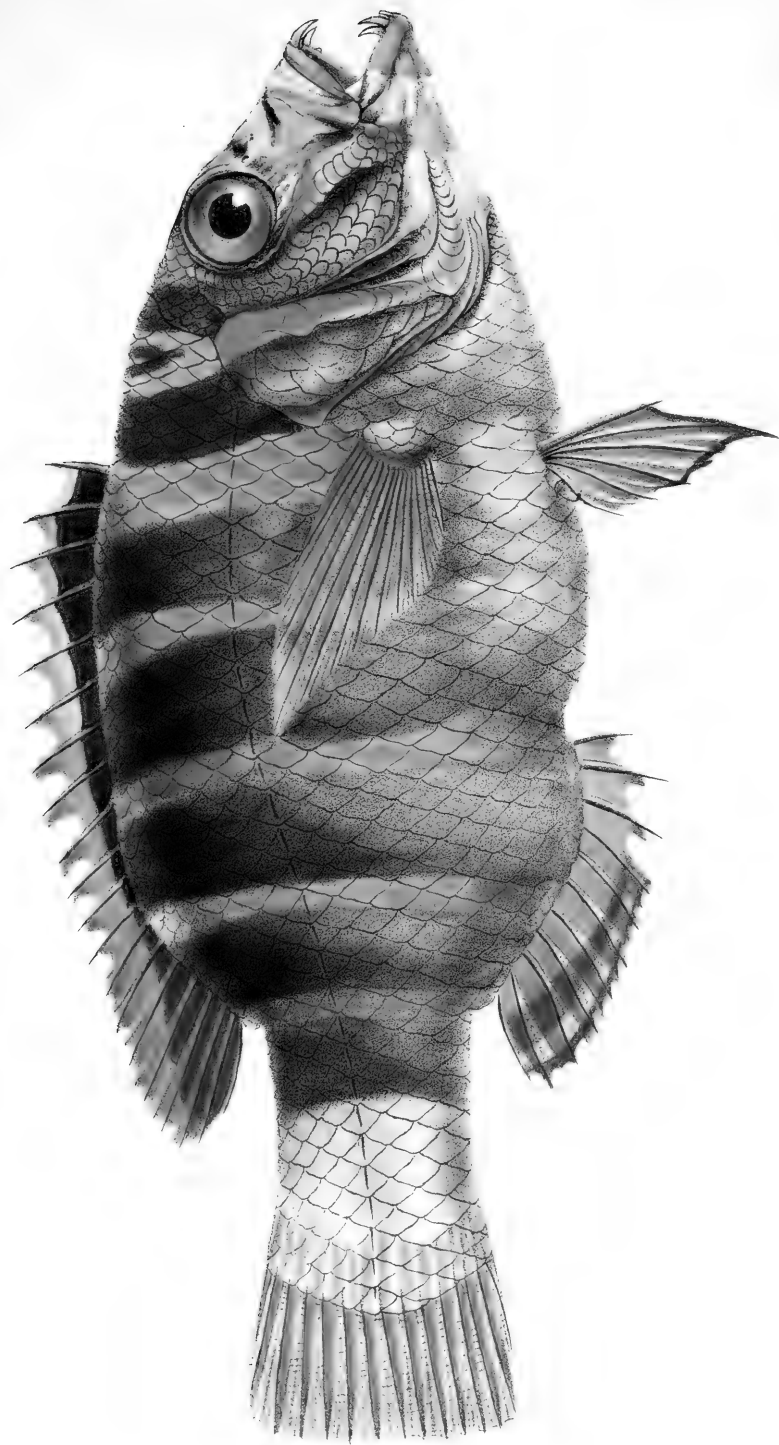












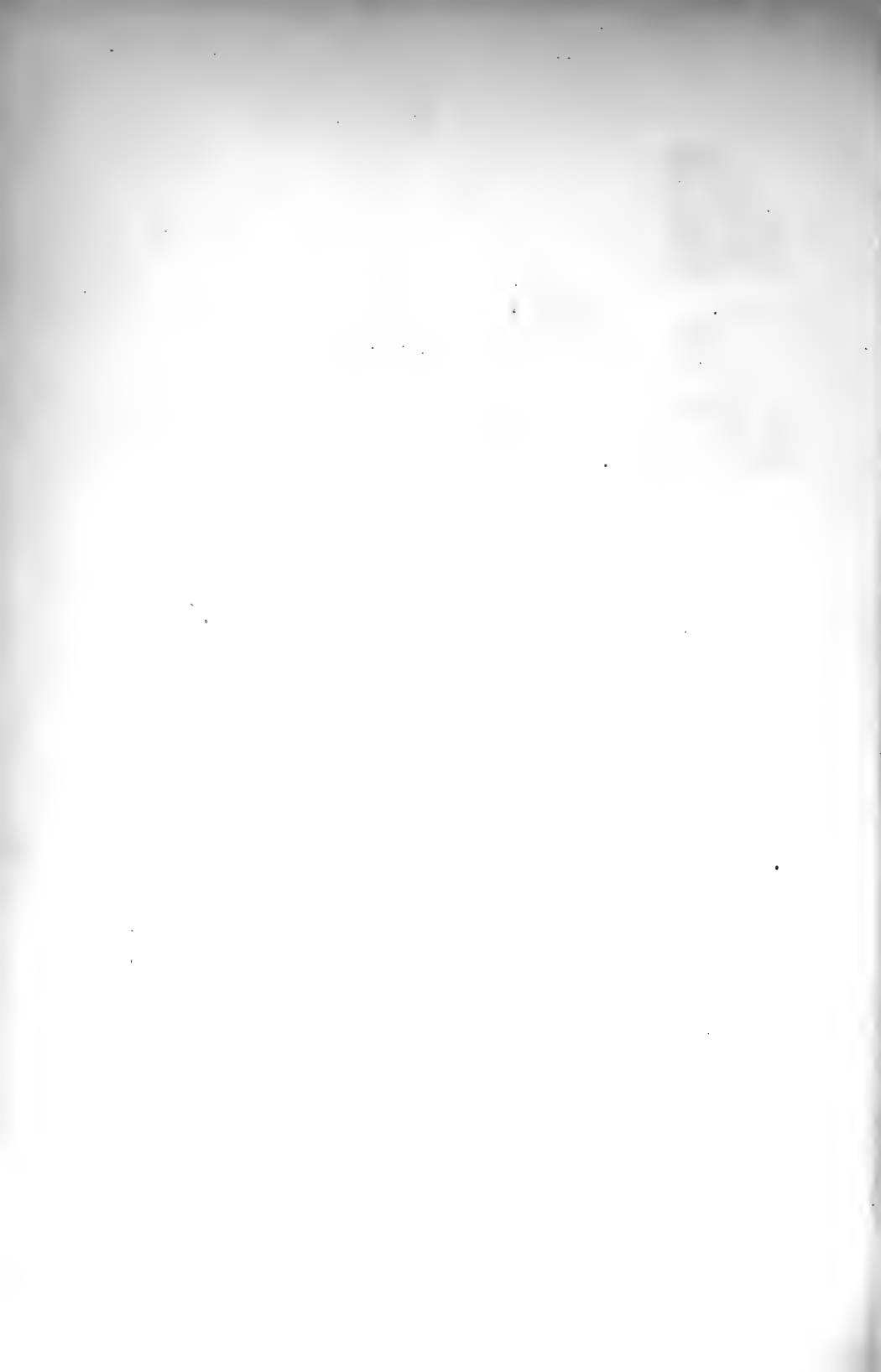


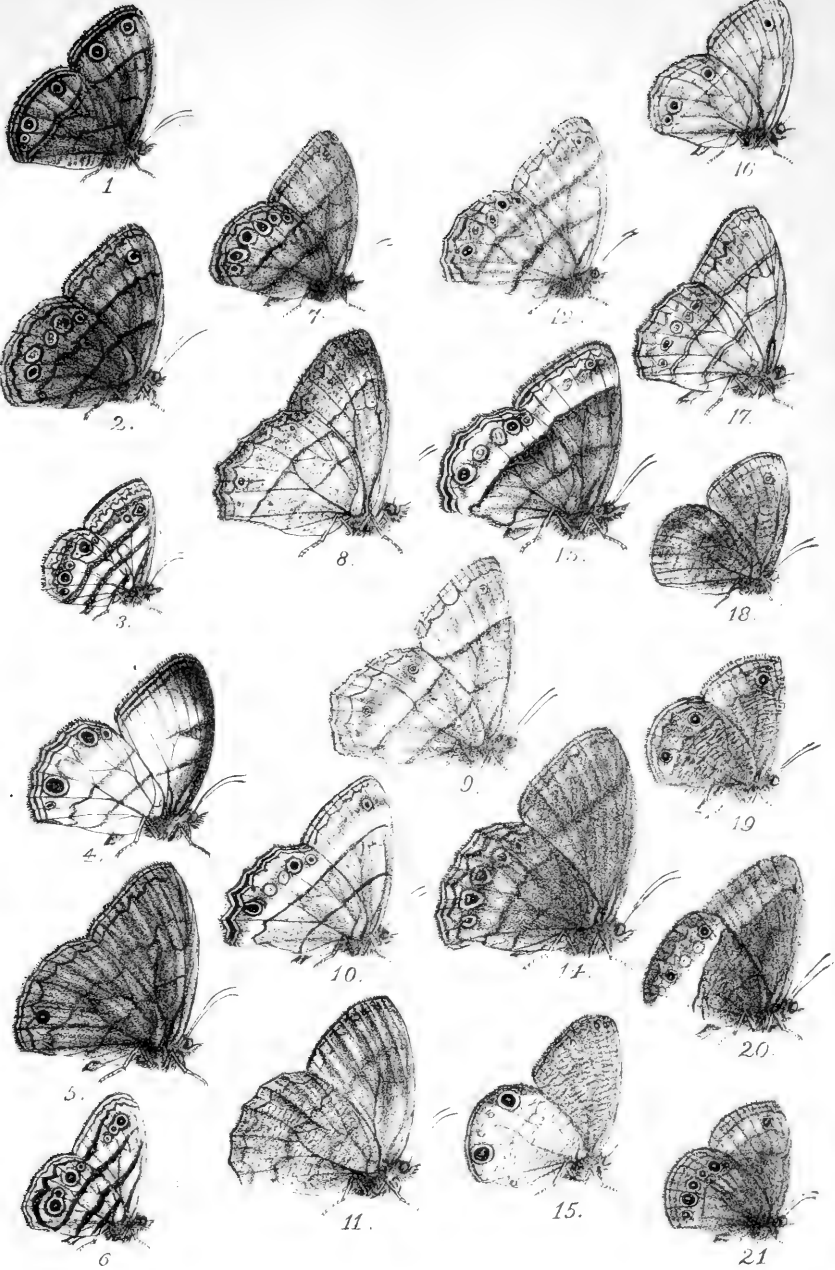


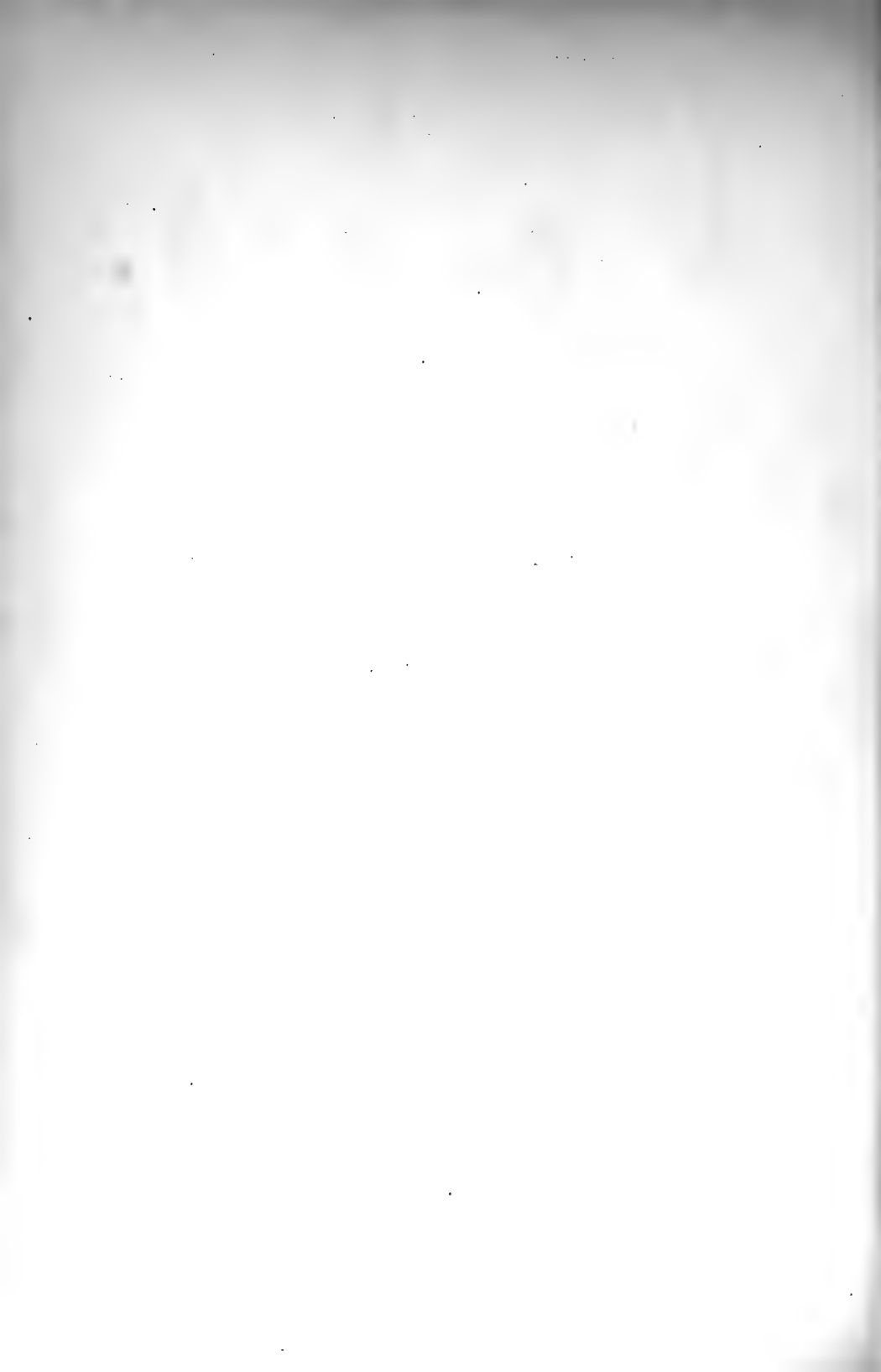
A. & Butler etc.

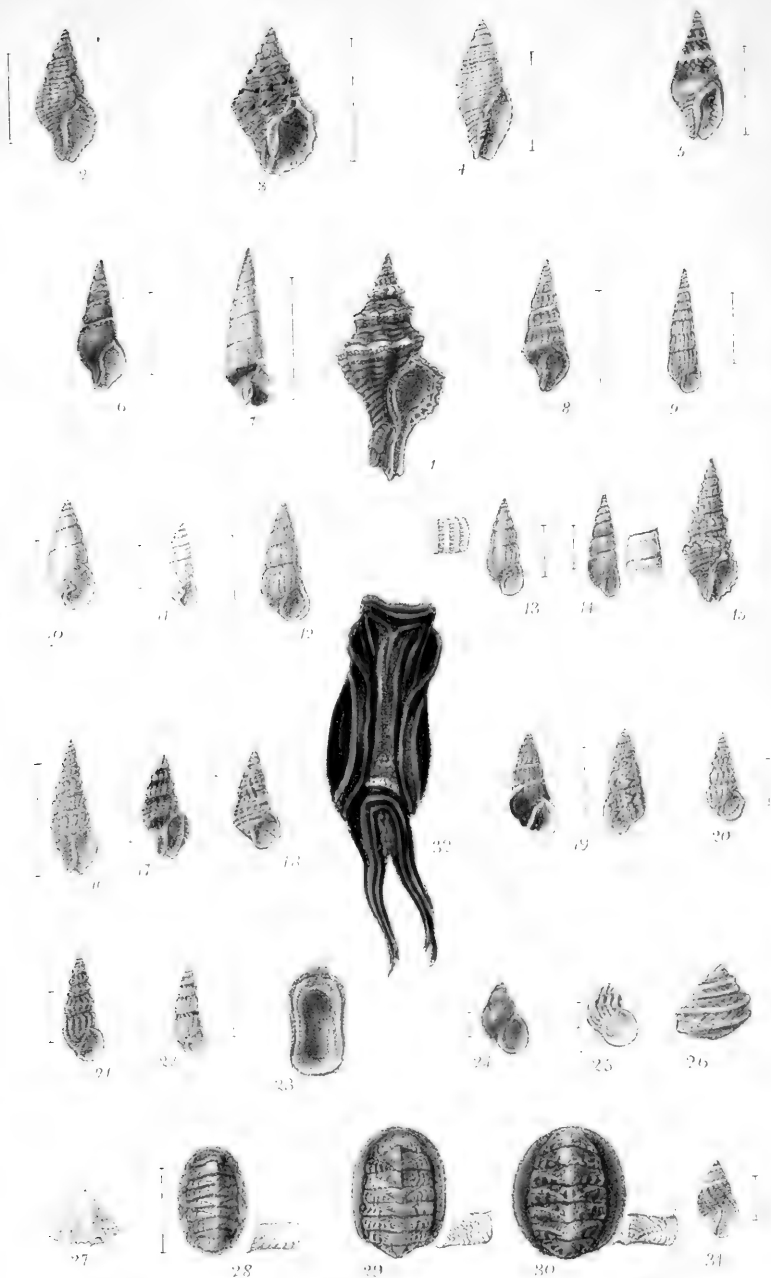
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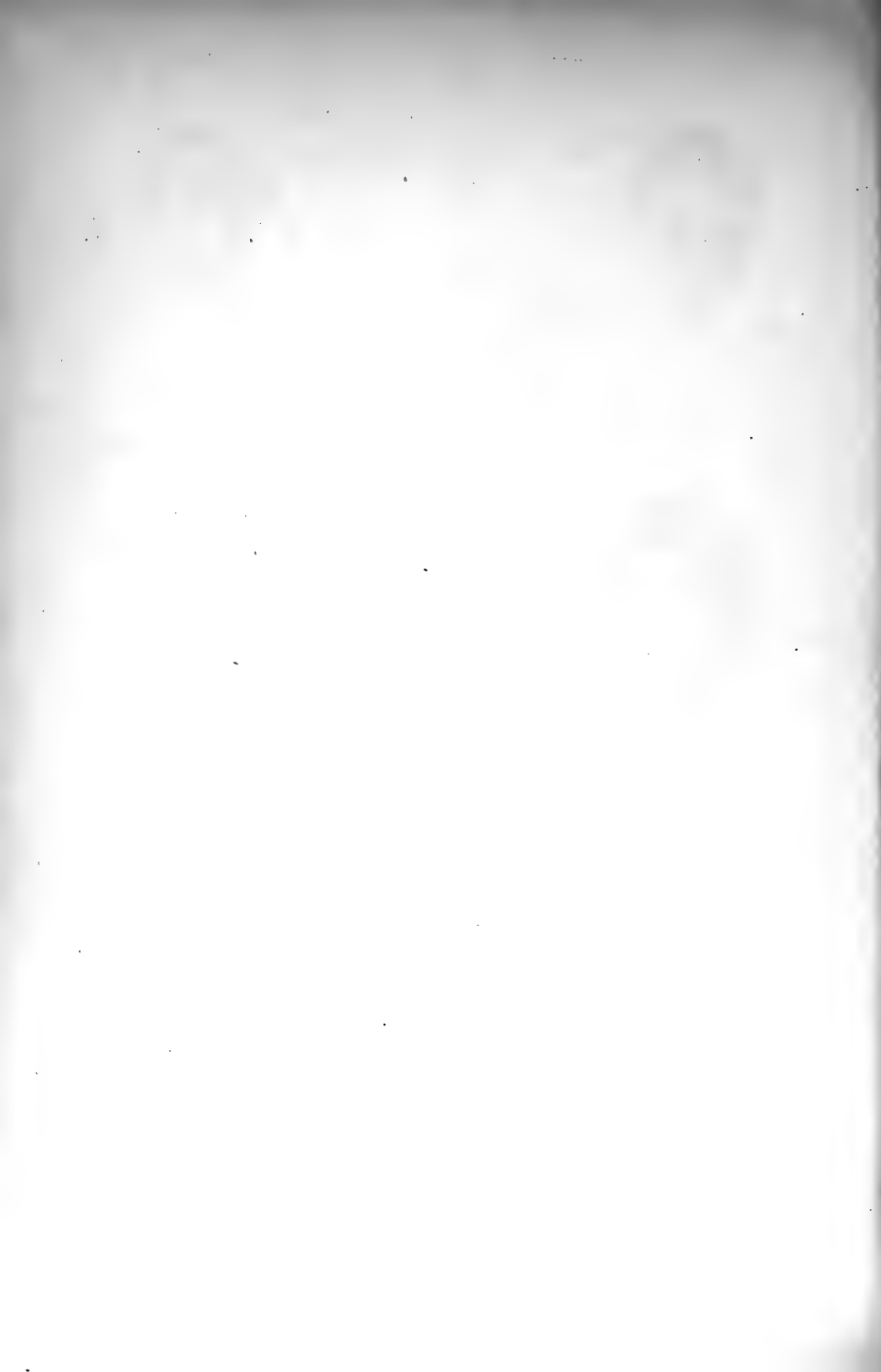


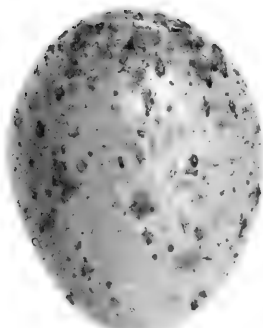
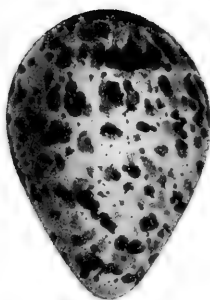
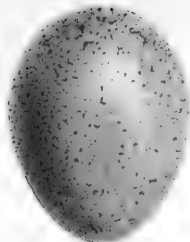






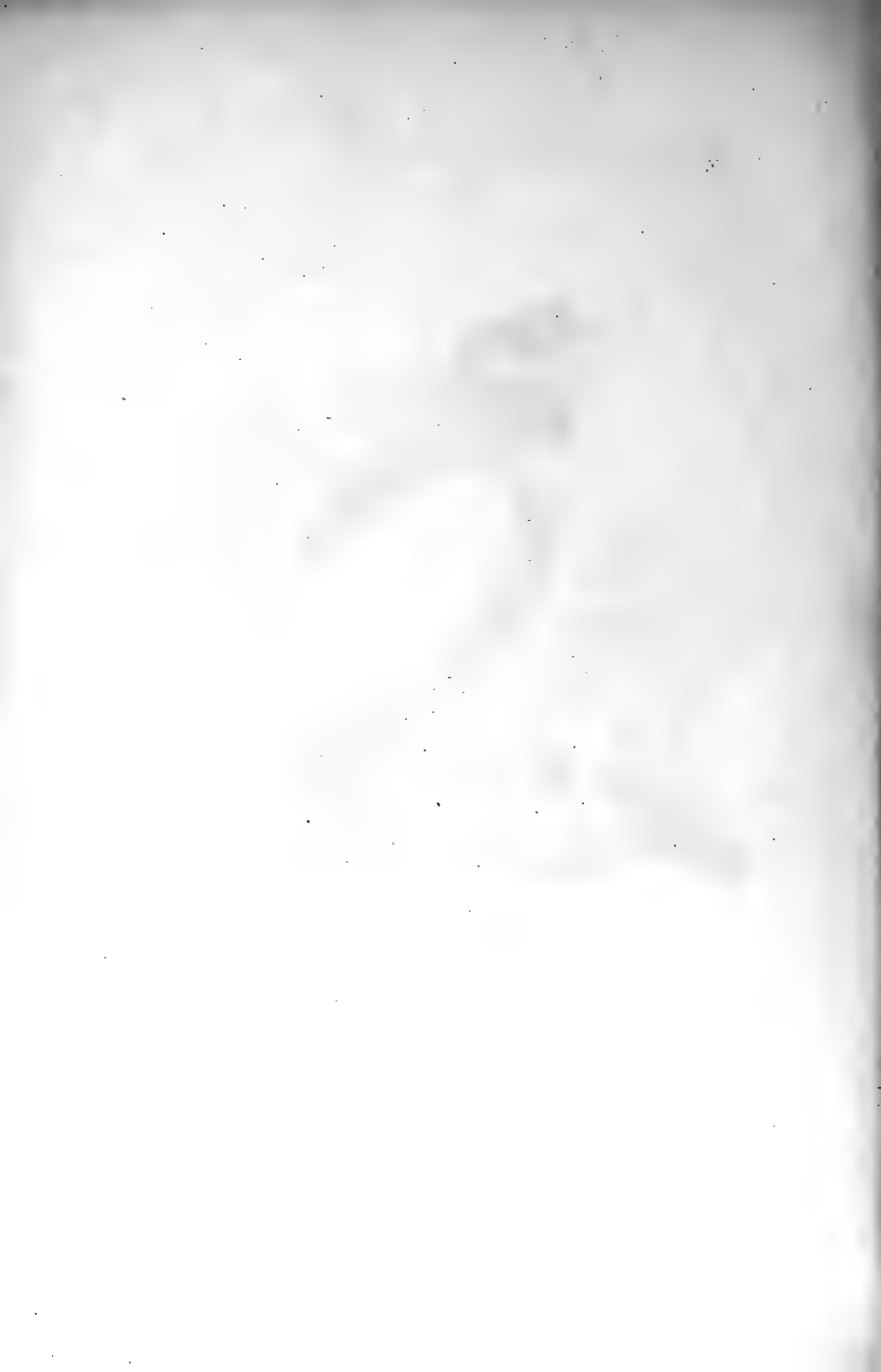






J. Smith.

John Kanhart Int





J. Wolf del. & lith.

M. & N. Hanhart imp.

LORIUS CHLOROCERCUS.

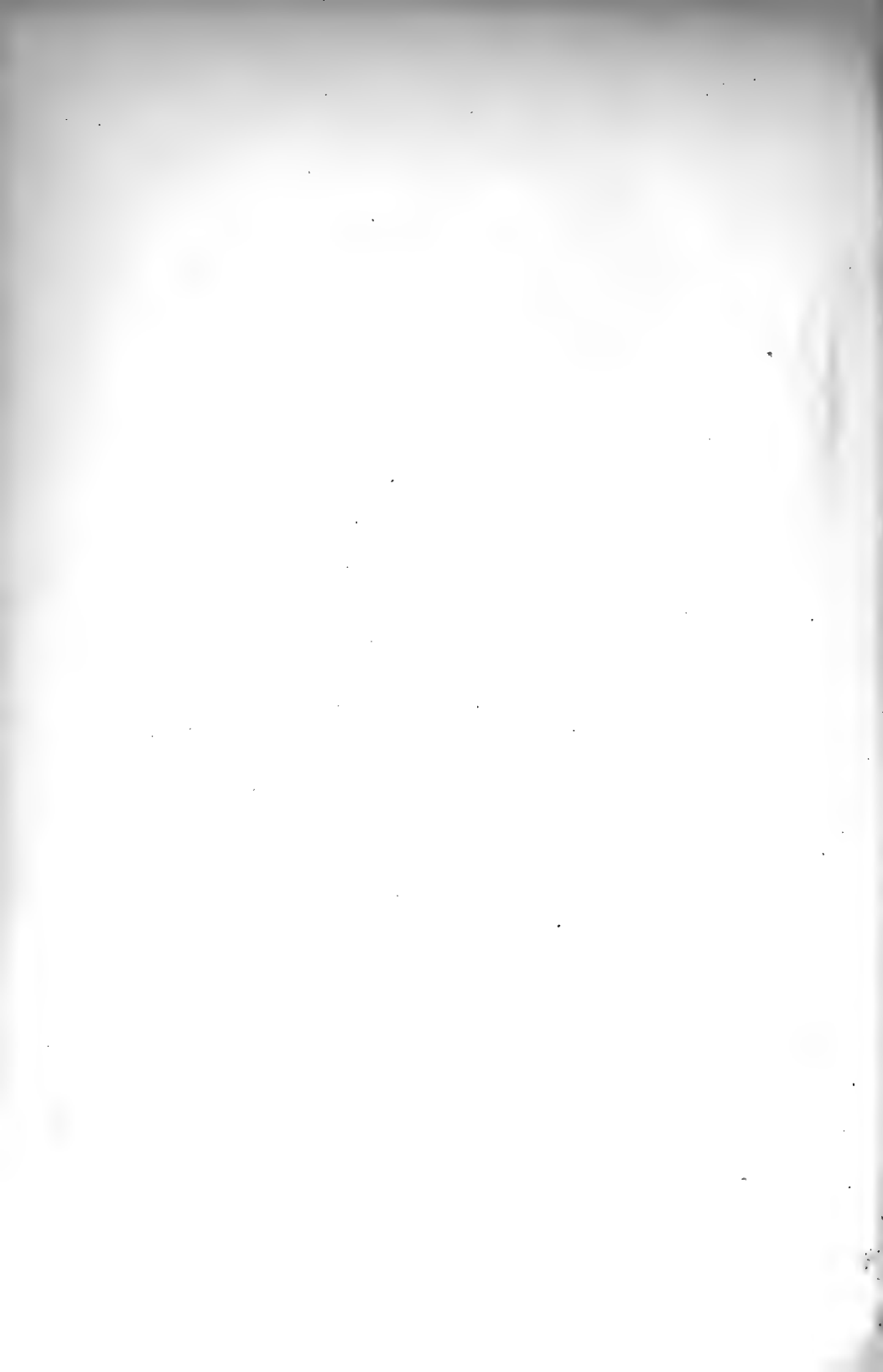


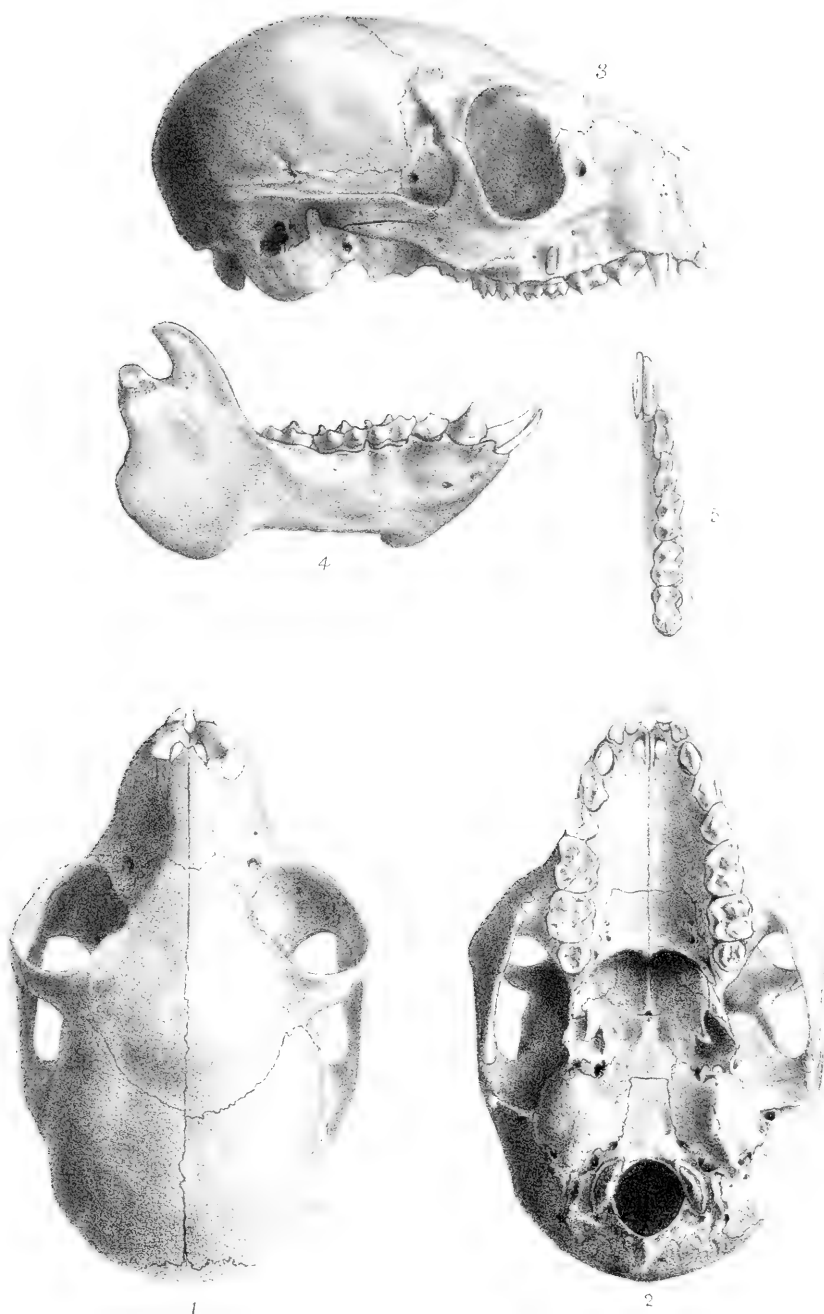


J. Wolf del.

Edw. H. Henshaw. inc.

SAIGA TARTARICA. 8

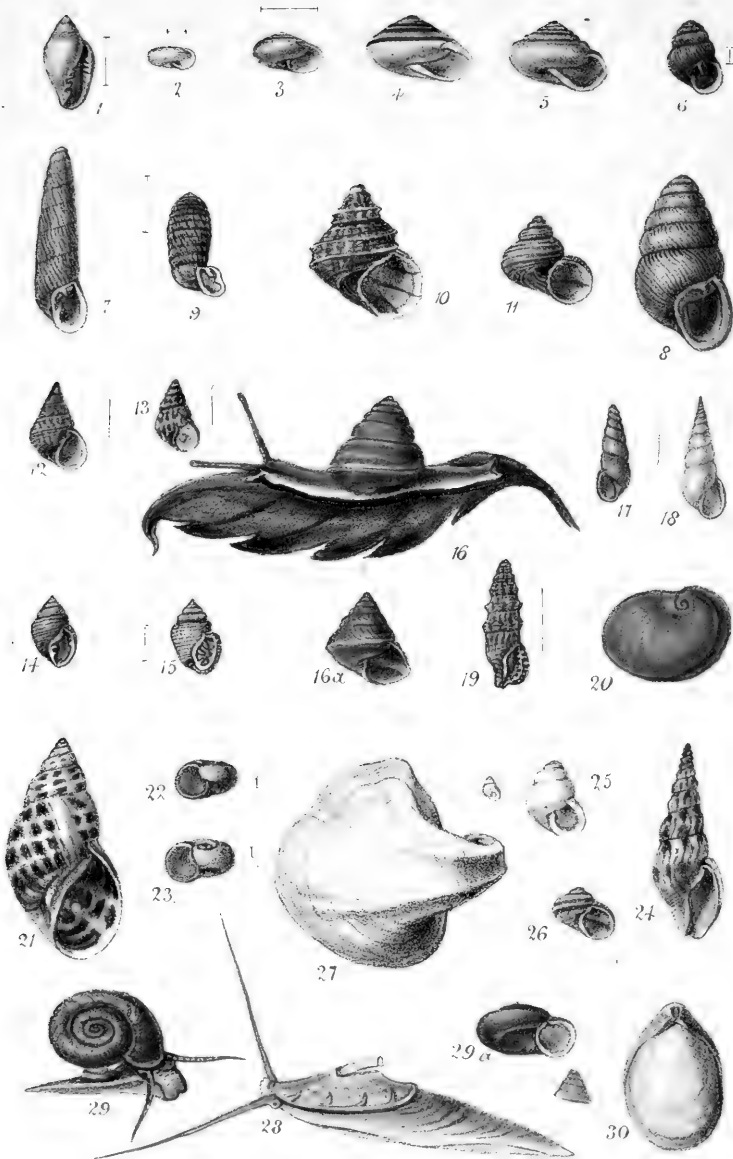




J. Smith lith.

M & N. Harshart. 1867

INDRIS DIADEMATUS



G.E. Sowerby lith

M & N Hanhart del





Smith, Arch.

Pl. XX. Fig. 1.

ECEPHALUS BONAPARTEI







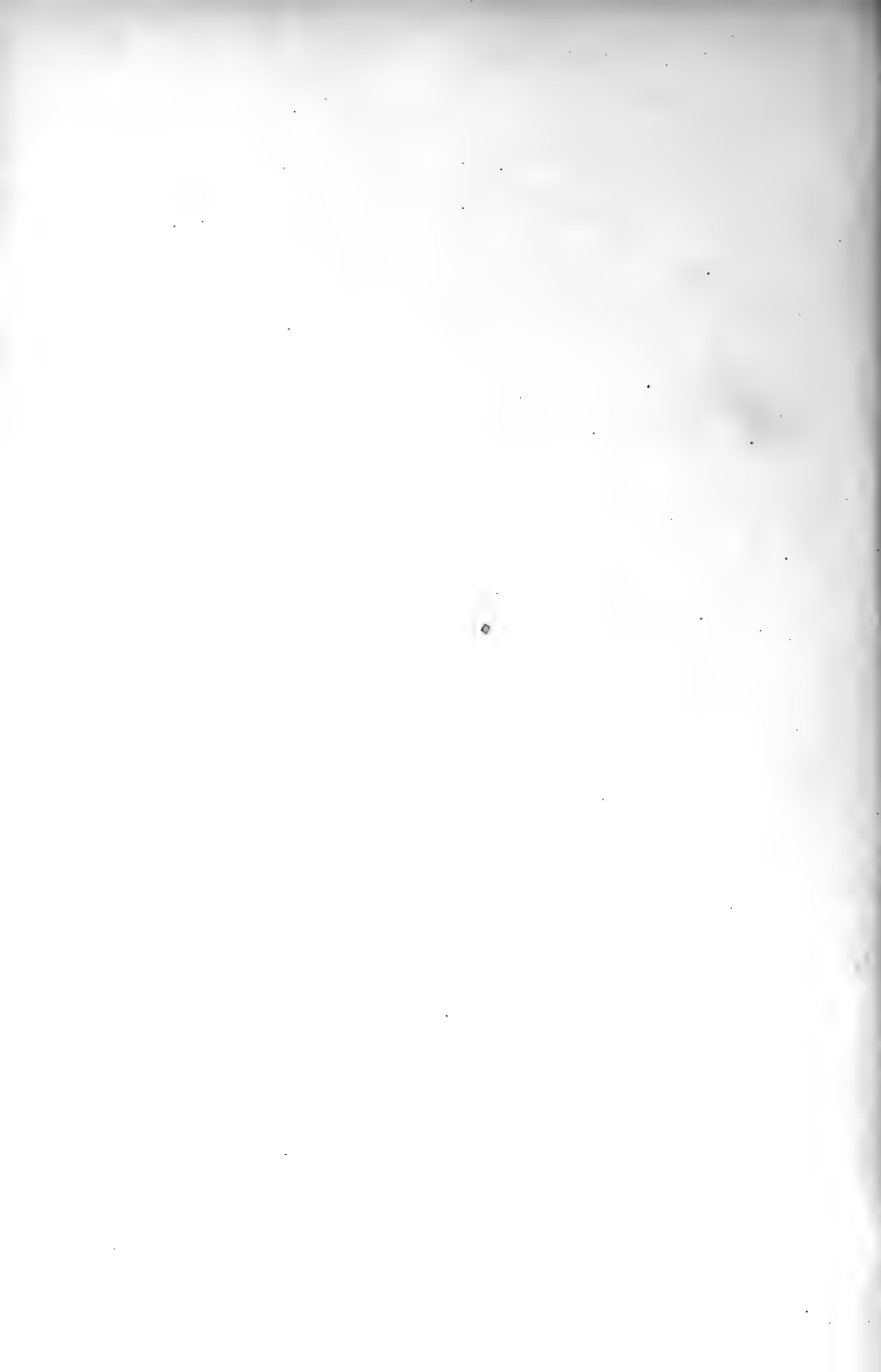


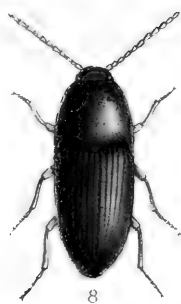
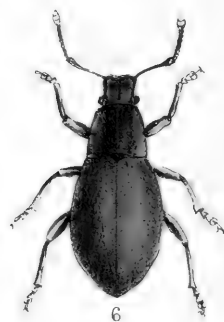
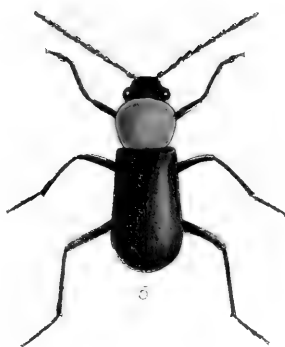
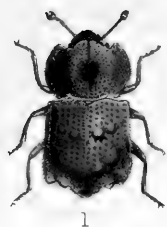
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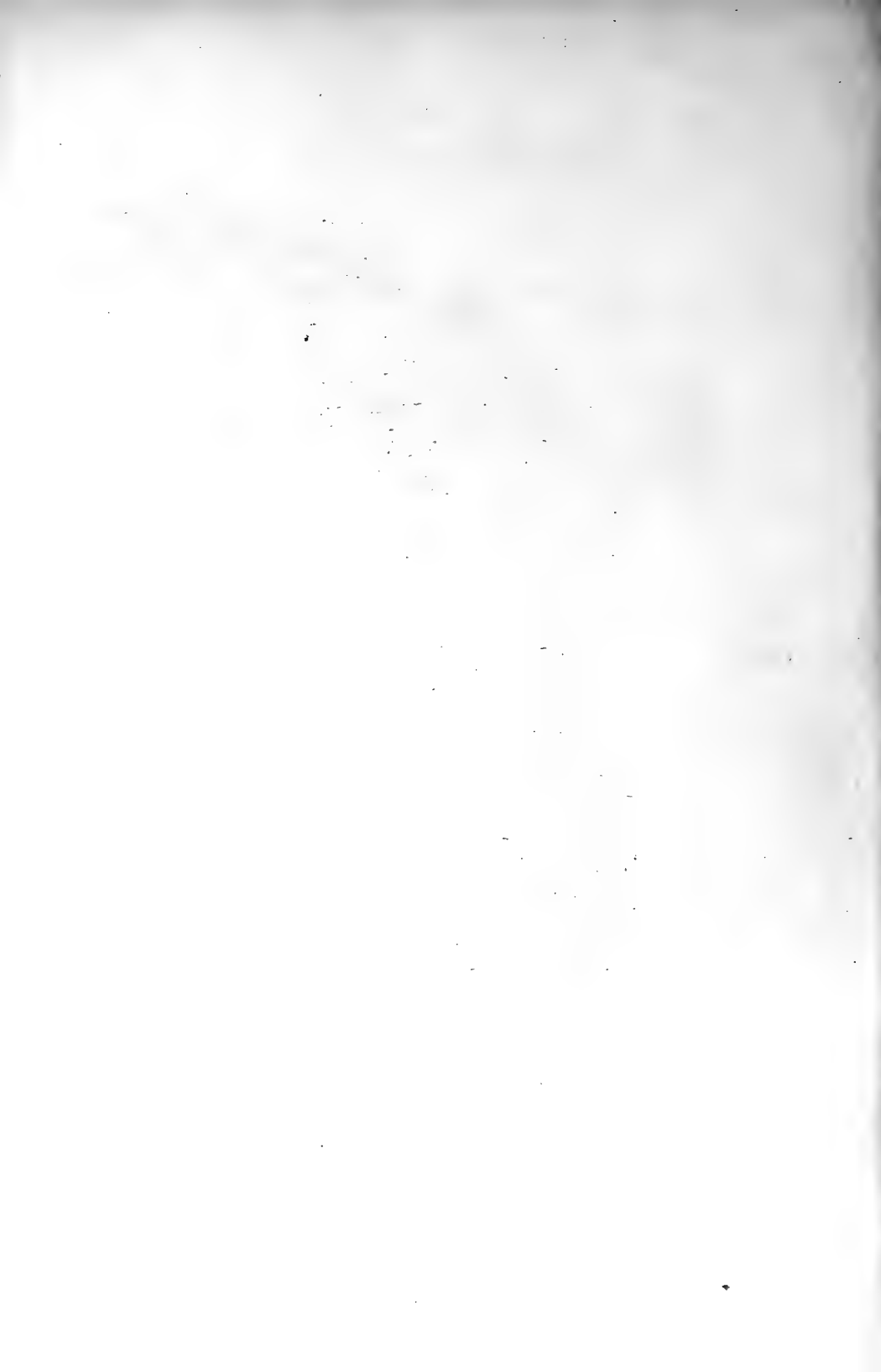
J. Wolf del et lith

Hanhart Chromo lith

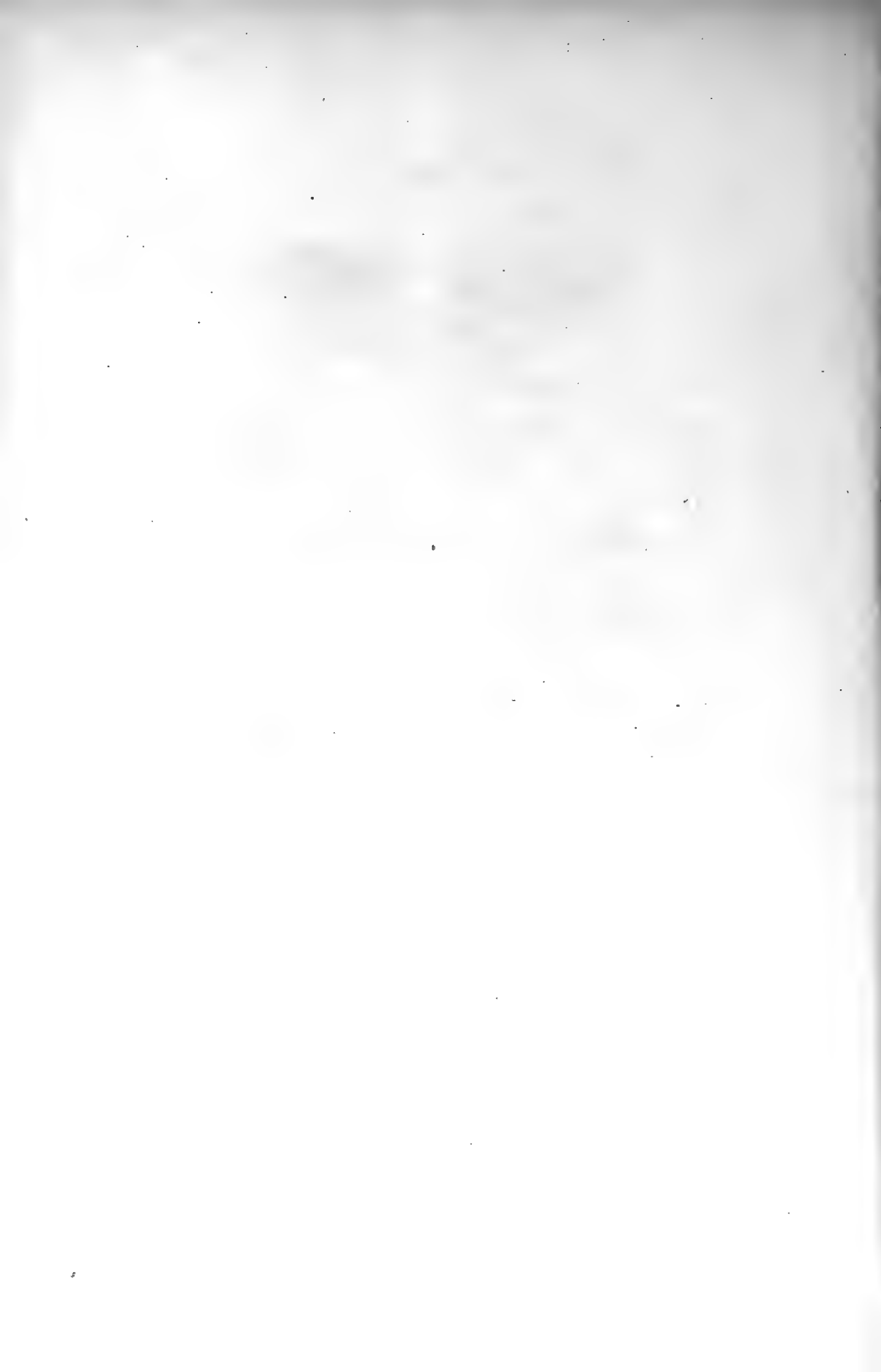
CORACOPSIS BARKLYI.













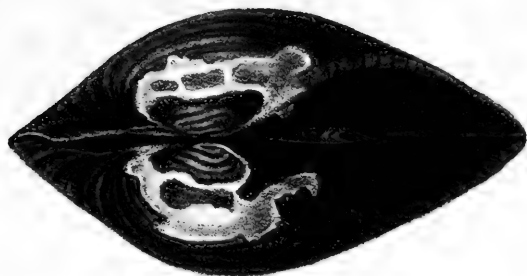
J. Wolf. del.

Hanbat Chromo lith

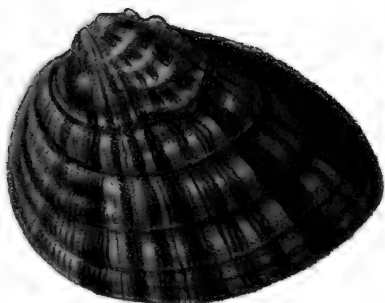
GUEPARD A GUTTATA, *Jacq.*



3^a



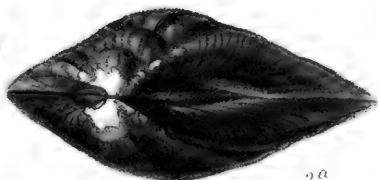
2



1^a

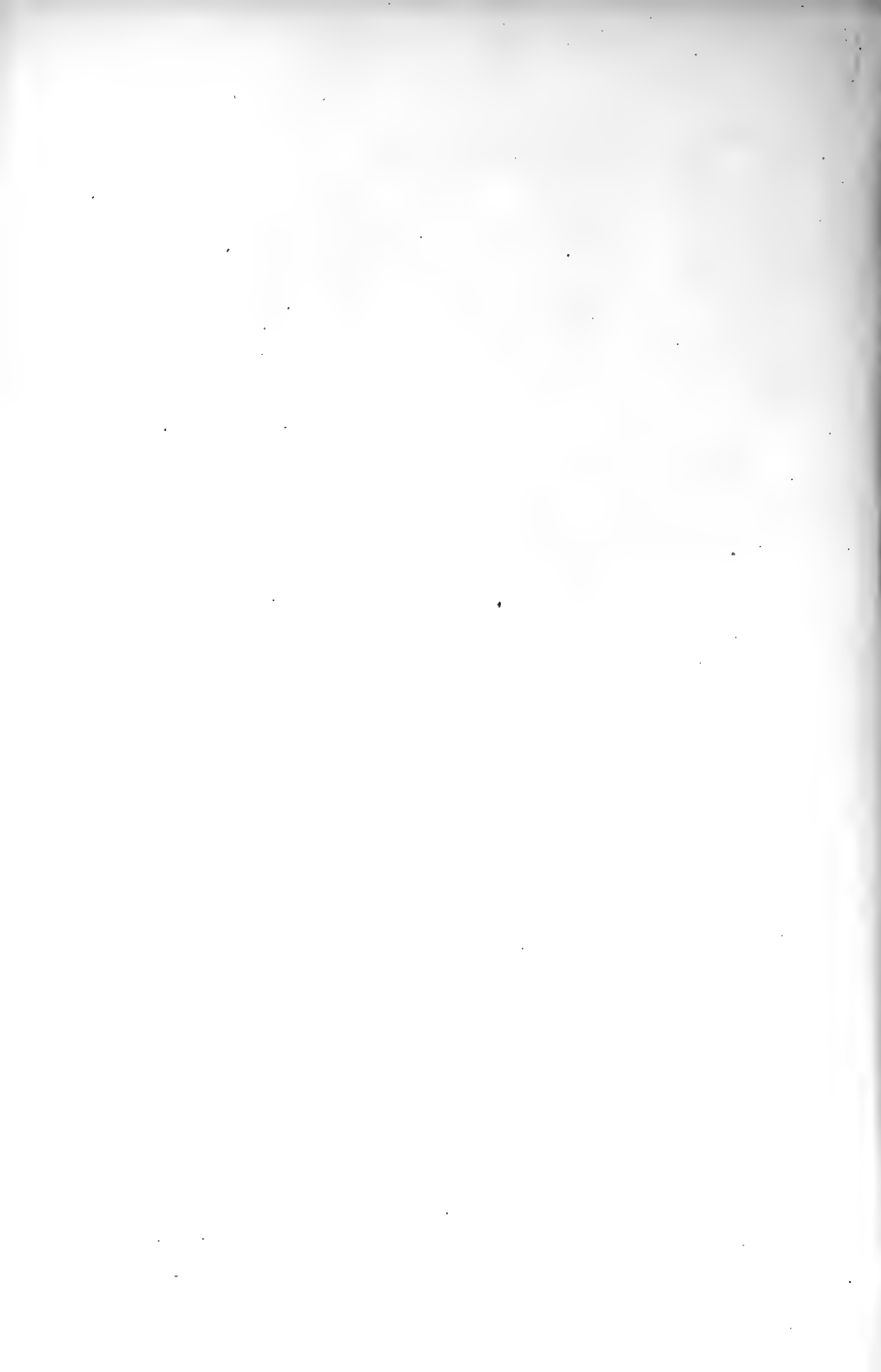


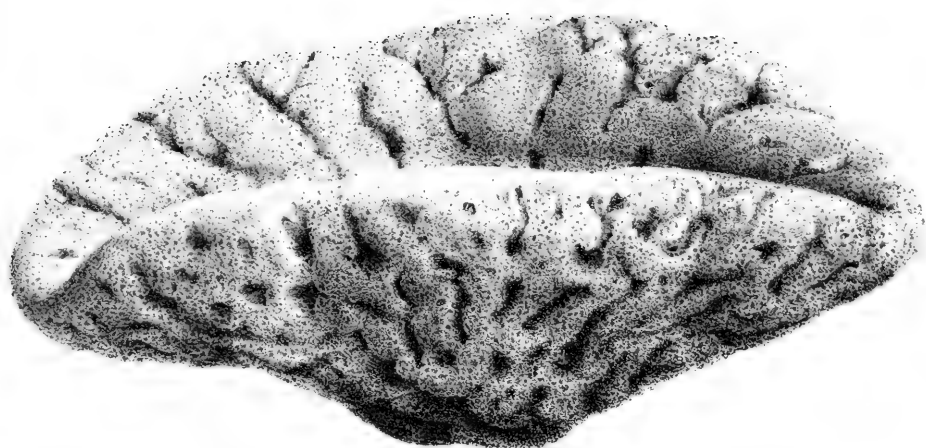
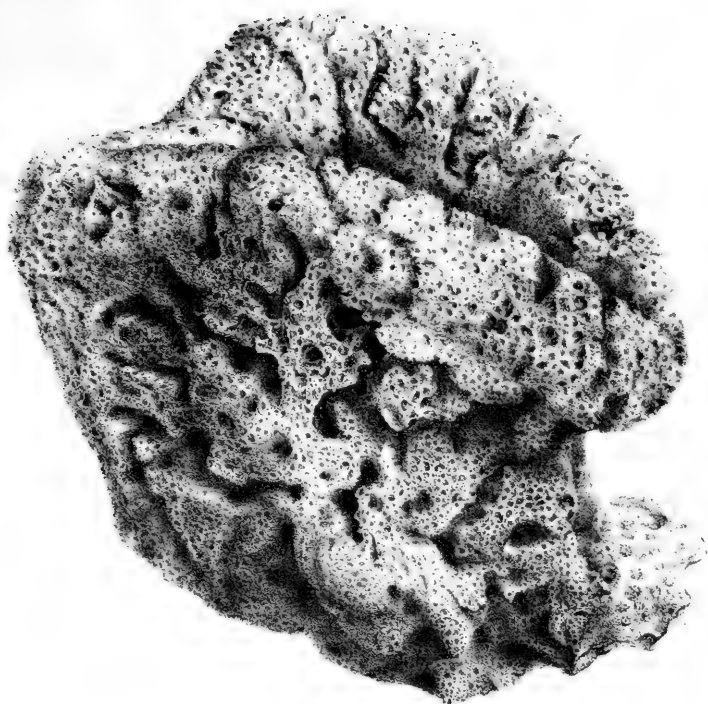
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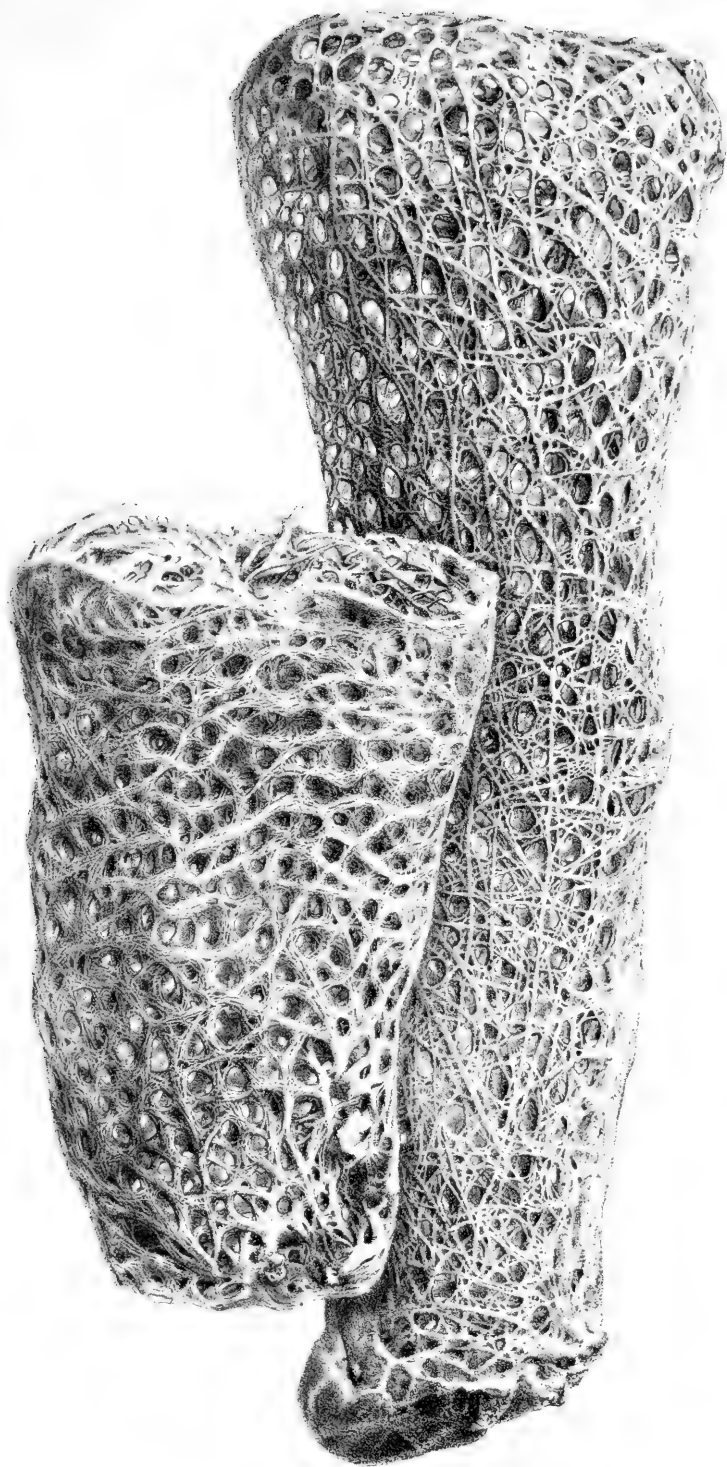
2^a





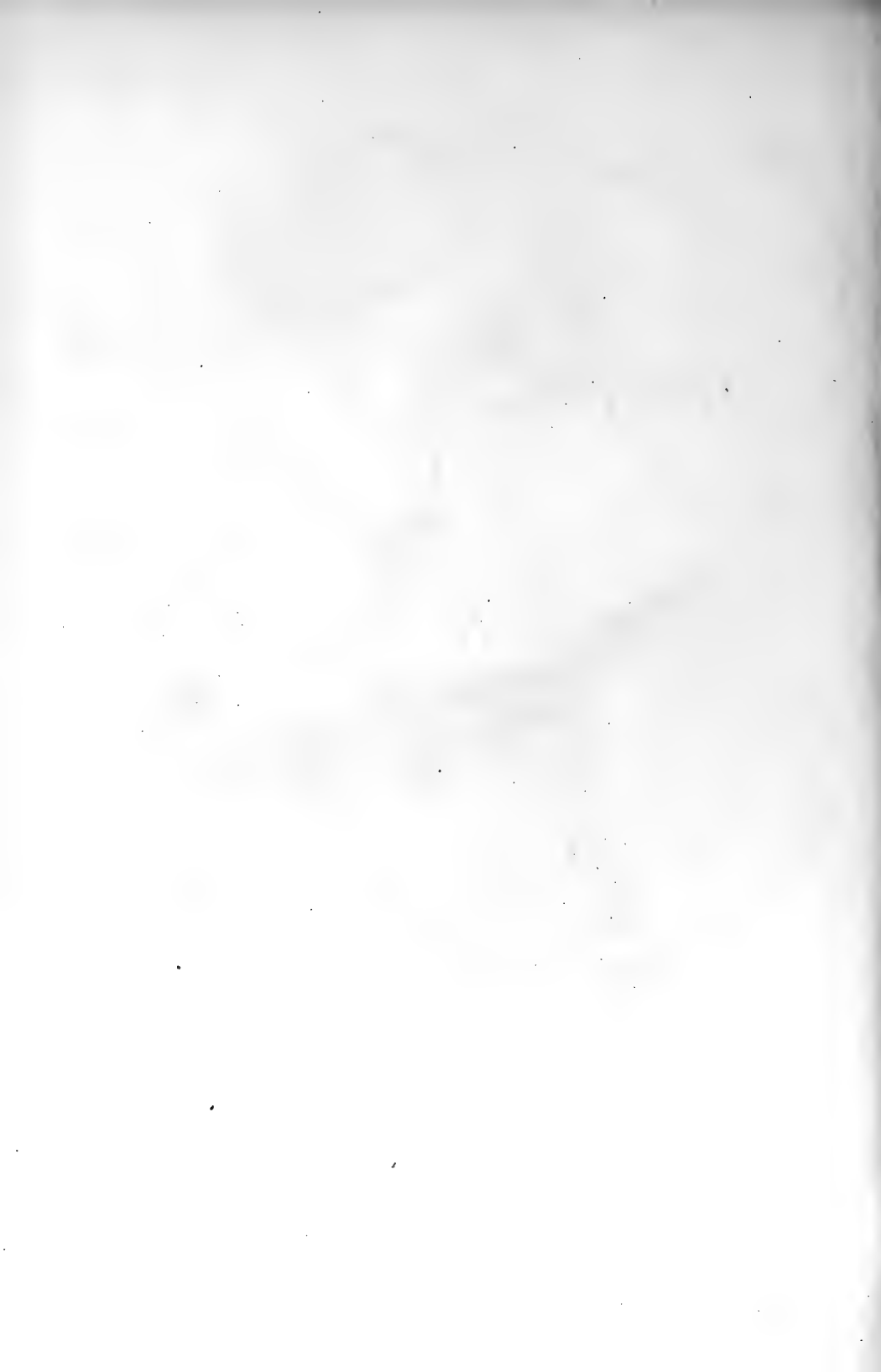






Amphipora coriacea



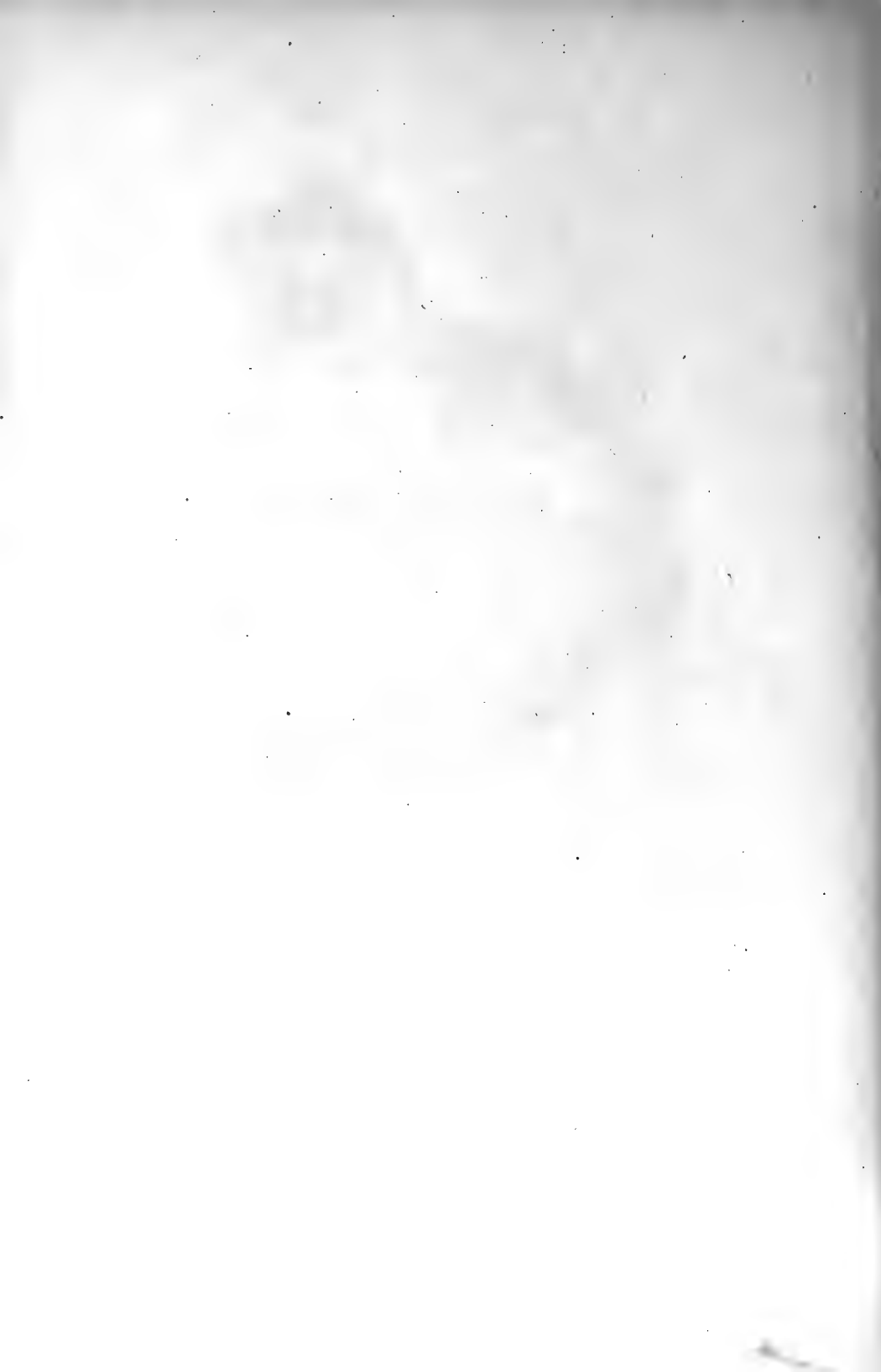




1 Smit lith.

M&N Hanhart. L. arane lith.

- 1 *HYLOPHILUS SEMINERUS.*
- 2 *_____* *HYLOPHILUS*

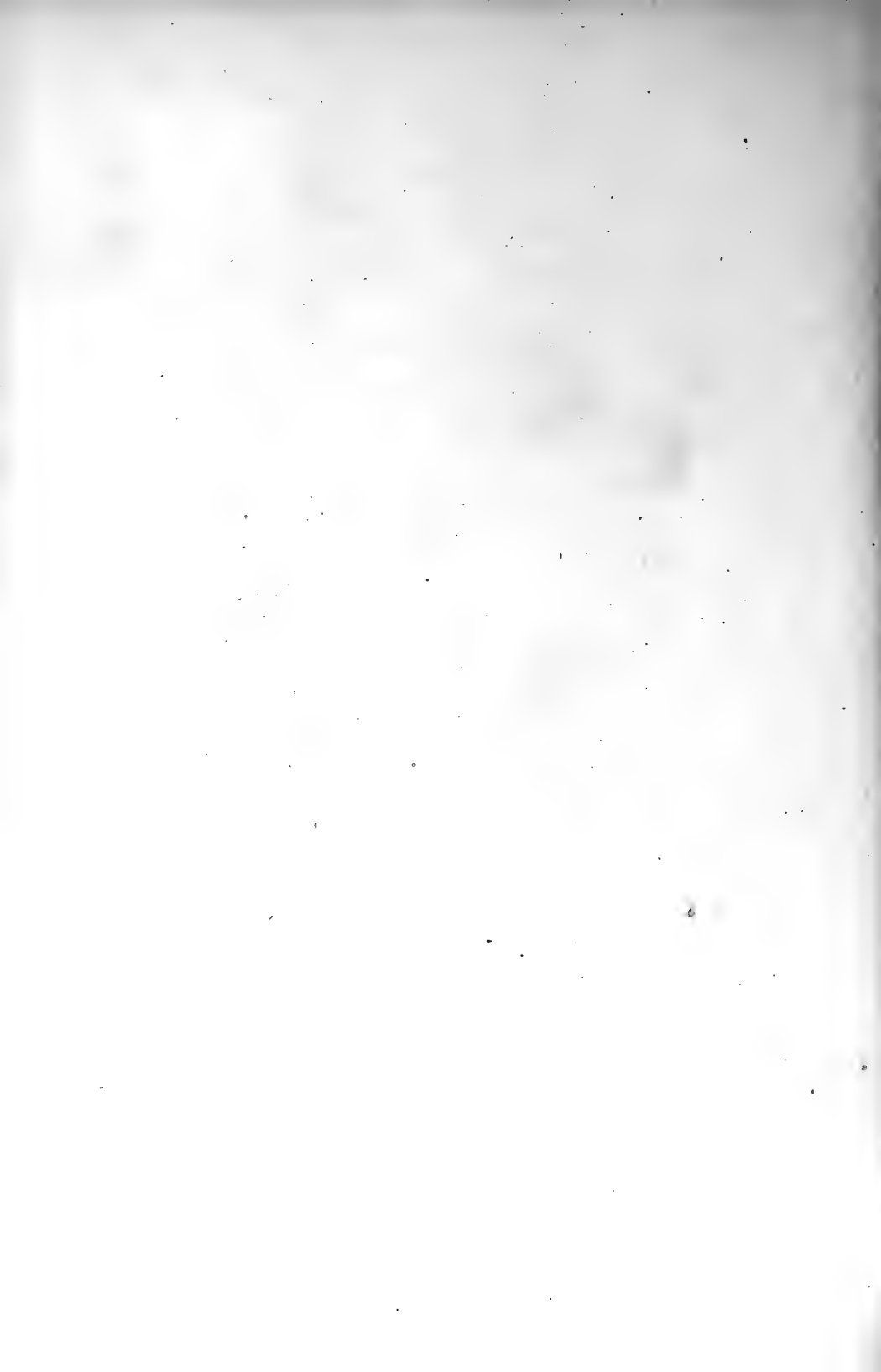


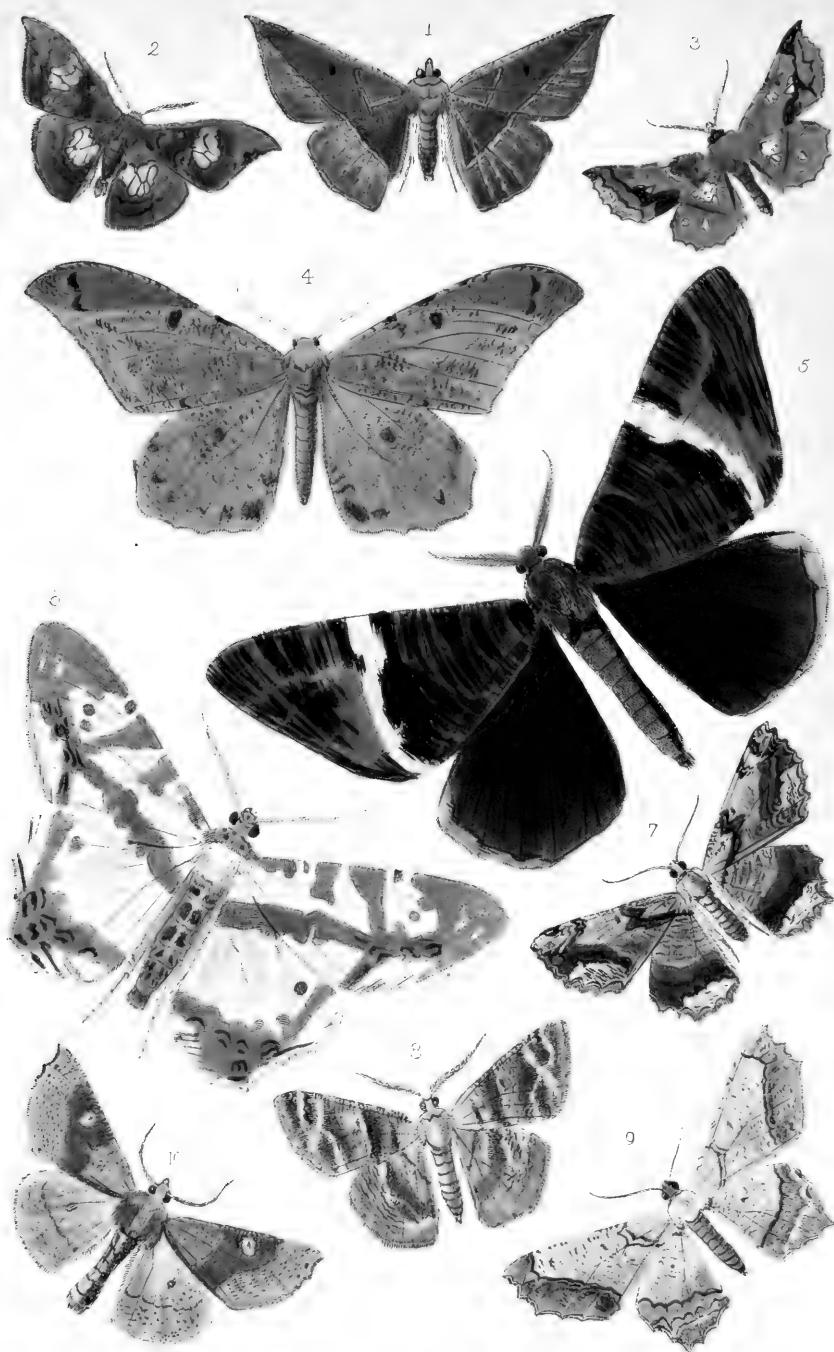


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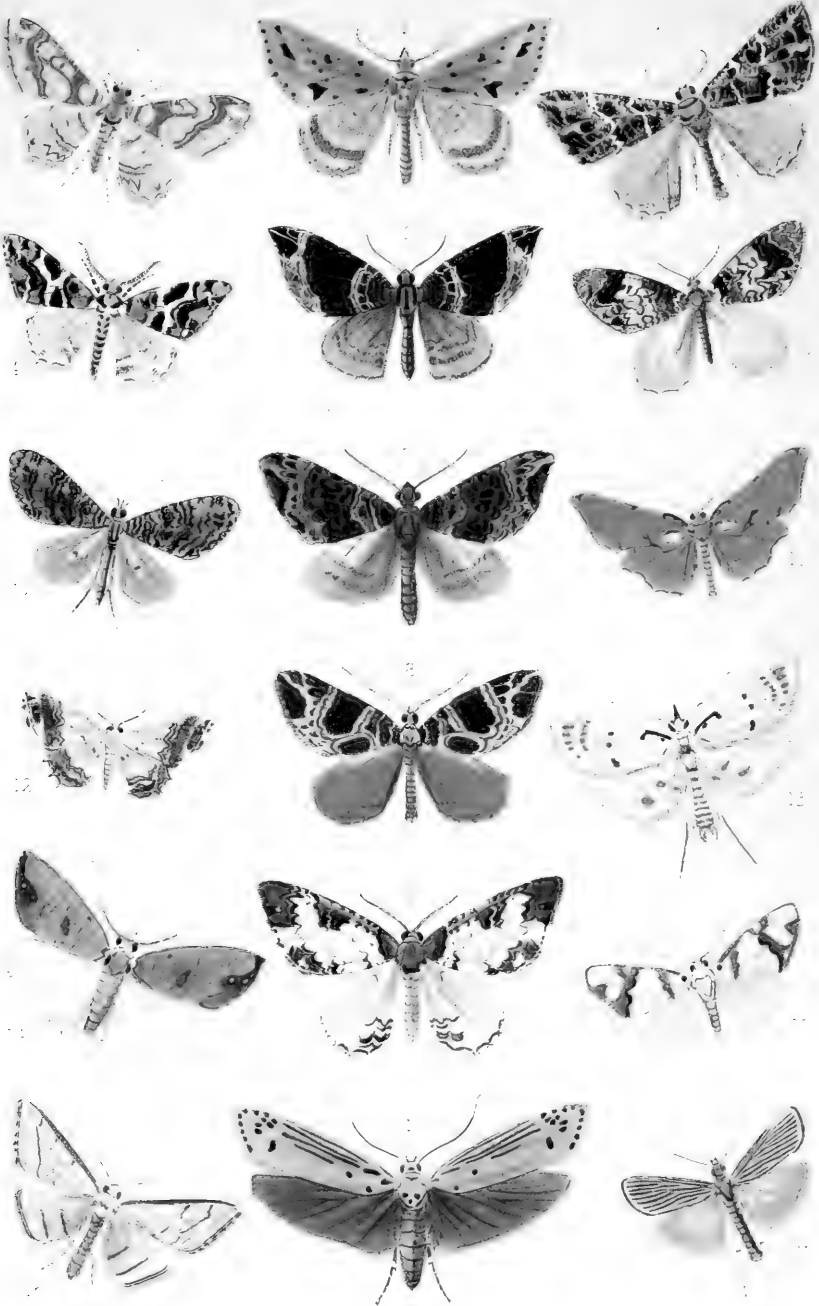
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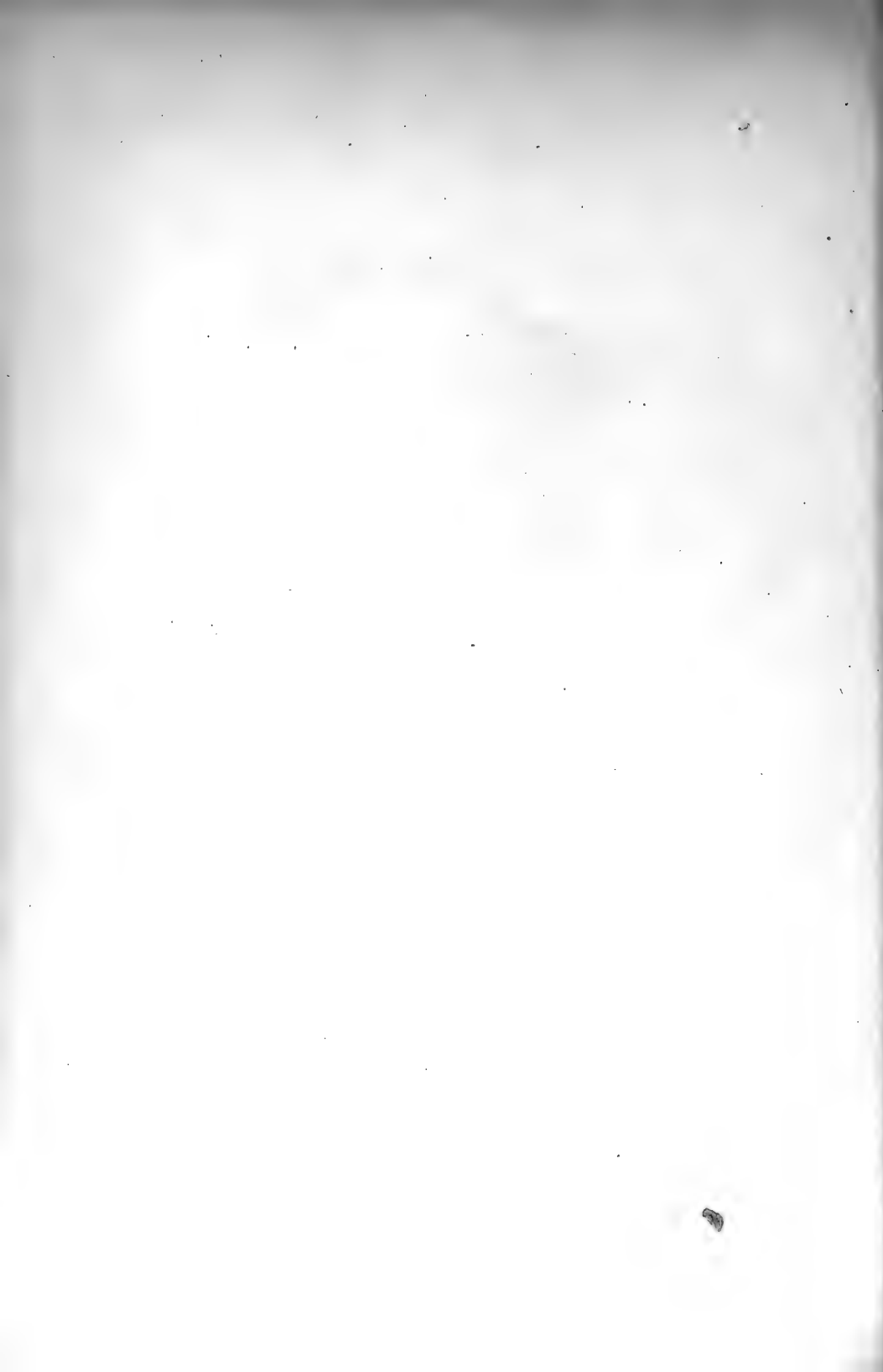




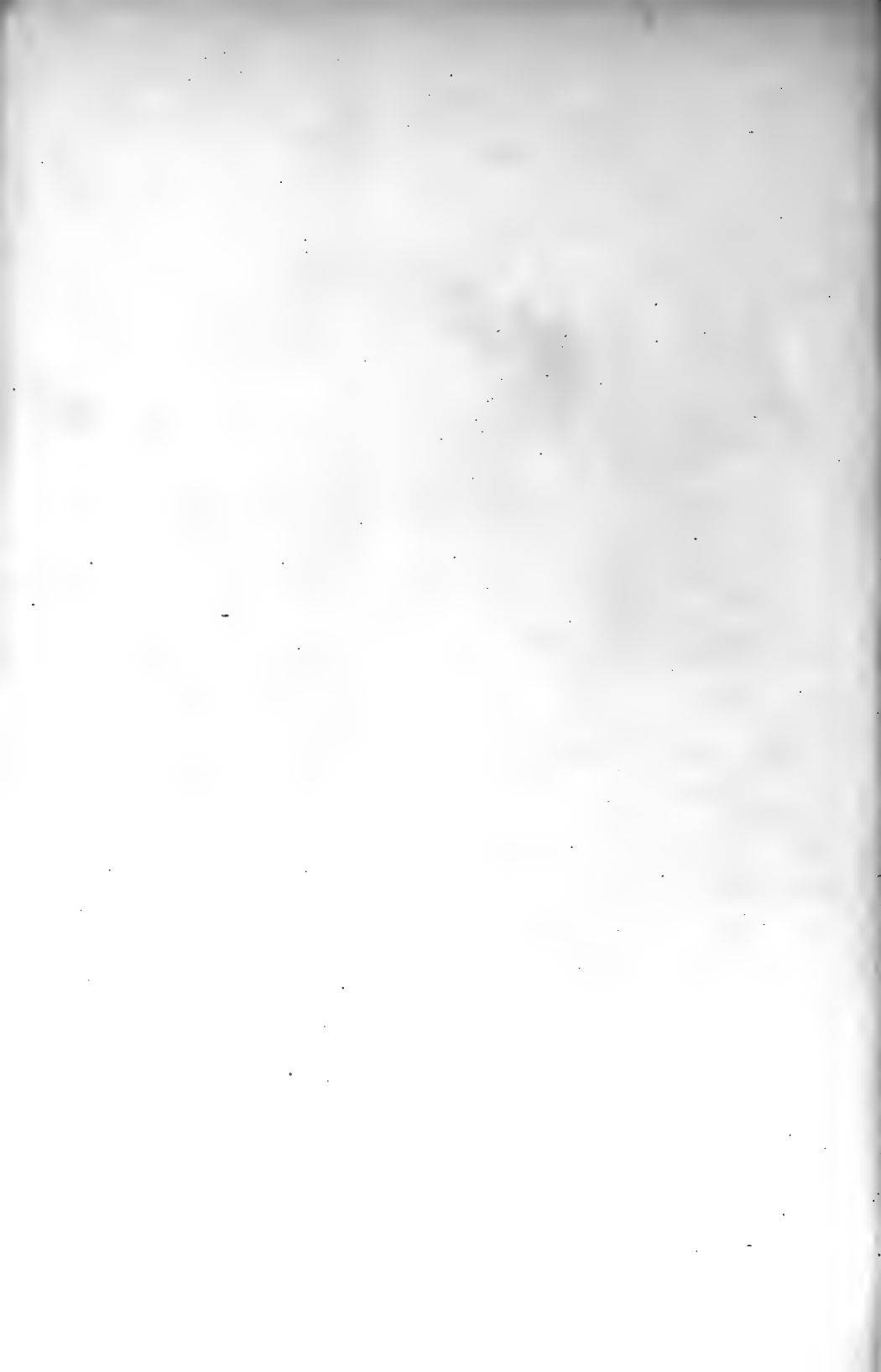
M&N Hanhart, imp.

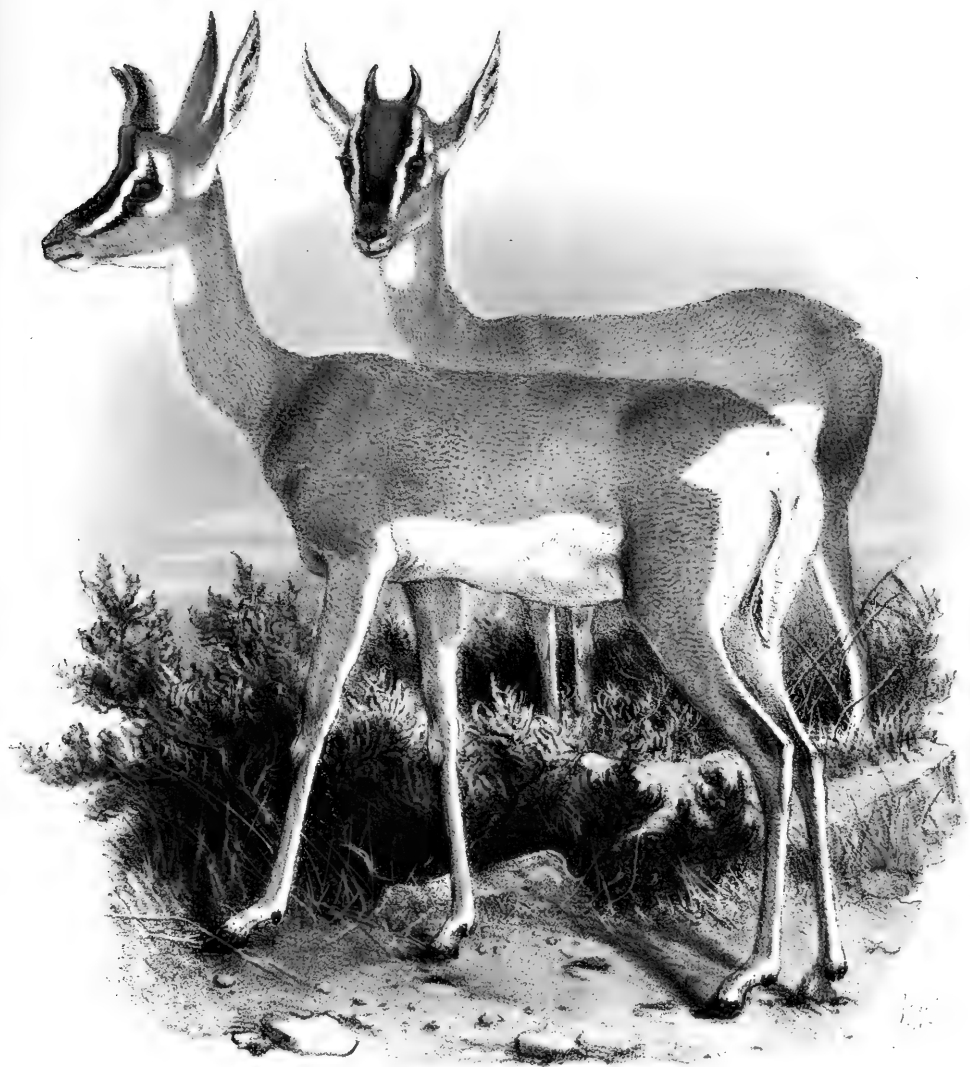
PLATE XXVII. PLATYRHINUS.

J. Wolf, del.





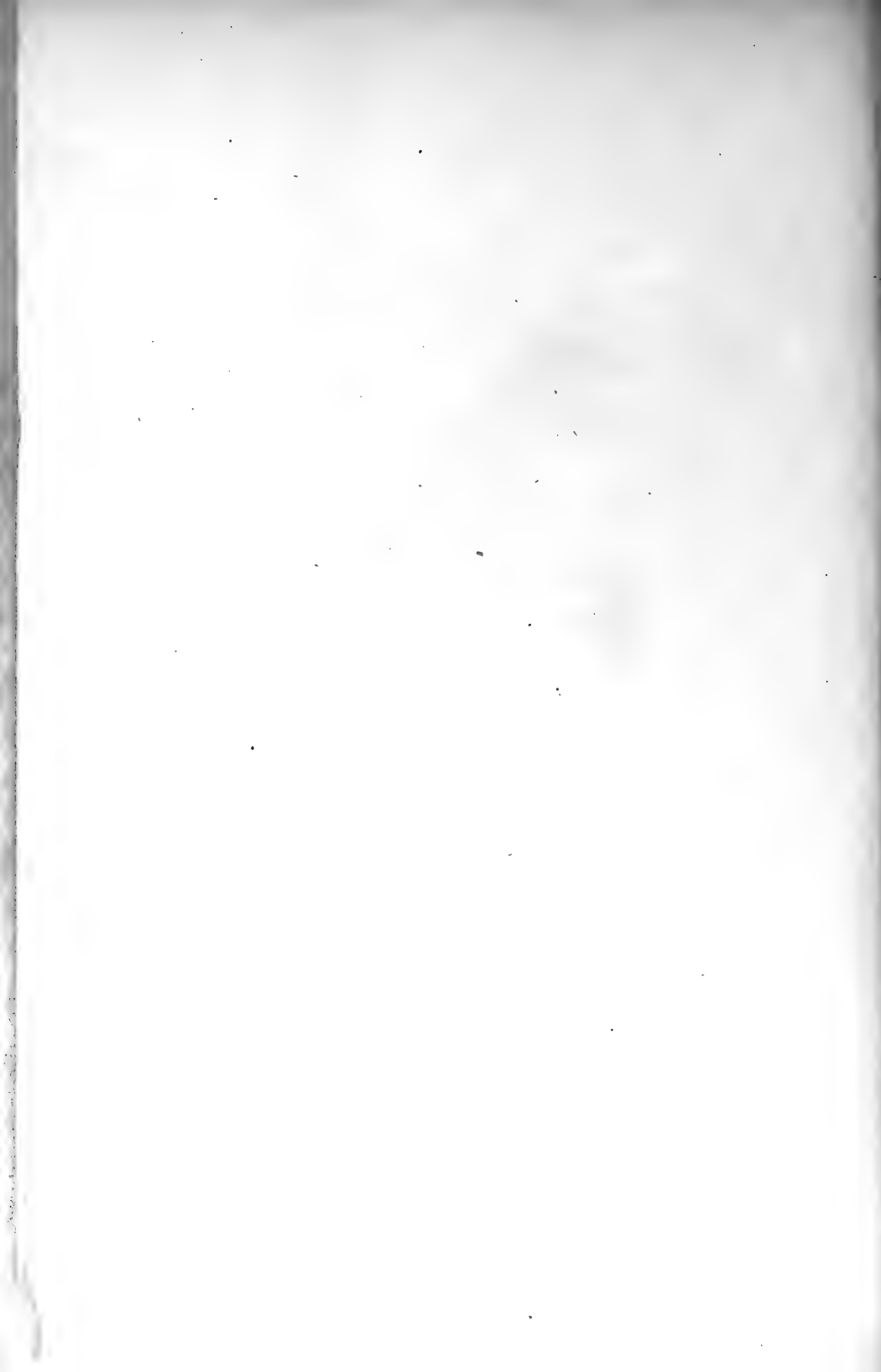




J.W. F. 1882

M.&N. Harhart Chromolith

GAZELLE SEMMEREINI

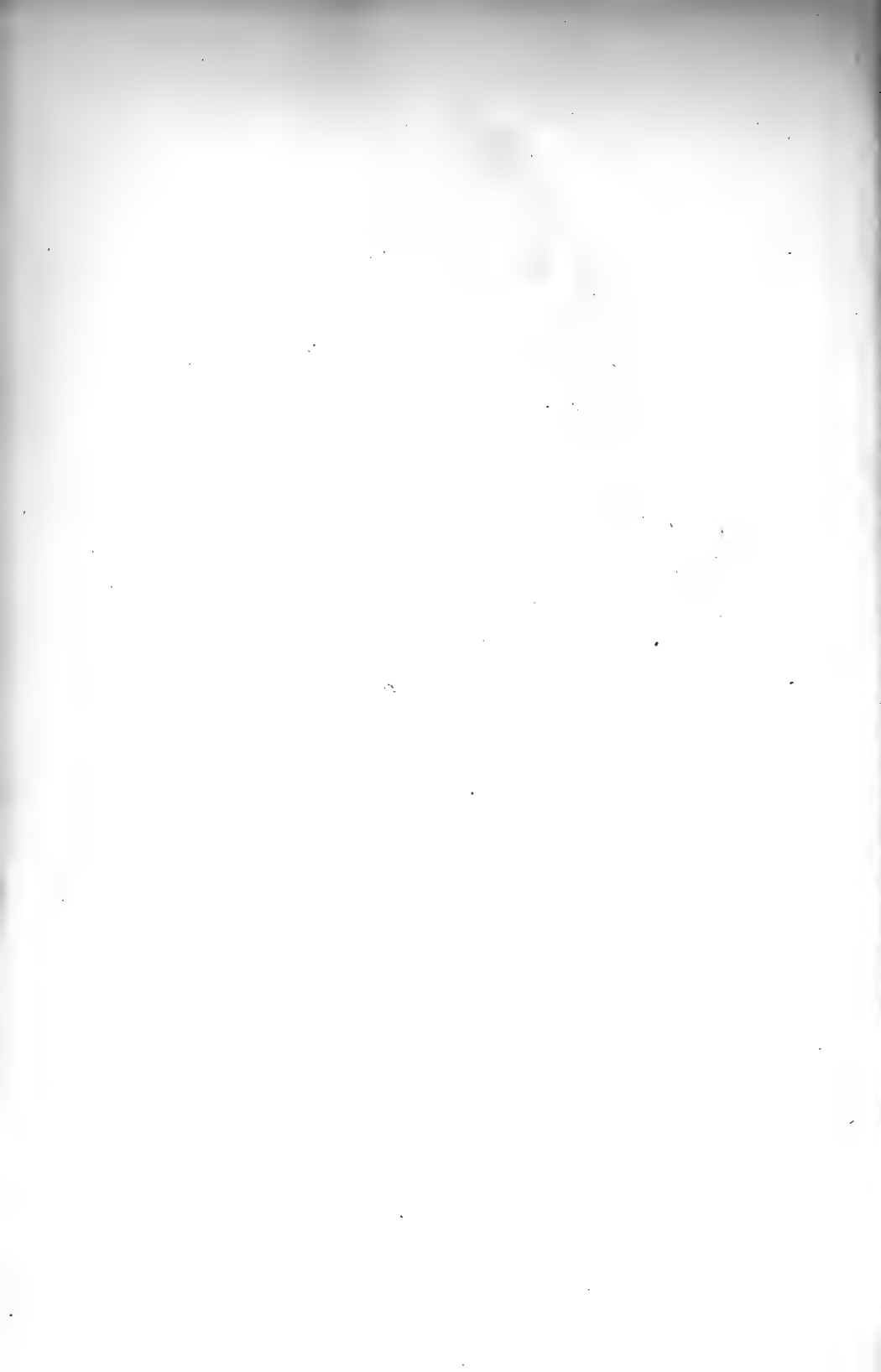


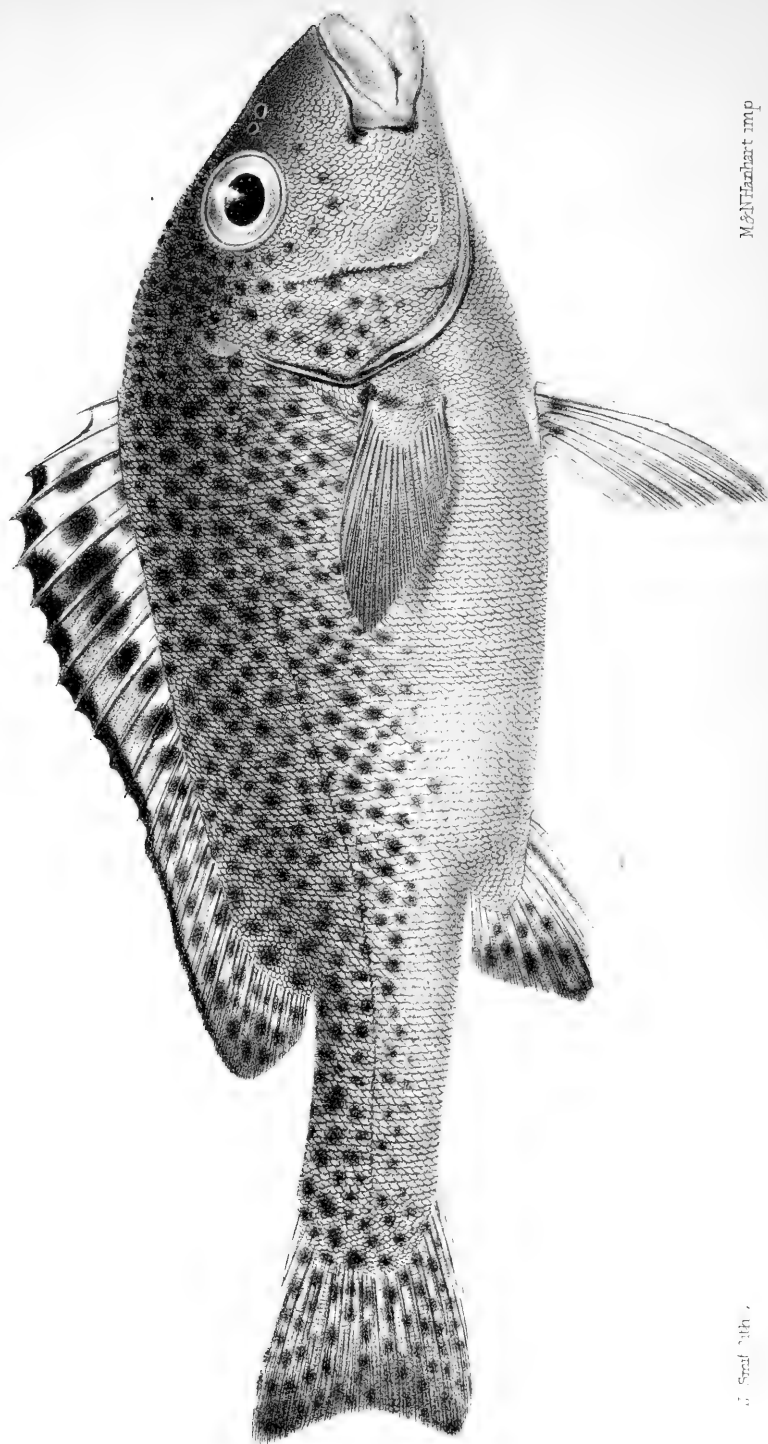




W. H. B. 1867

CALLINE ALBIVENTRIS.



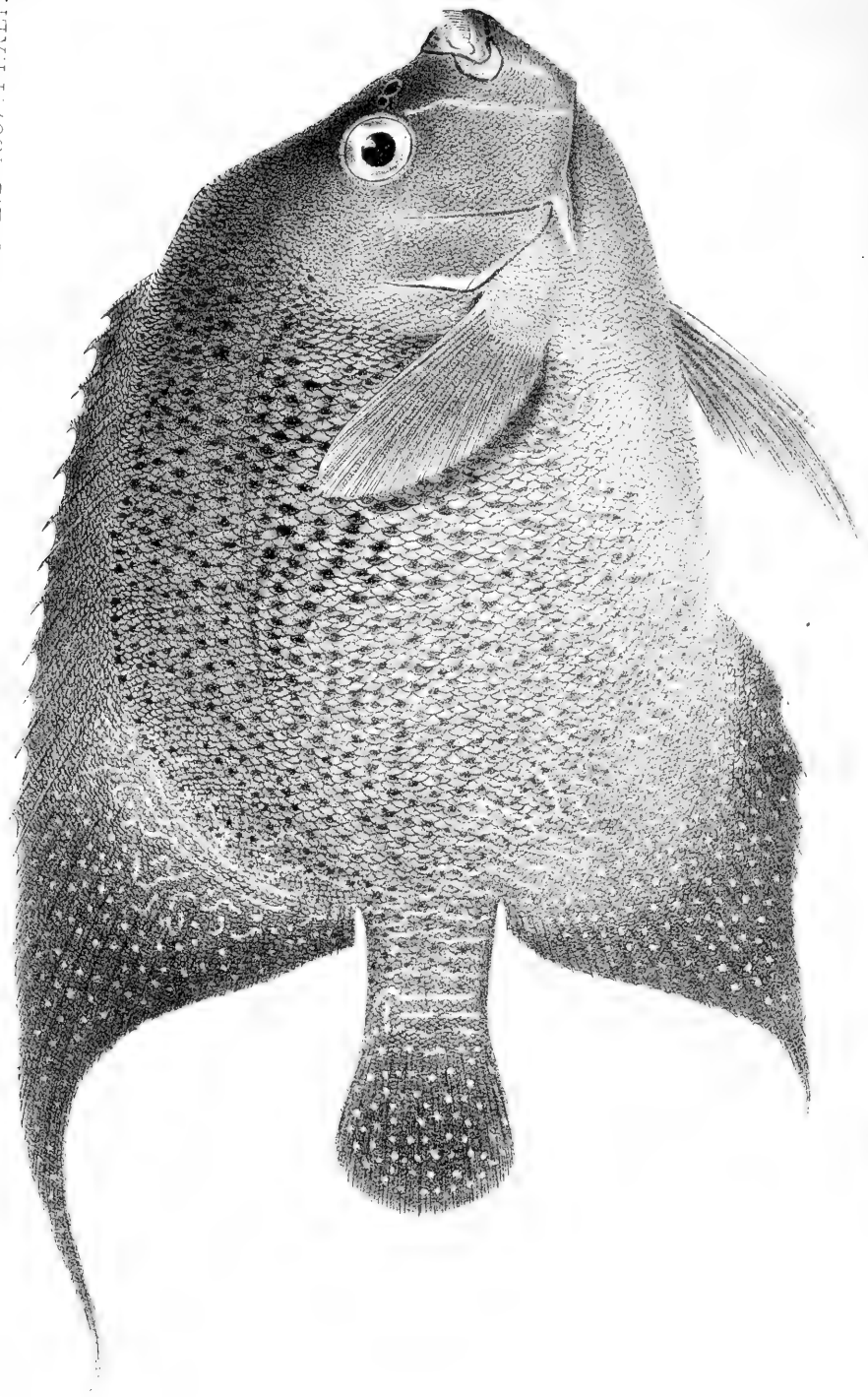


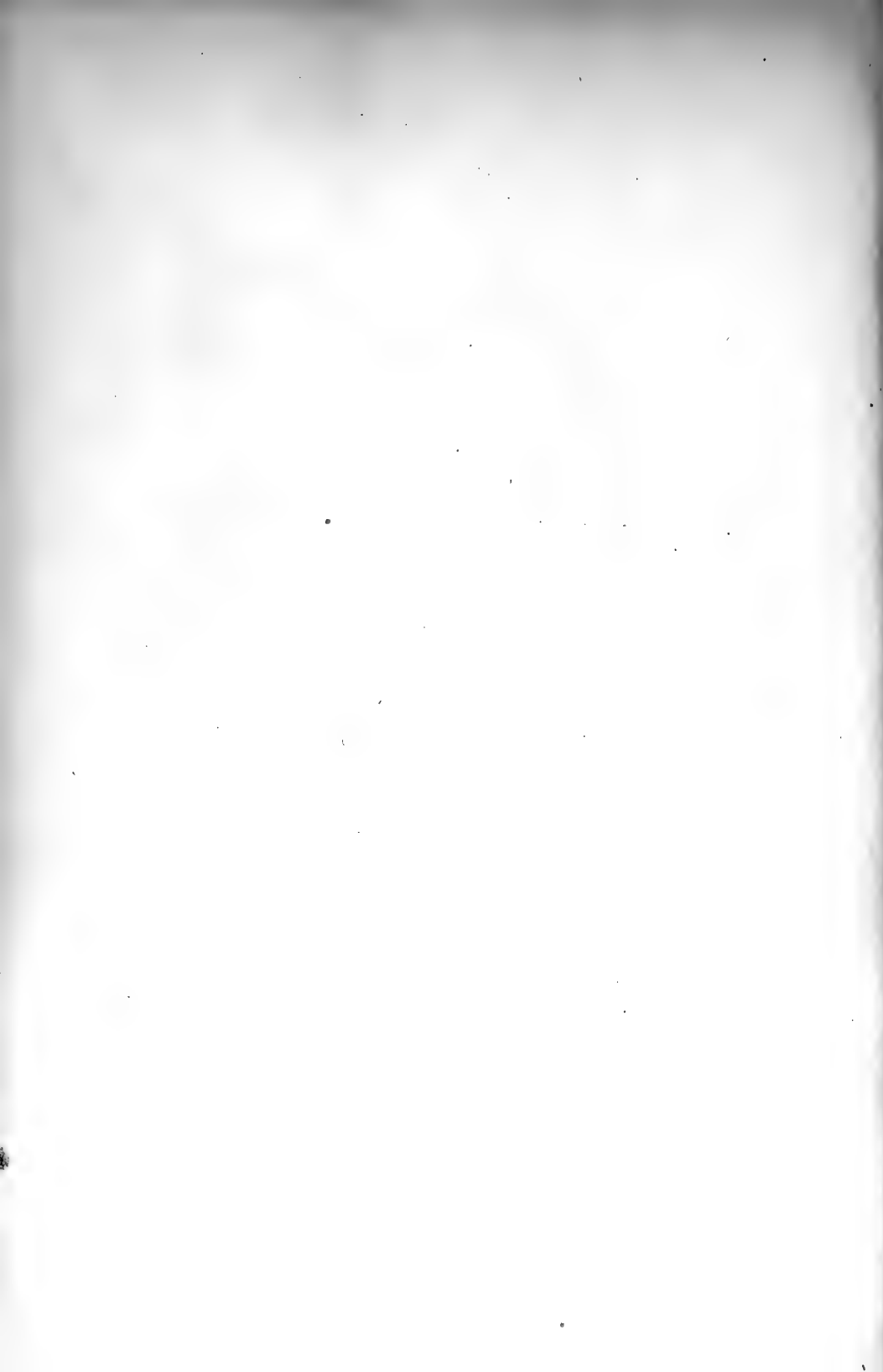
Meuschen imp

J. S. 1867.

DIAGRAMMA PUNCTATISSIMUM.





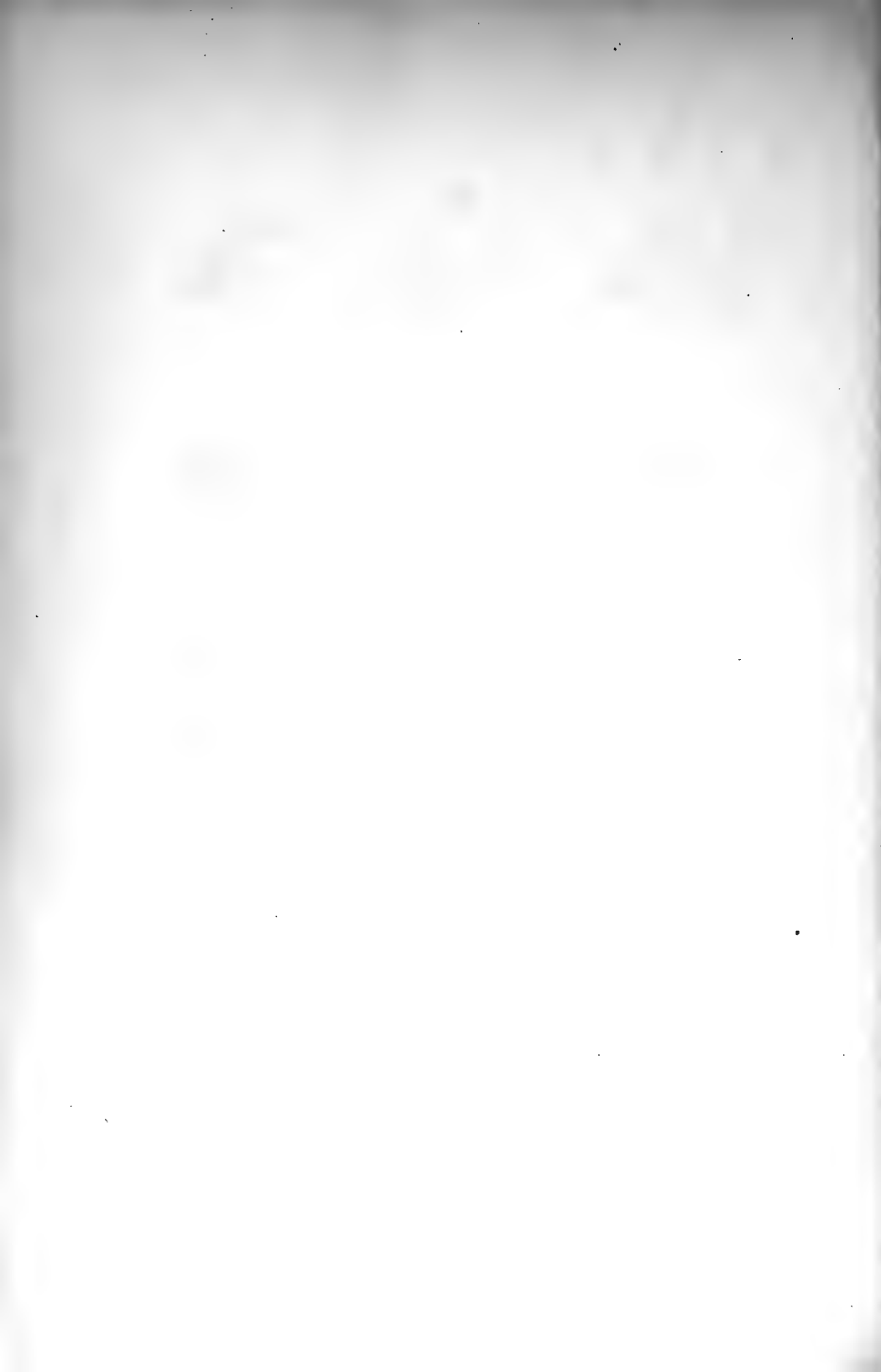


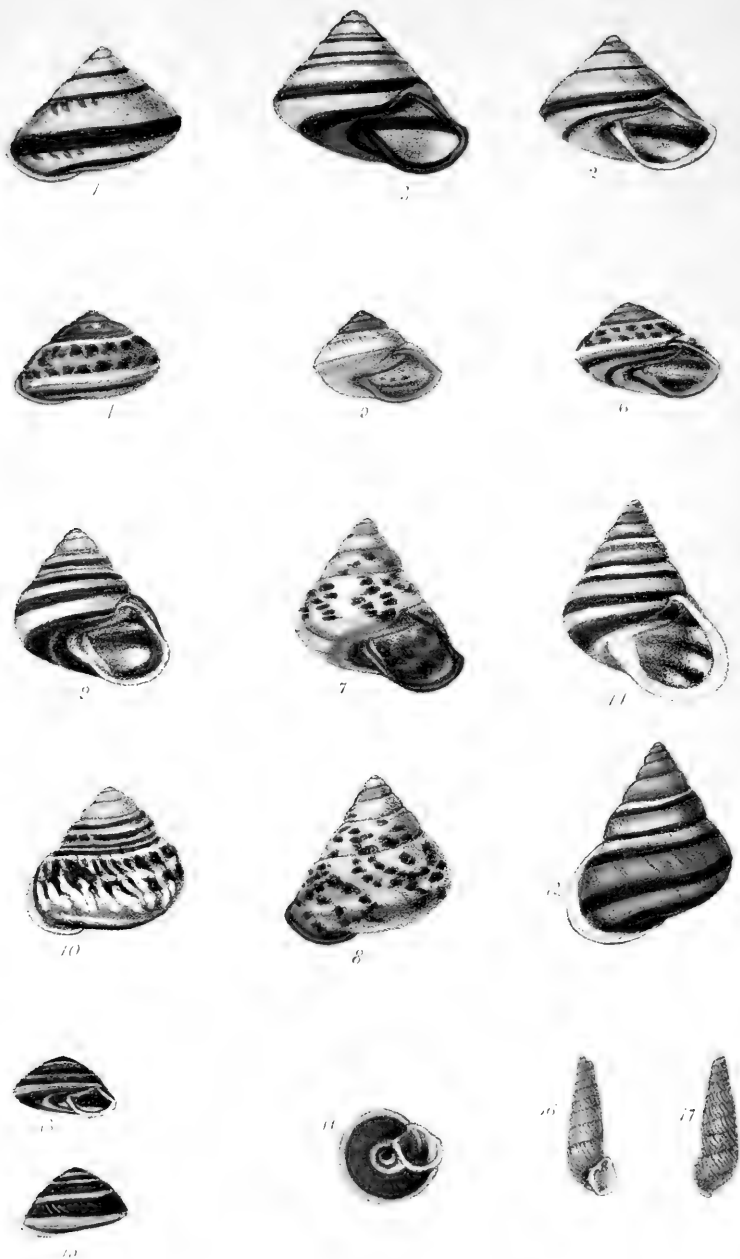


M & N Hanhart imp

ELASMOGNATHUS BAIRDI.

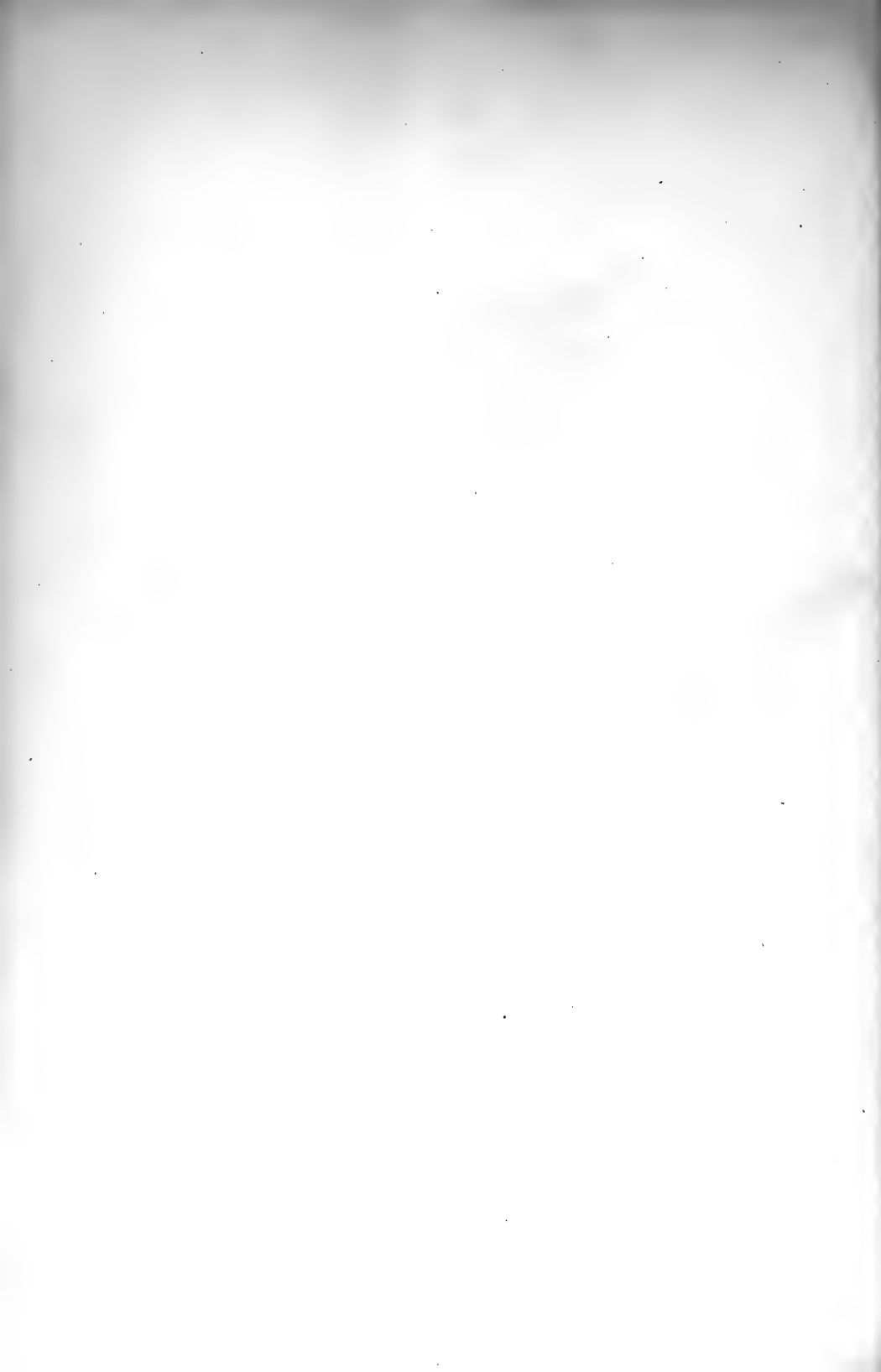
J. W. G. R. H.













1. Tern.

2. Tern.

- PERONOSTOLA B. L. 1825

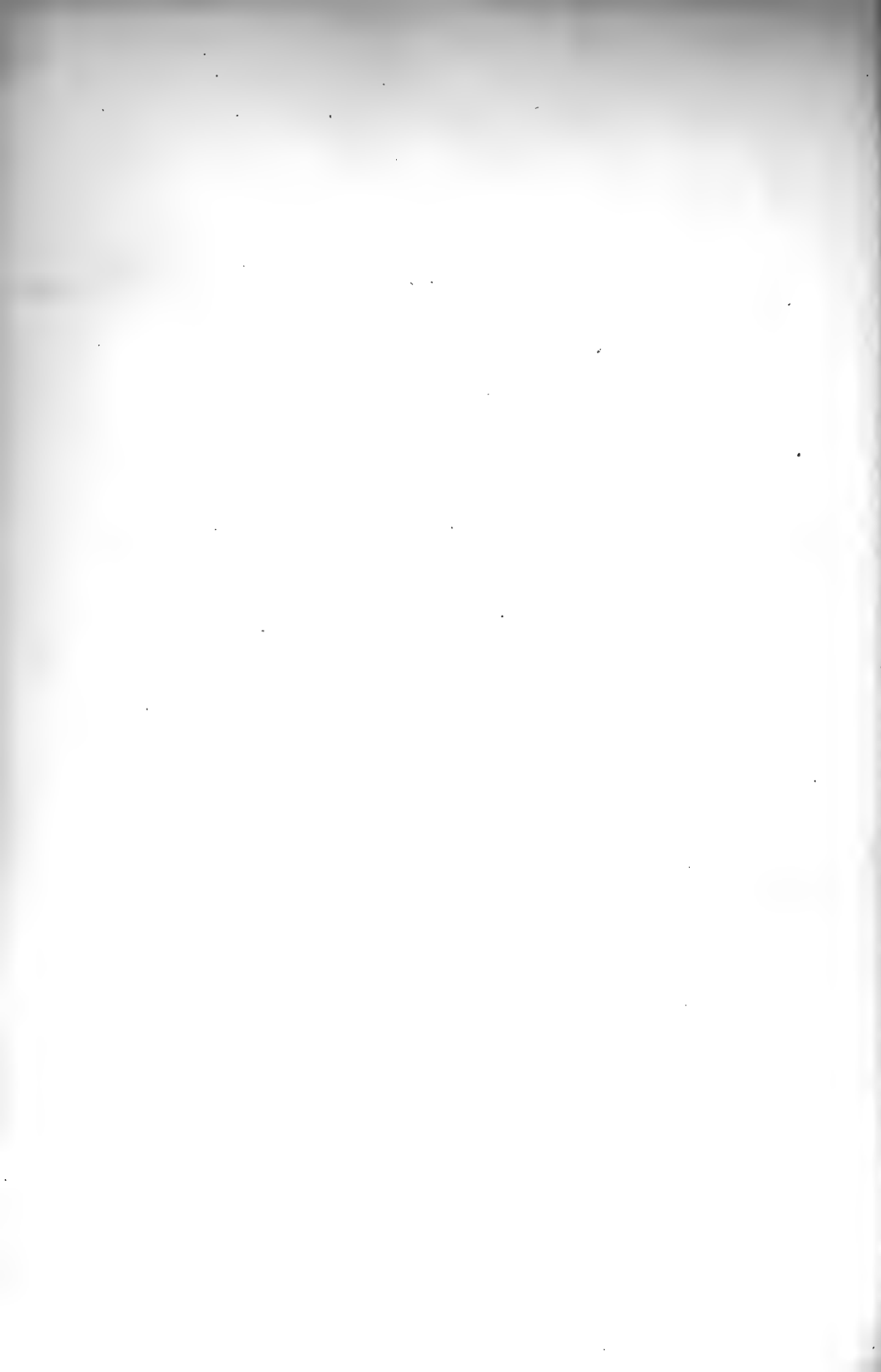
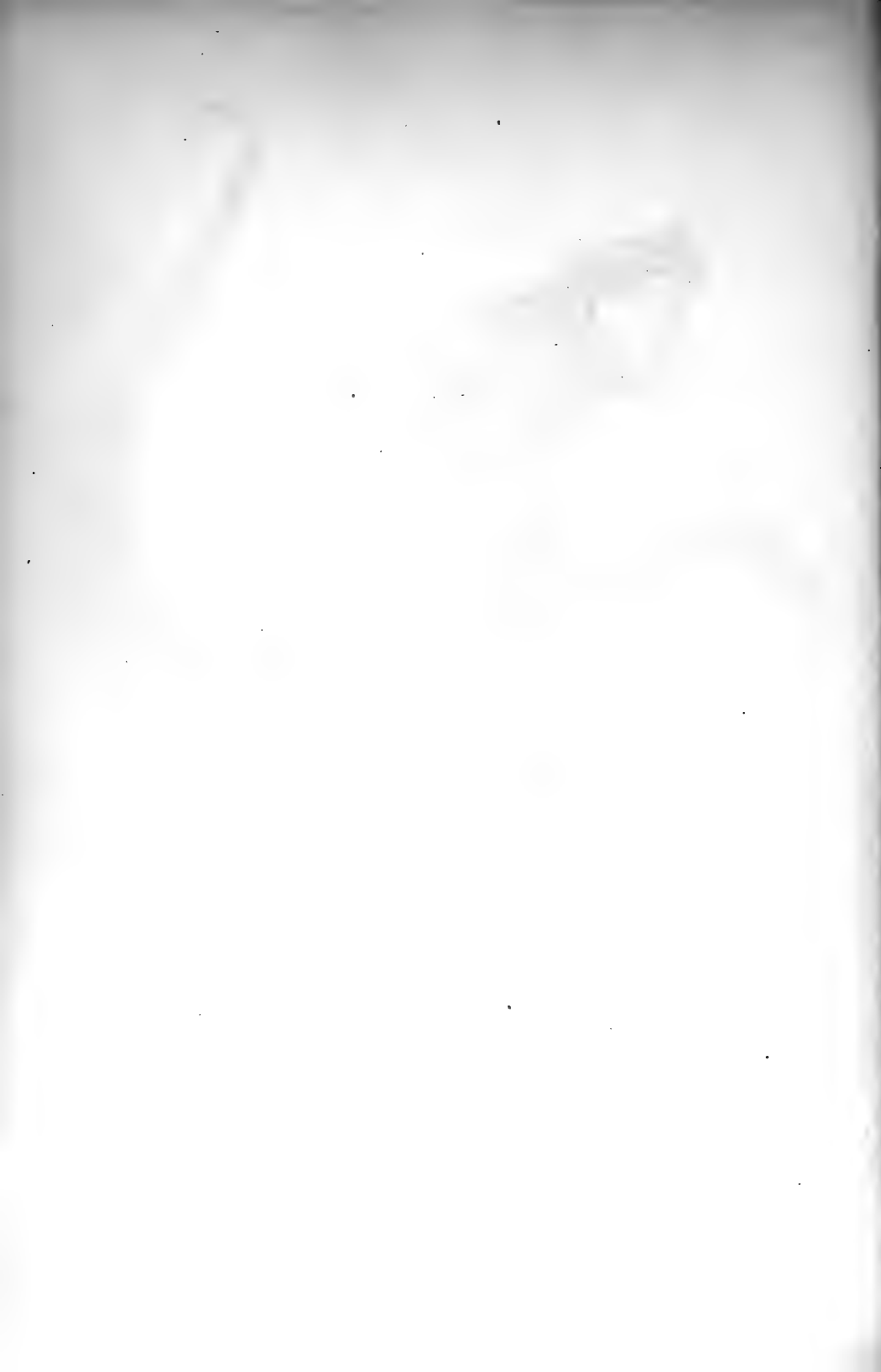




PLATE XLV.

W. W. T. and J. W.

MELOSPIZA FUSCICAPELLA





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