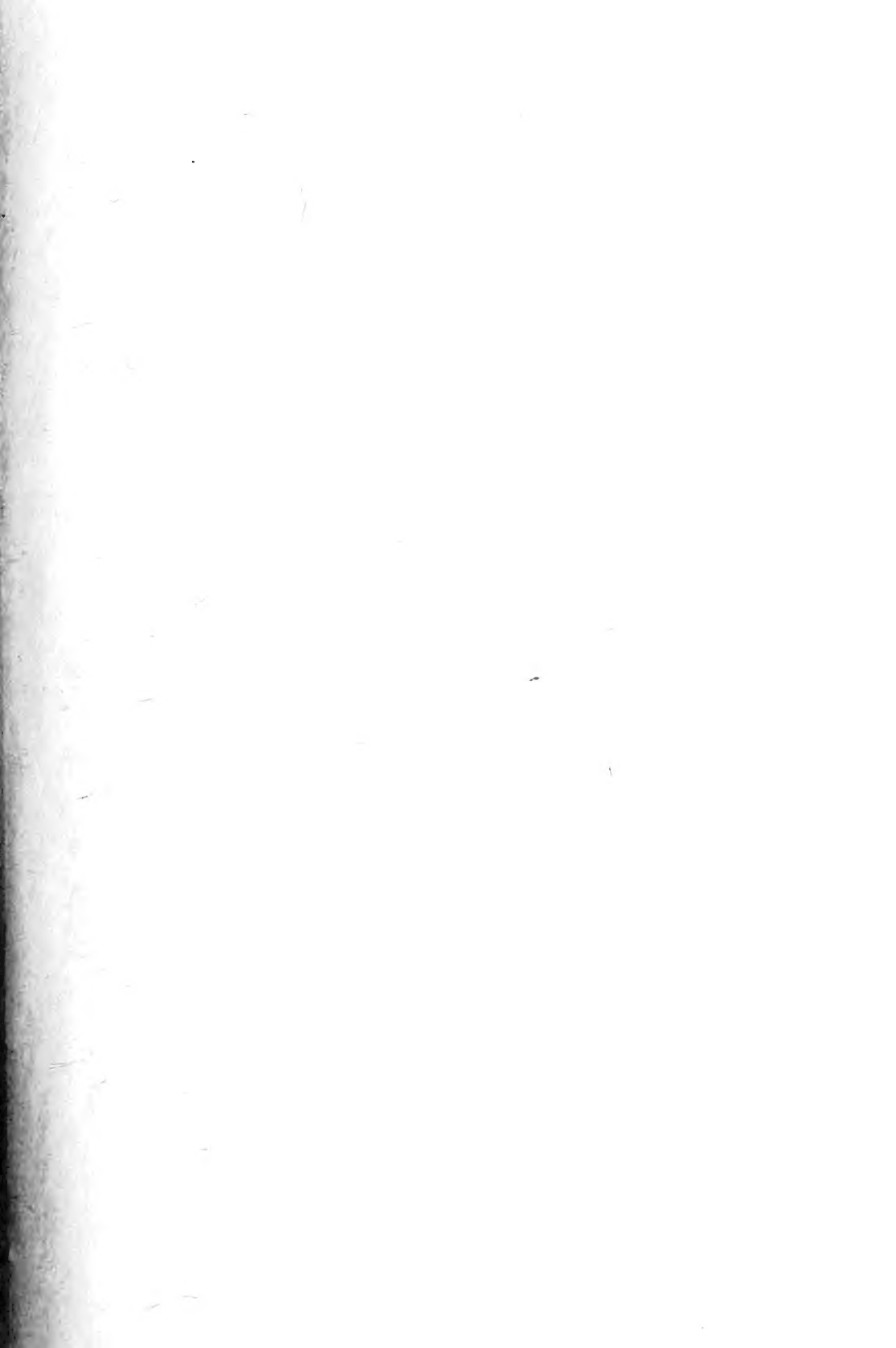




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# PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

# ZOOLOGICAL SOCIETY

## OF LONDON

FOR THE YEAR

# 1864.



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**ERRATA ET ADDENDA.**

In Dr. Gray's paper on the *Chelydidæ* (p. 129), the characters of the Section *Hydraspidina* should have been divided into two. The section-paragraph should commence with the words, "The aurio-occipital arch, &c.," and gives the characters that are contrasted with those of Section C, p. 131.

In Mr. Flower's paper on a new species of Grampus (*Orca meridionalis*), the drawing of the upper surface of the skull (page 421) should have been reversed by the artist. As it stands now, the nasal apertures appear distorted towards the right side, instead of the left, as they are in nature.

Dr. Gray wishes to state with reference to *Chamæleo tæniabronchus*, Smith, referred to at p. 476, that Sir Andrew Smith has, since the publication of Dr. Gray's paper, presented the type specimen of this species to the British Museum.

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PROCEEDINGS  
OF THE  
SCIENTIFIC MEETINGS  
OF THE  
ZOOLOGICAL SOCIETY OF LONDON.

---

January 12, 1864.

Dr. J. E. Gray in the Chair.

Mr. Buckland exhibited and made remarks on some specimens of Oysters from Prince Edward's Island, alluding especially to the probable advantages of introducing the American species *Ostrea virginica* into this country.

Mr. Leadbeater exhibited a young specimen of Owen's Apteryx (*Apteryx owenii*) from New Zealand.

Mr. Henry J. B. Hancock gave notice of his intention to try some experiments on the supposed electricity of *Octopus* in the Society's Gardens.

The following papers were read :—

1. A LIST OF BIRDS COLLECTED IN DAMARA LAND BY MR. C. J. ANDERSSON. BY J. H. GURNEY, M.P., F.Z.S.

In drawing up this list of birds, which I have received from my friend Mr. Andersson, and which bears full testimony to his well-known scientific assiduity as an ornithological collector, I have omitted those species which have already been enumerated, by Messrs. Strickland and Sclater in the 'Contributions to Ornithology' for 1852, as having been collected by Mr. Andersson in his first journey to Damara Land, and confine myself to the enumeration of species not mentioned in the above-named list, but which have been all collected by Mr. Andersson in that country.

PROC. ZOOL. SOC.—1864, No. I.

1. *FALCO BIARMICUS*, Temm.
2. *TINNUNCULUS RUPICOLOIDES* (Smith).
3. *TINNUNCULUS CENCHRIS* (Frisch).
4. *ERYTHROPUS VESPERTINUS* (Linn.).

This is the first instance which has come to my knowledge of the occurrence of this species south of the equator. The specimens sent me are marked as having been obtained at Omatolo, January 2nd, 1860; they consist of two adult and one immature males, and one adult female.

5. *MELIERAX MONOGRAMMICUS* (Temm.).
  6. *MELIERAX POLYZONUS* (Rüpp.).
  7. *ACCIPITER TACHIRO* (Daud.).
  8. *ACCIPITER MINULLUS* (Daud.).
  9. *ACCIPITER POLYZONOIDES*, Smith.
  10. *CIRCUS CINERARIUS* (Mont.).
  11. *CIRCUS SWAINSONI*, Smith.
  12. *BUBO LACTEUS* (Temm.).
  13. *CORACIAS PILOSUS*, Lath.
  14. *HIRUNDO MONTEIRI*, Hartl.
  15. *IRRISOR SENEGALENSIS* (Vieill.).
  16. *DRYMÆCA RUFICAPILLA*, Smith.
  17. *DRYMÆCA CHINIANA*, Smith.
  18. *DRYMÆCA SUBRUFICAPILLA*, Smith.
  19. *EREMOMELA FLAVIDA*, Strickland.
  20. *EREMOMELA FLAVIVENTRIS* (Burch.).
  21. *CAMAROPTERA OLIVACEA*, Sundev.
  22. *PHYLLOPNEUSTE TROCHILUS* (Linn.).
- Dr. Hartlaub agrees with me in referring the specimen sent to this species, though the dimensions barely equal the average size of European specimens.
23. *AËDON LEUCOPHRYS* (Vieill.).
  24. *BRADYORNIS MARIQUENSIS*, Smith.
  25. *PARUS NIGER*, Vieill.
  26. *ORIOBUS AURATUS*, Vieill.



27. MUSCICAPA GRISOLA, Linn.
28. CAMPEPHAGA NIGRA, Vieill.
29. ENNEOCTONUS COLLURIO (Linn.).
30. TELEPHONUS TRIVIRGATUS (Smith).
31. BASANISTES CISSOIDES (Smith).
32. PRIONOPS RETZII, Wahlberg.
33. PRIONOPS TALACOMA, Smith.
34. PHOLIDAUGES LEUCOGASTER (Gmel.).
35. PLOCEUS MARIQUENSIS, Smith.
36. ESTRElda BENGHALA (Linn.).
37. PASSER DIFFUSUS, Smith.
38. XANTHODIRA FLAVIGULA (Sundev.).
39. CRITHAGRA HARTLAUBII, Bolle.
40. FRINGILLARIA FLAVIVENTRIS (Vieill.).
41. OXYLOPHUS GLANDARIUS (Linn.).
42. CUCULUS CLAMOSUS, Lath.
43. CENA CAPENSIS (Linn.).
44. FRANCOLINUS SUBTORQUATUS, Smith.
45. CHETTUSIA LATERALIS (Smith).
46. TEREKIA CINEREA (Temm.).
47. PARRA AFRICANA, Gmel.
48. RALLUS AQUATICUS, Linn.
49. ORTYGOMETRA BAILLONI (Vieill.).
50. CORETHRURA DIMIDIATA (Temm.).
51. GALLINULA CHLOROPUS (Linn.).
52. GALLINULA PUMILA, Sclater, Ibis, 1859, pl. 7, p. 249.

Mr. Andersson has also, at my request, put together the following notes on the habits of some of the birds enumerated in this list and in that of Messrs. Strickland and Sclater above referred to, as observed by him in Damara Land and Namaqua Land.

FALCO BIARMICUS, Temm.

Not uncommon, but very wary and difficult of approach. Ob-

served both north and south of the Orange River (I always speak of the south-west coast). Found most abundant in the neighbourhood of the Okavango River. Flight very rapid and powerful.

#### ACCIPITER GABAR.

The commonest Sparrow-Hawk in Damara Land, especially abundant in some rainy seasons. Feeds on mice, lizards, locusts, moths, white ants, &c.

Anterior part of bill and legs bright reddish orange; nails of a dark horn-black; iris brilliant purple. Extreme length of a full-grown female\* about 1 foot 1 inch 8 lines, the male being only 12 inches long.

#### MELIERAX POLYZONUS (Rüpp.).

Not uncommon in Damara and Great Namaqua Land, but not so numerous as *Accipiter gabar*. Food nearly similar to that of the preceding species. Iris dark brown; legs yellow, brightest beneath the toes; bill bluish black, approaching to the latter colour towards the extremities.

#### POLIOHIERAX SEMITORQUATUS (Smith).

Very rare in all parts from the Orange River on the south to the Okavango River to the north, and Lake Ngami to the east. I never personally observed above seven or eight specimens. Their flight appears short when disturbed; they just remove from one tree or bush to another. Usually found in pairs. At a distance they have scarcely the appearance of Hawks, and may easily be mistaken for some large species of Shrike.

#### ACCIPITER POLYZONOIDES, Smith.

I am inclined to think this Hawk a scarce bird; at all events, I have only obtained three or four specimens, and, to the best of my recollection, have seen but few more; however, from its great resemblance at a distance to one or two other species, it is probable I may have overlooked or confounded him with such. Iris bright orange; legs yellow; base of upper mandible yellow, remainder (except near the base, where it is bluish black) darkish.

#### ACCIPITER MINULLUS (Daud.).

Very rare; I do not remember to have met with it in Great Namaqua Land.

#### CIRCUS SWAINSONI, Smith.

Migratory. In favourably rainy seasons met with pretty numerously. Their haunts are the sides and banks of marshes and rivers and other humid places. I have observed very few old or mature

\* All measurements given in these "notes" are taken from birds immediately after death. I divide my inch into 12 lines.

birds either in Damara or Great Namaqua Land. Food—lizards; mice, white ants, &c.

**PRIONOPS TALACOMA, Smith.**

I did not observe this elegant and interesting bird until I had passed the latitude of Omanboudi. To the northward of this it is not uncommon, being usually found in secluded spots, where it restlessly hops about from branch to branch amongst the brushwood (in flocks often consisting of numerous individuals). At times these fly slowly from tree to tree (or bush, as the case may be), and generally close to the ground. The moment they have reached their temporary destination, the first-arrived fix their gaze intently below them on the ground; and if any prey is within sight, down these alight as quick as thought. Thus some of the flock are always at once on the ground, perching or moving onwards.

**PRIONOPS RETZII, Wahlberg.**

I never but once observed this bird, and that was a few days south of the Okavango River. There were six individuals in a flock, all of which I secured—a rather fortunate event, since they were exceedingly wary and watchful, always perching on the loftiest and most exposed situations. These six individuals appeared to me to be all of one hatching, since I think I only obtained two adults (male and female), the remainder being evidently young birds of both sexes. They exactly resemble *P. talacoma* in their manners and habits.

**TELEPHONUS TRIVIRGATUS (Smith),**

**TELEPHONUS SENEGALENSIS.**

I have two specimens of these *Laniadæ* greatly resembling each other, as well as the one depicted in the 'Nat. Library' as *T. trivirgatus*. They differ from each other a trifle in size, and the bill of one is of a darker horn-colour, whilst that of the other is reddish brown (this is the colour of Dr. Smith's specimen). The two centre tail-feathers of mine are of a brownish grey, with numerous dark bars particularly conspicuous on the upper or outer surface. In Dr. Smith's, again, all the tail-feathers are broadly tipped with white, whilst in my specimens several of the centre feathers are without this edging. I never observed this bird till after I passed the northern frontier of Damara Land proper.

**BRADYORNIS MARIQUENSIS, Smith.**

Very common throughout Damara and Great Namaqua Land, and as far as the River Okavango to the northward. My experience of this bird differs considerably from that gained by Dr. Smith, who thinks it very similar in habits to the short-legged Thrushes. To me it is more of a Fly-catcher or even of a Shrike; for, like either of these, it watches for its prey from some elevated spot, from which it pounces with great rapidity on anything coming within reach. It

is very partial to burnt ground and localities singed by fire. Dr. Smith has given a good illustration of the young.

*ORIOLOUS AURATUS* (Vieill.).

I have only once or twice observed this splendid Oriole in the southern parts of Damara Land—that is, the mature bird. The young (at least I believe it to be the same bird) is pretty common, but only during the rainy season; for it is migratory. The old bird is extremely shy and wary, and always keeps to the thickest part of the jungle. On and in the neighbourhood of the Okavango River it is, however, more abundant, but still retains its shy habits.

In the young bird the iris is brown, legs lead-colour, bill reddish brown.

*PARUS NIGER* (Vieill.).

Never observed in Great Namaqua Land, and very rare in Damara Land. It is only as one approaches the Okavango River that it becomes of more frequent occurrence. Resembles the great European Titmouse in its habits.

*PARUS CINERESCENS*.

Found sparingly from the confines of the Okavango River to the Orange River on the south—that is, as regards the west coast. Iris dark brown.

*PHOLIDAUGES LEUCOGASTER* (Gmel.).

Common throughout Damara Land and parts adjacent (northward), but almost entirely as a migratory bird. A few isolated individuals probably remain all the year round, for I have observed such long after the general migration is over. Shy and wary.

*CAMPEPHAGA NIGRA*, Vieill.

First observed in the neighbourhood (and there very sparingly) of the Okavango River, and never in Damara or Great Namaqua Land. Its real home must be considerably north of the river in question, for I merely noticed it as a migratory bird. Exceedingly shy and difficult of approach; generally observed moving about in the upper parts of large trees.

*PLOCEUS MARIQUENSIS*, Smith.

Abundant in Damara and Great Namaqua Land. Most of the old birds appear to me to migrate. Builds its nest amongst reeds, or in small trees immediately overhanging water. Iris orange; legs, toes and claws, and lower mandible nearly flesh-red; upper mandible brownish red. Gregarious.

*FRANCOLINUS SUBTORQUATUS*, Smith.

I first observed this plain but pretty Francolin as I approached the Okavango River; indeed the few specimens obtained by myself

were secured within a few days' journey of it. It has a true Partridge's call. Dr. Smith describes its strongholds as rocky places, whereas I found it on grassy plains interspersed with large trees and a little brushwood.

*ORTYGOMETRA BAILLONI* (Vieill.).

Found sparingly (necessarily on account of the scarcity of suitable localities) in Damara Land, also on the River Okavango. At Omanboudi I found it plentiful, where it also bred. I found the nest repeatedly. It usually contained as many as seven eggs of a dull olive-brown colour, or rather a yellowish brown, indistinctly marked with a confusion of brownish freckles. The size of the eggs is enormous—if anything, larger than those of European Starlings. This species will take the wing for a short distance when hard pressed and when beyond the immediate refuge of reeds and rushes, its usual stronghold.

*GALLINULA CHLOROPUS*.

Common in Damara and Great Namaqua Land—that is, wherever there is a swampy spot.

*PARRA CAPENSIS*, Smith.

Never but once saw this bird in Damara Land, and that was at Omanboudi; but it is common in the lake regions, and on the River Okavango, where it also breeds.

*LAMPROCOLIUS PHENICOPTERUS*, Sw.

This is to Damara Land and parts adjacent what the Starling is to many parts of Europe. In manner, habits, mode of life, &c., it is precisely similar. Eggs of a similar colour, though scarcely of so deep a blue. Irides bright orange. My friend Layard thinks there may be two species; but this I think doubtful. Entire length 9 inches 8 or 9 lines.

*CRATEROPUS BICOLOR*.

Pretty common throughout Damara Land. I fancy there may be two distinct species. Irides light reddish brown; legs bluish brown; bill black. Is, like others of the species, very noisy but, as a rule, shy. A full-grown specimen measures 10 inches.

*DRYMÆCA CAPENSIS*.

Pretty common in the southern parts of Great Namaqua Land; not observed in Damara Land; abundant in the Cape Colony.

*AMADINA ERYTHROCEPHALA*.

I had been several years in this country (Damara Land) before I knew of the existence of this pretty Finch, or rather Sparrow. Could I possibly have overlooked it? I scarcely think so. A few

isolated specimens may have escaped me. Lately, at all events, I have discovered it in considerable numbers, particularly this year (1863). Numerous families were reared at my residence at Otjimbingue. They build a nest like that of the common European House-Sparrow; indeed, like that bird, they are partial to the eaves and corners of dwelling-houses and out-houses. In Great Namaqua Land I have found it more numerous, and I have reason to think it is not uncommon in some of the northern parts of the Cape Colony and the Orange River Free States; but of this latter circumstance I am not positive. In specimens supposed to have come from the Colony side, the red on the head is clearer, and the colours throughout considerably darker. There is also, in particular, a strong rusty-brown tint about the breast, wings, &c., not so perceptible in my Damara Land specimens.

#### CUSORIOUS BICINCTUS.

Sparingly scattered over Damara and Great Namaqua Land. This year (1863), I have found it particularly abundant in the south of Damara Land. Entire length probably about  $8\frac{1}{2}$  inches.

#### LANIUS SUBCORONATUS.

Common in Damara and Great Namaqua Land, but I am not sure that it is found as far south as the Orange River. I think not. Where it ceases, *Lanius collurio* takes its place. It resembles the rest of the true Shrikes in its habits. Pounces upon its prey from some elevated situation.

#### CORETHRURA DIMIDIATA (Temm.).

I found this pretty little Rail first and only at Omanboudi (Central Damara Land), where it was not uncommon, but very shy and retired in its habits. It bred at Omanboudi; but I did not succeed in procuring the nest.

## 2. LIST OF A COLLECTION OF BIRDS FROM HUAHEINE, SOCIETY'S ISLANDS. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

Mr. J. H. Gurney having received a small collection of birds from Mr. James H. Wodehouse, H. B. M.'s Consul at Raiatea, Society Islands, has requested me to look them through and to determine the species, which I have had great pleasure in doing.

The series only embraces ten species, but some among them are of much interest. Our best information on the Pacific avifauna is derived from Mr. Cassin's volume on the 'Mammalogy and Ornithology of the U. S. Exploring Expedition under Commodore Wilkes,' to which I have given references in most cases.

1. TATARE OTAÏTIENSIS, Less.: Cassin, U. S. Expl. Exp. p. 159.  
A single specimen of this characteristic Pacific form.

2. TODIRAMPHUS TUTUS (Gm.): Cassin, *l. c.* p. 206.

Two examples of this species, one of which is not quite mature, the blue on the head and back being tinged with greenish, and the white below with yellowish.

3. EUDYNAMIS TAÏTENSIS (Sparrm.): Cassin, *l. c.* p. 248.

One example of this Cuckoo.

4. PTILONOPUS CHRYSOGASTER, G. R. Gray, P. Z. S. 1853, p. 48, pl. 54.

It is very satisfactory to have an ascertained locality for this beautiful little Fruit-Pigeon, which is closely allied to *P. purpuratus* (Gm.), of the neighbouring island of Tahiti. Other species of the same form are *P. fasciatus* of the Samoan Islands, and *P. coralensis* of the Paumotu group. Indeed every island-group of the South Pacific appears to have one or more representatives of this genus of Fruit-Pigeons.

5. HERODIAS JUGULARIS (Forster): Gould, B. Austr. vi. pl. 60.

One specimen in the bluish-grey plumage of this widely spread species.

6. TOTANUS INCANUS (Gm.).—*T. oceanicus*, Less. et Cass. *l. c.* p. 318.

One example of this widely distributed Pacific species.

7. ANAS SUPERCILIOSA, Gm.: Gould, B. Austr. vii. pl. 9.

One example of this Australian Duck, which has a wide range in the Southern Pacific.

8. STERNA POLIOCERCA, Gould, B. Austr. vii. pl. 24.

9. ANOUS STOLIDUS (Linn.): Gould, B. Austr. vii. pl. 34.

A very widely distributed species.

10. TACHYPETES PALMERSTONI (Gm.): Cassin, U. S. Expl. Exp. p. 359.

One example of the Pacific Frigate-bird, if really distinct from *T. aquila*, as maintained by Cassin, *l. c.*

The following extracts from Mr. Wodehouse's letter to Mr. Gurney (dated Raiatea, September 3rd, 1863) give some particulars concerning these birds. I have inserted the scientific name after the native name in each case:—

“I forwarded in May last from here, per ‘John Williams,’ bound

for Sydney, a box containing some specimens of birds, inhabitants of this group. It so happened that at the time they arrived from the neighbouring island of Huaheine, we were busily engaged packing up two boxes of things for England, *via* Sydney, and I had no time to do more than pin on to each of the birds its native name, reserving an account of their habits, &c., for a future time.

“The ‘John Williams,’ missionary barque, would have had to perform a circuitous voyage to Sydney, where the box was to be transferred to a homeward-bound Australian trader. It may perhaps reach you a little before this letter.

“The only birds which will interest you at all will be the raptorial, but only after a fashion, as their food is chiefly fish.

“1. ‘Otaha,’ or Man-of-War Hawk (*Tachypetes palmerstoni*), so called, as you know, from its swift and dashing habits. The Otaha does not alight on the surface of the sea, being neither able to swim nor dive; but it hovers over the ocean with unwearied assiduity. Sailors believe it sleeps on the wing. Their flight is easy and graceful, and has the charm of variety. Sometimes the bird may be seen balanced in mid-air, its wings spread apparently motionless, its long forked tail expanding and closing with a quick alternate action, and its head inquisitively turned from side to side to inspect the ocean beneath; sometimes it wheels rapidly, or darts to the surface of the water, in pursuit of its prey, and at others soars to such a great height that it is lost to sight amongst the clouds of heaven. When the ocean is turbulent, they fare well; but when calm, they live by plundering other birds, whose ocean-food they compel them to disgorge by repeated blows, and, when ejected, the Otaha seizes it with great dexterity before it falls into the sea.

“They are very numerous in these islands. The Otaha builds its nest on the *motus* or verdant islets near the reef, amongst the leaves of the ‘wild palm.’

“I believe the female lays no more than three eggs.

“The above description of the Otaha is chiefly taken from a book; it is a faithful one.

“2. The ‘Tarapapa,’ or Blue Heron (*Herodias jugularis*). This bird is very common here, and takes its prey after the usual Heron fashion, walking along the shores of the lagoon, or, as I have often seen them, sitting motionless on a low coral-rock for hours. The ‘Tarapapa,’ I am told, makes its nest in the low coral-rocks, which here and there just show their heads above water, close to the shores of the lagoon.

“3. ‘Otino’ (*Sterna poliocerca*). White Reef-bird, also a species of Heron, as you will have seen. This gentleman passes his time on the ‘barrier-reef’ amidst the foam of the broken wave, which brings with it from the ocean the small fish which constitutes his food. His home is, too, the ‘wild palm’ of the ‘green motu,’ close to his beloved reef, on whose wave-beaten surface he passes his life. I do not know how many eggs the female lays.

“4. ‘Torea’ (*Totanus incanus*). This bird seeks its food along the shore, like the Heron.



“5. ‘Otatare’ (*Todiramphus tutus*). A white bird, which builds its nest in the mountains. This gentleman is the terror of the little native girls, as he swoops down on their little pet pullets. (Two specimens.)

“6. ‘Ooea’ (*Eudynamis taitensis*). A speckled bird with a long tail—a land-bird.

“7. ‘Moora,’ or Wild Duck (*Anas superciliosa*). Builds on the hillside in the trees.

“8. ‘Omamao’ (*Tatare otaitiensis*). A sort of Sparrow.

“9. ‘Ohio’ (*Anous stolidus*). A singing-bird, so called from its peculiar note.

“10. ‘Uupa’ (*Ptilonopus chrysogaster*). Pigeons (two specimens).

“The gentleman who, at my request, shot and preserved the above specimens is residing in Huaheine, one of the islands of the group, and is a collector of mountain and other Mollusca. As he understands preserving birds, I furnished him with materials out of your box. I only asked for the birds of prey; but as he sent the others, I thought you might as well have them all.

“There is no Owl here; but there is a species of Owl at the Sandwich Islands; and Mr. Garrett, the gentleman who sent these specimens, is visiting the Sandwich Islands, and will bring back some specimens. I do not know if there are any other birds of prey there.”

### 3. NOTES ON CERTAIN SPECIES OF TORTOISES FROM THE ASIATIC ISLANDS TRANSMITTED TO THE BRITISH MUSEUM BY DR. BLEEKER. BY DR. J. E. GRAY, F.R.S., ETC.

Dr. Bleeker has kindly sent to the British Museum a series of specimens of the Tortoises which he has lately named, but I believe not described, in the ‘*Natuurkundig Tijdschrift voor Nederlandsch Indie*,’ xiii. 1857, p. 470. I have compared these with the specimens in the British Museum, which I have at various times described, and herewith send the result of the comparison.

I have done so because I think it is very important that there should be a uniformity between the names used in the British Museum and those adopted in the museums on the Continent, more especially as I am desirous of conforming to the rule of priority, and quite willing to adopt the names used by any continental naturalist, if they are given and described before those described in this country.

It is more important that a concordance should be established as regards Dr. Bleeker’s species, as I believe that he has sent specimens to several of the larger continental and American collections.

I take this opportunity of stating how much I consider myself indebted to Dr. Bleeker’s kindness in contributing original typical specimens of these and other reptiles to the Museum, which has enabled me to make the comparisons.

I believe that Dr. Bleeker has only paid a limited attention to the study of reptiles: his great object has been to collect, to figure while living, and to preserve the fish of the Indian Ocean; and he has succeeded in forming a very extensive collection, the largest, I believe, that has ever been formed, and in discovering a very large number of new and most interesting species, and in establishing numerous new genera. Moreover he has most kindly furnished the British Museum with types of the greater part of these, thereby greatly enriching our collection, which, I believe, was, before that addition, the largest and best-preserved series of fish yet formed.

1. Under the name of *Cistudo bankanensis*, Bleeker, evidently from Banka Island, we have received a young specimen of a terrestrial Emydide, with moderately stout, rather short toes, united by a distinct web nearly to the tips. The toes are covered above with small scales like those on the webs, and there are only two or three very small, triangular, rather broader and more band-like scales on the upper surface of each of the toes near the claws, which are most developed and numerous on the inner toes or thumbs of each foot. The fore legs are covered in front with very thin membranous band-like shields; the hind legs are covered with small scales.

This specimen agrees in almost every particular with a young specimen of *Geoemyda grandis*, which I described in the 'Annals and Magazine of Natural History' for September 1860 (vol. vi. p. 218), from Camboja and Siam; so that I am inclined to think that it may be a variety of that species.

It differs in the underside being plain yellow, and very obscurely mottled with some smaller rather dusky spots.

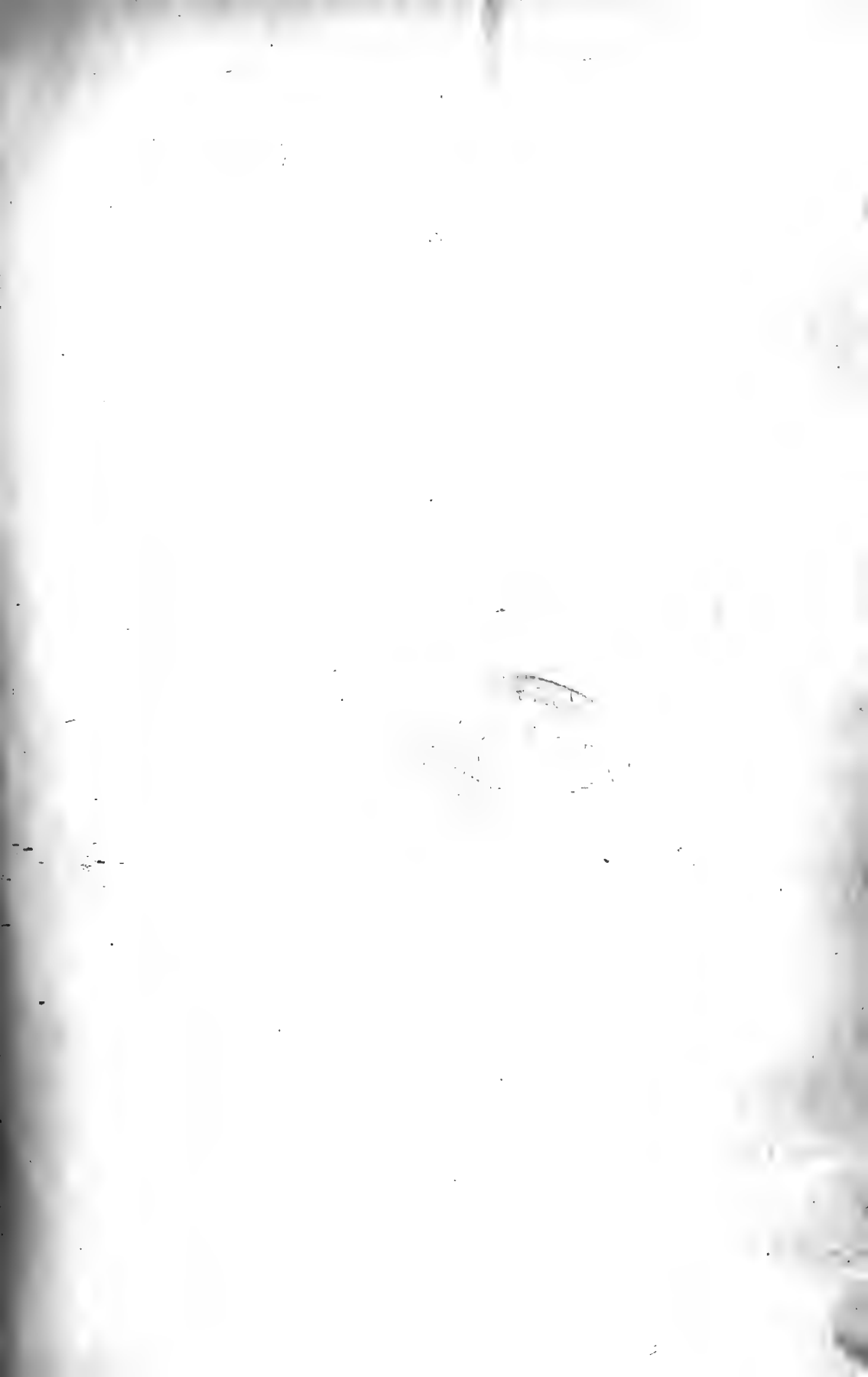
There are also on the side of the head two yellow streaks—one from the upper, and the other from the lower hind angle of the eye—which are extended on to the temple. These are not visible in our dried specimen of the Tortoise from Siam, but they may be there in the living state.

## 2. CYCLEMYS OVATA?

There is a young specimen of a fluviatile Tortoise named *Cistudo diardii*, Bleeker, but it is in too young and imperfect a state to decide which of the three species of the genus *Cyclemys* it may belong to. The back is rather more oblong than in the very young specimens I have seen of *Cyclemys orbiculata*, so that it may belong to either *Cyclemys ovata* of Sarawak or *Cyclemys oldhami* of Siam—most probably the former, but I have never seen the young state of these species.

## 3. CUORA AMBOINENSIS.

There are, in the collection of Dr. Bleeker, a small half-grown specimen of this species under the name of *Cistudo amboinensis*; a very dark young specimen of about the same size as the former, called *Emys melanogaster*, Bleeker; and a large adult specimen named *Emys hypselonotus*, Bleeker.





These all three seem to belong to *Cuora amboinensis*, Gray, Cat. Shield Rept. B. M. 41; Proc. Zool. Soc. 1863, p. 176.

Dr. Bleeker states that this species is found in Batchian and Boero (Nat. Tijdschr. Nederl. Ind. 1857, p. 473).

Dr. Bleeker, in the paper above-cited, has called a species *Cistudo borneensis*, from Borneo and Sintang; but I have not seen any specimen so named.

#### 4. CHELONIA, sp.?

There are two young specimens of this genus in the collection, one named *Chelonia dubia*, Bleeker, and the other *Chelonia polyaspis*; but it is not possible to determine the species from specimens in this state: they may be distinct, but I greatly doubt it.

Dr. Bleeker, in the 'Nat. Tijdschr. Nederl. Ind.' 1857, p. 471, mentions *Sphargis coriacea*, Merrem, as found at Pidang, in Sumatra.

#### 4. NOTICE OF A NEW SQUIRREL (*SCIURUS ORNATUS*) FROM NATAL. BY DR. J. E. GRAY, F.R.S., ETC.

(Plate I.)

Mr. W. Fosbrooke, who so kindly sent to the Museum the small Antelope (*Cephalophus bicolor*) which is described in the 'Proceedings' of this Society for 1862, p. 263, has now given to the Museum the skins of a male and female Squirrel, which is called the *Pocoluti* or Tree-Mouse by the Amazulus. The Zulus seemed to consider it a very rare animal, and the fact of a Squirrel being found in the district a discovery.

We have also received a very imperfect skin, in a bad state, of a Squirrel which appears to belong to the same species, from Capt. Speke, but without any special habitat.

#### SCIURUS ORNATUS.

Back dark blackish grizzled; hairs red, with a broad black sub-terminal band and a white tip. Head, legs and thighs, underside, and tail very bright red-bay; the hairs of the head, limbs, and belly red to the base; the hairs of the tail very vivid and dark red for more than half their length; the base, especially of those near the lower end of the tail, black, with two broad greyish bands.

The red colour of the female not quite so bright and dark, and the base of the tail grizzled, with shorter red tips to the hairs.

*Hab.* Natal (*W. Fosbrooke, Esq.*).

This species is about the size of the Common European Squirrel (*Sciurus vulgaris*).

5. ON THE VISCERAL ANATOMY OF THE SCREAMER (*CHAUNA CHAVARIA*). BY EDWARDS CRISP, M.D., F.Z.S., ETC.

Before I speak of the visceral anatomy of the *Chauna chavaria*, a few words respecting the habits of this bird will not be inappropriate. Linnæus calls it *Parra chavaria* (Syst. Nat. i. 260); Latham (Gen. Syn. v. 246), the Faithful Jacana—a name that throws some light upon one of its characteristics. Linnæus, according to Shaw (vol. xii. p. 272), on the authority of Jacquin, says “that its gait is solemn and slow, but it flies easily and swiftly; it cannot run unless assisted by the wings at the same time. When any part of the skin is touched by the hand, a crackling is felt, though it is very downy beneath the feathers; and this down adheres so closely as to enable the bird at times to swim, notwithstanding the length of its legs and of its cleft feet, which latter enable it also to walk on the aquatic plants of the pools.” He goes on to say “that by means of its four wing-spurs it can drive off even the Carrion-Vulture; and that it is used by the natives as a protector to the poultry, defending them against birds of prey, and returning home with its charge in the evening.” Cuvier, like Shaw, places this bird after the *Jacanas*, and before the *Megapodes*, *Rails*, *Crakes*, *Coots*, and *Gallinules*; he also alludes to the inflation of the skin and to the courage of the bird. Cuvier, in speaking of the Horned Screamer (*Palamedea cornuta*), says, “it has a bony box in the middle of the trachea, like that of the Velvet Pochard (*Edemia fusca*),” which may possibly occasion the difference in the voice of this and of the *Chauna* to be mentioned below.

I have had an opportunity of seeing the two above-mentioned birds alive in the Society’s collection. The sound emitted by the Horned Screamer that was in the Gardens for three or four years was a loud and sudden hoot—a noise that could always be elicited by imitating the sound of the bird; it had no resemblance to a scream. The voice of the bird, however, now in the Gardens (*Chauna chavaria*) is of a very different character, approaching that of a scream. Its food is chiefly vegetable, but the keeper tells me “that it will eat meat sometimes.” Through the kindness of Mr. Bartlett, I have examined the living specimen in the Gardens, and I find that the statement respecting the presence of air under the skin is correct.

I had an opportunity of examining two of the bodies out of the three that died recently, and also of inspecting the skeleton of one of them. These birds were male and female, and, with the exception of the difference in the generative organs, there was a great resemblance between them, both in the form and size of the viscera. As Mr. Parker is about to describe the skeleton, I will allude only to one circumstance connected with it. In my last paper “On the Presence or Absence of Air in the Bones of Birds,” I stated that I had not at that time met with the skeleton of a bird the bones of which were entirely permeated with air. This bird, however, has nearly every bone filled with air; and a few other birds that I have since

examined—the Gannet, Pelican, and Adjutant—have very light and airy skeletons.

As I have said on a former occasion, the body of a bird, as regards a part of its mechanism, is not unlike a balloon. When the Gannet and the Pelican descend with the rapidity of an arrow upon a shoal of fish, which their quick sight enables them to see at a great distance, the abdominal and thoracic air-cells are compressed by the abdominal and other muscles, and the greater part of the air is thus expelled and the bird descends with greater rapidity. The bird in question (*Chauna chavaria*) is no doubt one of rapid flight; but probably the great benefit it derives from the presence of air in its bones and under its skin is to enable it to walk with greater facility upon the aquatic plants, and thus obtain its food, which probably in a state of nature consists chiefly of Mollusca, judging from the form of its intestinal tube.

The visceral anatomy of this bird presents some points of especial interest, and, judging from the reference to my notes of the dissections of a great many birds (British and foreign), there are some peculiarities in its organization that I have not before met with. The tongue is fleshy, thick, and rather pointed. The trachea is large above and small below; but the greater part of the tube is uniform in size, and the rings firm and unyielding; the rings number 129. Two pairs of muscles are present at the lower part—the *sterno-tracheales* and *broncho-tracheales*; these are of large size. The eyes are large; irides of a light yellow colour. The lungs, heart, kidneys, thyroids, spleen, pancreas, generative organs, and renal bodies present no remarkable deviation from the ordinary type, except that the generative organs and renal bodies are of a deep orange colour. The lobes of the liver (in both specimens) are connected by a very small, narrow isthmus, much smaller than I have seen it in any other bird of the same size. But the intestinal tube of this bird, as shown by the drawings on the table, offers some of the most curious anomalies. The œsophagus is of uniform size and of moderate capacity; the proventriculus thick and capacious; the glands large and flask-shaped; the gizzard thin, its parietes of nearly the same thickness in every part; the calibre of the small intestines moderate, that of the rectum very large. The mucous lining of this gut forms forty-two transverse folds, so as to extend greatly the absorbing surface. The subjoined is the length of the canal:—

	inches.
Œsophagus . . . . .	12
Gizzard . . . . .	2½
Small intestines . . . . .	50
Appendices, three . . . . .	6
Large intestine . . . . .	13
	83½

The intestinal tube holds 14 ozs. 3 drachms of water. The appendices, although short, are very capacious, and, like the large intes-

tine, are furnished with transverse folds of the mucous membrane, but more faintly marked.

The important peculiarities of this bird are the great lightness of the skeleton, the presence of air under the skin, the great length of the rectum, and the extent of the mucous folds, the large calibre of the appendices, and the very slight connexion between the hepatic lobes.

#### 6. ON FILARIA GRACILIS IN A MONKEY. BY EDWARDS CRISP, M.D., F.Z.S.

I am induced to exhibit the following specimens of entozoa from a Monkey that I have recently dissected, because at the present time, as I have before stated in my paper on the Gall-bladder (Proceedings, 1862, p. 132), I believe that these brutes (the *Quadrumana*) have by some been unduly elevated in the animal scale; and a brief comparison of the entozoa found in the *Quadrumana* and in the human subject will, I think, be profitable, as it may induce others to investigate more fully this interesting subject. The *Filariæ* (*Filaria gracilis*) exhibited I found in the chest, along the œsophagus, and over the intercostal muscles, in a *Macacus cynomolgus* about one-third grown (not in the Society's collection); and I may state that, with the exception of some *Echinococci*, I have not before found an entozoon in nearly 200 Apes and Monkeys that I have examined; but I may add that in many instances entozoa were not carefully looked for. Diesing, who, in his 'Systema Helminthum,' has collected a larger number of species of entozoa than any other writer, mentions forty species of *Quadrumana* in which entozoa were found. Of these forty species, including one Lemur, I find on carefully analyzing the tables, that 83 entozoa were discovered, including 19 species; of these, 3 only are common to Man and to the Apes and Monkeys, viz. *Cysticercus cellulosæ*, *Trichocephalus dispar*, and *Echinococcus polymorphus*. The *Filaria gracilis* occurred in 19 instances, and its seat was as follows:—in the abdomen 12, abdomen and intercostal muscles 2, chest and abdomen 1, hand and intercostal muscles 1, skin and intercostal muscles 1, tongue 1, tongue and abdomen 1. From these statistics it will be seen that many of the same species of entozoa are found in different species of Monkey, disproving the generally received notion that every animal has its peculiar parasite.

Of the entozoa common to Man and the *Quadrumana*, among the 19 species above mentioned, the *Trichocephalus dispar* occurred in 7 instances, the *Cysticercus cellulosæ* in 2, the *Echinococcus polymorphus* in 2. The only species of *Filaria* was the *F. gracilis*; two species of tapeworm were present—the *Tænia megastoma* in 7 cases, and the *Tænia rugosa* in 1. Among the above animals was one Anthropoid Ape, the Orang; and in this the *Trichocephalus dispar* was found. In the Hunterian Museum are entozoa from two of the *Quadrumana* only—the *Filaria gracilis*, from the Orang and the Capuchin Monkey.



It is known to most that there is a great difference of opinion as to the mode of entrance of one species of *Filaria* into Man, viz. the Guinea-worm (*F. medinensis*), some supposing that it enters by the mouth, others by the skin. I think it is tolerably clear from the above statistics that the *Filaria gracilis* enters by the mouth, and creeps through the air-tubes or alimentary canal. In my next communication, I purpose introducing into my list other examples, of a more recent date, of the occurrence of entozoa in the *Quadrupana*.

7. ON SOME PARTS OF THE ANATOMY OF THE PORPOISE.  
BY EDWARDS CRISP, M.D., F.Z.S.

The communication recently made by Mr. Buckland on his treatment of the living Porpoise (*Phocæna communis*) lately brought by him to the Society's Gardens induces me to offer a few remarks on the anatomy of this animal, in relation to its treatment in confinement. It will be remembered that a herring was forced into its throat, and that suffocation was thus probably induced. This animal has four stomachs; and the intestinal canal of one, 3 feet in length, that I recently dissected, measured 56 feet 3 inches. In larger specimens I have found a greater length of tube; but the most remarkable circumstance connected with the intestines is the length and extent of the folds,—the mucous membrane in the greater part of the alimentary track being formed into six or seven duplicatures, so as to increase the absorbing surface to an enormous extent.

The liver is bilobular, the pancreas large, the spleen small; the lungs are large and unilobular; but the air-tube presents one of the greatest peculiarities, and a knowledge of its conformation readily explains how quickly the animal may be suffocated by the introduction of any large body into the pharynx. There are only four tracheal rings before the origin of the first bronchial tube, and four below that previous to the division into the main bronchi; so that we have the curious anomaly, in some of the animals of this family, that the bronchial rings are six or seven times as numerous as the tracheal. The brain of the Porpoise is very large; that of the one spoken of above weighed 16 oz.; the eyes 318 grains.

I have said enough to show that this animal, from the structure of its alimentary tube, requires a large and constant supply of food in confinement; and I moreover believe that there is no chance of its living out of salt water for any length of time.

January 26, 1864.

E. W. H. Holdsworth, Esq., F.Z.S., in the Chair.

Mr. Monteiro exhibited a living Pigeon (*Columba arquatrix*), obtained by his son Mr. J. J. Monteiro in Benguela.

An extract was read of a letter from Dr. Harry Anthony to Mr. Louis Fraser, dated Brass River, Bight of Biafra, 3rd Dec. 1863, referring (as follows) to what was supposed to be a species of *Clarias*:—

“I intend to try and send you by my next ship some of the ‘Black Fish’ out of the bush, called by the natives Egalegala; they are perfectly black, and are very fine eating. They are so fat they will fry without butter, taste something like eels; they are in shape something like ‘*Cat-fish*,’ with filaments from the lower jaw; they live amongst the mud in the mangrove bush. It would be grand to acclimatize them; they are such fine eating. They would drive eels out of the market.

The following papers were read:—

1. ON THE OPTIC LOBES OF THE BRAIN OF THE ECHIDNA. BY  
W. H. FLOWER, F.R.C.S., F.Z.S., CONSERVATOR OF THE  
MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

It is commonly stated in works on comparative anatomy, that while the optic lobes of the Mammalia generally are “*corpora quadrigemina*,” in the Monotremata they are “*corpora bigemina*,” and herein a transitional character towards the inferior vertebrates has been perceived.

Professor Owen’s description of these parts, in the article “Monotremata” in the ‘Cyclopædia of Anatomy and Physiology’ (the standard original authority upon the anatomy of this group of animals), runs thus:—In the *Ornithorhynchus* “the posterior bigeminal body is much smaller than the anterior, and the transverse depression which divides them is very feebly marked: the longitudinal groove is equally feeble on the ‘nates,’ and is altogether absent in the ‘testes,’ which thus form a single small tubercle. It is in the condition of these parts, recognized, but too briefly noticed, by Meckel, that the brain of the *Ornithorhynchus* deviates most essentially from the Marsupialia, and offers the most direct step in the descent to the Oviparous type.” Of the *Echidna* he says, “The optic thalami and nates appear as one convex body, slightly contracted laterally, and divided from each other by a sigmoid linear fissure: the testes are only half the breadth of the nates, and the median longitudinal line of division, which is very faint in the larger bodies, is not visible in the small and posterior tubercle. The *Echidna* corresponds in this characteristic modification with the *Ornithorhynchus*.”

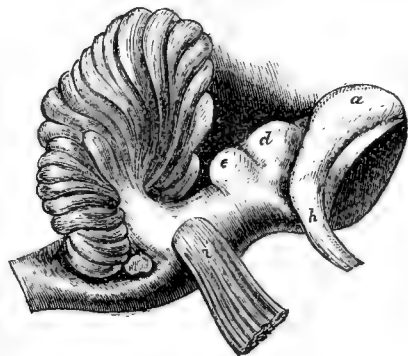
It appears from this account, that, of the cross fissures which divide the four tubercles in the higher mammals, the longitudinal one is deficient in the Monotremes, and that the bodies are "anterior" and "posterior" in respect to each other. Now, as in the inferior Vertebrates, the two optic lobes are placed laterally, and in birds widely separated from each other in the middle line, a deficiency of the median longitudinal fissure is anything but a step to the oviparous type; and to apply "bigeminal" to the optic lobes of the Monotremata in the same sense in which it is applied to those of the oviparous Vertebrates leads to an erroneous conception of their condition.

I have lately had an opportunity of examining the brain of an *Echidna* (*E. hystrix*) which died in the Gardens of the Zoological Society; and on exposing the optic lobes, found that they differed considerably in appearance from the above-quoted description. They form together a mass transversely oblong, being .35 inch in breadth and .25 inch in length, placed between the optic thalami in front and the superior peduncles of the cerebellum behind. The small pineal body lies in a hollow in the middle line in front, and on each side of this the groove of separation between their anterior border and the posterior edge of the optic thalamus is distinct enough, so that there is no confluence of the 'nates' with the optic thalamus. On their posterior contour there is a fairly deep notch in the middle line, and the longitudinal fissure is indicated by a shallow groove along the entire upper surface. The projecting anterior and posterior tubercles on each side are also distinct, being separated from each other by a curved depression. The former is round, the latter transversely elongated, or rather crescentic, with the concavity turned

Fig. 1.



Fig. 2.



forwards. Viewed laterally, the posterior eminence is seen to be somewhat less elevated than the anterior. Compared with the size of the cerebral hemispheres these bodies are small, much less deve-

loped, for instance, than in a Rodent of corresponding dimensions. Another important point to notice is, that the ventricles of the optic lobes, the persistence of which is so characteristic of the oviparous Vertebrates, are obliterated in the *Echidna*.

As is well known, there is considerable variation in the form and relative size of the four eminences on the surface of the optic lobes, and of the distinctness with which they are marked off from one another, in different mammals. In the Sloth, and more especially the Wombat, they are scarcely, if at all, more sharply defined than in the *Echidna*, which therefore, in this respect, presents no trenchant deviation from the ordinary Mammalian type.

#### EXPLANATION OF THE WOODCUT.

Middle portion of the brain of the *Echidna* (*E. hystrix*), twice the natural size.

Fig. 1. Seen from above. The cerebellum turned back to show its superior peduncles.

Fig. 2. Side view.

- a. Optic thalamus.
- b. Peduncle of the pineal body.
- c. Pineal body.
- d. Anterior eminence of the optic lobe (*natis*).
- e. Posterior eminence of the optic lobe (*testis*).
- f. Superior peduncle of the cerebellum (*processus a cerebello ad testes*).
- g. Cerebellum.
- h. Optic track.
- i. Fifth nerve.

## 2. DESCRIPTION OF ASPIDIOTES MELANOCEPHALUS, A NEW SNAKE FROM PORT DENISON, N.E. AUSTRALIA. BY GERARD KREFFT, ACTING CURATOR AND SECRETARY, AUSTRALIAN MUSEUM, SYDNEY.

Fam. BOJIDÆ.

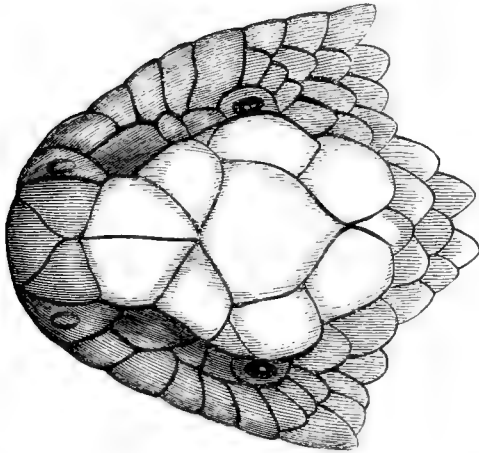
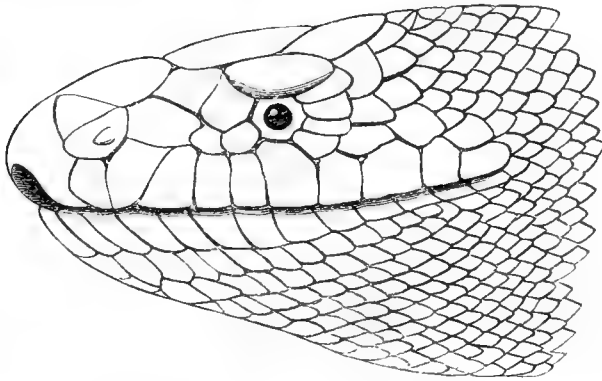
ASPIDIOTES, nov. gen.

Crown covered with broad shields reaching behind the eyes; the remaining part of the head scaly; labial shields without pits, the front ones high and narrow, the hinder shields lower and broad. Nostrils lateral, in the middle of a plate, two loreals, two anterior and four posterior oculars; superciliaries broad, rather prominent above the eye; nasal shield very large, much produced backwards, and deeply grooved on its lower edge. Scales smooth, in fifty-two series on the middle of the body; ventral plates rather narrow; subcaudals entire, except the last ten or twelve, which are divided. Tail conical, prehensile, ending in a blunt point. Head rather high, of moderate size; teeth not very large (smaller than in *Morelia*). Body thick and compressed.

ASPIDIOTES MELANOCEPHALUS.

Scales in 52 series on the middle of the body. Ventral shields narrow, 330. Anal entire. Subcaudals  $51\frac{13}{13}$ .

Head rather high ; body thick and compressed ; tail conical, tapering, prehensile, ending in a blunt point ; anal spurs small ; ten upper labials, the sixth coming into the orbit ; two anterior and four posterior ocular shields ; two loreals, the second nearest to the eye very small ; one nasal, pierced by the nostril ; eye moderate, pupil elliptical, erect. Three pairs of frontal shields, the middle pair longest ; vertical broad, the largest shield of the head, with an obtuse angle in front and an acute one behind, sides rounded ; superciliaries



large, prominent above the eyes ; occipitals distinct, but smaller than the vertical, forked and rounded behind ; the first pair of frontals small, triangular ; the second pair five-sided, nearly as large again as the first pair ; the third smaller than the second and larger than the first, quadrangular. Of the fourteen lower labial shields, the first seven are narrow and elongate, the rest broad ; no groove upon the labials. The nasal shield is very broad, with a deep pit, shaped like a bean, and much produced backwards. Head moderate ; body thick, compressed ; anal spurs small. Colour light brown, with a series of darker rings, which become indistinct near the sides ; below

yellowish-white here and there, with a few dark blotches; head and neck jet-black above and below. Total length 7' 10".

*Hab.* Port Denison.

### 3. DESCRIPTION OF A NEW SPECIES OF MORMYRUS.

By DR. A. GÜNTHER.

(Plate II.)

Only a short time ago I described\* a peculiar species of *Mormyrus*, *M. petersii*, distinguished by a very long mandibular flap. I have the pleasure to lay to-day before the Society another species with the same structure of the fins, and with a similar prolongation of the lower jaw. It comes, like *M. petersii*, from West Africa. The peculiar form of the snout has suggested the specific name of

#### MORMYRUS TAMANDUA. (Pl. II. fig. 1.)

D. 28. A. 31. V. 6. L. lat. 80. Body compressed, rather elongate—its greatest height, between the origin of the dorsal and anal fins, being two-ninths of the total length (without caudal); the length of the head is one-fourth of the same. The snout is much prolonged, tubiform, slightly tapering, and curved downwards, the distance between the eye and the end of the mandibular flap being twice that between the eye and the gill-opening. The mouth is very small, at the extremity of the snout, with the jaws equal, and armed with two pairs of feeble conical teeth above and below. The mandibular flap is as long as the eye. The eye is covered with the skin, but appears through from below it. The pectoral is nearly twice as long as the ventral, and extends beyond its base. The dorsal and anal fins are opposite each other, and placed on the caudal portion of the body, the origin of the former being in the middle between the occiput and the root of the caudal. The scales on the trunk are rather small and irregularly arranged, but become gradually larger and more regular posteriorly. Coloration uniform.

The single specimen obtained is 10 inches long.

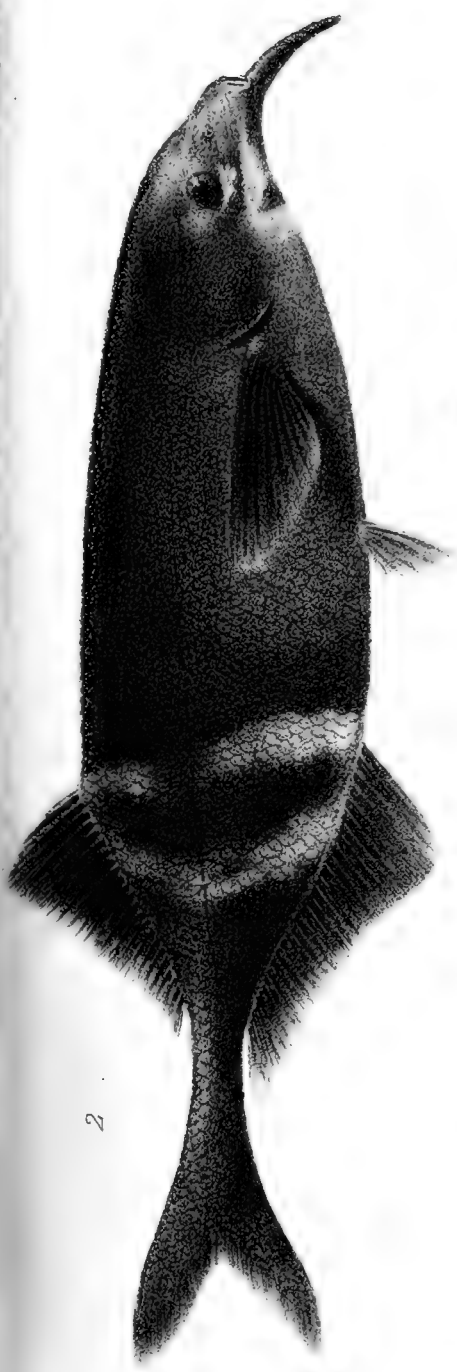
We add, for comparison, the diagnosis of the other species mentioned above:—

#### MORMYRUS PETERSII. (Pl. II. fig. 2.)

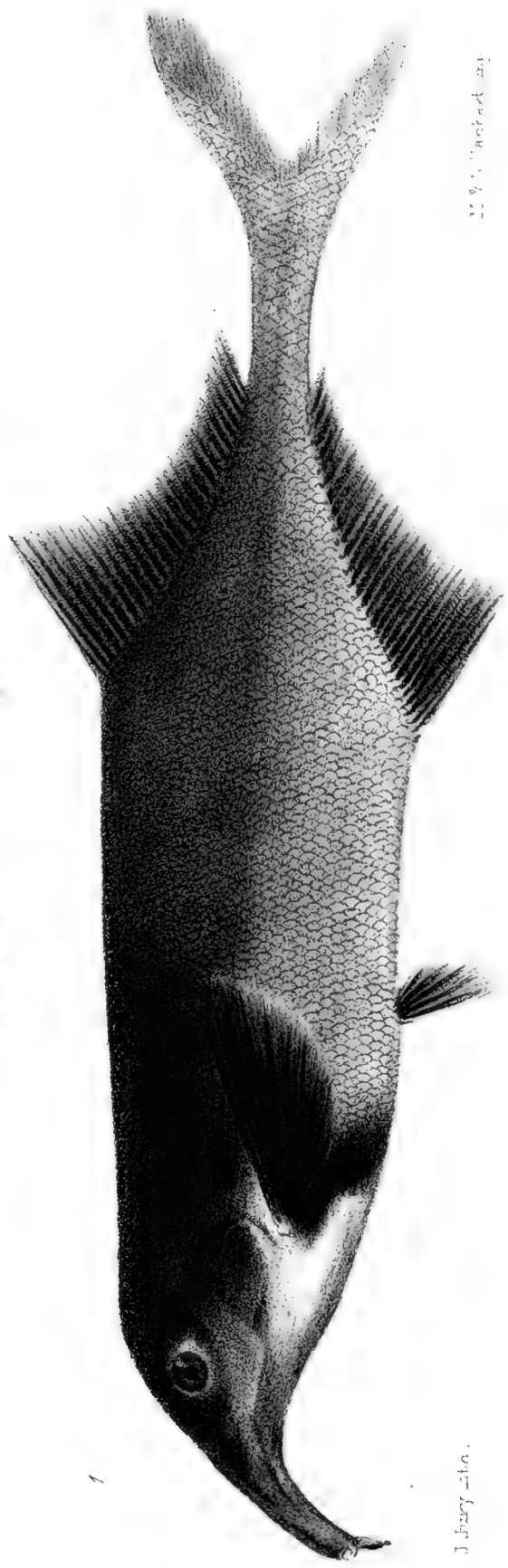
D. 27. A. 34. L. lat. 66. The mandible is prolonged into a long, conical fleshy appendage, which is nearly half as long as the head. Dark brown, with two lighter cross bands.

*Hab.* Old Calabar.

\* Wieg. Arch. 1862, p. 64.



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J. Gray del.

1891, Stanford 24

FIG. 1. MORMYRUS TAMANDUA. FIG. 2. MORMYRUS TAMANDUA.





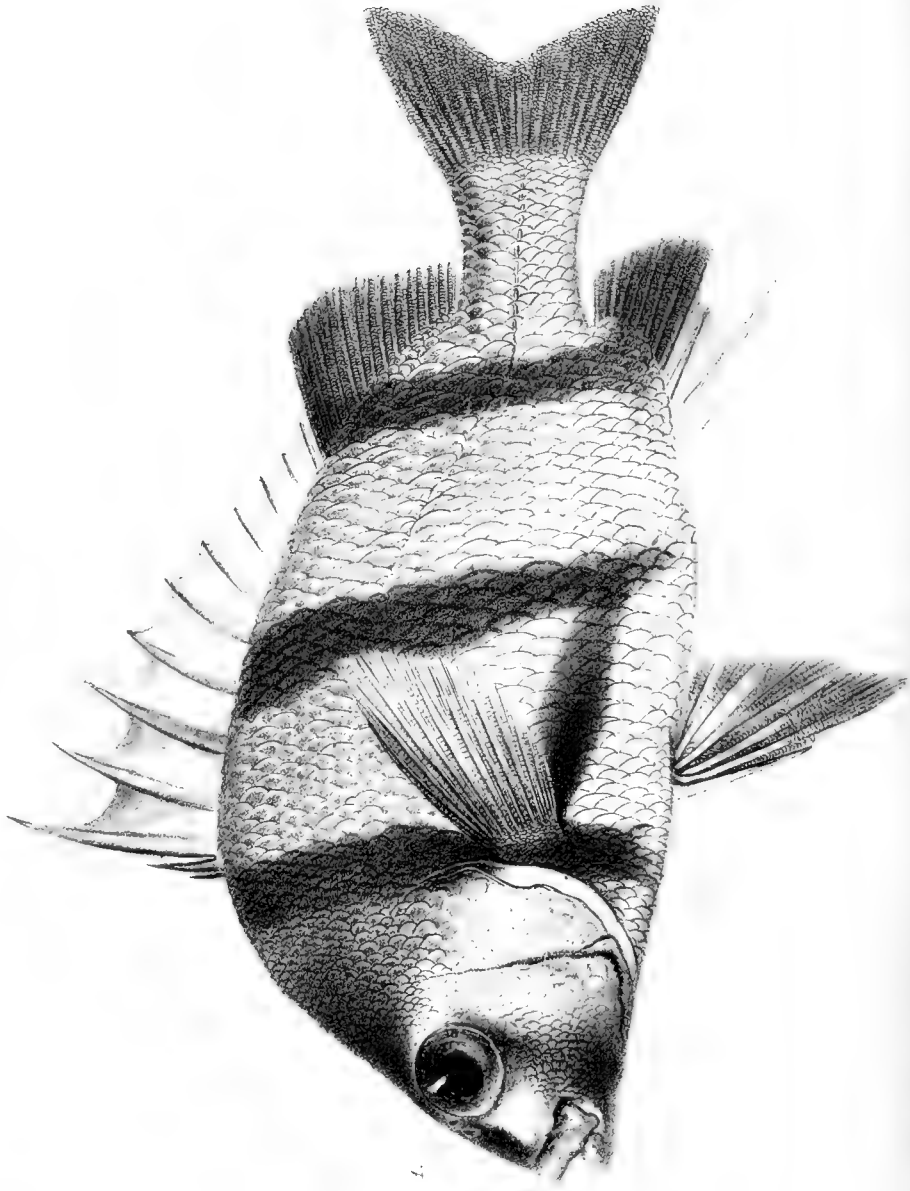




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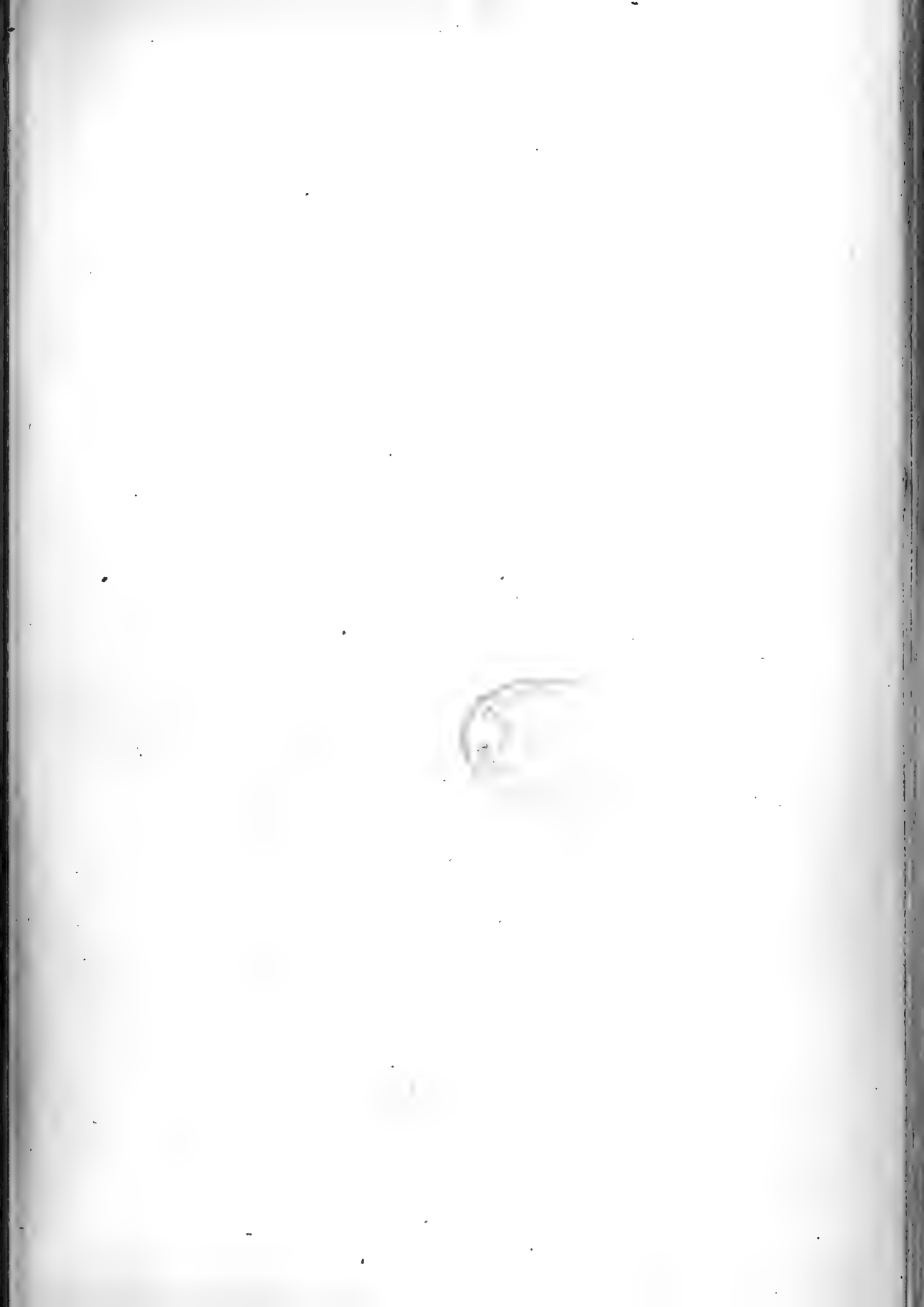


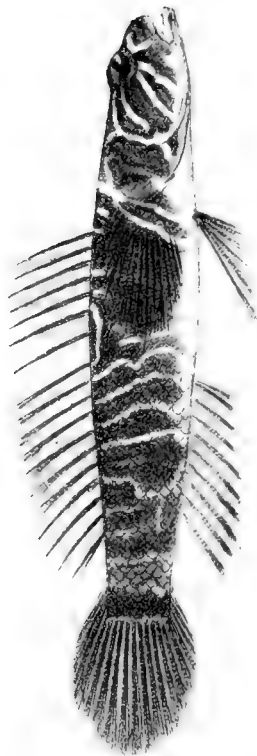
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3. *Jury. lida.*

M. & N. Hamhart, Inc.





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4. ON SOME NEW SPECIES OF CENTRAL-AMERICAN FISHES.  
BY DR. A. GÜNTHER.

(Plates III. & IV.)

Our Corresponding Member Capt. J. M. Dow having sent to this Society a second collection of Central American Fishes, a complete series of the species contained therein has been deposited by our Secretary in the British Museum. The following is a list of those which I have examined, a few others having been omitted, as they belong to families in the revision of which I am engaged at present or shall be in a very short time:—

I. *Species collected on the Pacific Coast of Panama.*

1. *SERRANUS SELLICAUDA*, Gill, sp.

2. *RHYPTICUS MACULATUS*, Holbr.

3. *MESOPRION NOVEM-FASCIATUS*, Gill, sp. Very closely allied to *M. griseus*.

4. *MESOPRION*, n. sp. There are two young specimens of an apparently undescribed form in the collection; but the description and determination are better deferred until more examples have been obtained.

5. *PRISTIPOMA MELANOPTERUM*, C. & V.

6. *PRISTIPOMA DOVII*, n. sp. (Pl. III. fig. 1.)

D.  $\frac{12}{16}$ . A.  $\frac{3}{9}$ . L. lat. 48. L. transv. 8/15. The height of the body is one-half of the total length (without caudal); the length of the head one-third. Snout obtuse, not much longer than the eye; cleft of the mouth small, the maxillary extending to the vertical from the anterior margin of the orbit. Lips thick; a pair of pores on the symphysis of the lower jaw, a central groove behind it. Snout naked, the remainder of the head being scaly. The width of the interorbital space is much less than that of the orbit. Dorsal and anal spines exceedingly strong; the third of the dorsal fin is the longest, and nearly two-thirds as long as the head. The second anal spine is much longer than the third, and a little shorter (but stronger) than the third of the dorsal fin. Each ray of the soft fins is accompanied by a series of minute scales, but only on the caudal fin are these scales dense enough to cover the rays. Caudal fin slightly emarginate. Silvery, with four black cross bands: the first runs from the occiput through the eye to behind the angle of the mouth; the second from before the dorsal fin to below the base of the pectoral; the third from the base of the sixth, seventh, and eighth dorsal spines to the vent; the fourth descends from the origin of the soft dorsal to that of the soft anal. Fins blackish.

Only one specimen,  $8\frac{1}{2}$  inches long, is in the collection.

7. *POLYNEMUS APPROXIMANS* (Lay & Bennett?).

D.  $7\frac{1}{13}$ . A.  $\frac{3}{15}$ . L. lat. 60.

8. *CARANX*, n. sp. There is a young specimen in the collection which appears to belong to an undescribed species closely allied to *C. carangus* and *C. hippos*.

9. *CARANX LEUCURUS*, n. sp.

D.  $8\frac{1}{28}$ . A.  $2\frac{1}{24-26}$ . Very closely allied to *C. bicolor*. The first dorsal fin is composed of short, stoutish spines, the fourth of which is the longest, but scarcely longer than the eye. The soft dorsal and anal are rather elevated; the caudal is emarginate, and has the lobes rounded. Teeth very small, forming a single series in both jaws; palate smooth. The height of the body is one-half of the total length (without caudal), the length of the head one-third. Snout rather obtuse, the jaws being equal in front when the mouth is closed; the maxillary extends to below the anterior margin of the orbit. The lateral line makes anteriorly a subsemicircular curve, the width of which is contained from  $1\frac{2}{3}$  to  $1\frac{4}{5}$  times in the length of the straight portion; it becomes straight behind the vertical from the origin of the second dorsal, and is armed with about fifty small and low shields, only a few of which terminate in a depressed spine. The pectoral fin extends to the anal spines. Brownish grey, body with six dark-brown vertical bands: the first crosses the body behind the base of the pectoral, and the fourth descends from the middle of the soft dorsal fin. Operculum with a large black spot. Dorsal, anal, and ventral black; pectoral and caudal whitish.

Only two young specimens are in the collection, the larger being 3 inches long.

10. ?*CARANX DORSALIS*, Gill, sp.

11. *GوبيUS SOPORATOR*, Cuv. & Val.

12. *ELEOTRIS SEMINUDUS*, n. sp. (Pl. IV. figs. 2, 2 a.)

D. 7|11. A. 9. The head and the trunk are naked; the tail is covered with small scales; head depressed, broader than high, flat above, its length being two-sevenths of the total. Snout rather obtuse, longer than the eye, with the lower jaw somewhat prominent; the cleft of the mouth extends to below the anterior margin of the orbit. Teeth in the upper jaw in a narrow band; the lower has four somewhat larger and recurved teeth in front, the others appear to form a single series; palate toothless. None of the fin-rays are prolonged; the pectoral does not quite extend to the origin of the second dorsal; ventral much shorter than pectoral, its inner ray is the longest, the others gradually decreasing in length outwards; caudal fin rounded. Brown, with numerous well-defined white cross stripes on the head as well as on the body; vertical fins black.

Although there is only a single example, 20 lines long, in the collection, the characters of this species are so well marked that I do not hesitate to describe it.

13. *SALARIAS ATLANTICUS*, Cuv. & Val.

14. *CLINUS DELALANDII*, Cuv. & Val.  
 15. *CLINUS MACROCEPHALUS*, Gthr.  
 16. *CREMNOBATES MONOPHTHALMUS*, Gthr.  
 17. *ATHERINICHTHYS PACHYLEPIS*, n. sp.

D.  $4\frac{1}{6-8}$ . A.  $\frac{1}{20-21}$ . L. lat. 41. L. transv. 7. The height of the body is nearly equal to the length of the head, and contained five times and a half or five times and a third in the total length (without caudal). The snout is short, not longer than the diameter of the eye, and the cleft of the mouth does not extend backwards to below the anterior margin of the eye. The anterior dorsal is composed of short, feeble spines, and its origin is opposite to the fourth or fifth anal rays. The pectoral fin is much longer than the head. The silvery streak occupies the adjoining halves of the third and fourth series of scales.

Two specimens, 6 inches long, were in the collection.

18. *MUGIL BRASILIENSIS*, Agass.  
 19. *MUGIL PROBOSCIDEUS*, Gthr.  
 20. *GOBIESOX RHODOSPILUS*, n. sp.

D. 6. A. 5. C. 8-9. P. 17. A vertical fold of the skin along the lower half of the base of the pectoral; the coracoid is scarcely below the level of the upper margin of the pectoral. The distance of the origin of the dorsal fin from the caudal is contained twice and two-thirds in its distance from the snout; the anal commences below the third dorsal ray. A very narrow band of short conical teeth in the upper jaw—one of the lateral teeth being somewhat larger than the others, recurved, canine-like. The lower jaw with a single series of teeth, the anterior being narrow incisors, whilst the outermost on each side is distinctly a canine tooth, corresponding to that in the upper jaw. Rose-coloured, with dark-rose transverse spots, each spot having an edge of deep-red dots.

Two specimens, 18 inches long, are in the collection.

21. *PLATYGLOSSUS DISPILUS*, n. sp.

D.  $\frac{9}{11}$ . A.  $\frac{2}{12}$ . L. lat. 28. L. transv.  $2/9$ . The height of the body equals the length of the head, and is contained four times and one-fourth in the total. Caudal fin rounded, with the lobes very slightly produced. Greenish olive, with a roundish black spot edged with silvery, on the lateral line, below the fifth and sixth dorsal spines; the side of the head with five or six pearl-coloured streaks, a part of which are continued on the body, forming a series of round spots. An oblong variegated blotch behind the pectoral fin: it is composed of three pearl-coloured stripes, enclosing two yellow bands, each of which has an undulated purple edge. No spot in the axil of the pectoral. A short oblique yellowish streak behind the base of

each soft dorsal ray; these streaks form a continuous band on the spinous portion. Anal fin with two or three whitish lines; caudal with several irregular reddish longitudinal bands, which are convergent behind.

*Young* specimens are much more plain-coloured; the black spot on the lateral line, however, is very distinct, and there is another at the root of the caudal.

Capt. Dow's collection contains a single young specimen; but Mr. Salvin has brought a second, apparently adult, it being  $5\frac{1}{2}$  inches long.

22. *PSEUDOJULIS NOTOSPILUS*, n. sp.

D.  $\frac{9}{11}$ . A.  $\frac{3}{12}$ . L. lat. 25. L. transv.  $\frac{2\frac{1}{2}}{8}$ . The height of the body is rather less than the length of the head, and contained four times and a quarter in the total. Dorsal spines pungent; caudal fin slightly rounded. Brownish or yellowish olive; young specimens with a silvery band along each side of the trunk, above the pectoral fin. Back with four or five indistinct broad brown cross bars; a series of blotches on the dorsal fin corresponds to these cross bands, one of them, on the three first soft dorsal rays, being the largest and most distinct; it is of a deep black colour, and of an ovate form. The corners of the caudal fin are white; ventral whitish, with a broad blackish outer margin.

One adult specimen, 4 inches long, and several young ones are in the collection.

23. *JULIS LUCASANA*, Gill.

24. *DINEMATICHTHYS MARGINATUS*, Ayres.

25. *MICRODESMUS DIPUS*, n. g. et sp. Of this we have received only a single small example; and as it is not in a perfect state of preservation, we cannot decide whether it should be referred to the *Blennoids* or *Gadoids*, or whether it is the type of a distinct family. However, we may hope that Capt. Dow will succeed in obtaining more specimens.

**MICRODESMUS.**

Body much elongate, eel-like, covered with rudimentary scales; head rather short, with obtuse snout, narrow cleft of the mouth, and prominent lower jaw. Eyes minute. Teeth in both jaws minute; palate toothless. The gill-opening is reduced to a small slit in front of the pectoral fin. Vertical fins united by a membrane, but the caudal can be easily distinguished from the two other fins. Dorsal fin very long, composed of flexible, undivided rays, like the anal. Pectorals short; ventrals thoracic, each reduced to a single ray. Vent in the middle of the total length.

*MICRODESMUS DIPUS*. (Pl. III. fig. 2.)

D. 55. A. 34. C. 16. P. 12. V. 1. The depth of the body



is about one-eighteenth of the total length; the length of the head one-eleventh. The head is rather compressed, the snout short, the mouth very narrow, and the lower jaw very prominent. The minute eye is lateral and in the anterior third of the length of the head. The dorsal fin commences at a distance from the occiput which is somewhat less than the length of the head; it is nearly even, and the rays are very distinct, the interradiation membrane being thin and transparent. The anal fin commences immediately behind the vent. The caudal rays are much more slender and more closely set than those of the dorsal and anal; the caudal fin is rounded, two-thirds of the length of the head. Pectorals as long as the ventrals, and half as long as the head; the latter fins are close together, and inserted a little behind the root of the pectoral. Upper parts uniform brownish olive.

The single specimen is  $4\frac{1}{2}$  inches long.

## 26. ANABLEPS DOVII, Gill.

### II. *Species collected at Colon.*

1. PRISTIPOMA MELANOPTERUM, Cuv. & Val.
2. POMACANTHUS PARU, Gthr.
3. SPHYRÆNA PICUDA, Bl. Schn.

### III. *Species from the Lake of Managua, Nicaragua.*

1. HEROS LABIATUS, n. sp. (Pl. IV. fig. 1.)

D.  $\frac{17}{11}$ . A.  $\frac{8}{8}$ . L. lat. 32. L. transv. 6/13. The anterior portions of the upper and lower lips are much enlarged, each forming a moveable subtriangular flap. The height of the body is somewhat more than the length of the head, and two-fifths of the total. The mouth is very protractile; the eye occupies the middle of the length of the head. Scales on the cheek in four series. Base of the dorsal almost scaleless. Uniform red, or sometimes red irregularly marbled with black.

The largest specimen is 7 inches long.

5. NOTES ON SEALS (PHOCIDÆ), INCLUDING THE DESCRIPTION OF A NEW SEAL (HALICYON RICHARDII) FROM THE WEST COAST OF NORTH AMERICA. BY DR. J. E. GRAY, F.R.S., ETC.

Mr. Charles B. Wood, the Surgeon of H.M.S. 'Hecate,' has very kindly sent to the British Museum, along with other interesting specimens from the north-western part of North America, the skeleton of a Seal from Fraser's River, and the skull of a Seal obtained on the west coast of Vancouver's Island.

The skull was procured from the natives, who had the animal

towed along the side of their canoe. They refused to part with the entire animal, but were at length induced to sell the head.

The examination of the skulls shows that the two Seals evidently belong to the same species, the specimen from Fraser's River being adult, and the other not quite so old. Mr. Wood observes that "the younger Seal was captured among the islands in Queen Charlotte's Sound, at the north end of Vancouver; has a fur of a dark brown, almost black-colour; and is unlike that from the Fraser's River, which is lighter and less timid, being often seen seated on a log floating down with the current."

The skull of this Seal differs so greatly from those of any of the Seals on the eastern side of the Arctic Ocean, that I am induced to propose for it a new subdivision, which may be thus named and characterized:—

#### HALICYON.

The palate of the skull arched out behind. Cutting-teeth  $\frac{6}{4}$ . Grinders 3 or 5, lobed, compressed. The lower jaw strong, bowed out on the sides, thick in front, and with a low crest on the inner side of the lower edge near the front; the ramus of the lower jaw erect, with a tubercular prominence beneath the notch at the angle.

#### HALICYON RICHARDII, sp. nov.

Fur pale brown; when young, darker.

*Hab.* Fraser's River and Vancouver's Island.

I have dedicated this species, at the request of Mr. Wood, to Capt. Richard, the Hydrographer to the Admiralty, and Captain of H.M.S. 'Hecate' when these Seals were collected. I have the more pleasure in doing this, as the Museum has received many very interesting specimens collected during the voyage of the 'Hecate,' showing the interest which her Commander takes in the natural sciences, which I have no doubt will receive additional encouragement in the new position which he has won by his hydrographic and scientific qualifications.

The skull resembles that of *Callocephalus hispidus* and *Pagophilus groenlandicus* in the dilatation of the front part of the lower edge of the lower jaw; but it agrees with *Callocephalus hispidus* most in the greater development of the face, and in the concave edge of the hinder part of the palate.

It differs from these skulls—

1. In the dilatation of the lower jaw not being extended so far back, only occupying the first two-fifths of the length of the jaw; while in the other two species it occupies full half the length of that bone.

2. In the sides of the lower jaw being much wider apart, and arched outwards, making the space between them much wider behind, agreeing in this respect with *Phoca barbata*.

3. In the front of the lower jaw being thick and swollen, and with only a slight ridge on the middle of the lower edge in front; and the jaws in this part being well separated from each other, not thin, concave inwardly, and with a well-developed inferior edge on the

inner sides, those of the two sides of the jaws being parallel and near together in the centre.

The angle at the hinder lower edge of the lower jaw is much more produced, and with a more prominent tubercle, than in either *Callocephalus hispidus* or *Pagophilus grœnlandicus*.

4. The hinder edge of the palate being concave forwards, and not straight and transverse as in *Pagophilus*, nor angularly cut out as in *Callocephalus*.

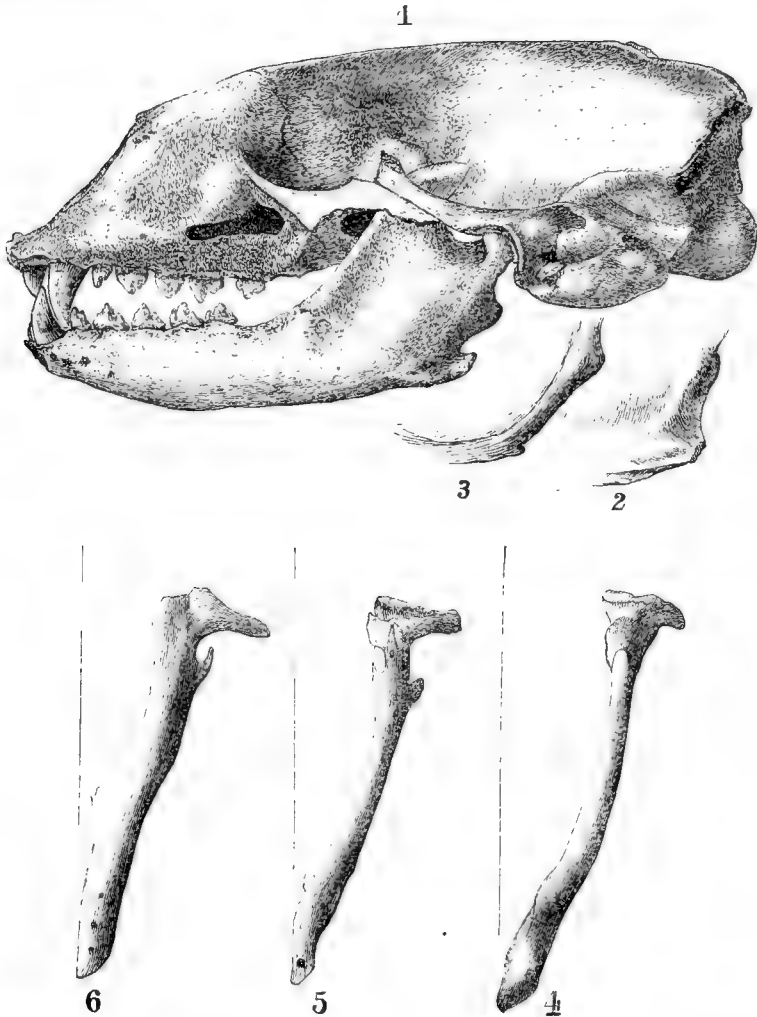


Fig. 1. Skull of *Halicyon richardii*.

2. End of lower jaw of *Phoca barbata*, to show the dilations and inflexions of the lobe over the angle.
3. End of the lower jaw of *Pagomys fœtidus*. The end of the jaw of *Callocephalus vitulinus* is somewhat similar.
4. Lower edge of the lower jaw of *Halicyon richardii*.
5. Lower edge of the lower jaw of *Phoca barbata*.
6. Lower edge of the lower jaw of *Pagophilus grœnlandicus*. The jaw of *Pagomys fœtidus* is somewhat similar, but much smaller.

In the younger specimen the edge of the palate has a slight prominence in the middle of each side; but this is evidently an accidental deformity, as the prominences are not of the same size in the two sides. In the adult skull the two sides of the palate are evenly arched out.

The lower jaw most resembles that of the restricted genus *Phoca* (of which *P. barbata* is the type) in being solid and strong, and in the two sides being arched out, leaving a very wide oval space between them, the front part of the space being continued by a tubercle on the inner edge of the front of the jaw, a short distance from the symphysis.

In *Phoca* the tubercle on the inner side of the lower edge is short, rounded, blunt, and more or less rugose; in the new Seal, *Halicyon*, it is a short-edged, elongated ridge. In *Phoca* the teeth are small, erect, and far apart; and in *Halicyon* they are larger, closer together, and distinctly three or five lobed.

In *Halicyon* the hinder edge of the ramus of the lower jaw is simple, with a distinct notch between it and the tubercular angle of the jaw. In *Phoca* the hinder edge of the ramus is inflected, forming a large half-oblong lobe, convex in front, and concave behind. (fig. 2).

It is very interesting to observe that there is a representative genus on each side of the Arctic Pole; and this agrees with my previous experience—that each species of Seal has a limited, indeed I may say a very well-defined and very limited, geographical distribution. Though the species are very difficult to distinguish by their external characters, yet the skeleton, and especially the skull, affords well-marked and very definite characters.

M. Lepechin described a *Phoca oceanica* (Act. Petrop. 1777, 259. t. 6 & 7), which has been considered the same as *Pagophilus grænlandicus*, as abundant on the ice around Nova Zembla. It would be curious to see the skull of a specimen from that locality, and thus discover which species extends itself so far north as those islands. *Phoca oceanica*, in its young and old state of fur, resembles *Pagophilus grænlandicus*; but unfortunately we have only a very limited knowledge of the external appearance of this new Seal from Vancouver's Island.

The study of a large series of specimens of several species of Seals shows that the form of the lower jaw, though hitherto little attended to by zoologists, affords a very good character for the distinction of the species.

In *Pagophilus grænlandicus* and *Halicyon richardii* the angle of the lower jaw is far back, and the hinder edge of the ramus ascends nearly perpendicularly, with a notch at the hinder end, as shown in fig. 6. In *Phoca barbata* the form of the lower jaw and ramus is nearly similar; but instead of a notch near the angle, the inner edge is produced inwards into a rounded lobe (fig. 2, and see Cat. Seals B.M. p. 27, f. 9).

In *Callocephalus vitulinus* and *C. (Pagomys) fœtidus*, on the contrary, the angle of the lower jaw is more towards the front, and the

hinder edge of the ramus ascends obliquely with the notch considerably in front of the condyle (see fig. 3).

M. Gaimard, in his 'Voyage to Iceland and Greenland,' Mammalia, plate 11, devotes a plate to the skull and teeth of the Seals of Iceland and Greenland; but he does not pay any attention to the form of the lower jaw, except incidentally, when representing the teeth of the lower jaw of his *P. annellata* (t. 11. f. 9). I may observe that this author names on his plates what we call *Phoca annellata* *P. hispida*, and what we call *P. grælandica* *P. annellata*.

Believing it to be desirable that the Seals, which are so difficult to distinguish by their external characters, should be divided into small sections or subgenera by organic characters, I propose to divide the tribe of *Phocina*, as defined in my Monograph (see Cat. Seals in the British Museum, p. 20), thus:—

1. Branches of lower jaw diverging; the lower edge of the lower jaw rounded, simple; palate angularly arched behind; angle of lower jaw blunt, sloping behind. CALLOCEPHALUS. *C. vitulinus*.
2. Branches of lower jaw diverging; lower edge of lower jaw dilated on the inner side.
  - \* Palate angularly notched behind; angle of lower jaw blunt, sloping behind. PAGOMYS. *P. foetidus*. *P. nummularis*.
  - \*\* Palate truncated behind; angle of lower jaw acute, erect behind, with a notch above the basal tubercle. PAGO-PHILUS. *P. grælandicus*.
3. Branches of lower jaw arched on the side and wide apart; lower edge produced on the inner side behind the symphysis; palate arched.
  - \* Tubercle on inner edge of front part of lower jaw elongate, sharp-edged; teeth moderate; angle of lower jaw simple, with a distinct notch above it. HALICYON. *H. richardii*.
  - \*\* Tubercle on inner edge of front part of lower jaw blunt, rugulose; teeth small; angle of lower jaw with a rounded lobe on inner side above the basal tubercle. PHOCA. *P. barbata*.

#### PAGOMYS? NUMMULARIS.

The lower jaws short and broad; the grinders thick, with a broad thick central lobe, and nearly side by side (in the skulls of the young animals).

*Phoca nummularis*, Temm., Faun. Jap. Mamm. Mar. p. 3.

*Hab.* Japan (*Temm.*).

This species is only known from some skins and three fragments of skulls in the Leyden Museum.

My excellent friend Professor Schlegel, the energetic Curator of

the Leyden Museum, has most kindly sent to me for examination and comparison the fragments of skulls above referred to: they consist of the face-bone and the lower jaws of three specimens; the most perfect specimen has part of the orbit and the upper part of the brain-case attached to it. They are all from very young specimens, of nearly the same age; and, unfortunately, the most perfect one is without the hinder portion of the palate, so that I cannot make sure that it has the same form of the palatine margin that is found in *Pagomys*; but the part of the side of the palate that is present, when compared with the same part in *Pagomys*, leads one to think it most likely to be of the same form as in that genus.

The general form and size of the face, and the form of the teeth, are very similar to those of a skull of *Pagomys foetidus* of the same age. It only differs from the latter in the lower jaw being rather shorter and broader, in the grinders being larger, thicker, and rather closer together, in the central lobe of the grinders being considerably larger, thicker, and stronger, and in all the lobes of the grinders being more acute. The lower margin of the lower jaw is dilated in front, just as in *Pagomys foetidus*; but the jaws behind the dilatation diverge more from each other, leaving a wider space between them at the hinder part. The form of the hinder angle of the jaws is very similar in the two species. The orbit is rather smaller and more circular; for in *P. foetidus* it is rather oblong, being rather longer than wide. The forehead appears, as far as one can judge by the fragments, to be flatter and broader, and the nose rather shorter.

The following measurements show the difference between the two species:—

	<i>P. foetidus.</i>	<i>P. nummularis.</i>
	in. 12ths.	in. 12ths.
Length of lower jaw to hinder notch . .	2 11	1 7
Length of lower jaw to end of dilatation.	1 5½	1 2½
Length of upper teeth-line . . . . .	1 3½	1 2
Length of three grinders . . . . .	0 2½	0 3
Width at outside of hinder notch . . . . .	1 9	1 7
Length of orbit . . . . .	1 8½	1 5

The *Phoca nummularis* of Japan has been considered to be identical with *Phoca largha* of Pallas, from the east shore of Kamtschatka, the *Phoca chorissii* of Lesson, and the *Phoque tigre* of Kraschennenikow (which has been named *Phoca tigrina* by Lesson), on the strength of their coming from nearly the same district; but I am not aware that specimens of any of the latter species exist to verify the union and determine what are the species described under these names.

The British Museum has lately purchased the dead body of a Seal, which had been exhibited in London as the "Talking Fish." The proprietor, an Italian, at first said it was from the coast of South America, but afterwards admitted that it was from one of the ports on the north side of the Mediterranean; and on examination it proved to be the Monk Seal (*Phoca albiventer*), the type of the

genus *Monachus* of Fleming and *Pelagus* of F. Cuvier, a genus which was one of the desiderata in the Museum Collection.

The comparison of the skull of this animal with the skulls of the Seal from Madeira, which I described in the 'Annals and Magazine of Natural History' for 1854 under the name of *Heliophoca atlantica*, has shown that the latter animal is the same as the Mediterranean Seal.

The British Museum has since received from M. Verreaux a very good skeleton of a Seal from Algiers, under the name of *Phoca leporina*, which is evidently the same as the *Phoca albiventer* of Cuvier (Oss. Foss. v. t. 17).

The following synonyms will therefore have to be added to those which I have placed under *Monachus albiventer* in the Catalogue of Seals in the British Museum, p. 18:—

*Heliophoca atlantica*, Gray, Ann. & Mag. N. H. 1854; Arch. f. Nat. 1855, p. 40.

*Phoca leporina*, Verreaux, not of Lepechin.

*Hab.* North and south shores of the Mediterranean, île d'Oléron, and Madeira.

These facts are interesting as showing that the Seal which was formerly believed to be confined to the north shore of the Mediterranean is also found on the southern one and on the islands of the Atlantic.

Nilsson, in his excellent monograph on the genus, after having examined all the materials that he could find in the different museums, reduced the number of species of Seals to fourteen.

We have now in the British Museum, as by the following list will appear, twenty-four most distinct species, established upon the examination of the osteological as well as the external characters of the animals.

1. *Lobodon carcinophaga*, Gray, Cat. p. 10. Antarctic Ocean.
2. *Stenorhynchus leptonyx*, Gray, Cat. p. 13. Antarctic Ocean.
3. *Leptonyx weddellii*, Gray, Cat. p. 16. Antarctic Ocean.
4. *Monachus albiventer*, Gray, Cat. p. 18 = *Heliophoca atlantica*, Gray. North and south shores of the Mediterranean; Madeira.
5. *Monachus? tropicalis*, Gray, Cat. p. 28. Jamaica.
6. *Ommatophoca rossii*, Gray, Cat. p. 19. Antarctic Ocean.
7. *Callocephalus vitulinus*, Gray, Cat. p. 21. North Seas.
8. *Pagomys fatidus*, Gray, Cat. p. 23. North Seas.
9. *Halocyon richardii*, Gray, P. Z. S. 1864. Vancouver's Island.
10. *Pagophilus grœnlandicus*, Gray, Cat. p. 25. North Sea.
11. *Phoca barbata*, Gray, Cat. p. 27. North Sea.
12. *Halichoerus grypus*, Gray, Cat. p. 30. North Sea.
13. *Trichechus rosmarus*, Gray, Cat. p. 32. North Sea.
14. *Morunga elephantina*, Gray, Cat. p. 34. Antarctic Ocean.
15. *Cystophora cristata*, Gray, Cat. p. 36. North Sea.
16. ———? *antillarum*, Gray, Cat. p. 38. Jamaica.
17. *Arctocephalus monteriensis*, Gray, P. Z. S. 1859, p. 358, t. 72. California.

18. *Arctocephalus hookeri*, Gray, Cat. p. 45. Falkland Islands.  
 19. — *lobatus*, Gray, Cat. p. 44. Australia.  
 20. — *nigrescens*, Gray, P. Z. S. 1859, p. 109. Falkland Islands.  
 21. — *gillespii*, Gray, P. Z. S. 1859, p. 110, t. 70. California.  
 22. — *delalandii*, Gray, P. Z. S. 1859, p. 107, t. 69. Cape of Good Hope.  
 23. *Callorhinus ursinus*, Gray, P. Z. S. 1859, pp. 103, 359, t. 68. Behring's Straits.  
 24. *Otaria leonina*, Gray, Cat. p. 47; P. Z. S. 1859, p. 360. Southern Pacific Ocean.

Besides these species, I have very little doubt that the *Phoca caspica* of Nilsson, from the Caspian Sea, the *Leo marinus* of Steller, from Behring's Straits, and *Pagomys nummularis*, from Japan, are distinct. I am not aware that the *Leo marinus* of Steller exists in any museum; the specimen we received from the St. Petersburg Academy under that name is the *Callorhinus ursinus* of the 'Proceedings of the Zoological Society' for 1859.

#### 6. NOTICE OF A NEW SPECIES OF GOLIATHUS. BY G. R. GRAY.

(Plate V.)

Dr. Kirk has, on his return from the Zambesi, added to our knowledge a species of the genus *Goliathus*, which he obtained as long ago as November 1858, when he picked it up among the hills of Kebrabassa, which is situated about forty miles beyond the Portuguese town of Tete. As it appears to be new, I have ventured to lay a description of it before the Society under the name of *Goliathus kirkianus*.

♂. Castaneous black, with the upper part of head, the seven narrow longitudinal lines on the thorax, the base, and outer edges of the elytra broadly margined, also with a series of narrow irregular transverse lines on their centres of a pearly white. The bifurcated horn in front of the head, all beneath the body, and legs deep castaneous; the four hind legs fringed inwardly with pale rufous hairs. Scutellum of a long-triangular form, castaneous black, with a short narrow longitudinal line in the centre of a pearly white.

Of the known species it approaches most nearly to the *Goliathus fornassinii*, from which, however, it differs in the form of the head and thorax: the former is longer, with the bifurcated horn in front shorter, while each fork of it is broader, with the apex of each broadly truncated; the latter is less rounded, with the sides subangulated in the centre, thus differing from the figure of the head of the male given in the 'Ann. Soc. Ent. de Fr.' iv. pl. 7. f. 1a.





*Goliathus kirkianus*



7. DESCRIPTIONS OF NEW SPECIES OF SHELLS, CHIEFLY FROM AUSTRALIA, IN THE COLLECTION OF MR. ANGAS. BY ARTHUR ADAMS, R.N., F.L.S., ETC., AND GEORGE FRENCH ANGAS.

1. TRITON WATERHOUSEI, Ad. & Ang.

*T. testa ovato-fusiforimi, rimata, epidermide fusca squamato-pilosa induta, pallide castanea, spira elata aperturam æquante; anfractibus convexis, postice planatis, longitudinaliter subplicatis, liris prominentibus transversis ad plicas nodulosis ornatis; liris crenulatis duabus magnis duplicibus cum tribus parvis alternantibus, interstitiis cancellatis; anfractu ultimo varice conspicuo compresso fimbriato instructo; apertura ovata, intus alba; labio antice lævi, canali angusto; labro margine late varicoso, intus nodoso-lirato.*

Long. 3 inches, lat. 1 inch 9 lines.

*Hab.* Port Lincoln (*Coll. Angas.*).

Differs from *T. spengleri* in the squamato-pilose epidermis, in the broad flattened varix of the outer lip, in the double liræ of the whorls, and in the inner lip being smooth anteriorly. It is named after Mr. F. G. Waterhouse, the South Australian naturalist and explorer.

2. TRITON STRANGEI, Ad. & Ang.

*T. testa ovata, solida, umbilicata, albida; anfract. 4, convexis, longitudinaliter subplicatis, costis transversis magnis trisulcatis, interstitiis lirulis duabus transversis crenulatis ornatis; anfractu ultimo varice unico crasso rotundato conspicuo instructo; apertura parva, rotundato-ovata, canali angusto valde recurvato; labro extus late varicoso, intus plicato.*

Long.  $1\frac{1}{2}$  inch, lat. 1 inch.

*Hab.* Moreton Bay (*Coll. Angas.*).

Characterized by its small plicate aperture, its recurved beak, and the peculiar sculpture of the whorls. We dedicate this species to the memory of the late lamented Frederick Strange, who lost his life in the cause of science at the Percy Islands, on the north-eastern coast of Australia.

3. NERITULA (CALLOMPHALA) LUCIDA, Ad. & Ang.

*N. testa orbiculari, depressa, imperforata, spira parva apice acuto, alba, semipellucida, nitida, radiatim creberrime striata; anfractibus 4, planis, ultimo ad peripheriam obtuse angulato, suturis impressis, regione umbilicali callo albo opaco granuloso obtecta; apertura circulari, antice integra; labio callo parvo angulato instructo; labro supra anfractum penultimum reflexo, margine callo albo incrassato instructo.*

Long. 1 line, lat. 2 lines.

*Hab.* Coodgee Bay, N. S. Wales, in shell-sand (*Coll. Angas.*).

This little shell differs from the other species of *Neritula* in the

aperture being entire in front, as in *Teinostoma*, on which account we have proposed to give it subgeneric rank under the name of *Cal-lomphala*.

4. *CATILLUS ORNATUS*, Ad. & Ang.

*C. testa ovata, tenui, luteo-virescente, lineis nigris transversis undulatis ornata, superficie decussata, apice prominulo ad sinistram inclinato; apertura intus cæruleo-alba.*

Long. 8 lines, lat. 6 lines.

*Hab.* Viti-Lifu, Fijis (*Coll. Angas.*).

This species is remarkable for the beauty of its painting and the finely decussated character of the surface.

5. *NERITELLA (DOSTIA) LIFUENSIS*, Ad. & Ang. 32, 1453

*N. testa capuliformi, oblongo-ovata, subdepressa, apice eroso ad sinistram inclinato, obscura, fusca, radiatim nigro fasciata; apertura ochracea; labio plano, aurantiaco, lateribus dilatatis.*

Long. 1 inch, lat. 8 lines.

*Hab.* Lifu (*Coll. Angas.*).

An interesting addition to the limited group named *Dostia* by Dr. Gray, characterized by its broad flattened inner lip and its *Catillus*-like form. The operculum is that of *Neritella*.

6. *GIBBULA NITIDA*, Ad. & Ang.

*G. testa elato-conoidali, apice obtuso, late umbilicata, lævi, nitida, luteo-viridescente, purpureo rubroque in flammulas longitudinales et lineas transversas interruptas dispositis varie picta; anfractibus tumidulis, transversim striatis, ultimo ad periphæriam obtuse angulato, basi convexa, umbilici margine angulato; apertura rotundato-quadrata, intus vivide iridescente; labio simplici; labro intus sulcato.*

Long.  $2\frac{1}{2}$  lines, lat.  $2\frac{1}{2}$  lines.

*Hab.* Hokianga, New Zealand (*Coll. Angas.*).

A beautifully painted small shining species, of an elevately conoidal form, and with the interior of the aperture vividly iridescent as in *Elenchus*.

7. *GIBBULA PICTURATA*, Ad. & Ang.

*G. testa depresso-conica, late umbilicata, viridescente, carmineo purpureo alboque sæpe in flammulas longitudinales et fascias transversas interruptas dispositis varie picta; anfractibus convexis, transversim valde sulcatis, ultimo cingulo prominulo albo rubroque articulato instructo; basi planiuscula; apertura rotundato-quadrata, intus iridescente; labio simplici; labro intus sulcato.*

Long. 3 lines, lat. 3 lines.

*Hab.* On seaweed, low water, Port Jackson (*Coll. Angas.*).

A small richly painted species, differing from *G. nitida* in form,

in the whorls being strongly transversely sulcate, and in the surface not being polished.

8. *THALOTIA MUNDULA*, Ad. & Ang.

*T. testa elato-conica, subperforata, albida, flammulis purpureis longitudinalibus obsolete picta; anfractibus planis, in medio concavis, ad suturas cingulo rotundato prominulo succinctis, transversim liratis, liris æqualibus subgranulosis, basi lirulis concentricis cum interstitiis radiatim striatis ornata; apertura subquadrata; labio arcuato, antice in dentem obtusum desinente; labro intus obsolete sulcato.*

Long. 6 lines, lat.  $4\frac{1}{2}$  lines.

*Hab.* Sharks' Bay, Western Australia (*Coll. Angas.*).

Characterized by the rounded elevated ridge at the sutures, the transverse granular liræ, and the obscure flame-like longitudinal markings.

9. *TROCHOCOCHLEA EXCAVATA*, Ad. & Ang.

*T. testa depresso-conoidea, imperforata, viridi-cinerea, maculis atro-purpureis undulatis confertis longitudinalibus ornata; anfractibus convexiusculis, transversim sulcatis, ultimo magno, ad peripheriam acute angulato, basi plana; apertura subquadrata, perobliqua; labio albo, lato, excavato; labro intus lævi.*

Long. 3 lines, lat. 4 lines.

*Hab.* New Zealand (*Coll. Angas.*).

A depressed species, with a concave base, and with the inner lip excavated.

10. *CANTHIRIDUS DECORATUS*, Ad. & Ang.

*C. testa turbinato-conoidea, imperforata, cupreo-aurantiaca, flammulis longitudinalibus albo articulatis, in anfractu ultimo fascia lata albo articulata et serie transversa macularum quadratarum albarum ornata, apice carneola tincto; anfractibus planis, transversim sulcatis, sulcis distantibus postice obsolete, anfract. ultimo ad peripheriam rotundato; apertura subquadrata; labio vix recto, in medio calloso; labro intus sulcato.*

Long. 3 lines, lat. 2 lines.

*Hab.* York Peninsula, South Australia (*Coll. Angas.*).

A small but beautifully ornamented species, of a rich golden-orange colour, marked with white spots and flammules.

11. *CYLINDROBULLA FISCHERI*, Ad. & Ang.

*C. testa cylindræa, fragili, tenui, alba, semipellucida, antice truncata, postice rotundata et radiatim striata, striis prope extremitatem posticam abrupte desinentibus; apertura in medio lineari, vix clausa, antice dilatata.*

Long. 3 lines, lat.  $1\frac{1}{2}$  line.

*Hab.* South Australia.

This species differs from the *C. beani*, Fisch., which is the only other described, and which inhabits Guadaloupe, in being white, in the spire being more conspicuous, and especially in the posterior extremity being strongly striate, the striæ ending abruptly at the distance of about a line from the suture.

12. *HELIX* (*CORASIA*) *ANADYOMENE*, Ad. & Ang.

*H. testa orbiculari, depresso-conica, imperforata, alba, epidermide tenui straminea pellucida obtecta; anfractibus 4, planis, longitudinaliter tenuissime striatis; ultimo antice dilatato, ad peritrema constricto, ad peripheriam angulato et carina filiformi conspicua ornato; apertura subquadrata; labio callo umbilici regionem tegente; labro in medio angulato, margine valde reflexo et incrassato.*

Long. 6 lines, lat. 1 inch.

*Hab.* Guadalcanar, Solomon Islands (*Coll. Angas.*).

This elegant species somewhat resembles in form *H. aphrodite*, Pfr., from which, however, it differs in the whorls being more convex, and in the keel and peritreme not being of an opaque-white; the aperture moreover is less produced and angular.

13. *BULIMINUS* (*CHONDRULA*) *LEPIDULA*, Ad. & Ang.

*B. testa turrata, pupiformi, umbilicata, tenui, nitida, semipellucida, cornea; anfractibus 5, valde convexis, longitudinaliter striatis; apertura rotundato-ovata, peristomate interrupto, albo, late reflexo; labio superne callo parvo albo tuberculiformi munito.*

Long. 2 lines, lat. 1 line.

*Hab.* Sharks' Bay, North-west Australia (*Coll. Angas.*).

This little species differs from *C. adelaidæ* in being semipellucid, shining, and of a horn-colour. The whorls moreover are much more strongly convex.

14. *SUCCINEA* *STRIGILLATA*, Ad. & Ang.

*S. testa ovato-conica, tenui, semipellucida, pallide luteo-cornea, spira aperturam vix æquante, apice papilloso; anfractibus 3½, valde convexis, longitudinaliter strigillatis; apertura oblongo-ovata; labio callo tenui longo instructo; labro simplici.*

Long. 5 lines, lat. 2½ lines.

*Hab.* Sharks' Bay, North-west Australia (*Coll. Angas.*).

A species somewhat allied to *Succinea strigata*, Pfr., from South Australia, having the same papillary apex; but differing in being smaller, thinner, of a lighter colour, and in the whorls being less strongly strigose.

15. *LEPTOPOMA* *DOHRNI*, Ad. & Ang. B.M. 1953

*L. testa depresso-turbinata, profunde umbilicata, pallide fulvo-olivacea, spira brevi conica; anfractibus convexiusculis, transversim obsolete liratis, anfractu ultimo ad peripheriam valde*

*carinato; apertura patula, peritremate late dilatato et reflexo, regione umbilicali excavata.*

Long.  $7\frac{1}{2}$  lines, lat. 9 lines.

*Hab.* New Ireland (*Coll. Angas.*).

A larger species than *L. panayense*, Sow., which it somewhat resembles in form. The last whorl is very strongly carinated at the periphery, and the peritreme is not dark-coloured. We have named the species in compliment to Dr. Dohrn, who has made the operculated land-shells an especial object of study.

#### 16. PHYSA INFLATA, Ad. & Ang.

*P. testa oblongo-ovata, umbilicata, tenui, semipellucida, viridicornea, anfractibus supremis fuscis opacis, epidermide pilosa oblecta, pilis in lineis transversis dispositis; anfractibus 4, valde convexis, longitudinaliter striatis et lineis transversis æquidistantibus punctatis instructis, anfractu ultimo magno ventricoso inflato; apertura ovata; labio late reflexo, umbilicum obtegente; labro simplici.*

Long. 8 lines, lat. 6 lines.

*Hab.* Wakefield River, South Australia (*Coll. Angas.*).

A fine inflated bulbous species with the upper whorls usually semi-opaque and fuscous, and the lower whorls more pellucid and of a pale greenish horn-colour. The epidermis is ornamented with regular transverse rows of short hairs.

#### 17. THECALIA MACROTHERCA, Ad. & Ang.

*T. testa oblonga, perinæquilaterali, pallide carnea, epidermide fulva tenui induta, radiatim valde costata, costis nodoso-squamosis, latere antico brevissimo subauriculato, postico longiore dilatato ad extremitatem rotundato, margine ventrali antice sinuato et crenato, theca interna magna infundibuliformi; apertura ovata, expansa.*

Alt. 4 lines, lat. 6 lines.

*Hab.* Rapid Bay, South Australia (*Coll. Angas.*).

The cup-shaped appendage is much larger in the female, which in the Cape species is frequently found filled with ova. In the male of *Thecalia concamerata* which we have examined, the ventral margin is also folded on itself; but the cup is much narrower, and appears never to contain any ova.

#### 18. UNIO (ALASMODON) EVANSI, Ad. & Ang.

*U. testa transversim ovata, compressa, tenui, viridi-olivacea, ad umbones pallidiore, umbonibus vix erosis, concentricè crebre plicata, lirulis duabus subnodulosis radiantibus ornata; latere antico parvo et rotundato, postico dilatato et oblique truncato, margine ventrali valde arcuato.*

Alt.  $1\frac{1}{2}$  inch, lat. 2 inches 3 lines.

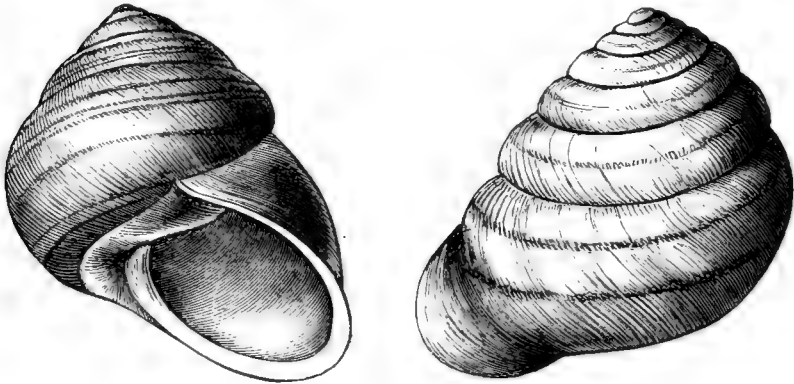
*Hab.* Lagoon of the Lower Murray River (*Coll. Angas.*).

This light olive-brown compressed species, which is characterized by the posterior side-angle being somewhat winged, is named after Henry Evans, Esq., an old colonist and a relative of one of the authors, who has derived considerable assistance in collecting specimens of natural history from his willing co-operation.

8. ON A SUPPOSED NEW SPECIES OF THE GENUS HELIX FROM NORTH-EASTERN AUSTRALIA. BY JAMES C. COX, M.D., F.R.C.S. EDINB., SECRETARY TO THE ENTOMOLOGICAL SOCIETY OF NEW SOUTH WALES.

HELIX FORBESII.

*H. testa obtecte umbilicata, globulosa, solida, sub epidermide lutescente alba, lineis fuscis cincta; spira obtusa; anfractibus septem; apertura lunato-rotundata, intus alba; peristomate undique expanso, margine columellari superne dilatato.*

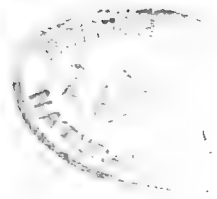


Shell with a covered umbilicus, globular, solid; white beneath a yellowish epidermis, encircled with brown lines; spire obtuse; whorls seven; aperture lunar rounded, white within; lip expanded throughout, columellar margin dilated at the top.

*Hab.* Port Denison, Queensland.

This shell, which I have named after the late Prof. Edward Forbes, and of which I have a large number of specimens, was found on the trunks of the native fig-trees at Port Denison. I believed it at first to be only a local variety of *H. lessoni*; but on more careful investigation I have found it to be a very well-marked new species, and I am unable to find any record of its having been before described.





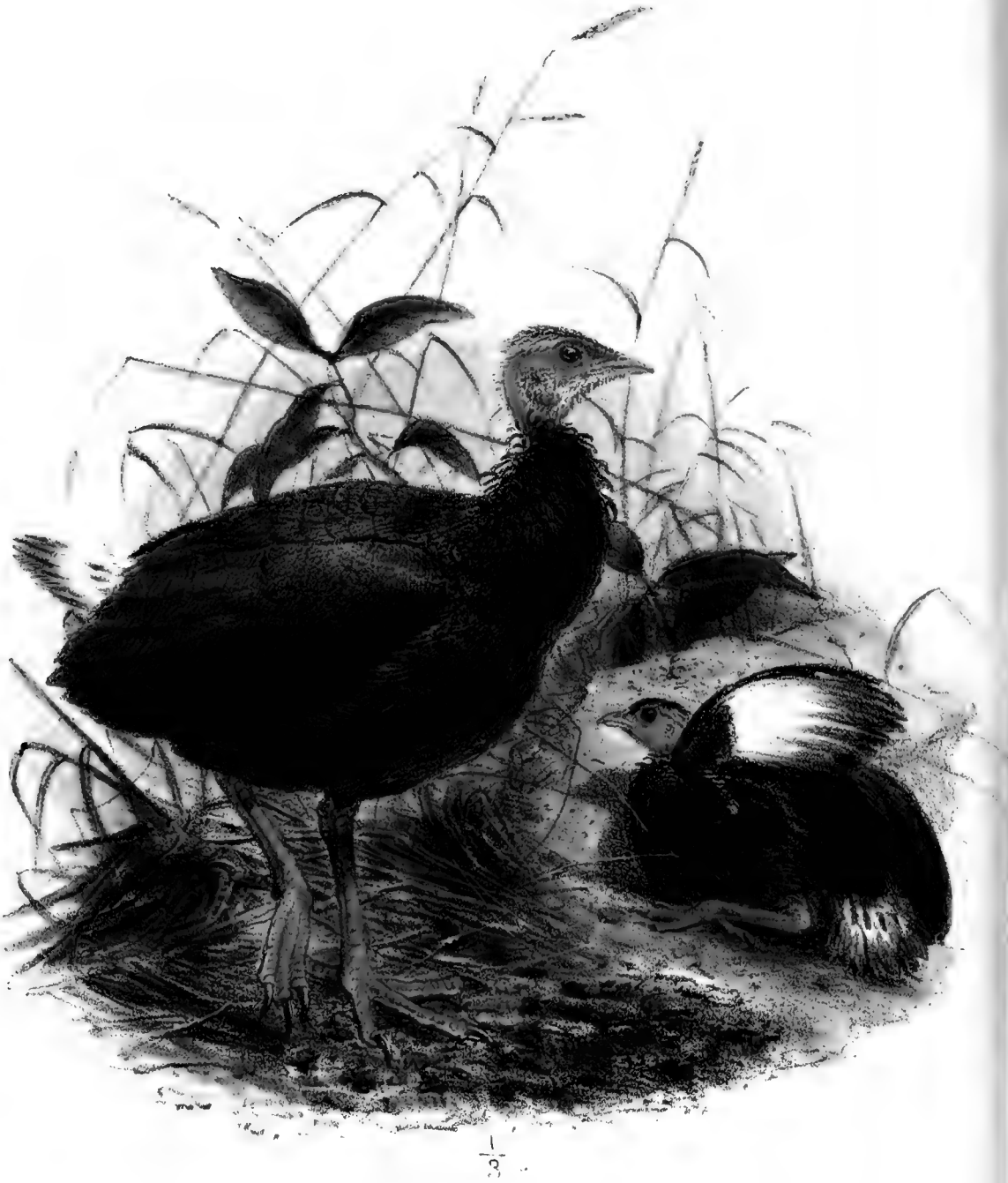


PLATE VI

S. N. Hannart. Imp.

MEGALOPTILUS PETCHARTI

February 9, 1864.

John Gould, Esq., F.R.S., in the Chair.

Mr. Tegetmeier exhibited experiments in a new mode of pinioning wild birds, by which they might be prevented from injuring their plumage.

The following papers were read :—

1. ON A NEW SPECIES OF MEGAPODE. BY G. R. GRAY.

(Plate VI.)

I have had placed in my hands a specimen of a bird (preserved in spirits) from the Island of Nina Fou\*, which, on examination, has proved to be a new species of the remarkable genus *Megapodius*. The specific characters are as follows :—

MEGAPODIUS PRITCHARDII. (Pl. VI.)

Young female. Slaty black †, with the base of most of the feathers white; wings (imperfect, the quills having been mostly cut away) with the first quill fuscous black; the rest are apparently white, probably fuscous black at their tips; upper tail-coverts white; tail fuscous black; abdomen pale fuscous black or slaty; cheeks and upper part of the neck vermilion-red, slightly feathered with small scattered black plumes; bill bright yellow; tarsi and toes pale yellow; claws blackish lead-colour.

Length, from tip of bill to end of tail, 12 or 13 inches.

The specimen from which the description was taken was obtained by Mr. W. T. Pritchard at Nina Fou, which island is situated about halfway between the Feejee Islands and the Samoan Islands, and is far removed to the northward of the Friendly or Tonga Islands, yet it is considered to form part of this latter group. This somewhat isolated island is said to be of small size, of a volcanic origin, and peculiarly liable to eruptions and earthquakes. The natives informed him that the bird "laid 200 eggs, and piled them one above another in the shape of a pyramid, the last egg forming the apex." This statement Mr. Pritchard "hesitated to believe; but the natives reiterated it." The bird lives in the bush, runs very fast, and does not fly any distance at a time.

It so happens that the Nina Fou bird was lately recorded in the 'Proceedings of the Zoological Society' (1862, p. 247), from information obtained by Mr. Bennett of Capt. McLeod, who stated that the bird was known to the natives by the name of "Mallow;" and it lives in the scrubs in the centre of the island, about the margin of a

\* Onooafow, or Proby Island, or Hope Island, or Good Hope Island.

† Mr. Bennett says, "of an uniform blackish-brown colour." While Mr. Pritchard remarks it to be "of a brownish blue."

large lagoon of brackish water, which has the appearance of having been an extinct crater; the birds lay their eggs on one side only of the lagoon, where the soil is composed of a sulphur-looking sand; the eggs are deposited from 1 to 2 feet beneath the surface.

This latter account is in accordance with the known habits of several of the species of this genus, and Mr. Pritchard was right in doubting the correctness of the marvellous and most improbable story related to him by the natives. It is only by the permission of the king or chief that the eggs or birds can be procured, which is also the case in other localities.

The natives of the Tonga Islands informed Mr. Pritchard that the bird was "*not* found on any of their islands, except Nina Fou." There is, however, in the British Museum an egg, with the provisional name of *Megapodius burnabyi*, which agrees with the description of the Nina Fou egg. It was obtained by Lieut. Burnaby, R.N., at the Hapace Islands, which is the centre cluster of the three groups usually considered to form the Friendly or Tonga Islands. The bird of the Hapace Islands may, when made known, prove to be a species closely allied to the *Megapodius pritchardii*, if not the same.

The subjoined list of species of the *Megapodidæ* is given to show which of them are contained in the British Museum. This is denoted by (B.M.) being placed after the localities whence the specimens have been received.

1. TALEGALLUS CUVIERI, Less.

New Guinea, Dorey (B.M.); Aru Islands.

2. TALEGALLUS LATHAMI (Gray).

Australia, North, West, and South (B.M.).

3. MEGACEPHALON RUBRIPES (Quoy & Gaim.).

Celebes, Menado (B.M.).

M. Teysmann, in his "Reise nach den Molukken," published in vol. x. of 'Bonplandia,' makes a remark which seems to imply that there are two species bearing a horn-like projection.

4. LEIPOA OCELLATA, Gould.

Australia, South (B.M.) and West.

\*

5. MEGAPODIUS FREYCINETI, Quoy & Gaim.

*Tetrao novæ guineæ*, Gm., juv.?

*Oriolus coturnix*, Scop.

*Coturnix novæ guineæ*, G. R. Gr.

*Megapodius*, juv., G. R. Gr.

*Alecthelia urvili*, Less.

New Guinea; Island of Waigiou; Mysol; Kaioa; Batchian (B.M.); and Morty Islands.

6. ? *MEGAPODIUS QUOYII*, G. R. Gr.

Gilolo, South (B.M., juv.).

Perhaps only a local variety; but the young state differs from that of the former.

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7. *MEGAPODIUS FORSTENI*, Temm.

Amboina (B.M.); Ceram (B.M.); Bouru; Banda?

8. *MEGAPODIUS MACGILLIVRAYI*, G. R. Gr.

Louisiade Archipelago, Duchateau Isles (B.M.) and Pig Island.

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9. *MEGAPODIUS REINWARDTII*, Wagl.

New Guinea, Dorey (B.M.), River Oetanata; Aru Islands (B.M.); Ké Islands (B.M.).

10. *MEGAPODIUS TUMULUS*, Gould.

Australia, North (B.M.); Islands in Endeavour and Torres Straits; Craincross Island (B.M.).

11. *MEGAPODIUS RUBRIPES*, Temm.

Amboina (B.M.).

12. *MEGAPODIUS GOULDII*, G. R. Gr.

Lombok (B.M.); Flores (juv. B.M.)?

13. *MEGAPODIUS NICOBARIENSIS*, Bl.

Nicobar Islands.

The adults of the last five species closely assimilate to one another; but the young birds exhibit differences in colour and markings, yet in general appearance they bear a great resemblance to each other.

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14. *MEGAPODIUS CUMINGII*, Dillw.

Philippine Islands, Manilla (B.M.); Labuan; Borneo.

15. *MEGAPODIUS GILBERTII*, G. R. Gr.

Celebes, Menado (B.M.).

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16. *MEGAPODIUS WALLACEI*, G. R. Gr.

Gilolo, East (B.M.); Ternate; Bouru.

\*\*\*\*\*

17. *MEGAPODIUS LA-PEROUSI*, Quoy & Gaim.

Ladrone or Marian Islands, Guam, Botta, and Tinian.

\*\*\*\*\*

## 18. MEGAPODIUS PRITCHARDII, G. R. Gr.

Island of Nina Fou (B.M.).

## 19?. MEGAPODIUS BURNABYI, G. R. Gr.

Hapace Islands (egg, B.M.).

## 20?. MEGAPODIUS STAIRII, G. R. Gr.

Samoan Islands (egg, B.M.).

## 21?. MEGAPODIUS? ANDERSONI, G. R. Gr.

New Caledonia.

Among other localities in which these birds are found, may be recorded all the islands that compose the group known as the New Hebrides. Mr. Bennett especially refers to Sandwich Island, where, he says, one of the species is known by the name of "Tarboosh;" while at Tanna, another of this group, a similar bird is denominated in English the "Bush-fowl."

They also inhabit the Salomon Islands, as eggs, certainly of a species of this genus have been brought lately from them; and Mr. Bennett states that living specimens were obtained by Mr. Dawson at the Island of Sava or Russell Island\*. Further, Downing, in his "List of the Birds of Norfolk Island," mentions a bird under the appellation of "Guinea Fowl," which may prove eventually, when found, to be a species of Megapode!

## 2. NOTICE OF A NEW SPECIES OF TURACUS FROM EASTERN AFRICA. BY G. R. GRAY.

A new species of the interesting genus *Turacus* has just been brought by the Rev. C. Livingstone from the Manganja Highlands of East Africa, where it was obtained at an elevation of 3000 or 4000 feet above the sea.

It approaches the *Turacus albocristatus* in its general appearance, but the crest differs in form, being as it were bicrested; viz. the plumes from the crown are long and narrow, thus forming a crest pointed posteriorly, while those on the occiput are very short and closely set upon it. All the plumes of both parts are tipped with white. The rest of the plumage is very similar to that of *Turacus albocristatus*; but the feathers of the back and wings are margined with shining golden green instead of bluish green, as is seen on the latter-mentioned species.

I propose the name of *Turacus livingstonii*, as a slight acknowledgment of that gentleman's merit in adding so interesting a species to our knowledge of this showy genus.

\* This island is not to be found in any map or geographical dictionary that I am acquainted with, nor even in any of the missionary works treating especially on the islands of the South Seas.

Two other species of this family are contained in the Expedition's collection, viz. *Turacus porphyreolophus* and *Coliphimus concolor*. The former differs in having a larger space of rich golden green on the sides of the head, while the rufous tint is entirely wanting on the breast. The second species also offers some slight variations, viz. the crest and throat are of a lighter colour. Thus both species differ in some respects from the specimens obtained in the Cape Colony; but, I suppose, they will come within the category of local varieties.

### 3. ON A NEW SPECIES OF PRIONOPS. BY G. R. GRAY.

I beg to lay before the Meeting the description of a new species of *Prionops*, which has been obtained during the Zambesi expedition.

#### PRIONOPS TRICOLOR.

Black; back, rump, wing-coverts, and tertials purplish grey; quills fuscous black, from the second to the tenth quills crossed interiorly with a white oblique band; vent, under tail-coverts, and tips of the tail-feathers white; on the latter the white decreases in width from the outer to the central feathers, where it exhibits only a small spot on each feather.

The frontal plumes covering the nostrils are short, turned upwards, and slightly curved backwards in front of the eyes, like those of the *Prionops talacoma*, which latter species, with the new one, were sent in the first series of birds as from Tette.

The eyes are surrounded by serrated fleshy rings. The bill and feet red; the former is tipped with yellow.

Length 7" 6''' ; wings 5''.

This new species is allied to *Prionops retzii*, but it is without the white rump, and the tips of the tail-feathers are white on both webs.

There are six species now known of the genus *Prionops*; they consist of

- P. plumatus*, Shaw.
- P. poliocephalus*, Stanley.
- P. concinnatus*, Sundev.
- P. talacoma*, A. Smith.
- P. retzii*, Wahlb.
- P. tricolor*, G. R. Gr.

The allied genus, *Sigmodus*, contains three species, viz.

- S. caniceps*, Temm.
- S. rufiventris*, Bp.
- S. scopifrons*, Peters.

All the species of these two genera are confined to the continent of Africa.

4. THIRD CONTRIBUTION TO OUR KNOWLEDGE OF BATRACHIANS  
FROM AUSTRALIA. BY DR. A. GÜNTHER.

(Plate VII.)

The following is a continuation of two other papers treating on the same subject; they were published in the 'Annals and Magazine of Natural History,' 1863, p. 26, and in the 'Proceedings' of this Society, 1863, p. 249.

MIXOPHYES (g. n. RANIDARUM).

Habitus as in *Rana*, the head being broad and large; legs of moderate length. Tongue circular, not notched behind; vomerine teeth in two series; lower jaw without tooth-like apophyses. Openings of the Eustachian tubes narrower than the choanæ; tympanum distinct. Fingers free, none opposite to the others; interdigital membrane between the toes well developed; fifth toe moveable to its base; a long, compressed, subsemicircular tubercle at the metatarsus. Male with a single subgular sac, which is not visible externally.

MIXOPHYES FASCIOLATUS. (Pl. VII. fig. 1.)

This Batrachian approaches the true Frogs more closely than any other known from the Australian region; its habitus is that of *Rana*, but the head is disproportionally large and broad. The snout is obtusely rounded, with the canthus rostralis gradually descending in a gentle curve, and with the loreal region obliquely flattened. The nostril is scarcely below the canthus, midway between the eye and the end of the snout. The eye is large, prominent. Cleft of the mouth very wide, much broader than long. The vomerine teeth are in a nearly straight line, between the anterior angles of the choanæ; the two series being separated in the middle by a narrow space. Two long slits on the side of the tongue lead into the subgular sac. The tympanum is nearly as large as the eye. With the exception of a very slight fold above the tympanum, the skin is perfectly smooth.

Fingers tapering, rather slender. The length of the body equals the distance between vent and heel, but it is much more than the length of the remaining foot. Toes two-thirds webbed, so that the three outer phalanges of the fourth toe remain free.

Upper parts brownish olive, with a darker cross band between the hinder half of the superciliaries. A black band runs along the canthus rostralis, widening on the foremost part of the snout below the nostril, and is continued behind the eye, above the tympanum; sides of the body with round brown or black spots; legs with numerous black cross bands, which are most distinct on the hinder side of the fore legs and on the anterior side of the hind limbs. Lower parts uniform white; throat of the male brownish.

Specimens of this Frog have been sent by Mr. Krefft from the



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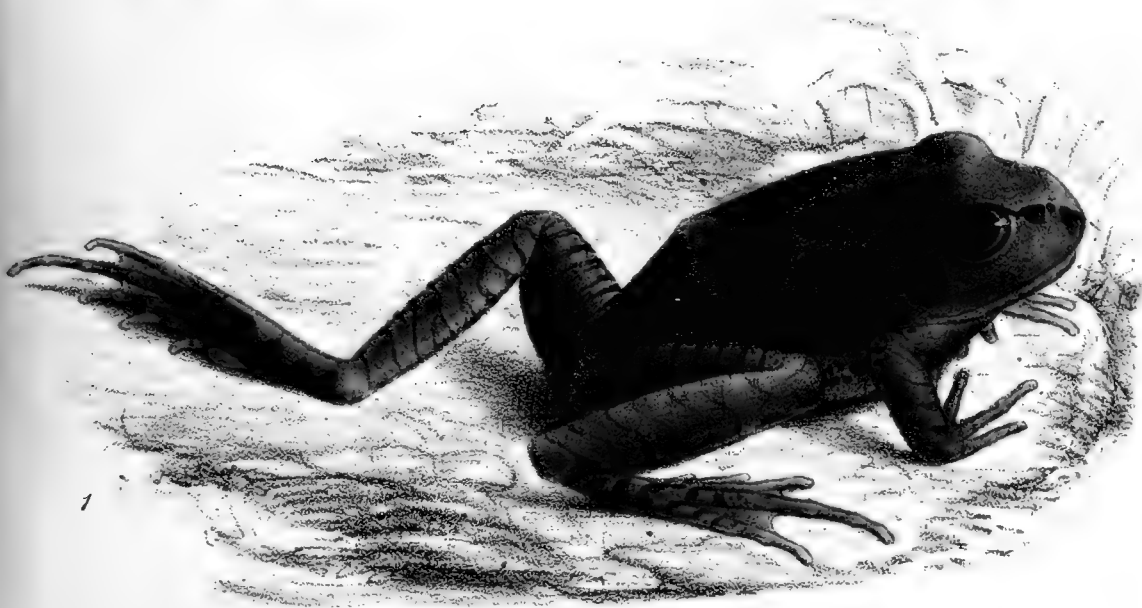
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1

1. *Mixophyes fasciolatus*. 2. *Pterophrynus affinis*.  
3. *P. tasmaniensis*. 4. *P. lævis*.



Clarence River; the following are the dimensions of an adult female:—

	lines.
Length of the body . . . . .	33
Width of the mouth . . . . .	14
Length of the fore limb . . . . .	23
——— of the third finger . . . . .	7
——— of the hind limb . . . . .	54
——— of the entire foot . . . . .	23
——— of the fourth toe . . . . .	15½

**PTEROPHRYNUS AFFINIS.** (Pl. VII. fig. 2.)

Habit as in *Camariolius varius*, Peters, but with the snout longer and more pointed; the canthus rostralis is rather distinct between eye and nostril, and is strongly deflexed in front. Upper parts smooth, the lower coarsely granulated. Eye rather large, not much shorter than the snout. Tongue narrow, ovate, entire behind; vomerine teeth none, but there is a short, scarcely perceptible osseous ridge in front of the orbital groove. Toes not fringed; tarsus with a longitudinal fold of the skin; metatarsus with two minute tubercles. The length of the body is more than the distance between vent and metatarsal tubercles. Upper parts reddish olive, with a double series of irregular blackish spots along the back; a black band runs from behind the eye along the side of the body towards the loin, a blackish streak along the canthus rostralis. Lower parts whitish.

	lines.
Length of the body . . . . .	12
——— of the hind limb . . . . .	16
——— of the fourth hind toe . . . . .	5
Distance between vent and knee . . . . .	4½

*Hab.* Western Australia.

Having found in the collection of the British Museum a specimen of *Pterophrynus verrucosus*, Lütken, I convinced myself that the slight swelling of the skin between the angle of the mouth and the shoulder is not produced by an accumulation of glands, so as to deserve the name of a parotoid. The processes of the sacral vertebra are so slightly dilated, that they might be described as cylindrical; however, each process terminates in a cartilage, which is very distinctly dilated. On comparing this Frog with the *Camariolius* of Peters, I came to the conclusion that both these genera must be united; for although Professor Peters describes the processes of the sacral vertebra as narrow, I find them in *Camariolius varius*, Peters, as slightly dilated as in *Pterophrynus*. Probably any one who had no opportunity of observing the following species would have overlooked the dilatation of those processes in the species mentioned. *P. lævis* has them very distinctly dilated, and *P. affinis* and *P. tasmaniensis* are, in this respect, intermediate between these extreme forms. They form only one genus, which, perhaps, must be still further extended; for, whilst none of the species mentioned

are provided with vomerine teeth, several specimens in our collection, which, perhaps, are the *Cystignathus georgianus* of D. & B., and which can scarcely be generically separated from our *Pterophryni*, have those teeth well developed. Tschudi has proposed the name of *Crinia* for the last-named species.

**PTEROPHRYNUS TASMANIENSIS.** (Pl. VII. fig. 3.)

Very similar to *Camariolius pictus*, Peters; upper and lower parts nearly entirely smooth, with scarcely any trace of flat tubercles. Snout rounded in front, somewhat pointed, sloping downwards in a gentle curve from the nostrils. Eye of moderate size, rather longer than its distance from the nostril. Tongue narrow, ovate, entire behind; vomerine teeth none. Toes fringed; *tarsus without longitudinal fold*; metatarsus with two minute tubercles. The length of the body equals the distance between vent and metatarsal tubercles. Upper parts blackish brown, with a more or less distinct broad reddish-olive band running from behind the eye towards the loin; lower parts beautifully rose-coloured, largely marbled with black; the pre-anal parts black.

	lines.
Length of the body . . . . .	13
—— of the hind limb . . . . .	19
—— of the fourth hind toe . . . . .	6
Distance between vent and knee . . . . .	5

*Hab.* Van Diemen's Land.

**PTEROPHRYNUS LÆVIS.** (Pl. VII. fig. 4.)

Habit as in *Pseudophryne*; snout rather short and rounded, with the canthus rostralis obtuse. Eye considerably shorter than the snout. Upper and lower parts perfectly smooth. Tongue narrow, ovate, entire behind; vomerine teeth none. Tympanum very small, covered not only by the skin, but also by muscle. Toes not fringed, without subarticular tubercles; neither a tarsal fold nor metatarsal tubercles are present. The length of the body is not much less than that of the hind limb. Brownish olive; small yellow spots are scattered over the upper parts; numerous brown spots on the belly and on the lower side of the hind limb.

	lines.
Length of the body . . . . .	13
—— of the hind limb . . . . .	16
—— of the fourth hind toe . . . . .	$5\frac{1}{2}$
Distance between vent and knee . . . . .	$4\frac{2}{3}$

*Hab.* Van Diemen's Land.

**LITORIA WILCOXII.**

Snout of moderate length, somewhat pointed in front, the distance between the front angles of the orbits being equal to that between the eye and the extremity of the snout. Canthus rostralis angular; nostril much nearer to the end of the snout than to the eye. Tym-

panum very distinct, half the size of the eye. Skin perfectly smooth; a fold across the chest; belly granulated. Vomerine teeth in two oblique short series between the anterior part of the choanæ; tongue entire behind. Openings of the Eustachian tubes much narrower than the choanæ. Limbs rather slender: the third finger is longer than the fourth. The length of the body is a little less than the distance between vent and heel. Tarsus with a lateral fold of the skin; metatarsus with two small tubercles. Toes three-fourths webbed; the length of the fourth toe is a little less than one-half of that of the body. Disks rather small.

Upper parts greyish olive, indistinctly marbled with darker; a dark cross band between the eyes. A black band runs from the snout along the canthus rostralis, and is continued behind the eye, through the tympanum, to behind the axil. Sides of the belly and hinder side of the thigh yellow, marbled with black.

	lines.
Length of the body . . . . .	19
Width of the cleft of the mouth . . . . .	$6\frac{2}{3}$
Length of the fore limb . . . . .	$13\frac{1}{2}$
——— of the third finger . . . . .	$4\frac{1}{2}$
——— of the hind limb . . . . .	35
——— of the entire foot . . . . .	15
——— of the fourth toe . . . . .	9

Two specimens were sent by Mr. Krefft; they were collected at the Clarence River by James F. Wilcox, Esq., to whom science is indebted for many valuable acquisitions from that country.

I take this opportunity of remarking that *Hyla aurea*, Less., has the first finger opposite to the three others, and that therefore it ought to be referred to the genus *Litoria*.

#### HALOPHILA PLATYDACTYLA.

This species is very similar to *H. vitiana*, Bibr., but distinguished by the very broad terminal disks of the fingers, which are as large as the tympanum. In the form of its head it agrees with the other species mentioned; the tympanum is not quite half as large as the eye; the choanæ and openings of the Eustachian tubes are small, and the minute vomerine teeth form only a very short oblique series behind the choanæ. The skin is perfectly smooth. The first finger is shorter than the others. The length of the body is more than the distance between vent and heel. Toes with a rudimentary web, and with the terminal disks much smaller than those of the fingers; the third toe is longer than the fifth; metatarsus with two minute tubercles. Uniform brownish violet above; light brownish below.

Length of the body 16 lines, of the hind limb 22 lines, of the fourth toe 7 lines, of the fore limb  $11\frac{1}{2}$  lines.

The locality where this species has been obtained is not known, but it is probable that it came from one of the Feejee Islands.

5. OBSERVATIONS ON THE GEOGRAPHICAL DISTRIBUTION OF THE SPECIES OF *VOLUTA* AND *CYMBIUM* IN THE AUSTRALIAN SEAS. BY GEORGE FRENCH ANGAS, CORR. MEM.

New Holland may well be regarded as the metropolis of the *Volutilidæ*, no less than twenty-eight or twenty-nine of the seventy species of the genus *Voluta* already known to us, and some half-dozen species of the allied genus *Cymbium*, having their habitat in the Australian waters. Under the term Australia I include New Caledonia, New Zealand, and the adjacent islands, which may fairly represent one geographical province or area, throughout which this family develops itself in a large number of species. Having had frequent opportunities, during my researches both in Australia and New Zealand, of determining the exact geographical range of many of the *Volutes*, I have been induced to embody my observations in the following notes on such species as are inhabitants of the Australian Seas.

1. *VOLUTA* (*SCAPHA*) *MAGNIFICA*, Chemnitz.

This noble species, one of the largest of the genus, is peculiar to the east coast of Australia, south of the tropic of Capricorn. Its most northern limit appears to be about Port Curtis and Moreton Bay, where a tubercled variety was found by the late Mr. S. Stutchbury, of which I have seen two examples. In the sheltered harbours of Brisbane Water and Port Jackson, where it seems to attain its maximum size, it is found half burying itself amongst the weed and ooze on a sandy or muddy bottom, often in shallow water below tide-mark. My largest specimen, from Vacluse Bay, in Sydney Harbour, measures nearly 1 foot in length; and the one in the British Museum, from the same locality, presented by Capt. Sir Everard Home, is still larger. This species occurs as far south as Woollongong and Jervis Bay, which I judge to be near its southern limit. As might be expected from so large and conspicuous a species, it is now becoming rare in Port Jackson, and fine specimens in good condition are very difficult to obtain.

2. *VOLUTA* (*SCAPHA*) *FUSIFORMIS*, Swainson.

This scarce and elegant *Volute* belongs to Tasmania and the islands of Bass's Straits; I have never met with it either in New South Wales or South Australia. In most of the specimens which have been obtained, the papillary apex is wanting. The specimens from King's Island and other parts of Bass's Straits are larger, thicker, and more ventricose than those from Southern Tasmania.

3. *VOLUTA* (*SCAPHA*) *RUTILA*, Broderip.

From the north-east coast of Australia. My specimen was obtained near Cape York, during the cruise of H.M.S. 'Rattlesnake,' and is not tubercled.

## 4. VOLUTA (SCAPHA) PIPERITA, Sowerby.

This lovely species is extremely rare: I do not think there are half a dozen specimens in Europe. Its habitat (till lately unknown) is Woodlark Island, whence the two fine examples in my own collection were obtained by H.M.S. 'Iris.'

## 5. VOLUTA (SCAPHA) PULCHRA, Sowerby.

An exquisitely beautiful Volute, of which a specimen in a live state was found at Heron Island, on the north coast of Australia, by my friend Mr. J. Macgillivray, and is now in the National Collection.

## 6. VOLUTA (SCAPHA) DESHAYESII, Reeve.

This gorgeously blood-spotted Volute has only been known to collectors during the last few years. Previously to its being described by Mr. Reeve in the 'Proceedings of the Zoological Society of London,' I had received several specimens from the tortoiseshell and bêche-de-mer traders, who visit the islands to the north-east of Sydney. It appears to come from the north coast of New Caledonia, and (although at one time I saw some hundreds lying on the deck of a small schooner in Sydney, and was obligingly offered as many as I liked to take by the captain) is still a species much valued by collectors in Europe.

## 7. VOLUTA (SCAPHA) NORRISII, Sowerby.

King George's Sound, Western Australia. Rare. This species differs from the common *V. nivosa* in being shorter and broader, with a very dark aperture, and in having the whorls coronated at the angle.

## 8. VOLUTA (SCAPHA) NIVOSA, Lam.

Peculiar to the west coast of Australia, where it ranges abundantly from Swan River to Sharks' Bay. At the latter place a small yellowish variety occurs, in which the snow-flake markings are nearly obsolete.

## 9. VOLUTA (SCAPHA) MARIA-EMMA, Gray.

This species is most probably from the north-west coast of Australia. At present I believe it is unique in the Cumingian collection.

## 10. VOLUTA (SCAPHA) MAMILLA, Gray.

Several specimens of this large and remarkably papillose shell have lately been obtained in Tasmania. A fragment, evidently belonging to this species, was found on the beach at Kangaroo Island, in South Australia, amongst a heap of débris and broken shells.

## 11. VOLUTA (SCAPHA) PACIFICA, Solander.

There are two or three very marked varieties of this species, which is pretty generally distributed along the shores of the north island of New Zealand. About Hokianga, on the west coast, I have met with

it nodulous and elongated. At the Bay of Islands there is a smooth variety, more ventricose, and richly coloured.

12. *VOLUTA (SCAPHA) GRACILIS*, Swainson.

A miniature species, differing in form and style of painting from the preceding, of which I have seen a few specimens from New Zealand only.

13. *VOLUTA (SCAPHA) SOPHIA*, Gray.

From the north coast of Australia, very rare. Mr. Murphy, of Sydney, possesses a very fine example of this species, which he obtained at Port Essington, when in company with the expedition of the late lamented Leichardt. One or two specimens have also been collected by H. M. surveying-ships on the north coast.

14. *VOLUTA (VOLUTELLA) FLAVICANS*, Gmel.

This species (*V. volvacea* of Lamarck) occurs also at Port Essington, whence my specimens were obtained. It probably extends northwards to New Guinea and the adjacent islands.

15. *VOLUTA (VOLUTELLA) PAPILOSA*, Swains.

This ponderous and handsomely marked shell is one of considerable rarity. Worn and dead examples, however, may frequently be met with on the beaches at Encounter Bay and Kangaroo Island in South Australia, and in several parts of Tasmania and Bass's Straits. In the adult state the outer lip is often extremely thickened; and the apex in the young shell somewhat resembles that of *V. mamilla*, on a smaller scale.

16. *VOLUTA (VOLUTELLA) FULGETRUM*, Broderip.

This fine species is also rare, and inhabits similar localities to the preceding, *V. papillosa*. The first specimen was brought to Europe from Port Lincoln by Flinders's Expedition, and afterwards realized a large sum at the sale of the Tankerville Collection. By far the finest example of *V. fulgetrum* yet obtained, both for size and brilliancy of colour, was dredged at Tunby Bay, in Spencer's Gulf, on the edge of a sandbank, and is now in my collection. In the British Museum are two specimens of this species, presented by my friend Mr. Harvey, of Port Lincoln, labelled as being from "Port Lincoln, Torres Straits"!

17. *VOLUTA (VOLUTELLA) ROSSINIANA*, Bernardi.

From New Caledonia, rare.

A very elegant species, somewhat resembling *V. imperialis* of the Philippines.

18. *VOLUTA (AMORIA) UNDULATA*, Lam.

This common species has a wider range of distribution than most of the genus. It occurs in Port Jackson, on the east coast, where it



is very rare, and extends round the south coast of Australia as far to the westward as Swan River. In Tasmania and Bass's Straits, where it is very abundant, the shells are of a darker colour and stouter than those from Port Lincoln, which are of a pale ivory tint and more elongated.

19. VOLUTA (AMORIA) EXOPTANDA, Sowerby.

This extremely rare Volute was first described by Mr. Lovell Reeve from a unique specimen in the collection of the Rev. Mr. Crotch. Miss Saul has shown me a second specimen, in a worn state, having been picked up on the beach at Port Elliott, in South Australia, by some children, who used it as a toy with other broken shells. On their arrival in England, the "much-to-be-desired" Volute was eagerly rescued by Miss Saul, and now holds a distinguished place in that lady's cabinet.

20. VOLUTA (AMORIA) VOLVA, Chemnitz.

This species (*V. pallida* of Gray) occurs freely along the west coast of Australia, especially about Swan River. *V. volva* has been confounded with *V. turneri* and *V. prætexta*, from the north and east coasts, by some authors; but I regard them as being each specifically distinct, besides belonging to widely different localities.

21. VOLUTA (AMORIA) RETICULATA, Reeve.

An extremely rare species, somewhat allied to the last, but banded and beautifully reticulated with chestnut-brown. The few specimens already known have been brought from the neighbourhood of Sharks' Bay, Western Australia.

22. VOLUTA (AMORIA) TURNERI, Gray.

A delicate longitudinally striped species from North-east Australia.

23. VOLUTA (AMORIA) PRÆTEXTA, Reeve.

A small reticulated species from the north coast of Australia.

24. VOLUTA (AMORIA) MACULATA, Swainson.

This rare and elegantly spotted shell, of which but few specimens are known, has its locality to the north of Queensland. I possess one example, which was obtained on the beach at Port Curtis.

25. VOLUTA (AMORIA) MARMORATA, Swainson.

Another very scarce species of a graceful *Cymba*-like form, from Port Stephens and Port Macquarie, on the east coast of New South Wales.

26. VOLUTA (AMORIA) ZEBRA, Leach.

A common species at Port Curtis and the mouth of the Richmond River, on the east coast of Australia. The *V. lineata* of Leach is a variety of this species.

27. *VOLUTA (LYRIA) MITRÆFORMIS*, Lamarck.*V. multicosata*, Broderip.

South Australia, on banks of sandy mud in Spencer's Gulf and Gulf St. Vincent. Large and richly coloured specimens are occasionally washed on shore near the Semaphore at Port Adelaide, in a tolerably good state. Those found at Port Lincoln are smaller and paler in colour. I possess a specimen of the latter variety from the beach at Buffalo Mouth, South Africa, though I do not find the species included in Professor Krauss's 'Süd-Afrikanische Molusken.'

28. *VOLUTA (LYRIA) NUCLEUS*, Lamarck.

The smallest of the Australian Volutes, of which I have obtained specimens from the north-east coast, near Cape York.

29. *VOLUTA (LYRIA) DELICIOSA*, Montrouzier.

A small, compact, delicately marked species from New Caledonia. It is very closely allied to *V. cassidula* from Japan.

30. *MELO GEORGINÆ*, Gray.

Moreton Bay and Swan River.

31. *MELO UMBILICATUS*, Brod

Moreton Bay.

32. *MELO DIADEMA*, Lam.

Port Essington.

33. *MELO MUCRONATUS*, Sow

Moreton Bay.

34. *MELO BRODERIPII*, Gray.

Torres Straits.

35. *MELO MILTONIS*, Gray.

Swan River.

## 6. DESCRIPTION OF A NEW SPECIES OF GULL FROM TIBET.

BY J. GOULD, Esq., F.R.S., ETC.

*CHROICOCEPHALUS TIBETANUS*, Gould.

Head light chocolate-brown, deepening into black on the nape, sides of the head, and fore part of the neck; back and wings delicate grey; shoulders and edge of the wing pure white; first two primaries black, with an oblong patch of white occupying the basal portion of the outer web and the corresponding portion of the inner web for about half its breadth, and with an oval patch of white near the tip;





J. Wolf. del., et lith.

M. & N. Harhart Imp.

MUSTELA AUREIVENTRIS.

the remaining quills white, largely tipped and broadly margined along the inner web with black; remainder of the plumage, comprising the neck, under surface, upper and under tail-coverts, pure white; bill, legs, and feet coral-red; nails black.

Total length 16 inches, bill 2 inches, wing  $12\frac{1}{2}$  inches, tail 5 inches, tarsi  $2\frac{1}{8}$  inches.

*Hab.* Tibet.

*Remark.* This fine and very distinct species belongs to that section of the *Laridæ* which comprises the well-known Black-headed Gull, *C. ridibundus*, but cannot be confounded with that or any other species, the broad black mark in the centre of its first two primaries, together with its larger size, serving at once to distinguish it. It was brought from Tibet by Major W. E. Hay, F.Z.S.

## 7. DESCRIPTION OF A NEW MUSTELA FROM QUITO.

BY DR. J. E. GRAY, F.R.S., ETC.

(Plate VIII.)

Mr. Gould has transferred to the British Museum the skin of a small *Mustela* which he received from Quito, along with a new species of Humming-bird, which he has lately described.

It is very distinct from any we have previously seen. It is about the size of the European Weasel (*Mustela vulgaris*).

MUSTELA AUREOVENTRIS. (Pl. VIII.)

Dark brown; chin and side of the throat white; throat, chest, inside of fore legs, and belly golden yellow; whiskers black; tail rather tapering, as long as the body; the soles of the hind feet hairy; the pad of the toes bald, callous, hairy on the sides; ears rounded, hairy. Length of body and head 6 inches, of tail  $4\frac{1}{4}$  inches.

*Hab.* Ecuador.

## 8. NOTES ON SOME MAMMALIA, WITH THE DESCRIPTION OF A NEW GOLUNDA, FROM WESTERN AFRICA. BY DR. J. E. GRAY, F.R.S., ETC.

In the 'Proceedings of the Zoological Society' for 1862, p. 8, Mr. Andrew Murray has described a Bat from Old Calabar under the name of *Sphyrocephalus labrosus*.

The British Museum has just received from Western Africa a young specimen of a Bat which evidently belongs to the same species; and, as it differs in several particulars from the adult, I herewith send a short account of its peculiarities:—

The wings of this specimen, like all young Bats, are not completely developed, the fingers being short and the bones soft and flexible. The bald disk at the end of the nose is by no means so much deve-

loped as in the adult; indeed the face differs only from the usual appearance of a Pteropine Bat in having the end of the nose rather broader, more bald, and in there being a deep groove with a slight fold of skin on the hinder side of it on each side of the muffle; and the front of the lower lip is reflected and bent down, with a slight notch in its middle. The nostrils are tubular and rather far apart. The



upper surface of the nose is rather swollen, convex, with a central longitudinal and some transverse wrinkles; the surface of this large swollen part is only covered with short hairs, and is scattered with slender, rather short, erect, black bristles.

*Epomophorus whitei*, Bennett.

A white tuft of short soft hairs at the base of the front side of the ear; a tuft of white short hairs covering a deep pouch on the side of the shoulder.

*Hab.* Shupanga, on the Zambesi.

Dr. Kirk has presented to the Museum two specimens of this species; they are both males.

“They eat figs, coming out just for an hour or so in the evening and then retiring into dark places.”

The lips are very thick and rather dependent on the side, forming a very large pouch on the side of the mouth. The nostrils are moderately convolute on the outer side of the muffle, which is divided by a deep central notch, which extends down to the edge of the lip.

In the ‘Proceedings of the Royal Physical Society of Edinburgh’ for March 28, 1860, Mr. Andrew Murray, under the title of “Contributions to the Fauna of Old Calabar,” has indicated two new genera of Mammalia. He has most kindly transmitted to the British Museum the specimens on which these observations were founded. I have been enabled, by comparison with other specimens, to determine what I consider them to be. The following are Mr. Murray’s notes:—

“*Anahyster* (new genus of Otter) *calabaricus*, Murray,” *l. c.* p. 157.”

“Its dentition differs from that of our Common Otter (*Lutra vulgaris*) in having one fewer premolar in the upper jaw. Mr. Murray had submitted it to Professor Owen, who believes it to be a non-

descript, and that it approaches *Enhydra* of Fleming (Phil. of Zool.) in having the first premolar suppressed above, but that the latter has also the first premolar suppressed below; it has, however, six incisors in the upper jaw; while the Sea-Otter (*Enhydra*) has only four in the adult state, which the specimen in question has."

"It would appear to form an intermediate link between the true Otter and the Sea-Otter; and its habitat in an estuary may therefore perhaps be thought suitable enough."

The skull transmitted by Mr. Murray exactly agrees in external form and disposition of the teeth with *Aonyx* of Lesson; but it differs from the specimen of the skull of *Aonyx* in the British Museum in the suppression of the front upper false grinders; but this may be only accidental, or peculiar to the West African form of that genus.

I have never seen any other specimen of a skull or a skin of the genus *Aonyx* from the west coast of Africa; so I cannot say whether it differs in any other character from the *Aonyx* of the Cape of Good Hope.

*Aonyx* differs greatly in the external form of the skull from both *Lutra* and *Enhydra*. I am inclined to regard *Anahyster* as a synonym of *Aonyx*.

The skull of *Aonyx* is well figured in De Blainville's 'Ostéologie,' plate 8 of the genus *Mustela*.

"*Rhinomus soricoides* (nov. gen., nov. spec.?), Murray, *l. c.* p. 159."

"This is a very puzzling little animal; it has the appearance of a Shrew, with its long snout, but is in reality a mouse. Its dentition is somewhat peculiar, having a process behind them like the cusp of a carnivorous tooth. It is pentadactylous both before and behind; and as all the allied genera and species have four fingers before and five behind, Mr. Murray considered that there was no alternative but to make a genus for its reception."

The specimen described is a *Sorex*, allied to, if not the same as, *Sorex myosurus*, the cusp on the lower incisor tooth being the usual form of the cutting-teeth of that genus, so that *Rhinomus* must be reduced to a synonym of *Sorex*.

#### GOLUNDA PULCHELLA, n. s.

Blackish brown; chin, throat, inner side of limbs, and beneath greyish white; head grizzled with yellowish-white hairs; back with six rows of small oblong spots, almost continuous, forming narrow lateral streaks; outside of limbs with smaller pale spots, which are separated in the middle of the back by a well-defined black streak; tail as long as the body, naked, with short scattered adpressed hairs.

*Hab.* West Africa (*Mr. Gould*); Central Africa (*Capt. Speke*).

This species is somewhat like *G. barbara* of North Africa, but the streaks of nearly continuous spots are very much smaller and narrower.

I received the specimen above-described from Mr. Gould. There is in the British Museum an imperfect skin of the same species, which was presented by Capt. Speke as coming from Unyamuezi. Capt. Speke's specimen is not so brightly coloured, and the vertebral streak is not so broad and distinct.

*AULACODUS SWINDERNIANUS.*

*Hab.* The delta of the Zambesi, on the Sand-Islands.

The flesh is much praised; said to be very similar to the Cavies of South America (*Dr. Kirk*).

Dr. Kirk has sent to the Museum two foetal specimens of this animal with their membranes.

9. NOTES ON SOME NEW LIZARDS FROM SOUTH-EASTERN AFRICA, WITH THE DESCRIPTIONS OF SEVERAL NEW SPECIES.  
BY DR. J. E. GRAY, F.R.S., ETC.

(Plate IX.)

Dr. John Kirk has most kindly sent to the British Museum a series of Lizards, Snakes, Insects, and other animals collected during the Zambesi expedition, under H. M. Consul the Rev. Dr. Livingstone. As the series of Lizards contains some species which do not appear to have been previously inserted in the 'Systematic Catalogue,' I forward an account of them to the Society.

*GERRHOSAURUS ROBUSTUS*, Peters, Monatsb. 1854, p. 618.

*Hab.* Tette (*Peters; Dr. Kirk*).

Dr. Peters gives the word *Caaiia* as the name of this Lizard; but, Dr. Kirk informs me, that word simply means "I do not know," which was probably what the native said when he asked him what they called it.

Common near Tette. The native told Dr Kirk that it entered fowl-houses and killed the fowls, and that it bit very hard.

This species agrees in general appearance with the Lizard figured in Dr. Andrew Smith's 'Illustrations of the Zoology of South Africa,' under the name of *Gerrhosaurus bibronii*; but the head of the Tette specimen is dark brown like the body, and is spotted with white; while in Dr. Smith's species the head is figured as uniform red-brown.

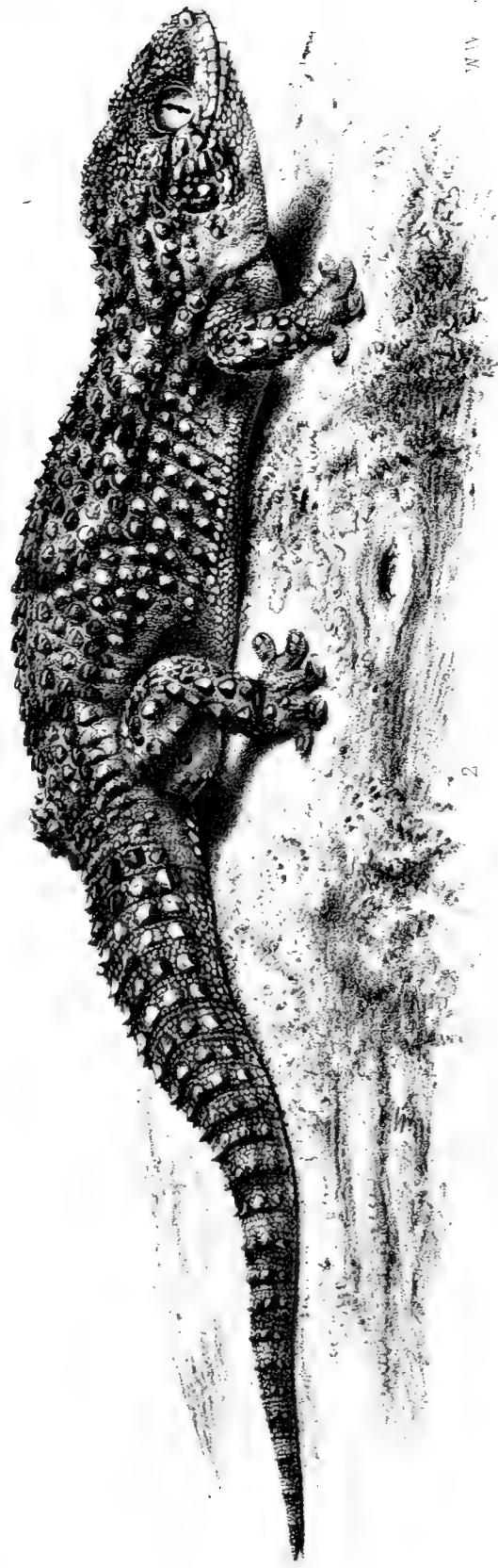
*TEIRA ORNATA*, n. s.

Blackish brown above (in spirits), with three narrow continuous streaks from the occiput to the base of the tail; head with small symmetrically curved white lines; sides of the head and body with numerous erect, more or less sinuous, white cross bands; chin and beneath white; tail pale reddish brown; ventral shields six-rowed; the throat with a slight fold of a single series of rather larger flat





1



2

1. *Euprepis kirkii*  
 2. *Homodactylus turneri*



scales; under the ears, scales small, granular, smooth; of the tail elongate, keeled.

*Hab.* South-Eastern Africa (*Dr. Kirk*).

#### LYGODACTYLUS, n. g.

Toes free, all clawed, slender, and subcylindrical, with a series of small scales beneath at the base rather dilated ovate, and with two series of regular transverse plates, separated by a central groove beneath, at the end; the thumb (of the hind foot, at least) large. Head, body, and tail covered with uniform granular scales. Tail cylindrical, tapering; front of the vent granular. Labial shields large, in form equal, smaller behind, with a large shield in front of the chin.

This genus agrees with *Thecadactylus* in the form of the plate beneath the toes; but the toes are freer, and the bases of the toes are slender and subcylindrical. It differs from *Ædura* and *Strophura* in the plates under the toes being of a uniform size, and closely imbricate.

#### LYGODACTYLUS STRIGATUS, sp. nov.

Grey brown (in spirits) above; crown vermiculated and marbled with black; chin and beneath white, with a black streak commencing from the nostril and continued, enclosing the eye, on the side of the neck and front of the body; tail pale brown; scales on the back very minute, of the crown rather larger; upper labial shields narrow; the lower labial shields 7.7, the four in front of each side larger, becoming gradually smaller; chin-shield six-sided, with two or three smaller shields on each side behind it.

*Hab.* South-Eastern Africa (*Dr. Kirk*).

Body and head  $1\frac{1}{2}$  inch long; tail 1 inch.

#### HOMODACTYLUS, n. g.

The toes free, broad, depressed, rather broader and rounded at the ends; thumb broad like the toes; all granular at the base, and with a single series of broad transverse plates beneath the dilated end, and without any free compressed terminal joints or claws. Back with large tubercles. Tail with rings of large tubercular scales. No pre-anal nor femoral pores.

This genus is like *Phelsuma* in the form of the toes; but the thumb is dilated at the end like the toes; the back is tubercular, and the tail ringed and tubercular.

In the latter character it resembles *Tarentola*, which has the same habit of living in houses; but it has no compressed joints on the middle toes of the hands and feet.

#### HOMODACTYLUS TURNERI, sp. nov. (Pl. IX. fig. 2.)

Pale brown; head blackish, tubercular; back with sixteen longitudinal series of large oblong, more or less keeled, black-brown tubercles, with a central series of much smaller similar tubercles down the

vertebral line. The outer side of the limbs with similar tubercles, which are largest on the outer side of the fore legs and hinder side of the thighs and hind legs. Tail with rather distant rings of similar, but rather more acute tubercles, which make six longitudinal series on the base of the tail; underside pale brown, with smooth subequal scales; chin with three band-like shields in front.

*Hab.* South-Eastern Africa (*Dr. Kirk*). In the houses.

Var. or junior?

Pale brown, with the tubercles paler and with some opaque-white tubercles intermixed. Head with four longitudinal brown streaks up the face to the forehead; a brown streak on the upper margin of the temple, five unequal, rather irregular, dark bands across the back, and with some more obscure paler bands across the tail. The toes appear scarcely so much dilated; but in other respects they are like the two larger dark specimens.

I have named this species in honour of J. Aspinall Turner, Esq., M.P., who has done so much to make known the zoology of Western Africa, and formed such a fine collection of insects, especially of *Coleoptera*.

M. Auguste Duméril, in the 'Revue et Mag. de Zoologie' for 1851, describes and figures a Nocturnal Lizard, which had been received from Senegal, under the name of *Stenodactylus caudicinctus* (p. 478, t. 13).

M. A. Duméril observes that the slender-toed Geckotians are easily divided into two genera,—the *Gymnodactyles* having slender toes, which are smooth on the edge and with small central plates beneath; while the *Stenodactyles* have each side of the toes fringed with small teeth, and the lower surface granular.

I cannot consider this an accurate account of the typical *Stenodactyles*, or, at least, of the toes of the long-known species on which the genus *Stenodactylus* of Cuvier was established; for in that animal, as is well shown in Savigny's figure in the large work on Egypt, the underside of the toes is furnished with a series of plates as in the *Gymnodactyles*, but instead of the plate being entire on the edge, as in *Gymnodactylus*, it is deeply dentated on the outer margin, which caused me, in my 'Catalogue of Lizards in the British Museum,' to form a tribe for it in the family *Geckotidæ*, under the name *Stenodactylina*, which is thus characterized:—

“E. Toes cylindrical, tapering, toothed on the sides, lower surface with denticulated cross plates” (*l. c.* p. 177).

The Lizard from Senegal, which M. A. Duméril has referred to this genus, does not agree with this character. It, indeed, has the under surface of its cylindrical tapering toes covered with small acute scales, like the soles of its feet; and therefore I think that it must be formed into a distinct genus, which will form an anomalous group among the Night Lizards, or *Geckotidæ*, characterized by this peculiarity in the toes.

The Senegal Lizard cannot be properly referred to the genus *Ste-*

*nodactylus* for another reason: the true *Stenodactyli* have the external appearance of the *Agamæ*, so much so that Geoffroy, on Savigny's plate, calls it *L'Agame ponctué*; and M. Audouin, in his 'Explanation of Savigny's Plates,' referred it to the genus *Trapelus*, under the name of *T. savignii*; while the Senegal Lizard is a typical Gecko in all outward characters except the toes, so much so that when it was first seen it was thought to be an *Eublepharis*, erroneously said to come from Africa.

I propose to call this genus

#### PSILODACTYLUS, g. n.

Toes short, subcylindrical, tapering, covered with flat scales above, and, like the palms, with small rough granules beneath; thumb like toes, but shorter; all clawed. Tail cylindrical, covered with flat scales, annularly plaited with a series of larger scales on the edge of the folds; beneath covered with subequal, flat, square scales. Pre-anal pores in a short angular line. Head depressed, covered with polygonal shields; labial shields low, broad; upper and lower rostral shields large, similar. Edge of the eyelids reflexed, expanded; pupil large. Back with series of granular tubercles, those on the side formed of three subequal, larger scales. Chin, throat, and belly with smooth polygonal scales.

This genus is very similar to *Eublepharis (hardwickii)* in external appearance and distribution of colour, but differs in the toes being very much shorter, thicker, and cylindrical and tapering, in the ends not being compressed and arched, but thick and cylindrical like the bases, and in the under surface of the toes being covered with small rough granules, like the under surface of the palm or soles of the feet. It differs also in the tubercles of the back being formed of groups of three scales; the central scales or tubercles on the middle of the back are larger than those on each side of it, but on the sides of the back the three scales are of nearly equal size.

In *Eublepharis* the toes are compressed at the end, and have a broad band-like scale beneath, and the tubercles of the back and sides are all formed of a single large scale.

#### PSILODACTYLUS CAUDICINCTUS.

*Stenodactylus caudicinctus*, A. Duméril, *l. c.*

In spirits, pale whitish; upper part of the head brown, edged with a black horseshoe-shaped band behind; cheek and side of the throat black, varied; back with two very broad irregular-edged black cross bands; tail dark, ringed.

*Hab.* W. Africa; Old Calabar?

#### EUPREPIS GULARIS, sp. nov.

Pale bronze-green brown (in spirit), with five narrow whitish streaks from the occiput continued on the base of the tail; crown of the head uniform brown; the central dorsal streak with a narrow black edge on each side, the two lateral streaks scarcely dark-edged,

the upper one arising from the back edge of the eye, and the lower from the pale scales on the upper lip; the throat, the sides of the face, and neck dark brown, white-speckled. The front edge of the ears with a few very small thin scales.

*Hab.* South-Eastern Africa.

In the 'Catalogue of Lizards in the British Museum,' I regarded these specimens from South Africa as varieties of the *Euprepis quinquefasciatus* from Western Africa; but on recomparing these specimens with other specimens received since, and with the specimens brought home by Dr. Kirk, I am convinced that they are distinct.

*EUPREPIS KIRKII*, sp. nov. (Pl. IX. fig. 1.)

Black-brown; back with three uniform well-marked yellow streaks, the middle one from the end of the nose to the base of the tail, the lateral ones from the eyebrows and continued on the side of the base of the tail, and tail-end blue. There is a streak like the others, but less distinct, on each side of the body, arising from the lips, continued across the ear-hole, and obscurely continued on the side of the base of the tail. The chin and underside of the body and base of the tail whitish; scales with three distinct keels; two series of scales between each pale streak; the ear-holes oblong, erect, open, with three very small indistinct prominences on the front edge, which are placed at unequal distances from each other.

*Hab.* Tette (*Dr. Kirk*).

This species resembles in external appearance the Blue-tailed Skink of North America; but the central dorsal streak is not forked over the head. It is very like the *E. quinquefasciatus* of Western Africa; but the dorsal streaks are not black-edged, and the central one is continued to the end of the nose. This is not the case in the latter species, which agrees with *E. kirkii* in having only two series of scales between each white streak.

Named in honour of Dr. Kirk, its discoverer.

*EUPREPIS GRANTII*, sp. nov.

Pale bronzed brown, with a broad pale whitish streak on each side of the back, continued from the eyebrows to the lower part of the tail. Sides of the head and neck with a broad blackish streak, enclosing the eye and over the ears. The upper lip and slender streak under the eye opaque white. Scales three-keeled.

*Hab.* South-Eastern Africa (*Dr. Kirk*).

*CHAMÆLEO DILEPIS*, Gray, Cat. Lizards B.M. 266.

The white band on the sides is formed of round groups of white scales of the same size and form as the other scales on the sides. There is also a triangular white spot at the angles of the mouth.

*Hab.* South-Eastern Africa (*Dr. Kirk*).

10. CONTRIBUTIONS TO THE ANATOMY OF THE GIRAFFE, WITH AN ACCOUNT OF THE LENGTH OF THE ALIMENTARY CANAL OF MANY OF THE RUMINANTS, AS MEASURED BY THE AUTHOR. BY EDWARDS CRISP, M.D., F.Z.S., ETC.

The anatomy of the Giraffe has been so ably described by Professor Owen in the second volume of our 'Transactions,' that it would be waste of time to enter minutely into matters connected with the dissection of this animal that are already published. My object will rather be to bring before the Society certain structural peculiarities that have not been, as I believe, properly investigated, and others that have not been noticed.

Since the publication of the communication by Professor Owen, mentioned above, I have had an opportunity of examining three Giraffes that died at the Society's Gardens. The old female was brought from Kordofan with three others in 1836; she bred six young ones, all males. Before her death, which took place in 1852 (at which period she was about eighteen years of age), her abdomen was greatly enlarged, and it was supposed that the enlargement arose from the presence of water; but I found after death that the stomach was enormously distended with vegetable food, which had evidently been accumulating for a long period, the enfeebled powers of the stomach from old age, combined with the state of the liver, not enabling this viscus to get rid of its contents. The liver contained several Echinococci, varying in size from that of a pigeon's egg to a hen's egg; two of these cysts were also present on the surface of the spleen, as seen in the drawing exhibited. To show the capacity of the stomach of this animal, I may mention that the vegetable food spoken of above weighed more than 180 lbs.

The next Giraffe examined was a young male that died the year following (Dec. 30, 1853), from inflammation of the lungs and diseased kidneys.

The third was a young animal bred in the Gardens in 1861; it died, from the effects of an accident, at the age of two months, and I examined the body in company with Dr. Cobbold and Mr. Jennens.

As I have said before, the form of the viscera of the Giraffe has been so well described by Professor Owen that I need not repeat the description here; but the accompanying drawings of all the viscera, reduced in size, will give at a glance the form of them, both in the Giraffe and in the Eland. I will also, as the weight of the viscera has not been before given (except in one example in my work on the 'Structure and Use of the Spleen,' 1853), append the following table:—

	Brain.	Heart.	Lungs.	Liver.	Spleen.	Pancreas.	Kidney.	Renal bodies.	Thyroids.	Eye.	Length of alimentary canal.
	oz.	lbs. oz.	lbs.	lbs. oz.	lbs. oz.	oz.	lbs. oz.	grs.	grs.	grs.	ft. in.
Old female : weight of body about 16 cwt.	...	5 0	10	12 0	1 12	5	1 12	...	...	...	254 0
Young male: weight of body about 16 cwt.	15	5 8	15	15 5	2 12	...	1 9	...	...	...	209 0
Young, two months: body 3 cwt.	13 $\frac{3}{4}$	1 0	2 $\frac{3}{4}$	3 0	0 10	2 $\frac{1}{2}$	oz. grs. 6 54	67	350	{ 400 lens 35 }	107 11

The most interesting feature in the above table, perhaps, is the great length of the alimentary canal; but it will be fully shown, in the table that I have appended to this paper, that the digestive tube of the Giraffe, when the size of the animal is taken into account, is of less extent than that of many of the smaller ruminants.

As regards the length of the intestinal tube, the differences between my measurements and those of Professor Owen are so great that they could only arise from the difference in the age of the animal. In Prof. Owen's three specimens (all adults) the canal measured 124, 133, and 136 feet (*Transactions*, vol. ii. p. 227); whilst in my specimens the length of the tube was 254, 209, and, in the immature specimen, 107 feet 11 inches. In the '*Mémoires du Muséum d'Histoire Naturelle de Strasbourg*,' 1840 to 1846, MM. Joly et Lavocat have given a long and elaborate description of the dissection of a young Giraffe, and they allude frequently to Professor Owen's paper on this subject. These gentlemen, in remarking on the alimentary canal, say, "Ce que nous a surtout frappé en étudiant l'appareil digestif, c'est la longueur réellement extraordinaire du canal qui forme la partie principale de cet appareil." And they quote from Cuvier and Duvernoy the length of the canal of the Camel 42<sup>m</sup>·213, Ox 48<sup>m</sup>·869, Stag 21<sup>m</sup>·538, Horse 25<sup>m</sup>·189; and go on to say that the total length of the alimentary canal of the Giraffe examined by them was 65 metres 25 millimetres (about equal to 211 English feet, and 2 feet longer than that of my young male), and, to quote their own words, "C'est à dire des dimensions relatives bien plus considérables que celles qu'ont offertes sous ce rapport tous les mammifères dont on a étudié l'organisation, le Mouton excepté."

As I have stated above, many animals have relatively a longer alimentary tube than the Giraffe.

In the examinations by Professor Owen, only the brain and liver appear to have been weighed. The brain in his specimen weighed 14 ozs.; that of the young male dissected by me, 15 ozs.; and it will be seen that the brain of the young specimen was nearly equal in



weight to that of the adult. Its eye, too, weighed 400 grains; the crystalline lens 35 grains (a large visual organ for so young an animal); the thyroids weighed 350 grains; and the salivary glands 1174 grains. The urinary bladder held  $2\frac{1}{2}$  pints of fluid. In the young male the tongue measured 1 foot 10 inches in length, and the trachea and bronchi contained more than 200 rings. Valves were present in the abdominal veins of the two last-named animals, including the renal and splenic; they were only seen in the splenic vein of the old Giraffe, the other abdominal veins not having been examined.

It is well known that the Giraffe has been variously classed by different writers, Illiger and Swainson placing it with the Camels; others think that it is more nearly allied to the Deer; some place it with the Antelopes; whilst Dr. Gray, I believe, makes it a distinct family.

As has been mentioned often at this Society, Professor Owen found a double gall-bladder in one of his specimens, whilst in all others it has been stated to have been absent; but I find another instance where a gall-bladder was found in a Giraffe, related by Gordon, in the supplement to the 7th volume of Buffon. Professor Owen thinks that the occasional presence of a gall-bladder is the best evidence of the affinity to the Antelopes; but, as I have stated in my paper on the gall-bladder, the oft-made assertion that the solid-horned ruminants (Deer) have no gall-bladder is not to be depended upon.

There is one feature (hitherto, I believe, unnoticed) that separates this animal entirely from the *Camelidæ*, viz. the *form of the blood-corpuscles*; and the more the anatomy of the Giraffe is investigated, the more aberrant it appears.

MM. Joly and Lavocat, before quoted (1846), state that in the Giraffe that they inspected they found seven or eight cavities, which appeared to be furnished with glandular crypts, at the origin of the duodenum. I believe these crypts had not been before noticed, and I omitted to look for them.

I have mentioned the subject of classification because the recent discovery of Dr. Cobbold of sacculated glands and pouches in the small intestine and cæcum, some of which he has compared to water-reservoirs, may lead to the inference that the affinity to the *Camelidæ* is greater than was formerly supposed; but as the matter is important, I quote Dr. Cobbold's own words from the Supplement to Todd's Cyclopædia, page 539:—"The intestinal glands in Ruminantia generally do not offer any deviation worthy of notice; in the Giraffe, however, we have discovered a curious exception to this rule, arising out of the presence of certain pouch-like folds in connexion with the *glandulæ agminatæ*, and in particular with a very remarkable extension of the last Peyerian patch beyond the ileo-colic opening. Probably more than one-half of the entire series of agminated follicles exhibited this peculiarity; but, in consequence of our having retained only some 6 or 8 feet of the gut for minute examination, we are not in a position to state with accuracy either the total number or precise localization of all the glands (four of which were found) presenting this anomaly. In the small intestines the fold consists

simply in a semilunar valve-like production of the mucous membrane overlapping the anterior or duodenal end of each patch so as to leave a kind of *cul de sac*, &c.

“Far more striking and complicated is the pouched structure situated within the cæcal extremity of the colon. Here we have from fifteen to twenty saccules, some of them resembling in many respects the water-reservoirs of the reticulum, and having a depth of 3 or 4 lines,” &c.

I now proceed to give an account of the intestinal tube of the young Giraffe last inspected. It was slit open from mouth to anus, and I examined it very carefully with Mr. Jennens in every part; and, that I might be correct, we went over it a second time. The only gland visible to the naked eye was a small agminated patch, 3 lines in length and  $1\frac{1}{2}$  in breadth, on the lower part of the ileum. The glands before described by Dr. Cobbold were present, but not in so well-marked a character as those figured in the paper alluded to; and on distending the cæcum with air, I found that *these crypts formed no external bulging, as is the case with the water-reservoirs spoken of by Dr. Cobbold*, as the preparation before the Society will show.

The careful examination, microscopical and otherwise, of the whole intestinal track of the abdominal tube in an old Giraffe will be a matter of great interest and importance, so that we may ascertain the exact condition of these peculiarities, duodenal, cæcal, and rectal, in the adult animal.

The most interesting part of my communication remains to be told. For the better inspection of the rectum of the young Giraffe, I took it to my own house, and was surprised to find, on cutting it open, that the mucous lining was elevated into irregular-shaped quadrangular folds, having somewhat the appearance of the cells of the *reticulum*, but on a larger scale. I have mislaid the preparation and a sketch of it, but I hope to exhibit it at the next Meeting. Since this examination, I have carefully looked at the rectum in all the ruminants inspected, but have found no analogous structure. I did not examine the lining membrane of this gut in the adult specimens, nor am I aware that it has ever been properly inspected.

Before I introduce the table, I will make a few remarks on the importance of a correct study of the alimentary canal and its appendages, the mucous glands, liver, pancreas, and spleen. Here it is that the pabulum of life is prepared, the blood-corpuscles generated, and the most important functions of the body performed. In addition to the usual mode of examination, I have adopted one that I believe is quite novel, viz. that of ascertaining the capacity of the digestive track by distending the various parts of the tube with water and accurately measuring the capacity of each division. When this plan is pursued throughout the whole class of Vertebrata, and the weight of the thoracic and abdominal viscera and other parts ascertained at the same time, I am sanguine enough to believe that many of our physiological deductions will stand on a firmer basis than at present. Let me give one example of the capacity of the alimentary

tube in a ruminant; and I select the Aoudad (*Ovis tragelaphus*) for that purpose.

The alimentary tube measured 91 feet 1 inch in length; the contents of the stomach weighed 20 lbs., and this viscus held 28 pints of water; the œsophagus 8 ozs.; the small intestines 9 pints, the large 4 pints: in all 41 pints. The gall-bladder contained 3 ozs. of bile.

In the subjoined table I have not selected all the ruminants I have dissected, as some of my papers have been mislaid; but the number, I hope, is sufficient to lead to a useful and practical inference. The comparison, too, of the length of the canal in young and in old animals is one, I think, of great interest. In all instances (when practicable) the intestines have been pulled from the mesentery.

Name.	Length of alimentary canal.	
	ft.	in.
Giraffe, female, 18 years ( <i>Camelopardalis giraffa</i> ) ..	254	0
Young male .....	209	0
Young, two months .....	107	11
Eland ( <i>Oreas canna</i> ) .....	161	0
Bubaline Antelope ( <i>Alcelaphus bubalis</i> ) .....	94	6
Old Leucoryx ( <i>Oryx leucoryx</i> ) .....	78	6
Young male ditto .....	65	0
Addax ( <i>Addax nasomaculata</i> ) .....	72	0
Bontiboc ( <i>Alcelaphus pygargus</i> ) .....	64	2
Duykerboc ( <i>Cephalophus mergens</i> ) .....	95	0
Rheitboc ( <i>Eleotragus arundinaceus</i> ) .....	48	0
Springboc, young ( <i>Gazella euchore</i> ) .....	38	0
Sing-Sing ( <i>Adenota kob</i> ) .....	64	0
<i>Gazella vera</i> .....	37	4
Indian Antelope ( <i>Cervicapra bezoartica</i> ) .....	39	0
Ditto, No. 2 .....	44	0
Bennett's Gazelle ( <i>Gazella bennettii</i> ) .....	43	0
Dorcas Gazelle ( <i>G. dorcas</i> ) .....	41	5
Fœtus, weighing 15 ozs. ....	10	6
Indian Antelope ( <i>Antilope cervicapra</i> ) .....	64	0
Young, a few weeks old .....	33	6
Philantomba Antelope ( <i>Cephalophus maxwellii</i> ) .....	39	8
Isabelline Antelope, young ( <i>Antilope isabellina</i> ) .....	31	0
Four-horned Antelope ( <i>Tetraceros quadricornis</i> ) .....	50	10
Harte Beest ( <i>Boselaphus caama</i> ) .....	83	2
Nylghau, at birth, weight 14 lbs. ( <i>Portax picta</i> ) .....	32	2
Ditto, old female .....	148	10
Ditto, old male .....	140	0
Reindeer, old female ( <i>Cervus tarandus</i> ) .....	120	0
Ditto. ditto. ....	126	0
Mexican Deer ( <i>C. mexicanus</i> ) .....	52	6
Malacca Deer, young .....	48	4
Sambur Deer ( <i>C. aristotelis</i> ) .....	80	0
Rocky-Mountain Deer (—?) .....	68	0

Name.	Length of alimentary canal.	
	ft.	in.
Virginian Deer, two days old ( <i>Cervus virginianus</i> ) . .	18	2
Musk Deer, 3 lbs. ( <i>Moschus moschiferus</i> ) . . . . .	13	5
Elk ( <i>Cervus alces</i> ) . . . . .	129	0
Alpaca ( <i>Auchenia pacos</i> ) . . . . .	70	0
Huanaco ( <i>Auchenia huanaco</i> ) . . . . .	95	0
Goat (kid), four months . . . . .	30	0
Brocket ( <i>Coassus rufus</i> ) . . . . .	55	9
Mufflon ( <i>Ovis musimon</i> ) . . . . .	46	7
Aoudad ( <i>O. tragelaphus</i> ) . . . . .	91	0
Cape Sheep ( <i>O. aries</i> ) . . . . .	97	7
Southdown Lamb, six months . . . . .	74	9
Old Southdown Ewe . . . . .	109	8
Leicester Ram . . . . .	117	0
Ox ( <i>Bos taurus</i> ) . . . . .	123	0
Ditto, No. 2 . . . . .	186	0
Bison, old ( <i>B. americanus</i> ) . . . . .	157	0

The above are not exactly in generic order. I may remark that the great majority of the animals were in the Society's collection.

As this Society was established partly for the cultivation of physiology, I may be excused, I hope, for saying a word in conclusion in reference to the ruminants in this table. In 1853, when I showed the valves in the splenic veins of the Giraffe to this Society (P. Z. S. 1853, p. 99), Kölliker, Carpenter, and all writers denied the existence of valves in the abdominal veins; but I have found that all the quadrupeds mentioned in this table, as well as many others of a different order, possess them, not only in the intestinal veins, but often in the splenic and renal.

Time will not permit me to enter on the anatomy of the Eland on this occasion; I must therefore defer the paper until a future Meeting.

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February 23, 1864.

John Gould, Esq., F.R.S., in the Chair.

Dr. E. Crisp exhibited some drawings representing the eggs and young of the Anaconda (*Eunectes murinus*).

Mr. F. T. Buckland made some observations on the habits of spawning Trout, and on the results obtained in the course of experiments he had made with eggs taken from dead fishes.





J. Wolf del. et sculp.

ZORILLA ALBINUCHA

M & N. Harshart. Unt.

The Secretary read the following extract from a letter addressed to Mr. S. P. Woodward, of the British Museum, by S. Archer, Esq., Assistant-Surgeon 98th Foot, dated Rawal Pindee, Dec. 26th, 1862, accompanied by specimens of *Vitrina flemingi* :—

“ I send you herewith a few specimens of *Vitrina flemingi*, in spirits, as I thought you might wish to examine the teeth of a large species of the genus. I found them pretty abundantly along the banks of the Jhelum, on the road to Cashmere, and it seems to be not uncommon in the Himalayas between 5000 and 8000 feet elevation.

“ With the exception of a large white *Bulimus*, frequently reversed, it was almost the only land-shell I obtained.

“ *Lymnæa stagnalis*, and a smaller species, is common in the lake near the city of Cashmere and in other places (about 5000 feet elevation). A small *Cyrena* is also abundant in the Jhelum, within the valley. There are a large number of plants indigenous to the valley, which are also common in England ; and I think I met with about half of our diurnal Lepidoptera, some of our rarest species being most abundant. (See paper, by S. P. Woodward, ‘On the Land and Freshwater Shells of Kashmir and Tibet, collected by Dr. T. Thomson,’ Proc. Zool. Soc. 1856, p. 185.)”

The following papers were read :—

1. NOTICE OF A NEW SPECIES OF ZORILLA.

BY DR. J. E. GRAY, F.R.S., ETC.

(Plate X.)

The British Museum, rather more than ten years ago, purchased of Mr. Argent the skin of a *Zorilla*, which differs from any others which I have seen. Unfortunately it was without any habitat, and I have been waiting in hopes of a second specimen occurring which would supply this deficiency.

It, however, appears so distinct that I think it now better to give a short account of it, that it may be recorded in the systematic catalogues.

ZORILLA ALBINUCHA. (Pl. X.)

Black ; back with four yellowish-white stripes, the two middle streaks short, the outer extending from the occiput to the base of the tail ; tail yellowish white ; forehead, crown, nape, and upper part of the ears pure white.

*Hab.* — ?

The hair soft and short ; the white hair of the crown and the yellowish hair of the dorsal stripes one-coloured to the base ; the hair of the tail rigid, more or less blackish at the base.

There are two or three small, black, unsymmetrically placed spots on the crown, and the central black streak of the back is extended a short way up the centre of the nape. The front claws are short and acute.

It differs from the *Zorilla vaillantii*, Loche (Rev. et Mag. de Zool. 1856, viii. 497, t. 22), in the crown of the head being entirely white, and the streak on the back narrower and well-defined.

## 2. ON THE OSTEOLOGY OF THE KAGU (*RHINOCETUS JUBATUS*). BY W. K. PARKER.

If we take the terrestrial, amphibious, and aquatic birds as a practical half of the whole class, we shall find that the minor groups into which they break up all fuse into each other at their margins.

If it were not for the fact that the Pigeons, Ardeine birds (e. g. Ibises, Storks, and Herons), and the "Pelecaninæ" have tender young, then a straight line might be drawn through the class, leaving on one side the plunderers, songsters, and other families of the "Aves altrices," and on the other the walking, running, wading, swimming, and diving birds. As it is, however, this interdigitation of the two main halves does not take away the great naturalness of such a subdivision; and the land- and water-birds may be considered as together forming a very natural group.

Certainly these birds have very much in common; and inosculant forms so completely connect together the minor subdivisions as to make one seamless web of these apparently incongruous materials.

This slow but sure melting of family into family, and genus into genus, this mixing of single types so as to form double, triple, and multiple types, makes the ancestral hypothesis very hard to digest, whilst yet it seems to be the only one at hand having any scientific value. It may be an *ignis fatuus*, but, to one perplexed with tracing the mazy labyrinth of types, it looks like a light shining in a dark place.

The *Palamedea* and the Kagu have turned up to me very opportunely just now; they have made me rethink my thoughts, and repeat and vary my observations, on the relationships of the land- and water-groups of birds. The former of these birds—the *Palamedea*—by bringing an essentially Anserine bird so near those outlying "Gallinæ" the Curassow and the Brush-Turkey, shows how it is that there exists so much in common in the skull and face of the Fowl and the Goose; whilst the Kagu, by tying closely together the Trumpeter and the *Eurypyga*, in some degree opens the eyes to understand why the relationship of the Cranes to the Herons, and of both to the Rails, should be so close and intimate.

I have also been brought to re-analyze the families so as to eliminate, if possible, the single or pure from the mixed types, whether merely double or multiple.

Tentatively and cautiously let us separate the true Ralline birds, from the *Notornis* to the Coot; this group may stand as one of the simple-type families.

Parallel with these birds—in some respects more intelligent, in others coming nearer to the reptile—we place the Plovers, not having respect to the length of their bills, but to the degree in which



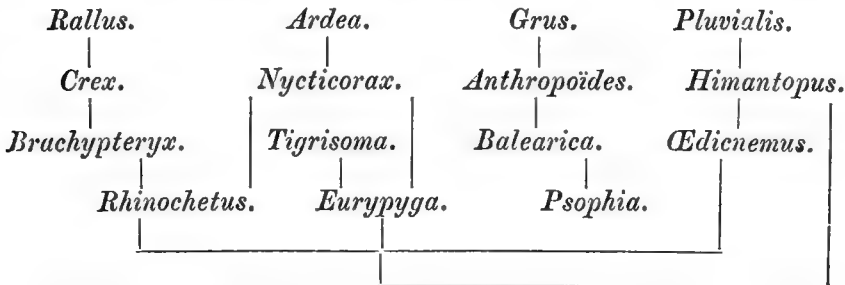
they have retained a certain embryological simplicity of structure, and are thus less typically *ornithic* than their relatives the Gulls, on one hand, and the Ibises, on the other.

The typical Fowls and the typical Geese and Ducks appear to form two more groups of equal value with the Ralline and Pluvialine groups; but as these two simple types do not bear very directly upon the subject of this present paper, they will be considered on some other occasion.

Any one who has mastered the development of a Rail or a Plover will be in a state of fitness to study the meaning of what he will see in the structure of the Heron and of the Crane.

At present my view of the matter is, that, whilst the Heron has risen considerably higher in the bird-scale than the Crane, yet they are intimately related; moreover, that the Heron has full two-thirds of the ralline nature in it to one of the pluvialine, and, on the other hand, that the Crane has in it twice as much of the Plover as of the Rail.

In supposing these birds to be thus double in their nature, I do not forget that they have characters peculiar to themselves alone; *identity-characters* they might be called: we see this everywhere in nature; and those of us who have large families know well that, whilst each child is in one sense a copy of both parents at once, yet he holds his own, and has so much and such well-marked individualism as to make him in a certain sense like the starting-point of divergence towards a distinct species. I here append a sort of scheme, showing some of the more important relationships of the Kagu, one of the best examples of a multiple type:—



The *Rhinochetus*, the *Psophia*, and the *Eurypyga* are on the same level; they are intimately related *inter se*, and very closely also to the Cranes and Herons. I am not aware whether, in placing them on the same line, I have truly indicated the *ornithic* height of each. In the upper line it is certainly not so; yet that is a natural arrangement in one important matter; for the Heron comes near to the Rail, and the Crane to the Plover, and all are intimately related.

The *Psophia* is the truest Crane in the bottom line, yet its skull is principally ralline in character; the *Eurypyga* comes nearest to the Heron: as for the Kagu, whether it be most of a Crane, a Night-Heron, or a Wingless Rail, I will not say; it has a more distant relationship with the Stone-Plover (*Œdicnemus*).

The *Psophia* has a very phasianine expression of face, and the structure of its head answers to that look very considerably; whilst the *Eurypyga* has stretched just as far out for some of its characters, and is unmistakably related to the Stilt-Plover (*Himantopus*). It would be tedious if the details were given; but I hold myself ready to prove my assertions. Leaving the beautiful and complex skulls of the Kagu, the *Eurypyga*, and the *Psophia* (merely remarking that the first is most like that of a Night-Heron, the second halfway between that of the Kagu and the *Himantopus*, and that the third is, as it were, the skull of a phasianine Rail), let us turn to the sternum in these birds.

In each case this bone answers best to that of a newly hatched Crane (e. g. *Grus montignesia*), whilst it is, as yet, totally unossified. The breast-bone of the Trumpeter comes nearest that of the Crowned Crane (*Balearica*); the Kagu's sternum is truest to the embryo Crane; whilst that of the *Eurypyga* answers in nature both to that of the young Crane and the young Heron. The sternum of the true Crane, in its early condition, is very interesting, as, besides its own proper characters, it shows a dying-out of the *pluvialine* inner hyposternal processes. The dorsal vertebræ are largely ankylosed together in these three mixed types—the Kagu, *Psophia*, and *Eurypyga*; and this occurs in all the Cranes more or less, and also in that strange Crane-Goose the Flamingo.

The furculum of the Kagu is but little stronger, and only a little more U-shaped, than that of the *Brachypteryx*; that of the *Psophia* has its rami more divergent than that of a Crane, and the process at the angle is weaker; and, lastly, the furculum of the *Eurypyga* is intermediate between those of the *Psophia* and the Stilt-Plover.

That which strikes the eye at once in the pelvis of the Kagu is the great height and steepness of the iliac crests, and the peculiar bend downwards of the hinder part of the sacrum; this is equally well seen in the pelvis of the *Brachypteryx* and the *Psophia*.

This has a further interest; for that which gives character to the pelvis of the *Talegalla*, as compared with that of other gallinaceous birds, is this peculiar height of the iliac crests.

In the *Eurypyga* this character is not only toned down, as it were, but the posterior part of the pelvis is much broader: and this part of the bird alone would only indicate a *specific* difference from that peculiar Ibidine Stork the *Umbretta*; for its pelvis differs but little from that of the *Eurypyga*, save in being stronger, and it answers to that common broad kind so constantly seen in every modification of an essentially pluvialine bird.

My last remark is, that all the outliers of the typical "Ardeinæ"—*Balæniceps*, *Scopus*, *Eurypyga*, *Rhinochetus*, and the Storks—take hands round the well-defined central group, viz. the Herons, Bitterns, Egrets, Night-Herons, Tiger-Bitterns, and Boat-bill.

3. ON SOME ADDITIONS TO THE LIST OF THE BIRDS OF THE FALKLAND ISLANDS. BY P. L. SCLATER, M.A., PH.D., F.R.S.

In the Society's 'Proceedings' for 1860, p. 382, I published a list of birds collected by Capt. Packe in the Falkland Islands, in which fifty-seven species were enumerated as occurring in that group of islands. In the following year Capt. Abbott's fine series of specimens from the same locality, concerning which he contributed a valuable paper to the 'Ibis'\*, enabled me to make an addition of ten species to the avifauna of the group†. Mr. Leadbeater has recently sent to me for examination a few additional specimens lately obtained by Capt. Packe, among which are two species not included in either of my former lists. These are—

1. EGRETTE LEUCE (Licht.): *Ardea leuce*, Licht. Doubl. p. 77; Burmeister, Syst. Ueb. iii. p. 416.

This is a widely distributed American species.

2. PRION TURTUR, Gould, B. Austr. vii. pl. 54.

A species found throughout the Southern Pacific and Atlantic, according to Mr. Gould.

I have thought it desirable to record the occurrence of these two species in the Falklands, in order to make the list as complete as possible. At the same time I may call attention to the rectifications made in the 'Ibis,' 1861, p. 312, concerning the names of two of the species contained in my first list, sc. *Nycticorax gardeni* and *Larus roseiventris*, which I now believe ought to stand as *Nycticorax obscurus* (Licht.) and *Larus glaucotis*, Meyen.

4. DESCRIPTION OF A NEW SPECIES OF CHRYSOCOCCYX.  
BY JOHN GOULD, F.R.S., ETC.

CHRYSOCOCCYX SCHOMBURGKI, Gould.

Crown of the head, neck, back, and scapularies rich shining coppery bluish green; wing-coverts bright shining green, margined with a coppery hue; first three primaries dark bluish black, with a stripe of white down the central part of their inner webs; the remainder of the primaries bluish green on their outer webs, with a tinge of copper on their margins, the inner webs bluish black with a broad stripe of white along their basal margin; tail-feathers deep bluish green, with a tinge of copper on their margins, and the outer feathers on each side crossed by three irregular bands of white, and with an oval spot of white at the tip; throat, under surface of the body, and under wing-coverts alternately banded with pure white

\* See Ibis, 1861, p. 149, "Notes on the Birds of the Falkland Islands," by Capt. C. C. Abbott.

† See P. Z. S. 1861, p. 45.

and bronzy green; under tail-coverts beautiful grass-green, those nearest the body largely tipped with white; bill orange, tipped with black; tarsi and feet olive.

Total length  $6\frac{1}{2}$  inches, bill  $\frac{7}{8}$ , wing  $4\frac{1}{2}$ , tail  $3\frac{1}{4}$ , tarsi  $\frac{1}{2}$ .

*Hab.* Siam.

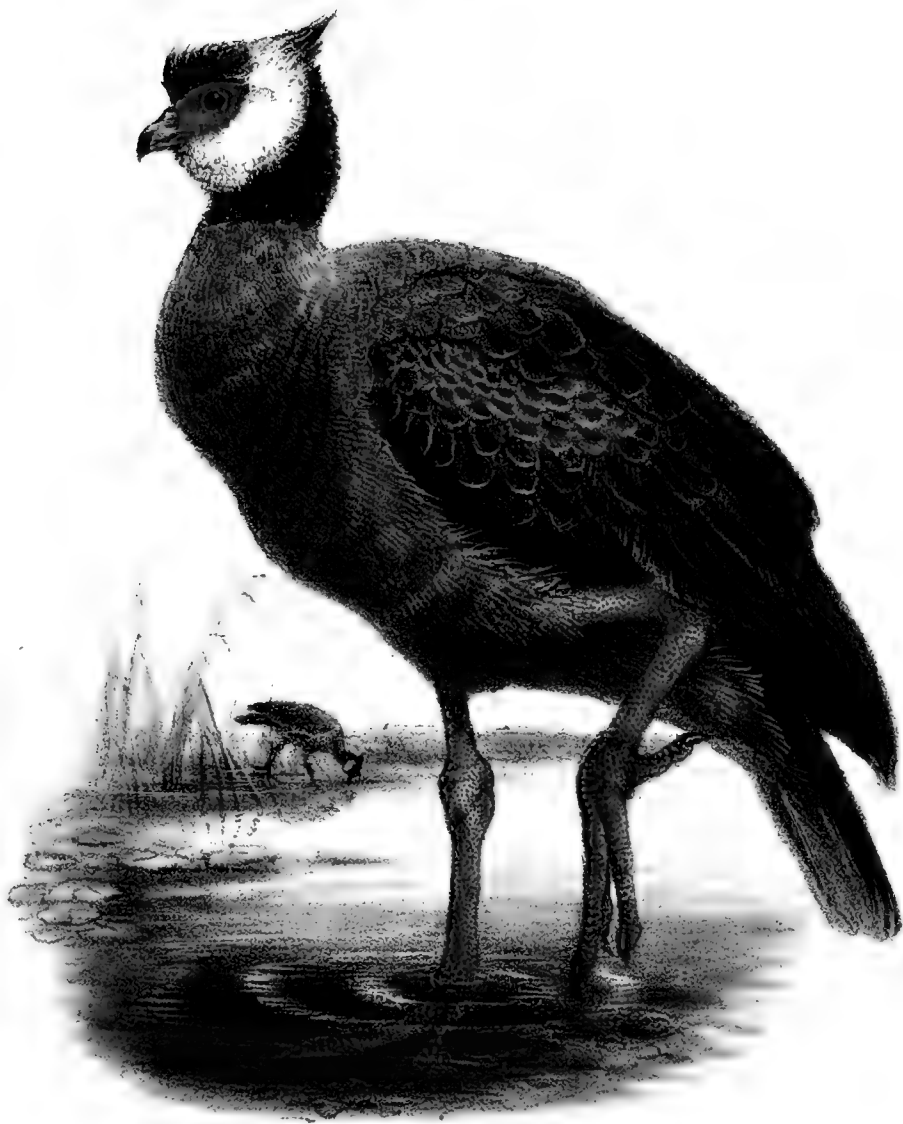
*Remark.* This very beautiful species is nearly allied to the *Chrysococcyx hodgsoni* of Moore (*C. smaragdineus*, Blyth) and *C. xanthorhynchus* of Horsfield. It was sent to me from Siam by Sir Robert Schomburgk, Her Britannic Majesty's Consul-General for that country; and I have named it in honour of one whose devotion to natural science is well known, and to whose merits in this respect I have had the pleasure of bearing testimony upon several previous occasions.

5. ON THE SPECIES OF THE GENUS CHAUNA. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XI.)

In my paper on some new and interesting additions to the Menagerie, read before this Society last November\*, I mentioned the acquisition of several specimens of a Crested Screamer (*Chauna*) from the neighbourhood of Cartagena, New Granada, which had been obtained for us through the exertions of our Corresponding Member Mr. Greey. Struck with the difference exhibited by these New Granadian birds from the ordinary Brazilian *Chauna chavaria*, I had at first considered them to belong to the scarce and little-known Central-American species *Chauna derbiana*, and under this name the fine living specimen received in July 1863, which still ornaments our aviary, was figured in the 'Illustrated London News' for October 3rd, 1863. I became, however, afterwards persuaded, by reference to former authorities, that I had erred in my identification, and that the New Granadian bird was more nearly allied to the Brazilian *Chauna chavaria*, and under this name I spoke of it in my communication referred to above. But within these last few weeks one of the dead specimens of this bird received from Mr. Greey having been mounted and placed in the British Museum, in close proximity to Brazilian examples of the true *Chauna chavaria*, I have had the opportunity of comparing them together, and have again somewhat modified my opinions as regards the New Granadian bird. It is, in fact, evidently intermediate in characters, as in geographical position, between the two former known species; and, as four specimens received from the same locality present similar appearances, I do not hesitate to characterize it as a third species of the genus, under the name of *Chauna nigricollis*, its most obvious distinguishing character from *Chauna chavaria* being the distinct black neck. This is continued upwards to the white throat and cheeks, from which it is separated by a well-marked boundary.

\* See P. Z. S. 1863, p. 377.



J. Wolf del, et lith

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CHAUNA NIGRICOLLIS

MUSEUM  
KING

The following diagnoses will, I think, serve to distinguish the three species of *Chauna* :—

1. *CHAUNA CHAVARIA*.

*Parra chavaria*, Linn. S. N. i. p. 260.

*Palamedeu chavaria*, Temm. Pl. Col. 219; Burm. Syst. Ueb. iii. p. 397.

*Cinerea*: collo undique obscuriore: ventre albo, cinereo flammulato.

*Hab.* In Brasil. merid. et Paraguay.

This appears to be the largest and most lightly coloured of the three forms of *Chauna*. The black ring is ill-defined, and placed much lower down the neck. In the two succeeding species the neck is wholly black up to the white throat and cheeks. The belly of this species is whitish, with indistinct flammulations of cinereous.

2. *CHAUNA NIGRICOLLIS*, sp. nov. (Pl. XI.)

*Chauna chavaria*, Sclater, P. Z. S. 1863, p. 377.

*Saturate nigricanti-cinerea*: gula et genis circumscripte et distincte albis: collo undique et late nigro: ventre cinereo, crisso albo.

*Hab.* In Noy. Granada, ad ripas fl. Dekke.

In its distinct white throat and black neck, this form agrees more nearly with *Chauna derbiana*, but in general coloration rather approaches the Brazilian *C. chavaria*. It appears to be decidedly smaller in dimensions than the latter species, and I see no traces of the partial denudation of the throat which appears to obtain in adult examples of *Chauna chavaria*.

As no *Chauna*, as far as I am aware, occurs in Guiana or in any part of the Amazon valley, it would seem that the areas of these two species are separated by a considerable interval.

3. *CHAUNA DERBIANA*, G. R. Gray.

*Chauna derbiana*, Gray & Mitch., Gen. Birds, pl. 161.

*Nigra*: gula genisque circumscripte albis: rostro et pedibus rubris.

*Hab.* In Guatemala, prov. Peten.

The only two specimens of this scarce bird in England are, I believe, those in the Derby Museum at Liverpool, from one of which the figure was taken. Mr. T. Moore, the Curator, has kindly furnished me with the following note respecting the precise locality of this species, which is of interest, as no details whatever have yet been published on the subject:—

“The original specimen of *Chauna derbiana*, that from which the figure in Gray’s ‘Genera’ was taken, was obtained by Mr. J. Bates, who was sent out by the late Lord Derby with the primary object of procuring and importing alive the *Meleagris ocellata*.

“The specimen is labelled ‘J. Bates, Sept. 1843, Peten,’ by his

Lordship's stuffer; and has also attached to it the following label in Bates's handwriting:—'Kept this bird alive by cramming it with food upwards of four months. Died while I was at Peten.'

"We have another and better specimen in skin, labelled as follows:—'Purchased of J. Leadbeater, Sept. 3, 1843, from Bogota.'

"I do not know on what grounds Leadbeater gives Bogota for the locality of his specimen, and should much doubt its correctness."

#### 6. REVISION OF THE SPECIES OF TRIONYCHIDÆ FOUND IN ASIA AND AFRICA, WITH THE DESCRIPTIONS OF SOME NEW SPECIES. BY DR. J. E. GRAY, F.R.S., ETC.

In the quarto 'Catalogue of Shield Reptiles in the British Museum' I carefully revised the species of this family, and figured the skulls of the genera as far as they were then contained in the Museum Collection. Since that period I have described, in the 'Proceedings of the Zoological Society,' several other Asiatic and African species.

Very shortly after the appearance of this catalogue, Professor Agassiz, in the 'Contributions to the Natural History of the United States' (2 vols. 4to, 1857), published his observations on this group. He remarks that "a critical revision of the genera of *Trionychidæ* appears a great desideratum in herpetology;" and goes on to say, "I have already satisfied myself that the number of species is much greater than is generally supposed;" and further, "in this connexion I would remark that it is hardly possible to distinguish the *Trionychidæ* by their external characters, and that nothing short of a careful examination of their jaws, and especially of the skull, will reveal their generic characters." (*Contrib.* p. 396.)

These observations are fully justified by the study of the Asiatic and African species contained in the Museum collection.

I have therefore re-examined the materials at my command, and send the result to the Society, referring to the 'Catalogue of Shield Reptiles' and my previous papers in the 'Proceedings' of the Society for the descriptions and the figures of the species before described.

As the American museums appear to have a very small collection of specimens of these animals from Africa and Asia, so the British Museum collection has scarcely any specimens from North America, and unfortunately I have no means of comparing the skulls of any of the American species with those from the Old World.

Professor Agassiz, in the 'Contributions,' shows that they belong to three genera, which he calls *Amyda*, *Platypeltis*, and *Aspidonectes*, containing six species; and I must refer naturalists to his work for the particulars, regretting that he has not given us a figure of the skulls of these and other genera of Tortoises mentioned in his work for comparison.

Referring to the American species, Professor Agassiz justly and philosophically observes, "The external resemblance between *Platy-*



*peltis ferox*, *Aspidonectes spinifer*, and *A. asper* is so great that I am not surprised that they have been confused or even deliberately considered as identical. We have, in fact, a case here, of which a few other examples only are thus far known, in which, under the most surprising similarity of external appearance, marked structural peculiarities amounting to generic differences are hidden. I have already pointed out such cases in the genera *Phoxinus* and *Chrosomus*, and in the genera *Carpoides*, *Bubalichthys*, and *Ichthyobus* among Cyprinoids." (*Amer. Journ. of Science*, 2nd ser. xix. p. 71.) "Many similar examples might be quoted among the Rodentia." (*Contrib.* p. 410, note.)

I believe that such cases are much more common than has hitherto been suspected; and it is on such superficial resemblances that Mr. Bates's observations and theories respecting the Brazilian Butterflies are founded— notions which will vanish into the air when the insects are more carefully examined by a systematic entomologist.

Professor Agassiz, in the American species, points out a difference in the form and structure of the nostrils:—

Thus, in *Amyda mutica* the nostrils are small, simple, circular, and far apart, rather on the underside of the snout.

In *Platypeltis ferox* and *Aspidonectes spinifer* these are larger, close together, and with a process on the middle inner side of each.

Unfortunately it is not possible to make similar observations on the African or Asiatic species, as one has not the power of observing them alive. Indeed they rarely arrive in a sufficiently good state to make the comparison with certainty in the specimens preserved in spirits. All the African and Asiatic species that I have been able to examine seem to have nostrils as in *Platypeltis* and *Aspidonectes* of Agassiz.

As we have only two adult stuffed and four or five young specimens and no osteological preparations of the American species in the British Museum, I shall not attempt to make any observations of them, but refer the reader to the work of Professor Agassiz before referred to, and proceed to examine with care the specimens of the Asiatic and African species in the Museum collection.

In the Museum Catalogue I showed that the coloration of the young specimens, especially the disposition of the colour on the head, afforded very good specific character for a certain number of Asiatic and African species. But Professor Agassiz, in his account of the North American species, shows most distinctly that, though all the species of *Trionyches*, or Mud-Tortoises, found in that country have a very similar distribution of colour on the head and shield, yet, when the skulls of these animals from different localities are examined, they prove to be very distinct—so distinct that he divides them into three genera.

These observations will furnish an example showing how every zoologist must be hampered at every step in his progress by the limited quantity of the materials at his disposal. I have now, and had when I printed my 'Catalogue of Shield Reptiles,' every wish to examine and arrange the species of this family according to their

organization, both external and internal; but when I printed the former catalogue I had only the skulls of three species. I have been able to add considerably to the collection of skulls; but the number of known species has also extended, and now the skulls of only about half of the species determined on their external form and coloration are known, so that I am not able to make the rigorous examination and comparison between the skulls that I could wish; and I am by no means sure, after what I have seen, and especially after the facts stated by Professor Agassiz, that more than one species may not be confused under one name, from the species having been simply determined by their external form and coloration.

Wagner, in his system, separated the species that had their hind legs covered with moveable valves and the margin of the shield bony, from those which have the hind legs free and the margin of the disk flexible, calling the former *Trionyx*, and the latter *Aspidonectes*. In my Synopsis of Reptiles in the translation of Cuvier's 'Animal Kingdom,' I retained the name of *Trionyx* for the latter group (as it contained the typical species of the genus), and called the former one *Emyda*. Duméril and Bibron, with the usual habit of the French naturalists, gave new names to all the groups, calling the first group *Cryptopus*, and the latter *Gymnopus*.

Dr. Peters, when in Mozambique, discovered a Tortoise (which he at first called *Cyclanosteus*, but afterwards *Cycloderma*) intermediate between these two groups, having the hind leg covered with sternal valves, and the margins of the shields boneless and flexible.

I may here observe that I cannot agree to the changes in the nomenclature proposed by Professor Agassiz in the 'Contributions,' at pp. 396 and 397; indeed I am convinced that, if he had studied the Indian and Asiatic species as he has the American, he would modify his suggestions.

Fitzinger, in his "Systematic Catalogue of Tortoises" in the 'Annals of the Vienna Museum,' published in 1836, divided the *Trionychnes* with free feet and a flexible margin into four genera, containing most incongruous species associated together (for example, *Trionyx javanicus* and *T. ægyptiacus* of Geoffroy and *T. indicus* of Gray, *Trionyx muticus*, Lesueur, and *T. subplanus*, Geoffroy) in the same genus. Sometimes he refers the same species (as, for example, *T. ægyptiacus*, Geoffroy, and *T. labiatus* of Bell, which are only states of the same species) to two genera, as the first to *Aspidonectes*, and the latter to *Pelodiscus*.

Professor Agassiz truly remarks, "All these new genera are founded upon delusive characters, as Gray has already stated, which depend only upon the progress of the ossification of the shield, and may be observed in specimens of different ages of one and the same species, as my numerous skeletons of these Turtles clearly show; moreover the difference in the length of the tail is only sexual, the tail being very short in the female, and extending beyond the rim of the shield in the males of all the species that I know."—*Contrib.* 395, 396.

If the generic names which Fitzinger has given are used, it must be with quite a different significance than that attributed to them

by him. They may be retained for some of the species which he referred to his badly characterized groups.

Professor Agassiz, in describing the genera of the North American Terrapins, places great confidence in the form of the alveolar surface of the jaws, and probably correctly, as he seems to have studied this part in a series of specimens of different ages. My observations would lead me to believe that it is of considerable importance in the distinction of the *Trionychidæ*; but there are two specimens which I have received from the same locality (which are in other respects so much alike that I am inclined to believe that they are skulls of the half-grown and adult animals of the same species) that are so different in the form of the alveolar surface as to induce me to believe that this part alters considerably during the growth of the animal, at least in some species of the family; nevertheless additional specimens may show that what I have taken for alterations in growth are, in fact, specific distinctions. The examination of the skulls of the half-grown and the adult *Tyrse nilotica* and *Trionyx gangeticus*, the only species that I have at present the power of examining in more than one state of growth, does not reveal any great change in the form of the alveolar surface as the animal increases in age. But there is no reason why a change of this kind may not take place in one species or genus, and not occur in others or in the generality of the species. I have therefore for the present adopted Professor Agassiz's views.

He seems to use the form of the alveolar edge as of generic importance, and this when he says he has a series of skeletons from animals of different ages. He describes as follows:—

“Thus, the alveolar edges of the lower jaw of *Amyda* and *Aspidopectes* are sharp all round.”—*Contrib.* pp. 398 & 403.

In *Platypeltis* “the lower jaw, like the upper, has a very broad alveolar surface; this surface is nearly flat at the symphysis, but has a deep depression near the hinder end.”—*Contrib.* p. 400.

Yet these are just the characters that one might expect to occur after examining the skull of *Cyclanosteus senegalensis*, between the young and adult specimens of the same species.

The examination of the series of specimens at my command induces me to place considerable confidence in the characters furnished by the general form of the skull—in the position of the internal nostrils, whether they are placed in a deep or a shallow groove in the palate, and if that groove is situated only behind the internal nostrils, or is continued in front to the edge of the jaws, and, if so continued, whether it is nearly of the same width throughout its length, or more or less contracted in front of the interior nostrils—and also in regard to the position of the internal nostrils themselves, whether they are in the front of the palate or some distance from the front edge, so as to be nearly on a level with the front edge of the zygomatic arches.

The genera, for example, may be divided into two groups by the forms of the skulls, which probably indicate some peculiarity in their

habits, quite as important as the form of the sternum and the flexibility or inflexibility of the edge of the dorsal disks; but so little is known of the habits and manners of these animals, that we have no materials to work from.

A. The skull solid, convex, subtrigonal; nose moderate; eyes lateral; the palate concave, with raised alveolar edges, and a deep oblong concavity enclosing and extending behind the internal nostrils.

*Æmyda. Cyclanosteus. Trionyx. Tyrse. Dogania. Rafetus.*

B. Skull oblong, thin, and light; nose very short; eyes anterior; forehead flat, often elongate; palate flat, with scarcely raised alveolar edges, and only a very slight depression before and behind the internal nostrils.

*Chitra. Heptathyra. Pelochelys.*

There is a very considerable difference in the form of the grooves in the palate, and in the position of the internal nostrils.

In *Trionyx gangeticus* the groove is very broad, equally open, and of an equal width, with the circular internal nostril behind on a level with the front of the zygomatic arch.

In *Potamochelys stellatus* the groove is very narrow in front, partly arched over on the sides by the inner edge of the large alveolar margin, with the oblong internal nostrils very close together, in a line with the middle of the upper lip.

In *Rafetus euphraticus* the palate-groove is intermediate in form between that of *Trionyx* and *Potamochelys*, being broad, deep, entirely open, but rather narrower in front, with the large circular internal nostrils rather in front of the zygomatic arches.

In *Cyclanosteus senegalensis* the palate is somewhat like that of *Potamochelys*; but it is not so much contracted in front, and the oblong internal nostrils are larger, broader, and nearly in the same situation.

In *Tyrse nilotica* the palate is regularly concave in front of the internal nostrils, which are in a deep pit, just before the front of the zygomatic arch, and this concavity is separated by a longitudinal ridge between the nostrils.

There is an apparent anomaly in the development of the sternal callosities, which can only be solved by the conjecture that (as Professor Agassiz declares to be the case) there are several species which have very much the same external appearance. In more than one of the species under examination, the sternal callosities are well developed in some specimens, and scarcely visible in others of the same species and, sometimes, even of a larger size.

1. *The typical or naked-legged Mud-Tortoises have the sternum narrow behind, without any valves over the hind legs; only two or four sternal callosities, and margin of the disk flexible, without any internal bones.* GYMNOPUS.

*Aspidonectes*, Wagler, Syst. 1830.

*Trionyx*, Gray, Syn.; Griffith; Cuvier, 1831.

*Æmyda*, Bonap. Tab. Anat. 19, 1836.

*Gymnopus*, Dum. et Bib. Erp. Gén. ii. 479, 1835.

- A. *Skull solid, subtrigonal; nose moderate; eyes lateral; forehead short, not longer than the face; palate concave, with a well-raised alveolar ridge, and a deep pit before and behind the internal nostrils.* Trionychina.
- a. *Lower jaw (of adult) with a broad, flat alveolar disk; palate with a deep, wide concavity in front of the inner nostrils.*

#### TRIONYX.

Skull oblong, swollen. Nose convex, arched. Forehead convex. Upper jaw with a broad, flat, rugose alveolar plate, which is narrow in front and wide behind. Lower jaw with a broad, deeply concave alveolar edge, which is of nearly equal width in all parts, and with a slight prominence in the middle of the hinder edge. Palate with a broad, deep concavity, which is nearly as wide before as behind, and with the large oblong internal nostrils in the hinder part of the palate, and a deep groove, separated by a longitudinal ridge, behind each of them. Sternal callosities four, well developed.

“The nostrils rather small, far apart, with a lobe on the inner side. Pupil circular.”—*Wagler*.

TRIONYX GANGETICUS, Cuvier, R. A. ii. 16; Gray, Cat. Shield Rept. in B.M. 66.

*Aspidonectes indicus*, Fitz.

*Aspidonectes gangeticus*, Wagler, N. Syst. Amph. t. 2. f. 13-18 & f. 20.

*Hab.* India: Ganges.

Cuvier figured the skull (Oss. Fos. v. 187, t. 11. f. 5-8); and it is also figured in the ‘Cat. of Shield Rept. in B.M.’ (t. 42. f. 1). Wagler figured some part of the skeleton (N. Syst. Amph. t. 2. f. 13-18 & f. 20).

#### RAFETUS.

Skull oblong, swollen. Nose convex, arched. Forehead flat. Upper jaw with rather broad rugose alveolar plates, rather wider behind than in front. Lower jaw with a broad, slightly concave alveolar edge, which is rather wider in front. Palate concave, with a broad, deep concavity, which is rather narrower in front than behind, and with the large oblong internal nostrils in the hinder part of the palate, and a deep groove, separated by a central longitudinal ridge, behind each of them. Sternal callosities two, lateral, small.

The skull of this genus is very similar to that of the genus *Trionyx*, as restricted in this paper; but it is at once known from that genus by the absence of the hinder sternal callosities and the small size of the lateral ones.

RAFETUS EUPHRATICUS.

*Trionyx rafeht*, Gray, Cat. Shield Rept. B.M. 65. t. 30.

*Tyrse rafeht*, Gray, Cat. Tort. B.M. 49.

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*Testudo rafeht*, Olivier, Voy. Pers. ii. 452, t. 11.

*Testudo euphraticus*, Daud.

*Trionyx euphraticus*, Geoff.

*Hab.* Tigris and Euphrates.

In the 'Catalogue of Shield Reptiles,' p. 65, I noted that the skull is much shorter and broader than that of *T. niloticus*.

#### DOGANIA.

*Dogania*, Gray, Cat. Tort. B.M. 49, 1844; Cat. Shield Rept. 69.

Head depressed; skull depressed, wide behind. The nose of the skull shelving; the orbit large, subcentral. Forehead small, rhombic, not reaching to over the ear; occipital ridge very much produced, elongate. Palate concave, with a raised margin on each side behind,

Fig. 1.

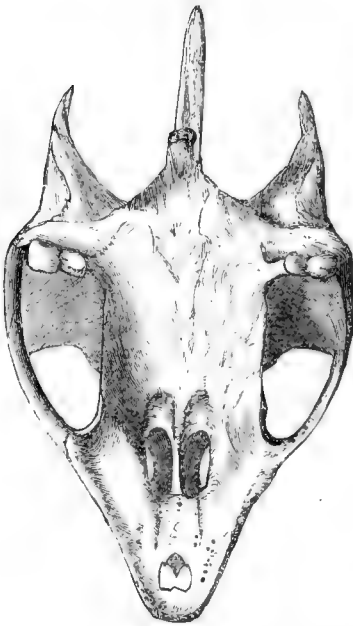


Fig. 2.

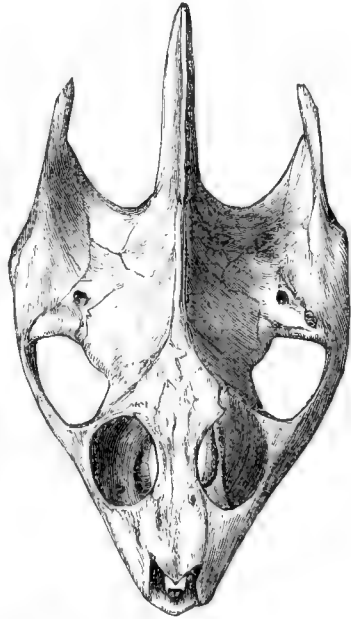
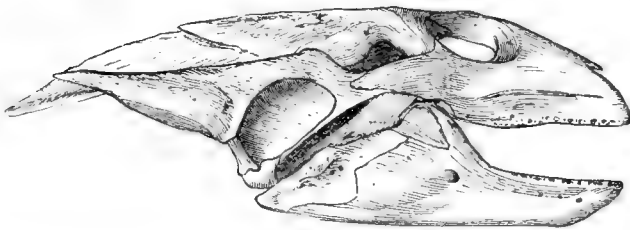


Fig. 3.



*Dogania subplana*.

under the orbits, and with a deep concavity in front of the internal nostrils, which is dilated in front. The internal nostrils very large,

oblong, with a short deep concavity at the hinder edge of each, separated by a central longitudinal ridge. The upper jaw with a broad oblong alveolar plate on each side behind, edging the side of the inner nostrils. The lower jaw rather produced in front; the front alveolar edge simple, sharp-edged, the hinder half rather flattened, broad, but shelving inwards. Sternal callosities two, lateral, linear.

1. *DOGANIA SUBPLANA*, Gray, Cat. Tort. B.M. 49; Shield Rept. 69, t. 33; Proc. Zool. Soc. 1862, p. 265; Cuvier, Oss. Foss. ii. t. 13. f. 5 (dorsal disk). (Skull, figs. 1, 2, 3.)

*Hab.* China and Formosa. *Terrapin* of the Europeans in China. Sold to make soup.

2. *DOGANIA GUENTHERI*, Gray, P. Z. S. 1862, 265.

*Hab.* India.

Face of skull flat, shelving downwards; eyes close together; forehead flat.

#### ASPILUS.

Head elongate, rather depressed. Skull elongate; forehead convex, short; orbits submedial. Nose shelving, rather convex. The palate slightly concave, with the hinder sides under the orbits rather expanded; narrowed in front, with a narrow deep concavity; grooves of equal width in front of the internal nostrils. The internal nostrils oblong, subposterior, on a level with the front edge of the zygomatic arches, with a deep elongate groove behind each of them, separated by a central longitudinal ridge. The alveolar surface of the upper jaw broad, shelving outwards; the inner edge forming a ridge on the side of the inner nostrils. The lower jaw shallow in front, with a broad flat alveolar surface, with a sharp simple outer edge, and shelving internally. Sternal callosities two, lateral.

The skull of this genus is figured by Wagler (N. Syst. Amph. t. 2. f. 4-9) as *Aspidonectes javanicus*.

1. *ASPILUS CARINIFERUS*. (Skull, figs. 4, 5, 6.)

*Trionyx cariniferus*, Gray, Cat. Shield Rept. B.M. 67, t. 32.

*T. stellatus*, var. *javanicus*, Schleg. Faun. Japon. Chelonia, t. 5. f. 6 (head?).

? *Aspidonectes javanicus*, Wagler, N. S. Amph. t. 2. f. 1, 12 (skeleton and skull).

*Hab.* Java.

Wagler, in his 'N. Syst. Amphib.' t. 2. f. 1, 11, figures a very young *Trionyx* under the name of *Aspidonectes javanicus*. It is not the *Trionyx javanicus* of Cuvier nor of my catalogue. The head, neck, and body are minutely white-speckled; the chin and throat are varied with rather larger white spots, and the dorsal disk is speckled with white, as in *Potamochelys stellatus*; but he represents the dorsal disk as having six rings of white spots on the hinder part near the margin, which I have never seen in this species. Hence

it is probably the young of a species that has not come under my observation.

Fig. 4.

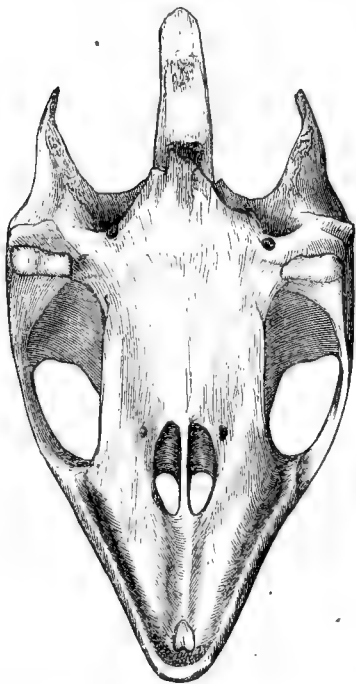


Fig. 5.

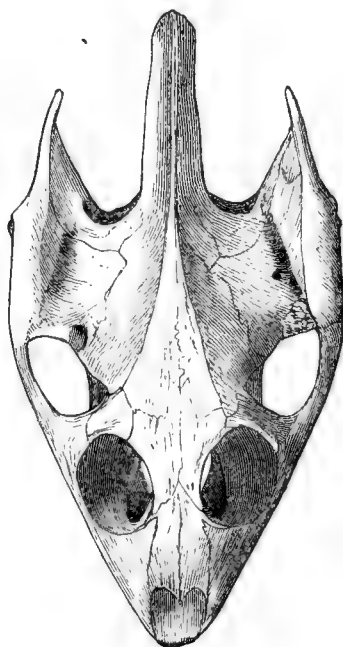
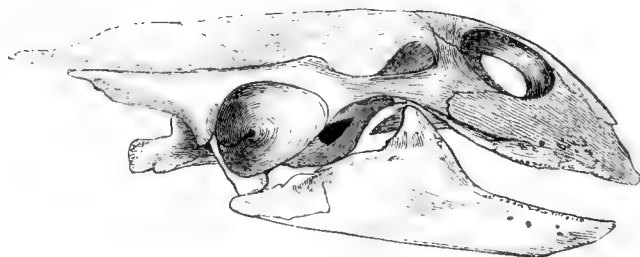


Fig. 6.

*Aspilus cariniferus.*

The following species probably belong to this genus, but I have not been able to examine the skulls of them :—

## 2. ASPILUS ? PUNCTULATUS.

Dark grey brown ; back of the shield with numerous minute white specks, and a narrow thin white margin ; beneath white. Head dark, with minute white specks above, and larger white spots on the chin and throat, with a large irregular-shaped spot on the side of the neck behind the angle of the gape ; the specks and spots on the head regularly dispersed ; sternal callosities not developed.



*Trionyx cariniferus*, spec. *d* & *e*, Cat. Shield Rept. B.M. 67.  
*Hab.* Amboina or Ceram (*Madame Ida Pfeiffer*).

### 3. ASPILUS? ORNATUS.

*Trionyx ornatus*, Gray, P. Z. S. 1861, p. 41, t. 5; Ann. & Mag. N. Hist. 1860, vi. p. 218.

"*Trionyx javanicus*, juv., Dum. & Bib." Mus. Paris.

*Hab.* Camboja.

Young specimens from Siam have rudimentary, narrow, linear, band-like callosities on the lateral sutures. Head minutely white-speckled (no large spot at angle); the first vertebral bone transverse, broad, with a prominence on the middle of hinder edge. The hinder part of the disk with close large tubercles.

A stuffed young specimen from Sarawak, which appears to belong to the same species, has no indication of callosities. Head white-spotted, like young from Siam. The first vertebral bone separate, transverse, smooth, not rugose. The hinder part of the disk smooth, with a central elongated streak, and two oblique converging short lines of small tubercles.

b. *Lower jaw with a simple sharp shelving edge in front, and a flat shelving alveolar disk on the hinder half.*

\* *Palate concave, with a narrow deep groove of equal width in front of the large internal nostrils, which have two very large grooves behind them, and which are contracted, and overlapped on the sides by the alveolar plates.*

### POTAMOCHELYS.

Head elongate, rather depressed; nose rounded; forehead flat; orbits submedial. Sternal callosities four. The palate of the skull rather convex behind, with a slight expansion on each side under the orbits, concave, contracted and bent down in front, with a short, very narrow, deep groove of equal width in front of the internal nostrils. The internal nostrils medial, large, oblong, hooded over by the dilated side of the alveolar plates, and with a very long deep groove behind each of them. The alveolar surface of the upper jaw rather convex in front, shelving outwards behind, and with a raised inner edge, which hoods over the cavity of the internal nostrils. The lower jaw low and produced in front, with a simple sharp edge in front, and a subtrigonal, elongate, flattened, rather concave alveolar disk occupying the hinder half of the inner side.

#### 1. POTAMOCHELYS STELLATUS. (Skull, figs. 7, 8.)

*Trionyx javanicus*, Geoff. Ann. Mus. xiv. 15, t. 3; Gray, Cat. Shield Rept. B. M. 67.

*Potamochelys javanicus*, Fitz.

*T. stellatus*, Geoff. Ann. Mus. xiv. 13 (junior).

*Hab.* India: Deccan (*Sykes*).

I have changed the name of this species because it has been applied to a number of species on the Continent, and I have never seen a specimen from Java. It is known in the young state from all the other species by the broad black streaks radiating on the crown of the head; and they are to be seen in the half-grown specimens.

Fig. 7.

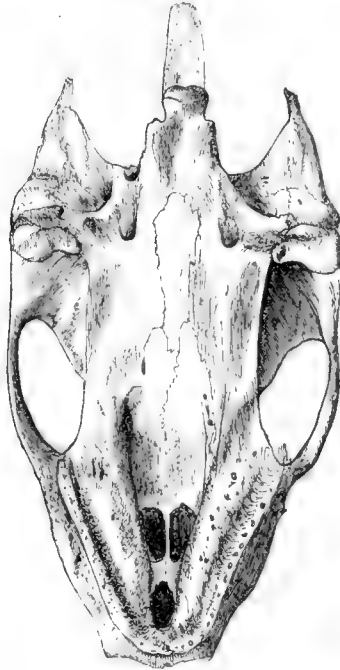


Fig. 8.

*Potamochelys stellatus.*

The following species, which have four sternal callosities, appear to belong to this genus, but I have not been able to examine the skulls of them :—

2. *POTAMOCHELYS?* *PEROCELLATUS.*

*Trionyx perocellatus*, Gray, Cat. Tort. B. M. 48; Cat. Shield Rept. 65, t. 31.

*Hab.* China and Chusan.

Face moderately long, subconical, rather convex; forehead and crown flat (length from back of orbit to nose and to occiput the same), longer than in *P. stellatus*; nostrils large, rather close, with a very small lobe on the inner side of each.

The neck of the young specimens with a dark-edged pale streak on each side, which is bent down towards the throat behind; head brown, black-speckled, with a narrow line across the forehead on the front edge of the eye.

### 3. POTAMOCHELYS? FRENATUS.

*Trionyx frenatus*, Gray, Cat. Shield Rept. 67.

*Hab.* Singapore (*Wallace*).

### 4. POTAMOCHELYS? TUBERCULATUS.

*Trionyx tuberculatus*, Cantor; Gray, P. Z. S. 1861, p. 42.

*Hab.* Chusan.

### 5. POTAMOCHELYS? MICROCEPHALUS, n. s.

Olive-brown. The hinder part of the disk nearly smooth, without any rows of tubercles. The first vertebral bones transverse, short, rugose, with two circular pits behind, between it and the second vertebral plate (probably disappearing in the adult); sternal callosities four, evenly rugose; head small, slender, rather elongate; nose slender, conical, tapering.

*Hab.* Sarawak (*Wallace*).

This species differs from all the other Mud-Tortoises from Asia in the small size, slender and tapering form of the head. It is evidently a young specimen, from the extent of the ribs, which are still free, and the separate state of the bones of the head; but the dorsal bony disk and the sternal callosities are well developed.

This Tortoise will probably be found to form a genus by itself, when the adult animal has been examined.

See also—

1. *Trionyx maackii*, Brandt, Bull. Acad. St. Petersb. xvi. 110, 1857; Institute, xxvi. no. 1288, p. 298; Arch. f. Nat. 1858, p. 63.

*Hab.* N. China: Amoor River.

2. *Trionyx schlegelii*, Brandt, *l. c.* 1857.

*T. stellata*, sive *javanica*, var. *japonica*, Schlegel, Fauna Japon. t. 8 (animal), t. 5. f. 7 (head).

*Hab.* Japan.

\*\* *Palate flat, with a broad shallow groove of equal width in front of the large posterior internal nostrils, which have two short deep grooves behind them.*

### TYRSE.

Sternal callosities four. Nose elongate, conical, shelving. Fore-

head flat. Eyes submedial. Upper jaw with a broad concave alveolar plate of nearly equal width in all parts. The lower jaw with a sharp edge, with only very slight indications of a flattened alveolar edge on the hinder part of the inner side; the front of the jaw shelving forwards, and with a large concavity on the upper surface behind the edges. The palate flat behind, with a broad concavity in front of the internal nostrils, which is continued behind on both sides of them. The internal nostrils large, oblong, far back, nearly in a line with the front of the zygomatic arches, and with a large deep concavity, separated by a central longitudinal ridge, behind each of them. The nostrils large, rounded, with an internal lobe on the inner edge (see Wagler, N. Syst. Amph. t. 2. f. 19).

The skull of this genus is at once known from those of the genus *Trionyx*, by the nose being elongated, shelving, and not rounded, and by the form of the palate. The skull of a young specimen from the Nile is figured in the 'Cat. of Shield Reptiles,' t. 42. f. 2.

TYRSE NILOTICA, Gray, Cat. Tort. B. M. 48.

*Trionyx niloticus*, Gray, Syn. Rept. 48; Cat. Shield Rept. 68.

*Testudo triunguis*, Forsk.

*Trionyx ægyptiacus*, Geoff. Egypt.

*Gymnopus ægyptiacus*, Dum. & Bibr.

*Trionyx labrosus*, Bell, Test.

*Aspidonectes ægyptiacus*, Fitz.

*Aspidonectes aspilus*, Cope, Proc. Acad. Nat. Sci. Philad. 1859, p. 295 (adult).

*Hab.* Africa, North and West: Fernando Vas River (Cope); Sierra Leone (Bell).

The young specimens have the head, limbs, and edge of the shield dusky, with round white spots.

The very large specimen of *Trionyx* from Western Africa, obtained from M. Du Chaillu, agrees with Mr. Cope's description of *Aspidonectes aspilus*; I can see no difference between it and the half-grown specimens of *Trionyx niloticus* from Egypt in the British Museum. In the two Egyptian specimens the hinder callosities are separated from the lateral ones, and the hinder part of the inner edge of the lateral callosities is regularly rounded. In the very large adult West African specimen the front edge of the hinder callosities is furnished with a process that fits into a notch in the hinder edge of the lateral callosities; and the inner edge of the lateral callosities is straight, and then bent off at an acute angle at the hinder part.

But this is only a difference depending on age; for a more adult specimen collected at Chartoum by Mr. Petherick, in the British Museum, has the lobe and notch in the hinder edge of the lateral callosity well marked, and the hinder part of the inner edge of the lateral callosities approaches more nearly the form of the callosity in the larger and more adult West-African specimen.

There is a large skull and other bones of a species of the genus in the Museum of the College of Surgeons, which was presented by Captain Sir Everard Home. The locality of the species is not

stated, but it is probably from the Indian or Australian Seas. It is very like the skull of *Tyrse nilotica*; and if it came from Africa, it may probably belong to that species. It is described in detail by Professor Owen in the Catalogue of the Osteological Specimens in that Museum (see p. 181, nos. 922, 923).

In the 'Knowsley Menagerie' I described a species of *Trionyx* living in Knowsley Park, which was said to have been sent from Sierra Leone, under the name of *Tyrse argus*, Gray, Cat. Tort. B.M. 48; Knowsley Menagerie, t. ; *Trionyx argus*, Gray, Cat. Shield Rept. B.M. 68. When I compare this specimen with the specimen of *Trionyx spiniferus* which I have received from North America, I am very doubtful whether there must not have been some confusion about the habitat of the specimen, and whether it is not more probably a North American species—especially as since our increased intercourse with West Africa we have not received any more specimens.

The head of the specimen figured in the 'Knowsley Menagerie,' which is now in the British Museum, has the nose elongate-conical; and the forehead, as shown in the dry specimen, is elongated, lozenge-shaped, much longer than broad.

B. *Skull oblong, thin; nose very short; eyes anterior; forehead elongate, longer than the face; palate flat, with a scarcely raised alveolar edge, and only a very slight depression before and behind the internal nostrils.*

a. *Skull short and broad, much depressed; alveolar edge of both jaws flat, simple.*

#### PELOCHELYS.

Head depressed, moderate-sized; the face very short, shelving; eyes rather close together, superior; the forehead flat, rather concave; skull much depressed, broad; nose very short, shelving; orbits very large, subanterior; forehead depressed, rather concave; præfrontal bones large; præmaxillary bones none; the maxillar bone circumscribing the lower edge of the exterior nostrils. Palate nearly flat, very broad, rather convex in the centre behind, slightly concave (but without any central groove) in front of the internal nostrils. Internal nostrils oblique, oblong, with a rather wide, deep, short groove behind each of them. The alveolar edge flat, simple, with an acute scarcely raised edge. Lower jaw very slender, weak, with a simple sharp edge, with a slightly thickened internal rib. The first vertebral plate of the shield as broad as the front edge of the second one.

Professor Owen, in the account of the skull of this genus which is in the College of Surgeons, named *Trionyx bibrioni*, no. 954, describes the difference between it and the skull of *Trionyx gangeticus*, and a *Tyrse* allied to *T. nilotica*, and he also describes some peculiarities in the formation of the dorsal disk (see Cat. Osteol. Spec. Mus. Coll. Surg. p. 185, nos. 954–959).

## 1. PELOCHELYS CANTORII. (Skull, figs. 9, 10.)

*Chitra indica*, Blyth, J. A. S. 1863, xl. 77; Günther, Indian Rept. t. (not Gray).

*Gymnopus indicus*, Cantor, Rept. Malacca, 10.

*Hab.* Malacca, marine (Cantor; Blyth).

Dr. Günther, who soaked Dr. Cantor's specimen, says he observed some black lines on the head and throat, and some dark marbling on the edge of the dorsal disk as in *Chitra indica*.

Fig. 9.

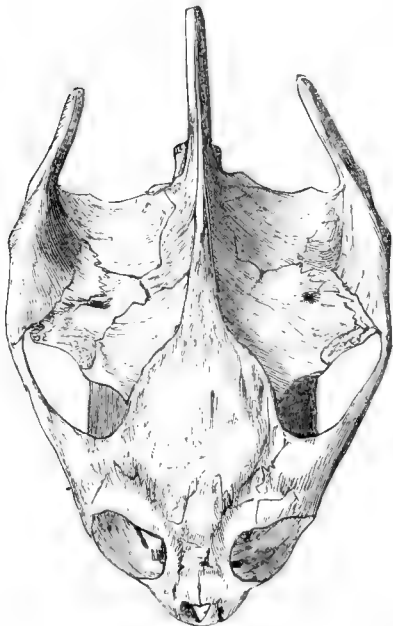
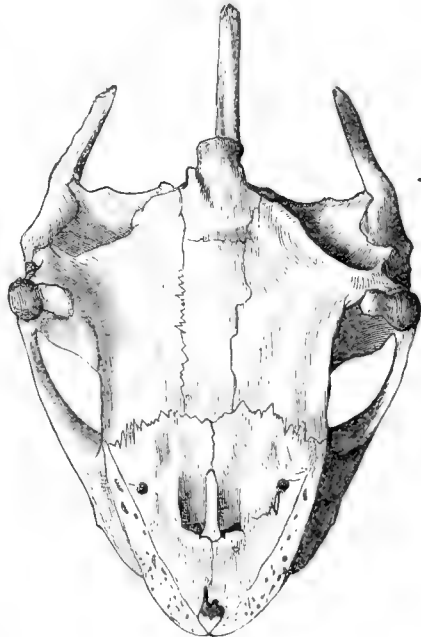


Fig. 10.

*Pelochelys cantorii.*

## 2. PELOCHELYS CUMINGII.

*Chitra indica* (part), Gray, Cat. Shield Rept. B.M. p. 70.

*Hab.* Philippines (Cuming).

Much larger than the preceding, which has the sternal callosities fully developed.

The young specimens that Mr. Cuming brought home, apparently belonging to the same species, have the head olive, minutely black-dotted; the throat olive, minutely white-speckled.

## 3. PELOCHELYS BIBRONII?.

*Trionyx (Gymnopus) bibroni*, Owen, Cat. Osteol. Spec. Mus. Coll. Surg. p. 185, nos. 951-959.

*Hab.* ?Australia (Capt. Sir E. Home, F.R.S., fide Owen).

This is only known from a skull, a dorsal disk, and some other bones in the Museum of the College of Surgeons.

Prof. Owen, in the 'Catalogue of the Osteological Specimens in the Museum of the College of Surgeons,' describes the skull on which this species is founded. It differs from the skull of the young specimens of *P. cantorii* in the Museum collection from Malacca in being rather longer compared with its width; but then that may depend on the age of the specimen, for its size and the bones of the dorsal disk show that it belongs to a more adult specimen than the young one with which I was able to compare it.

There is some doubt as to the skull in the College of Surgeons having been obtained from Australia, as I have never heard of any Mud-Tortoises being found in that country; and it is not unlikely that the specimen was obtained from Singapore, or if obtained from Australia may have been carried there.

b. *Skull elongate; forehead shelving, much produced behind; nose very short, convex; alveolar edge of both jaws with a deep groove.*

#### CHITRA.

*Chitra*, Gray, Cat. Tort. B.M. 49; Cat. Shield Rept. 70.

The head elongate, depressed; nose very short; eyes near the front margin; forehead elongate, slightly convex, shelving. Skull elongate, ventricose, thin, light; the nose very short, convex; orbits very large, near the front margin; the forehead very much elongated, several times as long as the face, shelving, slightly convex (see Cat. Shield Reptiles, t. 41). Palate flat, concave in the centre; internal nostrils anterior, with only a very slight, very broad depression behind each of them; alveolar edge with a deep angular groove, concentric, with sharp outer edges. Lower jaw strong, with a deep angular alveolar groove, concentric with the sharp outer edges (see Gray, Cat. Shield Rept. B.M. t. 41). The first vertebral plate of the dorsal disk is rather broad and transverse, arched in front; but (in the younger specimen at least) it is not so broad as the front edge of the second vertebral plate of the disk.

This genus and *Pelochelys* are so similar externally, especially in the dried or stuffed specimens, that the specimens were named alike in the British Museum, and so remained for years, though in the meantime they had been examined by several herpetologists, both English and foreign. It is only by a slight difference in the length of the head, compared with the width and the flatness and slight convexity of the forehead, that they can be distinguished, different as the forms of the skulls are.

1. *CHITRA INDICA*. (Skull, figs. 11, 12.)

*Testudo chitra*, B. Hamilton, Icon. ined.

*Trionyx ægyptiacus*, var. *indicus*, Gray, Illust. Ind. Zool. i. t. 80.

*Trionyx indicus*, Gray, Syn. Rept. 47.

*Chitra indica*, Gray, Cat. Tort. B.M. 49; Cat. Shield Rept. B.M. 70 (part), t. 41 (skull).

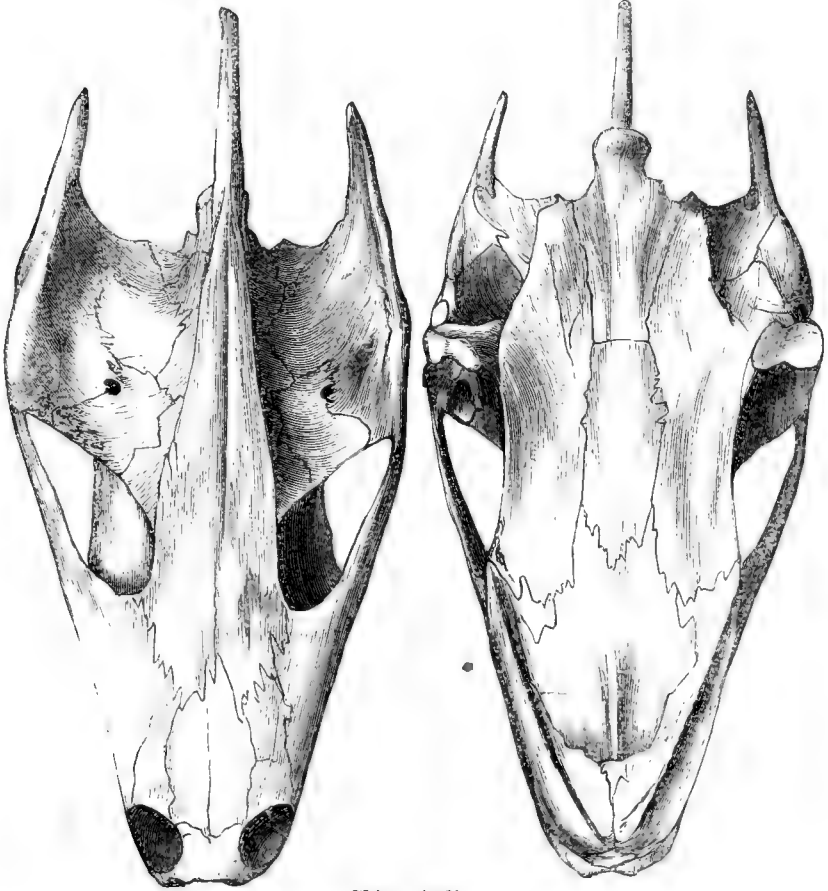
*Gymnopus lineatus*, Dum. et Bib. Erp. Gén. ii. 491.

*Hab.* India: Ganges; Futtaghur (*Hardwicke*); Nepal (*Falconer, Boys*).

The young specimens are olive, with short black lines on the head, and dorsal disk marbled with darker bands and streaks.

Fig. 11.

Fig. 12.

*Chitra indica.*

- II. *The aberrant Mud-Tortoises, with covered hind feet, have a broad sternum, furnished with a moveable valve on each side behind, which covers the hind feet when they are contracted; and there are seven or nine sternal callosities.*
- a. *The margin of the dorsal disk flexible, without any internal bones; the skull short, depressed, flat above; the palate flat, with scarcely any alveolar ridges, and only a very slight pit before and behind the internal nostrils. Heptathyrina.*

#### HEPTATHYRA.

*Heptathyra*, Cope.

*Aspidochelys*, Gray, P. Z. S. 1860.



Face of skull very short, flat above; forehead flat, rather concave, slightly swollen between the hinder parts of the eyes. The palate flat, slightly concave in the middle behind the posterior nostrils. The edge of the maxilla nearly flat, with a narrow slightly raised edge.

Fig. 13.

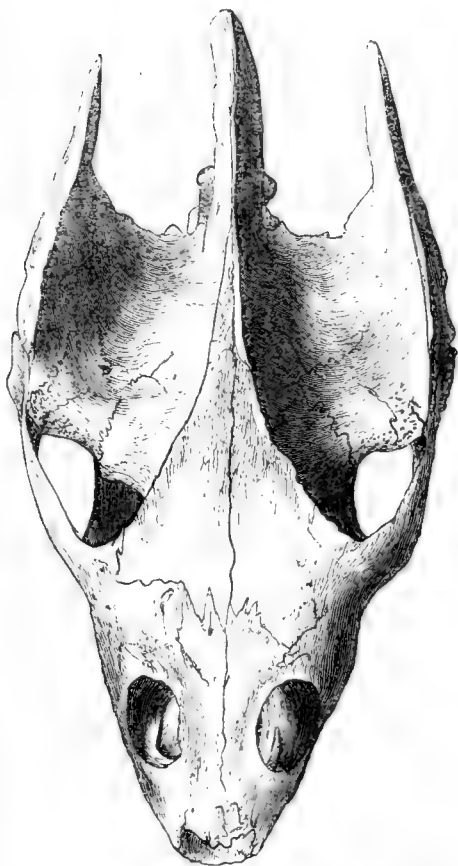


Fig. 14.

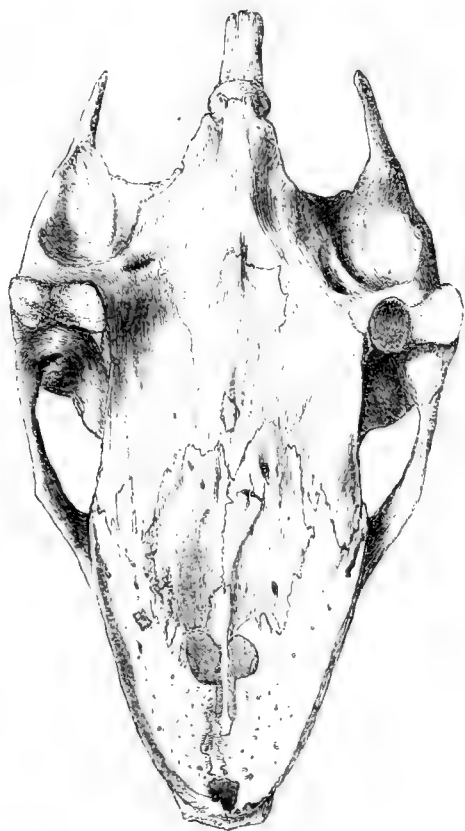
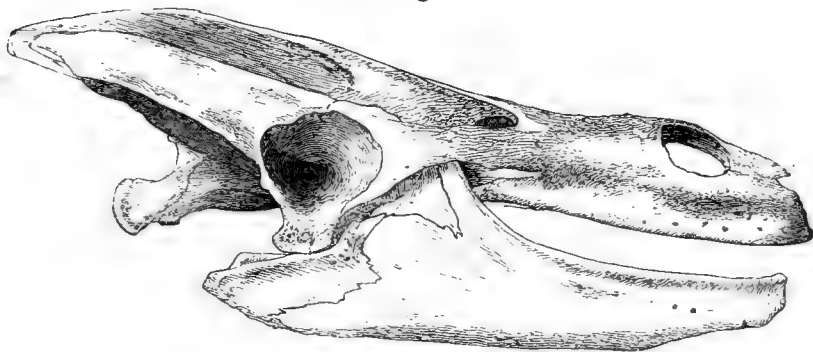


Fig. 15.

*Heptathyra frenata.*

The genus *Cycloderma* of Peters was instituted to contain all the *Cryptopi* of Duméril, which had a boneless flexible margin to the shield, without paying any attention to the number of the callosities, which are also coexistent with a very differently shaped skull and, doubtless, different habits in the animal.

The skull of this genus is analogous to the skull of the genus *Pe-lochelys* among the naked-footed *Trionychidæ*, as the skull of *Cyclanosteus* resembles that of the more typical *Trionychidæ*.

1. HEPTATHYRA FRENATA. (Skull, figs. 13, 14, 15.)

*Cycloderma frenatum*, Peters, Monatsb. 1854, p. 216.

*Cyclanosteus frenatus*, Peters, MSS. 1848; Gray, Cat. Shield Rept. 64 (1855).

*Cryptopus aubryi*, A. Dum. Rev. Zool. 1856, p. 37, t. 20.

*Heptathyra aubryi*, Cope, Proc. Acad. N. S. Phil. 1859, p. 296; Gray, P. Z. S. 1860, p. 315.

*Hab.* Africa: Gaboon (*Duméril*); Mozambique (*Peters*).

The similarity of the descriptions of the bands on the head shows that the *Cyclanosteus frenatus* of Peters and the *Cryptopus aubryi* of Duméril most probably belong to the same species.

2. HEPTATHYRA LIVINGSTONII.

*Aspidochelys livingstonii*, Gray, P. Z. S. 1860, pp. 6 (pl. xxii.), 315.

*Hab.* Central Africa: River Zambesi.

This may be the same as the former, not quite so full-grown; but the hinder pair of callosities are oblong and united by their hinder edges only, and the colour of the head is not known. Dr. Peters's name, however, and his description of the specimen he had from Mozambique show that one of the *Heptathyra* found on that side of Africa has the black streak and cross bands that are characteristic of the Gaboon species.

- b. *Margin of the dorsal disk flexible, without internal bones; the skull oblong, swollen, convex above; palate concave, with large distinct alveolar plates, and a deep central pit before and behind the internal nostrils.* *Cyclanosteina.*

CYCLANOSTEUS.

*Cyclanosteus* (restricted), Gray, P. Z. S. 1860, 315.

The face of the skull short, convex, arched in front; orbits rather lateral, shelving; forehead flat, rhombic, elongate. Palate concave, flat behind; in front with a large, broad, deep concavity behind the very large oblong internal nostrils, and a small central, deep, triangular concavity in front of them. The alveolar plate very broad and flat, broader behind, and hooding over and continued far behind the internal nostrils. Lower jaw strong, flattened, very broad, simple, depressed, and sharp-edged in front, with the hinder half flattened out internally into an ovate, rather concave alveolar disk.

1. *CYCLANOSTEUS SENEGALENSIS*. (Skull, figs. 16, 17, 18.)

*Cyclanosteus petersii*, Gray, Cat. Shield Rept. 64, t. 29; Proc. Zool. Soc. 1860, p. 315.

*Cyclanosteus (Cyclanorbis) petersii*, Gray, P. Z. S. 1852, p. 133; Ann. & Mag. N. H. xv. 69.

Jun. *Emyda senegalensis*, Gray, Cat. Tort. B.M. 47; Cat. Shield Rept. B.M. 64; P. Z. S. 1860, p. 316.

Fig. 16.

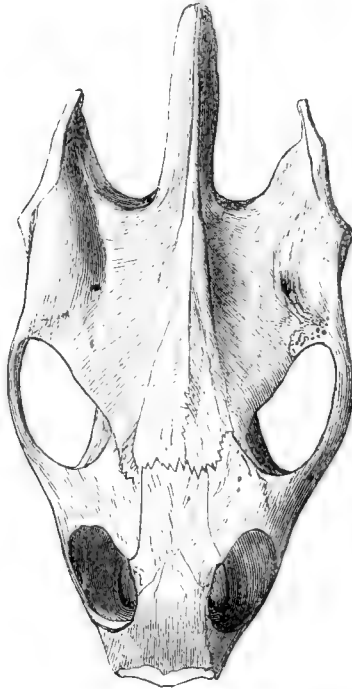


Fig. 17.



Fig. 18.

*Cyclanosteus senegalensis*, jun.

Fig. 19.

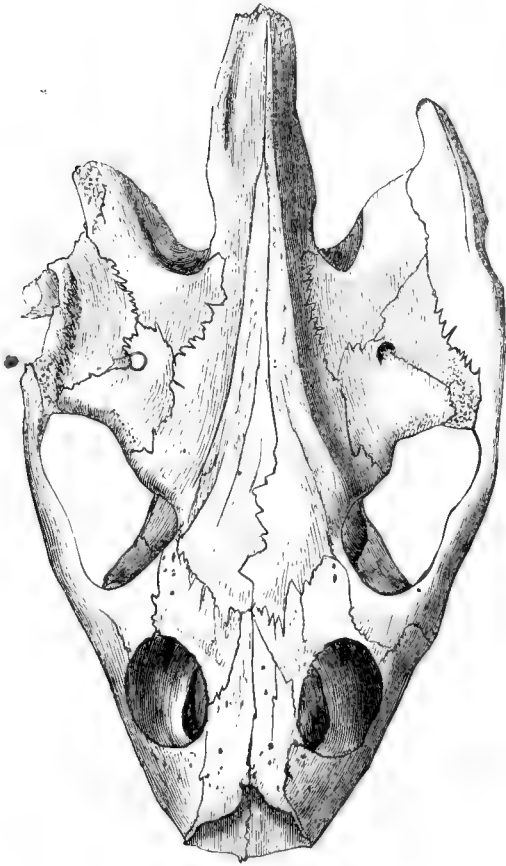


Fig. 20.

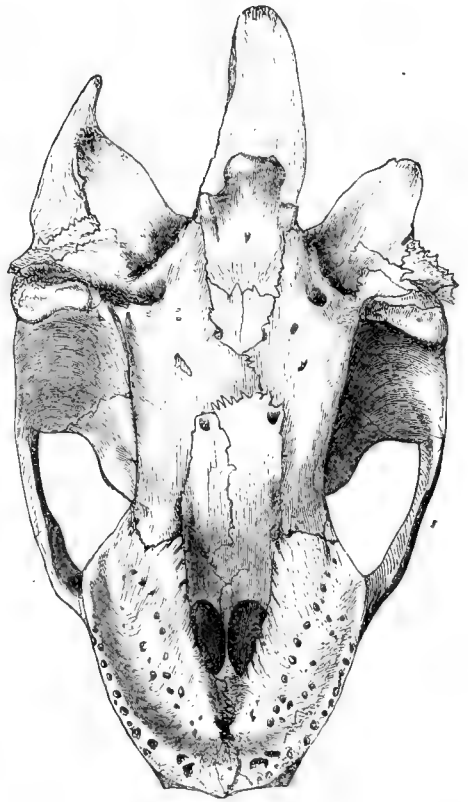


Fig. 21.



*Cyclanosteus senegalensis* (adult?).

*Cryptopus senegalensis*, Dum. et Bib. Erp. Gén. ii. 504; Gray, P. Z. S. 1860, p. 316.

*Hab.* W. Africa: River Gambia.

The young specimens in the British Museum from the River Gambia have the head pale grey, with some pale roundish spots (and without any indication of black streaks).

The specimen of *Emyda senegalensis* which we have received from Paris, as coming from Senegal, is evidently the young of a *Cyclanosteus*, and not of an *Emyda*; and as it agrees in many particulars with the young specimen which we have received from the Gambia as *Cyclanosteus petersii*, it is most probably the young of that species. It differs from the specimen which we have from the Gambia, of the same size, in having a few scattered black specks on the hinder part of the dorsal shield; but this probably arises from the Senegal specimen having been better preserved by being placed and kept in stronger spirits.

In the British Museum there is a skull (figs. 19, 20, 21) which was received from the River Gambia without the animal, and which appears to be that of the adult *Cyclanosteus senegalensis*. The whole upper edge of the lower jaw is very much dilated and moderately concave; while in the skull of a half-grown specimen, apparently of the same species, the front half of the lower jaw is high, narrow, with a simple sharp edge, and the hinder portion of the upper edge is more and more dilated and flattened as it approaches the condyle, so as to form an oblong, concave, flattened disk on the surface. Unfortunately I have not the skull of a young specimen to compare with the other two; but I should not be surprised to find that the whole upper edge in the young specimen is simple and shelving, like the adult state of *Tyrse nilotica*.

I may observe that I have not seen any observations in Professor Agassiz's work which show that he has observed such a change of form of the lower jaw in any of the North American species of this family. In his account of the general characters of the family he simply observes, "the lower jaw grows more flattened towards the front end." (Contrib. i. 332.)

c. *The margin of the dorsal disk strengthened with a series of internal marginal bones; skull oblong, swollen, convex.* Emydina.

#### EMYDA.

*Emyda*, Gray, Syn. 1831; Cat. Shield Rept. 63.

*Trionyx*, Wagler, 1830.

*Cryptopus*, Dum. et Bib. 1835.

The face short, convex; forehead and crown flattened above.

The skull, as figured by Wagler (N. Syst. Amphib. t. 2. f. 24-31), has a high arched nose, rather flattened over the eyes, and a flat forehead. The palate with a narrow groove, rather narrowed in front of the oblong internal nostril, placed in front of the middle of the alveolar margin. The alveolar margin of the upper jaw is flat, rather

dilated behind. The lower jaw is strong, angular on the sides, with a narrow flat alveolar edge.

1. *EMYDA PUNCTATA*, Gray, *l. c. f. 3.*

*Trionyx coromandelicus*, Geoff.; Wagler, N. Syst. Amph. t. 2. f. 21–23 (anat.).

We have lately received specimens from Allahabad and Sikkim, collected by the brothers Schlagintweit.

2. *EMYDA CEYLONENSIS*, Gray, *l. c. f. 4. t. 29 a.*

*Emyda vittata* (Peters, Monatsb. 1854, p. 216), from Goa, appears to be the same as *E. ceylonensis*, Gray, Proc. Zool. Soc. 1855, p. 201; Cat. Shield Rept. 64. t. 29 a (1855). This animal is also figured by Mr. Bell as the true *Emyda punctata*, in his 'Testudinata,' t. 1, 2.

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March 8, 1864.

Dr. J. E. Gray, F.R.S., in the Chair.

Dr. E. Crisp read a paper, entitled "Contributions to the Anatomy of the Eland."

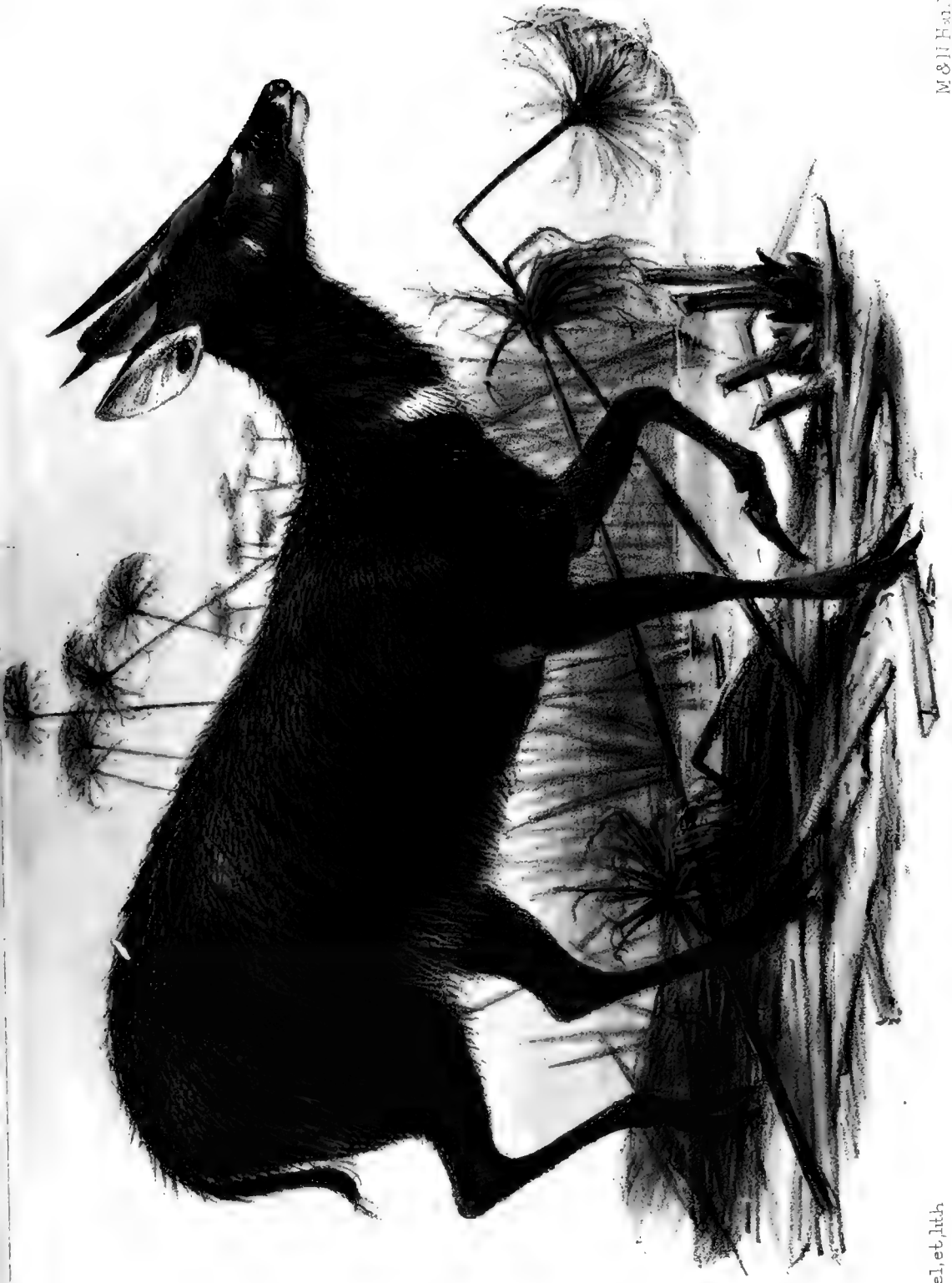
The following papers were read:—

1. ON THE MAMMALS COLLECTED AND OBSERVED BY CAPT. J. H. SPEKE DURING THE EAST-AFRICAN EXPEDITION. BY P. L. SCLATER; WITH NOTES BY CAPT. J. H. SPEKE.

(Plates XII., XIII.)

Owing to the serious difficulties encountered on the route, the specimens of Mammals collected by Capt. Speke and Capt. Grant during the East-African Expedition are not so numerous, and those that have reached England are not in so perfect a condition, as might have been wished. They consist principally of heads and horns of Antelopes, and fragmentary parts of these and other species of animals killed for food—powder and shot having been too precious to admit of its habitual use for the purpose merely of procuring specimens. These, however, together with Capt. Speke's notes as to several well-known species, supply us with indications of the existence in Eastern Africa, between Zanzibar and Gondokoro, of species of Mammals belonging to the following orders:—

Quadrumana . . . . .	1	Ruminantia . . . . .	19
Chiroptera . . . . .	2	Pachydermata . . . . .	4
Carnivora . . . . .	6	Proboscidea . . . . .	1
Rodentia . . . . .	6		



J. Wolf, del., et, lith

TRAGFLAPHUS SPEKII.

Mell. Faun. Ind. 1







GCEJUNDA PULCHELLA



It will be observed that the only order in which Capt. Speke's specimens form anything like a series is among the Ruminants, where sixteen species of Antelopes appear determinable specifically, and two others are uncertain. By comparing these with what Rüppell obtained in Abyssinia, and Dr. Peters in Mozambique, it will be seen that the country traversed by Capt. Speke has much more resemblance zoologically, as far as its Antelopes go, to the latter. This will be seen by the following table, in which Capt. Speke's Antelopes and those that also occur in the other districts are placed side by side.

ABYSSINIA. (Rüppell.)	(Speke.)	MOZAMBIQUE. (Peters.)
	Antilope melampus . . . .	Antilope melampus.
	Calotragus melanotis . . . .	Calotragus melanotis.
Scopophorus montanus . .	Scopophorus montanus.	
	Nesotragus moschatus . .	Nesotragus moschatus.
Heleotragus bohor (?) . . . .	Heleotragus reduncus.	
	Kobus ellipsiprymnus . . . .	Kobus ellipsiprymnus.
	— sing-sing.	
	— leucotis.	
	Ægoceros leucophæus.	
	— niger . . . . .	Ægoceros niger.
	Catoblepas gorgon . . . . .	Catoblepas gorgon.
	Boselaphus, sp. . . . .	Boselaphus lichtensteinii.
	Tragelaphus spekii.	
	— sylvaticus . . . . .	Tragelaphus sylvaticus.
	Oreas livingstonii . . . . .	Oreas canna (?).
	Strepsiceros kudu . . . . .	Strepsiceros kudu.

### Ordo I. QUADRUMANA.

#### 1. CERCOPITHECUS, sp.

An imperfect skin of a species of *Cercopithecus*, indeterminate.  
"Tumberi" Monkey. Numerous in the forests near the coast, in Uzaramo.—J. H. S.

### Ordo II. CHIROPTERA.

#### 2. SCOTOPHILUS, sp.

One example in spirits of a Bat, which Dr. Gray identifies as a species of *Scotophilus*.

#### 3. MEGADERMA FRONS, Geoffr. ; Wagn. Suppl. v. p. 643.

One dried specimen.

This Bat was shot flying at Meninga. They were numerous, but rose singly from the ground, and alighted sometimes in the bushes, sometimes again in the grass.—J. H. S.

### Ordo III. CARNIVORA.

#### 4. FELIS CHAUS, Güld.

An imperfect skin in Capt. Speke's collection is probably referable to this species.

Found near Meninga, concealed in a rut on the road.—J. H. S.

5. *FELIS LEO*, Linn.

Lions were abundant all along the route we traversed, though not often met with. In Uganda, in particular, there were many complaints made of their ravages.—J. H. S.

6. *FELIS SERVAL*.

An imperfect skin of a young kitten obtained in Unyoro is probably referable to this species.

The princes of Uganda wear the skin of this animal as a royal badge. This kitten was given to me alive by a native in Unyoro, under the condition that, if it died, the carcass was to be given back to him for his dinner.—J. H. S.

7. *HERPESTES BADIUS*, Smith, Ill. S. Afr. Zool. pl. 4.

Mgunda Mkali.

Seen singly in the wilderness of Mgunda Mkali, on the ground.—J. H. S.

8. *OTOCYON LALANDII* (Smith).

Shot in Ugogo, whilst foraging alone in the jungle.—J. H. S.

9. *HYÆNA CROCUTA*, Zimm.

Capt. Speke speaks of this (P. Z. S. 1863, p. 4) as the common scavenger of the country. It appears to be abundant all over Eastern Africa.

## Ordo IV. RODENTIA.

10. *SCIURUS ORNATUS*, J. E. Gray, P. Z. S. 1864, p. 13, Pl. I.

Dr. Gray has identified a portion of skin of a Squirrel obtained by Capt. Speke as belonging to his newly discovered species, described and figured *anteà*, p. 13.

11. *GEORYCHUS ALBIFRONS*, Gray, sp. nov.12. *GEORYCHUS PALLIDUS*, Gray, sp. nov.

Two skins of a *Georychus* are in the collection, of which Capt. Speke does not know the exact locality. Dr. Gray has kindly undertaken the examination of them, and his remarks on them will shortly be read to the Meeting.

13. *GOLUNDA PULCHELLA*, Gray, P. Z. S. 1864, p. 57. (Pl. XIII.)

Unyamuezi. Capt. Speke only procured a very imperfect skin of this beautiful Mouse. Dr. Gray, having subsequently received a more perfect specimen (stated to have been obtained on the west coast), has lately described it as new. Mr. Wolf's figure is taken from the latter specimen.

This Grass-Rat is common in the grasses in Unyamuezi.—J. H. S.

## 14. EURYOTIS, sp.

Imperfect skin. Unyamuezi. Lives in houses, like the common House-Rat in this country.

## 15. AULACODUS SWINDERNIANUS.

A head of this Rodent, from Uganda.

This animal was given to me alive by the King of Uganda. I never met with it in a wild state, though they are commonly caught by his hunters for the royal table.—J. H. S.

## Ordo V. RUMINANTIA.

16. *ÆPYCEROS MELAMPUS*, Licht.

Uzaramo. Two heads of males. Native name, "*Pallah*."

One of the commonest Antelopes in Uzaramo and along our route up to Unyamuezi. They roam about in large herds, frequenting open parts of the forest.—J. H. S.

17. *CALOTRAGUS*, sp.

Usui; S. of Karagweh. Imperfect head of a male; not sufficient for the determination of the species. Capt. Speke thinks it is the Grysbok (*C. melanotis*, Thunb.).

18. *SCOPOPHORUS MONTANUS* (Rüpp.).

Karagweh. Imperfect head of male.

Shot on the mountains in Karagweh, where it is not very common, moving about in small herds.—J. H. S.

19. *NESSOTRAGUS MOSCHATUS*, Von Duben.

Specimens of this little Antelope were obtained by Capt. Speke in the island of Zanzibar; these are now in the British Museum.

20. *HELEOTRAGUS REDUNCUS* (Pall.).

Capt. Grant shot the only example of this Antelope we obtained, in Usagara.—J. H. S.

21. *KOBUS ELLIPSIPRYMNUS* (Ogilby).

"Uzaramo." Heads of three males and three females of this Antelope.

This fine Antelope is very numerous in Uzaramo, frequenting the jungle along the banks of the Kingani river. The lunate mark on the rump is very distinct in the living animal. The does and young are met with in considerable herds; the old bucks singly, or in twos and threes. After crossing the hill-range we saw no more of this species.—J. H. S.

22. *KOBUS SING-SING* (Bennett)?

From Uganda. Capt. Speke has brought home two heads of

males of a large species of Antelope, which is apparently not different from the Sing-Sing of the western coast.



Sing-Sing?

The general aspect of the head resembles that of *K. ellipsiprymnus*, but the face is blacker, and the top of the head between the horns dark rufous.

“The Nsumma Antelope was only met with in Uganda and Madi, where it lies concealed in the high grasses in the daytime, and comes out to feed in the evenings. The males are often found singly, but the females in herds. It does not possess the lunate mark on the rump of the Waterbuck, and does not stand so high, but is rather more stoutly built.”—J. H. S.

## 23. KOBUS, sp.?

Uganda. Imperfect head of female, probably of a species of *Kobus*. Native name, "Ndjezza."

The "Ndjezza" is found among the grasses near water in Uganda. I never obtained the male of this Antelope.—J. H. S.

## 24. KOBUS LEUCOTIS (Licht. &amp; Pet.).

*Antelope leucotis*, Licht. et Peters, Monatsb. Akad. Berl. 1853, p. 164.

Uganda. Two heads.

This Antelope, of which the native name is "Nsunnu," is found in Uganda, Ungoro, and Madi, but never south of those countries. They roam about in large herds in thick bush and grassy plains, but never go far from water.—J. H. S.

## 25. ÆGOCEROS LEUCOPHÆUS (Pallas).

Found in swampy ground near Kazeh in considerable numbers. The specimen, of which I brought home the head, after being wounded by my rifle, was pulled down at night by lions; so that I got it in the morning.—J. H. S.

## 26. ÆGOCEROS NIGER (Harris).

Once seen near Kazeh, and distinctly recognized, as Capt. Speke informs me.

Capt. Speke has also brought home the head of a young (male?) Antelope, which he shot at Ukutu, under the east-coast range. Dr. Gray has kindly examined this for me, and determined it as referable to this species.

## 27. CATOBLEPAS GORGON, H. Smith.

Heads of a male and female Gnu, which I cannot distinguish from this species.

This Gnu is found in large herds in Khutu, on the western borders of Uzaramo, close to the Kingani river. It inhabits the park-like lands adjoining the river. It was not seen after crossing the hill-range.—J. H. S.

## 28. BOSELAPHUS — ?.

Capt. Speke's "Hartebeest" (see P. Z. S. 1863, p. 3), which he found all along his route from the coast to Gondokoro, can hardly have been *B. caama*. It was probably *B. lichtensteini* (Peters).

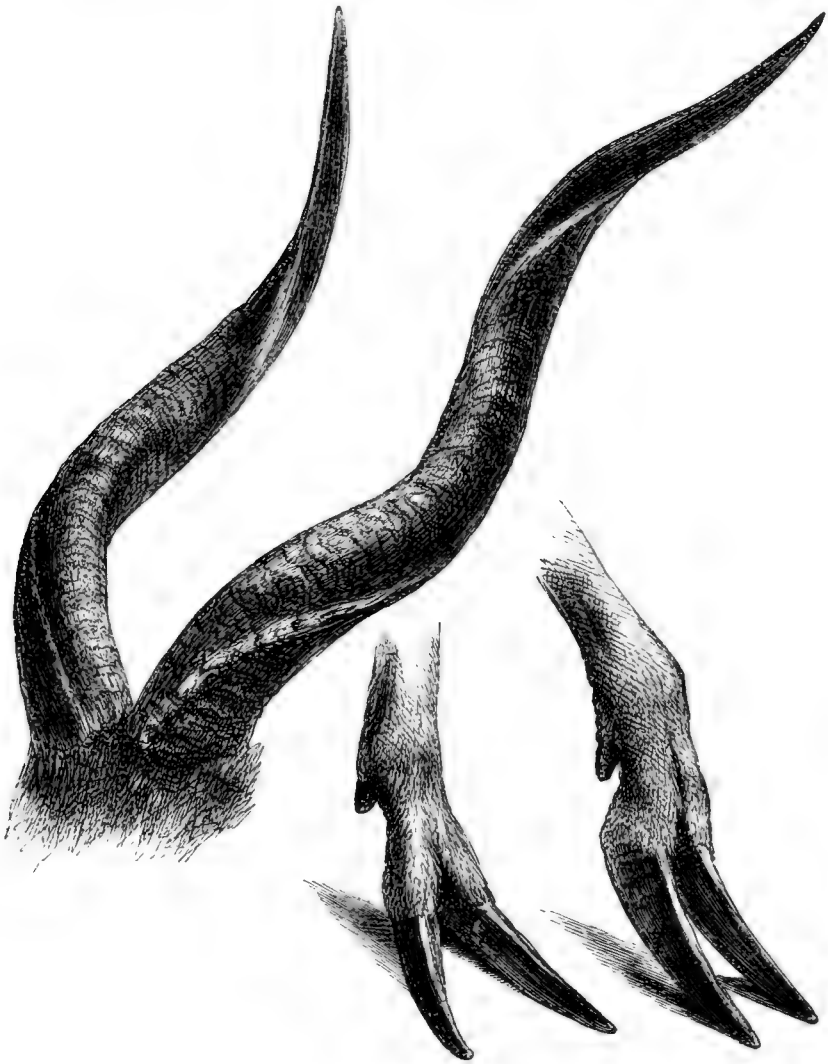
## 29. TRAGELAPHUS SPEKII, sp. nov. (Pl. XII.)

*T. obscure badius, fere unicolor, stria dorsali pallidior vix conspicua: auribus intus, macula nasali utrinque, duabus alteris subocularibus, et mento albidis: cauda elongata tenuiuscula, supra brunnea, subtus alba: ungulis valde elongatis: cornibus quoad formam T. euryceroti similibus, sed longioribus et gracilioribus, nigris, ad apicem albis.*

Capt. Speke has obtained in Karagweh the horns of an adult and the imperfect skin and skull of a young male Antelope of the genus *Tragelaphus*, apparently belonging to a new species, which I propose to name provisionally after its discoverer.

The horns are hardly different, apparently, from those of *Tragelaphus euryceros*.

The fur is very long and coarse, as in *T. angasi*. The skin is of a uniform mouse-colour; front of head reddish; narrow dorsal streak



*Tragelaphus spekii*.

paler, with some whitish hairs; below lighter; tail darker; under-side and terminal tuft white; knees white; side of the cheek, chin, and front of upper lip white; horns diverging backwards at the tip.



The hoofs are excessively elongated; evidently specially adapted for traversing the reedy swamps which it inhabits.

This Antelope frequents the beds of Papyrus in the borders of the lakes of Karagweh. King Rumanika, of Karagweh, ordered his boatmen to catch me a specimen. They procured me a young male alive, the skin of which I brought home. I kept him some days alive, feeding him on Papyrus-tops, the only thing he would eat. He was very awkward on the hard ground, his long toes being evidently only adapted to carry him among the swamps. The king also gave me the horns of an adult of this Antelope. The skins of this animal are highly prized in Karagweh, Uganda, and Ungoro, and are worn by the kings and their officers.—J. H. S.

### 30. TRAGELAPHUS SYLVATICUS (Sparm.).

The head of a young male Antelope of this species.

The Bush-bok frequents the thick bushes in the countries we traversed, from Unyamuezi to Madi. It is usually found singly, and makes a bark when suddenly disturbed.—J. H. S.

### 31. OREAS LIVINGSTONII, sp. nov. (?).

Capt. Speke met with a small herd of about a dozen Elands at Inenge, in Usagara. He describes them as "head and horns like the common Eland, but more rufous on the forehead, with black points and a broad black band strongly marked on the hinder part of the fore legs, just above the bend of the knee." His figure represents the animal as having a very distinct black dorsal band, and seven or eight white cross stripes across the flanks. I have no doubt this is the same northern species of the Eland (*Oreas*) as that described in Dr. Livingstone's Travels.

Dr. Kirk informs me that he met with this Eland on the left bank of the Zambesi, in the neighbourhood of the Kafue, a large tributary of the former stream, and that it is readily distinguishable at first sight from the Common Eland (*Oreas canna*) by its striped flanks. I think there can be no doubt, therefore, as to its being a distinct animal; and I propose to name it after its discoverer, *Oreas livingstonii*.

### 32. STREPSICEROS KUDU, Gray.

The Koodoo was met with in Ugogo, at Ustuke, though no specimens were obtained; but I am certain of the species.—J. H. S.

### 33. BOS CAFFER.

Met with everywhere, where the grass is sufficiently heavy.—J. H. S.

### 34. CAMELOPARDALIS GIRAFFA.

The Giraffe is abundant everywhere in the countries we traversed, from the coast to Gondokoro, wherever the country affords it suitable haunts.—J. H. S.

## Ordo VI. PACHYDERMATA.

## 35. PHACOCHÆRUS ÆLIANI.

Skulls of both sexes of this Wart-Hog.

Found in herds in Uzaramo and Mgunda Mkali; generally near water.—J. H. S.

## 36. HIPPOPOTAMUS AMPHIBIUS, Linn.

Abundant in the Kingani river and on the adjoining sea-coast, also in Lake Nyanza and the Nile.—J. H. S.

## 37. RHINOCEROS BICORNIS, Linn. }

## 38. RHINOCEROS SIMUS, Burchell. }

The Black Rhinoceros is very common throughout the whole country we traversed, down to Gondokoro. The White Two-horned Rhinoceros is found in Karagweh, where several specimens were shot. It is rather larger than the black animal.—J. H. S.

## Ordo VII. PROBOSCIDEA.

## 39. ELEPHAS AFRICANUS.

Met with throughout the country, from the coast to Gondokoro.

2. ON THE BIRDS COLLECTED BY CAPT. J. H. SPEKE DURING  
THE EAST-AFRICAN EXPEDITION. BY P. L. SCLATER; WITH  
NOTES BY CAPT. J. H. SPEKE.

(Plate XIV.)

Capt. Speke having submitted to my examination all the birdskins obtained during his recent successful expedition through Eastern Africa, I have had great pleasure in undertaking the task of the determination of the species. This, I may remark, has been rendered less easy by the imperfect state of many of the specimens, naturally resulting from the difficulties of collecting them in and transporting them through a hazardous and previously unknown country.

The specimens brought home by Capt. Speke, altogether about seventy in number, were all obtained between Bogamogo, opposite Zanzibar (6° 30' S. lat.), and Gondokoro on the Nile (5° N. lat.), and with very few exceptions before reaching Usui, in the countries of Uzaramo, Usagara, Ugogo, Unyamuezi, and Uzinza; so that on the whole they may be taken as characteristic of the East-African avifauna immediately south of the Equator.

The species represented in Capt. Speke's collection are sixty-two, namely:—

Accipitres.....	3	Columbæ.....	5
Passeres.....	27	Gallinæ.....	4
Fissirostres.....	10	Grallæ.....	3
Scansores.....	5	Anseres.....	5



Volf, del, et, lith

M&N Hanhart Imp

PSALIDOPROCNE ALBICEPS



This is of course a very small proportion of an avifauna which probably contains from 500 to 600 species\*, if not more. But the collection is of value as being from a country of which we had previously no ornithological knowledge whatever, though hardly sufficiently extensive to allow even of deductions from it as to the general character of the fauna.

The following species in Capt. Speke's collection seem to be without doubt new:—

*Bradyornis spekii.*

*Psalidoprocne albiceps.*

*Dryoscopus funebris.*

*Dryoscopus hamatus.*

*Vidua eques.*

Of these, *Bradyornis spekii*, the two species of *Dryoscopus*, and *Vidua eques* have been already described by Dr. Hartlaub in the Zoological Society's 'Proceedings'†. I now proceed to give a systematic catalogue of the entire collection, with a description of the undescribed species. Capt. Speke has added such particulars as his note-book or his memory could supply concerning each of them.

It will be observed that the greater part of the species in Capt. Speke's collection are such as have already been noticed as belonging to the East-African Fauna. There are, however, a certain number of southern species (such as *Colius striatus*, *Numida mitrata*, &c.) intermixed.

Capt. Speke's remarks on each species are added, and indicated by his initials.

#### FALCONIDÆ.

##### 1. FALCO TANYPTERUS, Licht.

Unyamuezi. One example: irides yellow. Shot at Kazeh by myself.—J. H. S.

##### 2. HYPOTRIORCHIS SEMITORQUATUS (Smith).

*Polyhierax semitorquatus*, Smith, Ill. S. Afr. Zool. pl. 1.

*Hypotriorchis castanonotus*, Heuglin, Ibis, 1861, pl. 12.

One example, with the back slate-coloured, thus showing that Heuglin (Ibis, 1860, p. 407) is wrong in stating that all the northern examples are red-backed. See also 'Ibis,' 1861, p. 346.

Shot in Bogue, whilst sitting on a tree.—J. H. S.

##### 3. MELIERAX MONOGRAMMICUS (Temm.).

*M. musicus*, P. Z. S. 1863, p. 105 (nec Daudin). This species was wrongly determined by me, and placed in Dr. Hartlaub's list of the birds collected by Capt. Speke at Kazeh, as *M. musicus*.

Irides yellow. Shot at Kazeh by myself, after it had just devoured a small lizard.—J. H. S.

\* Rüppell's 'Systematische Uebersicht' gives 532 species as occurring in N.E. Africa, from Egypt to Abyssinia. Heuglin's Synopsis (in the Sitzungsberichte Akad. Wien for 1856) enumerates no less than 754 species.

† See P. Z. S. 1863, pp. 105, 106.

## MOTACILLIDÆ.

## 4. MOTACILLA LUGUBRIS, Pallas.

Unyamuezi. Identified for me by Mr. Swinhoe, who has paid special attention to this group. See his remarks, 'P. Z. S.' 1863, p. 275.

## 5. BUDYTES FLAVA (Linn.).

A bad skin, referable to this species or one of its varieties. Unyamuezi.

## TURDIDÆ.

## 6. BRADYORNIS SPEKEI, Hartlaub, P. Z. S. 1863, p. 105.

Kazeh. The "Morning Warbler," as I named this species, was met with at Meninga, in Unyamuezi. It came about our tents in the morning, and delighted us with its cheerful song, being the sweetest singing-bird we met with.—J. H. S.

## 7. CRATEROPUS JARDINII, Sw.

Shot at Bogue, in Uzinza, where I saw it flying about in flocks of from ten to twenty, which frequent the forests. Rather pugnacious in disposition.—J. H. S.

## PYCNONOTIDÆ.

## 8. PYCNONOTUS NIGRICANS (Vieill.): Bp. Consp. p. 267.

The Bulbul of Unyamuezi: found all over the country, and well known as a songster.—J. H. S.

## ORIOOLIDÆ.

## 9. ORIOLUS MOLOXITA, Rüpp.

Common in Uzinza, where I brought home one example. Irides red.—J. H. S.

## HIRUNDINIDÆ.

## 10. PSALIDOPROCNE ALBICEPS, sp. nov. (Pl. XIV.)

*P. nigra, pileo et gula summa albis.*

Long. tota 5·5, alæ 4·2, caudæ rectr. ext. 3·1, rectr. med. 2·2 poll.

Capt. Speke has brought home in spirits from Uzinza a single example of this apparently new Swallow of the section *Psalidoprocne*. It seems to form a third of this little African group, which is distinguished from true *Hirundo* by its long cleft tail, short tarsi, small feet, and the saw-like margination of the outer edge of the first primary.

The two previously known species of the group are—

1. *P. holomelæna* (Sund.): *Hirundo holomelas*, Sund. Vet. Ac. Förh. 1850, p. 108: *Atticora hamigera*, Cassin, Proc. Acad. Phil.

1850, p. 57: *P. cypselina*, Cab. Mus. Hein. p. 48, ex Afr. occ. et merid.-orient.

2. *P. pristoptera* (Rüpp.): *Hirundo pristoptera*, Rüpp. Faun. Abyss. pl. 39. f. 2, ex Afr. orient.

This present species is easily known by its white head and throat.

#### MUSCICAPIDÆ.

11. TCHITREA, sp. ?

Observed in Unyamuezi, Uzinza, and Uganda.

12. BUTALIS, sp. ?

Uzaramo. A single specimen of an obscure species of this genus.

#### LANIIDÆ.

13. BASANISTES CISSOIDES (Licht.): Hartl. P. Z. S. 1863, p. 105.

Shot in Bogue. Seen in small flocks. The present specimen shot while sitting on a village palisade.—J. H. S.

14. LANIARIUS ICTERUS (Cuv.).

Uzaramo. Shot by Capt. Grant. Irides reddish yellow. Found singly in the bush; has a single note with a hollow sound.—J. H. S.

15. PRIONOPS POLIOCEPHALUS (Stanley).

Usui, in Uzinza. Found in the small detached bushes.—J. H. S.

16. DRYOSCOPIUS FUNERRIS, Hartl. P. Z. S. 1863, p. 105.

Two examples. Shot at Meninga.

17. DRYOSCOPIUS HAMATUS, Hartl. P. Z. S. 1863, p. 106.

Unyamuezi. Found in detached bushes.—J. H. S.

18. DICRURUS, sp. ?

Kingcrows were rather common all over the Unyamuezi and Uzaramo countries, resembling in their habits the well-known Kingcrow of India (*D. macrocerus*).—J. H. S.

#### FRINGILLIDÆ.

19. ALECTO DINEMELLI (Horsf.): Bp. Consp. p. 638.

Shot at Tura, in Unyamuezi, where it goes about in small flocks.—J. H. S.

20. EUPLECTES FLAMMICEPS, Sw.

Meninga. Flies about in large flocks, feeding in the corn-fields, and roosting at night in the rushes in the swamps.—J. H. S.

21. EUPLECTES IGNICOLOR (Vieill.): Bp. Consp. p. 446.

Unyoro. Found in large flocks in the corn-fields (*Holcus sorghum*).—J. H. S.

22. *STEGANURA VERREAUXI*, Cassin, Pr. Acad. Phil. 1851, p. 56.  
—*S. sphenura*, Bp. Consp. p. 449.

Meninga and Unyamuezi. Flies about on the tops of the Mimosas.—J. H. S.

23. *VIDUA EQUES*, Hartl. P. Z. S. 1863, p. 106, pl. 15.

Shot at Meninga. Seen in twos and threes among the corn and long grass.—J. H. S.

24. *VIDUA MACRURA* (Gm.): Bp. Consp. p. 448.

Found in the same locality as the last, and has the same habits.—J. H. S.

25. *HYPHANTORNIS LARVATUS*, Rüpp.

*Textor larvatus*, Bp. Consp. p. 440.

Uzaramo.

26. *HYPOCHERA NITENS* (Gm.): Bp. Consp. p. 510.

Unyamuezi. Common in the villages, feeding like Sparrows about the rows and heaps of dirt.—J. H. S.

27. *ESTRELLA MINIMA* (Vieill.).

Unyamuezi. Found in flocks in company with the last species in the villages.—J. H. S.

28. *ESTRELLA PHÆNICOTIS*, Sw.

Unyamuezi. Found in small flocks in the milk-bushes (*Euphorbia*) that in some places form the village fences; generally distributed in Unyamuezi.—J. H. S.

29. *SPERMESTES CUCULLATA*, Sw.

Unyamuezi. Found in the Euphorbias, like the previous species.—J. H. S.

30. *PASSER SWAINSONI*, Rüpp.

Unyamuezi and Karagweh. Frequents the villages like our House-Sparrow.—J. H. S.

#### UPUPIDÆ.

31. *IRRISOR CYANOMELAS* (Vieill.).

Uzaramo.

#### CORACIIDÆ.

32. *CORACIAS CAUDATA*, Vieill.: Sclater, P. Z. S. 1862, p. 12.

Bogue, in Uzinza.

33. *EURYSTOMUS AFER* (Lath.): Hartl. Orn. W. Afr. p. 28.

Uzaramo. Shot, on October 7th, 1860, a female with eggs partially developed in the ovary. Irides dark brown.—J. H. S.



## MEROPIDÆ.

## 34. MEROPS ERYTHROPTERUS, Gm.

Shot at Meninga.—J. H. S.

## ALCEDINIDÆ.

## 35. HALCYON SENEGALENSIS (Linn.): Hartl. P. Z. S. 1863, p. 105.

Meninga. Shot sitting on a tree over a brook.—J. H. S.

## 36. HALCYON CHELICUTI (Stanley).

This *Halcyon* seems to be the little *H. chelicuti*, not *H. variegata* (as entered in Dr. Hartlaub's list, P. Z. S. 1863, p. 105), from which, however, it only differs in its smaller size.

Bogue. Found in the forest.—J. H. S.

## BUCEROTIDÆ.

## 37. BUCORVUS ABYSSINICUS (Gm.).

Unyoro. This Hornbill is found in flocks of four or five, feeding on the ground. When disturbed, they fly up into the trees. I saw them also in Madi.—J. H. S.

## 38. BUCEROS CRISTATUS (Rüpp.): Bp. Consp. p. 89.

A head, apparently of this species.

Only seen in Uganda, where it flies about in small flocks from tree to tree, and makes a very loud and harsh noise.

## 39. TOCCUS MELANOLEUCUS (Licht.).

*Calao couronné*, Levaill. Ois. d'Afr. p. 234.

*Buceros coronatus*, Shaw.

Two examples, young and adult. Dr. Kirk's collection from the Zambesi likewise contains examples of this species. In the young bird the bill is yellowish, and in two rather immature specimens shows a yellowish band towards the base.

## CAPRIMULGIDÆ.

## 40. COSMETORNIS VEXILLARIUS (Gould).

*Semiophorus vexillarius*, Gould, Icon. Av. pl. in No. 2.

At first I was inclined to consider a single specimen of this species brought home by Capt. Speke different from the true *S. vexillarius* of Gould, and had intended to call it, after its discoverer, *S. spekii*, under which name it is figured in a woodcut in Capt. Speke's narrative of his expedition; I have, however, subsequently modified my opinion on this point. The only noticeable difference between the present specimen and Mr. Gould's figure is in the colour of the elongated ninth primary, which in Capt. Speke's bird has the inner

web brown like the outer, but in Mr. Gould's figure is represented as wholly white.

Dr. Kirk informs me this Goatsucker is very abundant on Lake Nyassa, and on the Zambesi at Tété. A specimen in his collection has the ninth elongated primary white on both webs at the base, but gradually passing into brown, showing that this is not a specific character.

This specimen was shot flying, after dark, in Uganda, at Urongani. Others were often seen lighting on the bare ground in the clear patches near the villages, whence they flew off when disturbed. This bird was well known to my servant "Bombay," who said they were very common in Uhiyou, which is in 8° S. lat.—J. H. S.

#### MUSOPHAGIDÆ.

##### 41. SCHIZORHIS PERSONATA, Rüpp.

This Touraco is rather common in the hilly country of Usagara. As in Somali-land, where I met with the same species\*, it is found amongst the thorny Acacias in flocks of from four to five.—J. H. S.

#### CUCULIDÆ.

##### 42. ZANCLOSTOMUS ÆREUS (Vieill.).

Uzaramo.

#### CAPITONIDÆ.

##### 43. POGONORHYNCHUS TORQUATUS (Dumont).

*Bucco torquatus*, Dumont, ex Levaill. Barbus, pl. 28.

Apparently undistinguishable from the South-African species, of which there is an example in the British Museum, collected by Mr. Livingstone at Tété.

Uzaramo. Found among the upper branches of the highest trees.—J. H. S.

#### COLIIDÆ.

##### 44. COLIUS STRIATUS, Gm.: Bp. Consp. p. 86.

Uzaramo. Also seen and shot higher up, in Usui. This bird is found in small flocks, frequenting the thickest bushes.—J. H. S.

#### PSITTACIDÆ.

##### 45. PŒOCEPHALUS FUSCICAPILLUS (Peters).

*Pionus fuscicapillus*, Verr. Rev. Zool. 1849, p. 58.

*Ps. cryptoxanthus*, Peters, Monatsb. Ak. Berl. 1854, p. 371.

Uzaramo. Very common in flocks in Uzaramo and on the interior plateau. The example preserved was a female. "Irides dirty yellow."

\* See Ibis, 1860, p. 245.

## COLUMBIDÆ.

46. *TRERON DELALANDII*, Bp. Consp. ii. p. 6.

Uzaramo; and seen all along the route to Madi, in large flocks; affording very good food.—J. H. S.

47. *COLUMBA GUINEA*, Linn.

Shot at Kazeh and Meninga; but not observed elsewhere during the journey. Seen in flocks; resorting to roost in the "ginger-bread" palms.

48. *CHALCOPELIA CHALCOSPILOS* (Sw.): Rüpp. Syst. Ueb. pl. 38.

Obtained at Duthumi.—J. H. S.

49. *CHALCOPELIA AFRA* (Linn.).

Uzaramo.

50. *TURTUR SEMITORQUATUS*, Sw.

Very common all along the route from the coast to Kazeh, and thence north to Gondokoro.—J. H. S.

## PTEROCLIDÆ.

51. *PTEROCLES*, sp.?

A bad specimen. Species uncertain.

Sandgrouse were seen in Unyamuezi and Ugogo, where this specimen was obtained.—J. H. S.

## TETRAONIDÆ.

52. *PTERNISTES CRANCHII* (Leach).

*Perdix cranchii*, Leach, App. Tuckey's Voy.

A single skin of what seems most likely to be the male of this scarce species, which is at present only known by the typical example in the British Museum.

Native name, *Quali*, from its call. This bird is found in pairs, and breeding in covies from the coast up to Usui; and is abundant in many places. The throat is yellow; naked space round the eyes bright red.—J. H. S.

53. *FRANCOLINUS* ——?

One example of a small Francolin, more like *F. gutturalis* of Rüppell than any other known species, but probably distinct. I do not venture to describe the specimen, it being imperfect and not very decided in its characters.

This Francolin is found in the forests all over Unyamuezi. I found young birds on the 20th February, near Kazeh, in company with the mother.—J. H. S.

PROC. ZOOL. SOC.—1864, No. VIII.

## PHASIANIDÆ.

## 54. NUMIDA MITRATA, Pallas.

Uzaramo. This Guinea-fowl was common in flocks near the villages, and also in the jungle, from the coast as far as Bari. In Ugogo I also met with a second species, with a tufted head, and small spots on the feathers\*.

Guinea-fowl afforded us a constant supply of food throughout our journey, when other meat was scarce.—J. H. S.

## OTIDÆ.

## 55. OTIS MELANOGASTER, Rüpp.

This Floriken was seen occasionally in Unyamuezi, and on the heights of Karagweh. It haunts the grassy spots in twos or threes, and is rather shy. The example brought home was shot at Uronogani, in Uganda. The irides are yellow.—J. H. S.

## ARDEIDÆ.

## 56. SCOPUS UMBRETTA, Linn.

The Umbrette is very common from the coast to Kazeh, frequenting the pools of water and ravines. It stands watching the water like a Heron, and on being disturbed flies up into a tree.—J. H. S.

## RALLIDÆ.

## 57. LIMNOCORAX FLAVIROSTRIS, Sw.: Hartl. Orn. W. Afr. p. 244.

Uzaramo. Frequents the rice-fields, where the present specimen was shot.—J. H. S.

## ANATIDÆ.

## 58. SARCIIDIORNIS AFRICANA, Eyton: Hartl. Orn. West Afr. p. 247.

This Duck is very common all over Unyamuezi in the rainy season, frequenting the pools and lakes in considerable flocks.—J. H. S.

## 59. PLECTROPTERUS RUEPELLI, Sclater, P. Z. S. 1859, p. 132, pl. 153.

Unyamuezi. Found on the lakes, whence it resorts to the rice-fields to feed.—J. H. S.

## 60. CAIRINA MOSCHATA, Linn.

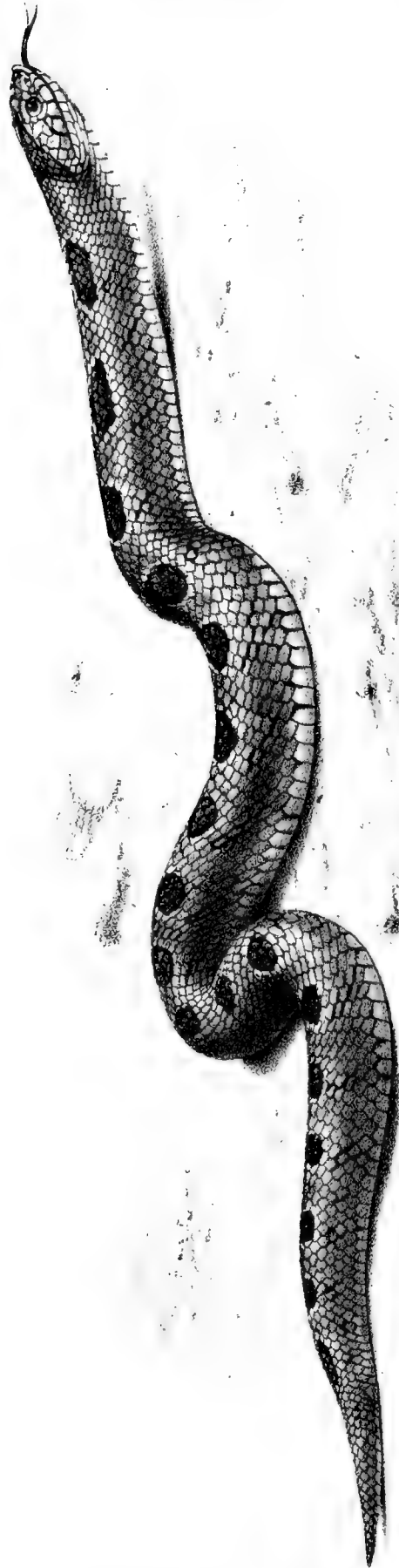
This is the only tame Duck of Meninga and Unyamuezi generally. It has been introduced by the Arabs.—J. H. S.

## 61. DENDROCYGNA VIDUATA (Linn.).

Meninga. Shot flying, out of a large flock.—J. H. S.

\* Probably *Numida pucheranii*, Hartl.—P. L. S.





## 62. PELECANUS, sp.

Head, perhaps, of *P. minor*, Rüpp.

Uganda; and common all the way down the Nile to Gondokoro.  
—J. H. S.

3. ON THE REPTILES AND FISHES OBTAINED BY CAPT. SPEKE  
DURING THE EAST-AFRICAN EXPEDITION. BY DR. A.  
GÜNTHER.

(Plate XV.)

The Reptiles brought home by Capt. Speke consist of four specimens of Tortoises, belonging to the genera *Testudo*, *Kinixys*, and *Pelomedusa*. One of the species is new, and has been named by Dr. Gray *Pelomedusa spekii*.

The Lizards consist of two specimens of *Agama*, two of *Eremias*, one *Phelsuma*, and one *Tiliqua*.

The Snakes consist of one specimen of *Python sebae*, one of *Coronella*, two of *Psammophis*, one of *Bucephalus (capensis)*, three of *Ahætulla (A. irregularis and A. natalensis)*, two of *Echidna (arietans)*, one of the black African Cobra (*Naja haje*), and one of a new and interesting species of *Causus*, which I have described\* as new, with the following characters:—

“CAUSUS (HETEROPHIS) ROSTRATUS. (Pl. XV.)

“Rostral shield turned upwards, forming a prominent, sharpish transverse ridge above; scales in seventeen rows; a series of large spots along the back.

“The rostral shield has a flat oblique inferior surface, and forms above a curved, prominent transverse ridge; it terminates posteriorly in a triangular process intercalated between the front parts of the anterior frontals. The nostril is between three shields, viz. between a narrow longish anterior nasal, a small square posterior nasal, and the anterior frontal; the latter shield is larger and longer than the posterior, which is twice as broad as long. Vertical five-sided, rather large; occipitals small, shorter than vertical, truncated behind. Loreal square. The orbit is surrounded by four narrow shields (the supraorbital not included), so that none of the labials enter the orbit. Six upper labials; temporals 2+3. Scales small, smooth, in 17 rows. Ventrals 121; anal entire; subcaudals 15.

“Greyish olive above, with a vertebral series of subrhombic white-edged black spots; neck with a triangular blackish spot, the point of which is directed forwards, and resting on the vertical shield. Lower parts whitish, along the middle blackish.

“This interesting species was obtained in Ugogo. The single specimen is 10 inches long, the tail measuring 10 lines.”

Five specimens of fishes are in Capt. Speke's collection; but their imperfect state only enables me to say that one of them is of the genus *Clarias*.

\* Ann. Nat. Hist. ser. 3. vol. xii. p. 363.

4. LIST OF THE SHELLS COLLECTED BY CAPT. SPEKE DURING HIS SECOND JOURNEY THROUGH CENTRAL AFRICA. BY DR. H. DOHRN.

The more we become acquainted with the African conchological fauna, the more the fact is proved that there is less variety of forms here than in any other part of the world. It has seemed hitherto that the west coast, especially the countries in the neighbourhood of the Gaboon and the mouth of the Niger, claimed a higher rank for conchological life than the rest; but the expeditions to Central Africa furnish us with materials sufficient to show that, in fact, this superiority does not exist, and we see the same species occurring near the east coast as well as on the borders of the Gulf of Guinea.

From Captain Speke's collection we find this statement to be quite true; and, what is more interesting still, we learn that up from the mouth of the Nile to the Victoria N'yanza, at a distance of more than 32 degrees of latitude, we meet with exactly the same species. It is not quite clear from the collection whether freshwater species hitherto considered peculiar to Mozambique occur in the Victoria N'yanza together with Nilotic shells, the specimens from different localities having been partly mixed up; but at least terrestrial species occur there which have likewise been found as far southwards as Tete and Quillimane, and others which have been brought from Old Calabar.

It is much to be regretted indeed that we cannot get full knowledge of the limits of South-African forms; however, we can state the general fact that the same species occur from Natal (and, on the other side, from the mouth of the Nile) to the Equator.

The following catalogue gives an idea of this mixture of the different faunas of Natal, Mozambique, Guinea, and Egypt, all the shells having been collected between the fourth degree of southern and the fourth degree of northern latitude:—

1. *VITRINA*, sp. ? The specimens being in a very bad state, it was not possible to make out the species.

2. *NANINA*? *MOZAMBICENSIS*, Pfr. From Uzaramo and the banks of the Victoria N'yanza. The typical specimen in Mr. Cuming's collection is not full-grown. The shell has got seven whorls, the white keel is prominent on the last four whorls. The diameter of the largest specimen is 17 millimetres.

3. *LIMICOLARIA* (*BULIMUS*) *NILOTICA*, Pfr. From Uganda and Karagwá.

4. *LIMICOLARIA FLAMMEA*, Müll. From the same localities. I have tried in vain to find out differences of this and the following species from the West-African type. In the collection are two varieties, one white, the other rose with pale-brown flames.

5. *LIMICOLARIA TENEBRICA*, Reeve. From Uganda.



6. *ACHATINA SPEKEI*, Dohrn, n. sp.

*Testa oblonga, solidula, superne obsolete granulata, sub epidermide cornea albida, irregulariter fulvo strigata; spira conica, apice obtusula, sutura submarginata; anfr. 6-7, convexiusculi, ultimus  $\frac{3}{4}$  longitudinis æquans; columella oblique truncata, arcuata, callo tenui induta; apertura oblongo-ovata.*

*Hab.* Ad lacum Victoria N'yanza.

Accedit ad *Achatinam ustulatam* Lamarckii, a qua præcipue spira graciliore, apice tenuiore, anfractibus superioribus convexioribus, columella magis arcuata differt.

7. *CYCLOSTOMA CALCARIUM*, Sow. Locality doubtful.✓ 8. *LIMNÆA*, sp., and

✓ 9. *PLANORBIS*, sp. From the Victoria N'yanza and the White Nile, as far down as 4° of N. latitude.

10. *PHYSOPSIS AFRICANA*, Krauss. Mixed up with Nilotic shells; but I suspect it is probable that this South-African species has been found in the Kingani River.

11. *LANISTES PURPUREUS*, Jonas, and

12. *LANISTES OVUM*, Peters. Probably from the Kingani River.

? 13. *LANISTES BOLTENIANUS*, Chemn. From the Nile and the Victoria N'yanza. The specimens are larger than those previously found further down the river.

14. *AMPULLARIA SPECIOSA*, Phil. From the Kingani River.

15. *NAVICELLA PORCELLANA*, Linn. From Johanna Island, Zanzibar.

✓ 16. *PALUDINA UNICOLOR*, Oliv., and

✓ 17. *PALUDINA BULIMOIDES*, Oliv. From the Victoria N'yanza and the White Nile. Of the latter species there is a gigantic specimen from the lake, more than twice as long as usual.

18. *MELANIA TUBERCULATA*, Müll., and

19. *CORBICULA FLUMINALIS*, Müll. Both probably from the Nilotic district.

20. *UNIO CAILLAUDI*, Fér., and

21. *UNIO ÆGYPTIACUS*, Caill. Are known as Nilotic species.

22. *UNIO MOSSAMBICENSIS*, Peters. Has been described from the Zambezi, where it lives together with the following species.

23. *SPATHA PETERSI*, Martens.

24. *SPATHA WAHLBERGI*, Krauss. Known from the Limpopo River in Caffraria.

25. SPATHA DUBIA, Gmel., and

26. SPATHA RUBENS, Lam. Both common Nile shells.

27. ETHERIA CAILLAUDI, Fér. Confined to the Upper Nile.

These species form the present collection. Two of them, *Limicolaria flammea* and *L. tenebrica*, are known from the coast of Guinea; seven are South-African types, viz. *Nanina mozambicensis*, *Physopsis africana*, *Lanistes purpureus* and *L. ovum*, *Unio mossambicensis*, *Spatha petersi*, and *S. wahlbergi*; two are distributed over Egypt, Syria, and a great part of Asia—*Melania tuberculata* and *Corbicula fluminalis*; *Navicella porcellana* is known from several islands near the African coast; *Limicolaria nilotica*, *Achatina spekei*, *Cyclostoma calcarium*, and *Ampullaria speciosa* seem to belong to the equatorial parts of East Africa; and all the rest are known from the Nile and from Egypt.

5. LIST OF INSECTS COLLECTED BY CAPT. SPEKE DURING THE EAST AFRICAN EXPEDITION. BY FREDERICK SMITH.

COLEOPTERA.

GEODEPHAGA.

*Anthia striatopunctata*, Guér.

*Polyhirma polioluma*, Chaud.

*Scarites procerus*, Klug.

HYDRADEPHAGA.

*Dineutes africanus*, Aub.

LAMELLICORNIA.

*Rhizotrogus* — ?

*Gymnopleurus profanus*, Latr.

*Trox* — ?

HETEROMERA.

*Pimelia*? — ?

*Tentyria* — ?

*Adesmia* — ?

New genus (*Scotinus*)?

*Epicauta gigas*, Westw.

RHYNCHOPHORA.

*Cleonus* —.

LONGICORNIA.

*Purpuricenus*, new sp.

HYMENOPTERA.

*Formica longipes*, Gerst.

*Ponera pestilens*, Smith.

*Dorylus helvolus*, Linn.

*Mutilla guineensis*, Fabr.

*M. bilunata*, Gerst.

FOSSORES.

*Ammophila* — ?

DIPTERA.

*Dexia* (new subgenus).

*Asilus* — ?

*Bengalia* — ?

*Chrysomyia clara*.

*Tabanus* — ?

ORTHOPTERA.

*Mantis* —.

*Acridium* —.

*Phymateus squarrosus*.

*Heterodes servillei*, Reich.

*Truxalis* — ?

*Acheta* (2 species).

*Pamphagus* — ?

*Polyzosteria* — ?

HEMIPTERA.

*Polymerus* —.

*Odontopus sexpunctatus*.

*Dysdercus albicollis*.

MYRIAPODA.

*Spirobolus pulvillatus*.

*Eurydesmus oxygonus*, Peters.

*Ixodes*, 2 species.

*Spirostreptus gigas*, Peters.

ARACHNIDA.

*Mygale*, sp. ?

6. ON THE SPECIES OF THE AMERICAN GENUS COCCYZUS.  
 BY P. L. SCLATER, M.A., PH.D., F.R.S., ETC.

In my 'Catalogue of American Birds' (pp. 322-3) I arranged, for convenience' sake, the species of the genus *Coccyzus* of Vieillot in my collection in two groups according to the colour of their bills, placing in one division the species with the base of the lower mandible *yellow*, as in the well-known *C. americanus*; in the other those with the whole bill *black*, as in the equally well-known *C. erythrophthalmus*. In my collection I had at that time three well-distinguished species of each of these two groups, namely,

Rostro partim flavo.	Rostro nigro.
1. <i>C. americanus</i> .	4. <i>C. erythrophthalmus</i> .
2. <i>C. dominicus</i> .	5. <i>C. melanocoryphus</i> .
3. <i>C. seniculus</i> .	6. <i>C. pumilus</i> .

Mr. A. Newton having kindly presented me with a Cuckoo from Jamaica, which appears to belong to new species of the yellow-billed section, I have lately taken the opportunity of examining again the examples of this genus in my own collection and also those in the British Museum, and I have drawn up the following notes upon the subject.

In the lately published fourth part of the 'Museum Heineanum' of MM. Cabanis and Heine, in which this group is treated of (p. 75 *et seq.*), all the six species above enumerated are admitted as valid under the same names as those I had employed for them, except the second, which I had called *dominicus*. For this Antillean species (the *C. seniculus* of Gosse) MM. Cabanis and Heine propose the new name *nesiotes*, alleging that it is not the true *Cuculus dominicus* of Linné, but that that term (founded upon Brisson's *Cuculus dominicensis*\*) is nothing more than a synonym of *Coccyzus americanus*. Upon again considering this matter, and referring to the older authorities, I must confess I was probably wrong, in identifying the Jamaican *Coccyzus seniculus* of Gosse with Linnæus's *C. dominicus*. Indeed I had already bestowed on this bird a new name in my MSS. and collection, and only subsequently altered it to *dominicus*, in order to save giving the bird a fresh appellation, when I thought I could make an old one do. I therefore adopt MM. Cabanis and Heine's name *nesiotes* for this insular species, which may be readily distinguished from the true *Coccyzus seniculus* by its smaller size, as observed by Mr. E. C. Taylor (Ibis, 1864, p. 170).

Again Prof. Baird, in his remarks upon the collection of birds made by Mr. Morel in Jamaica (Proc. Acad. Phil. 1864, p. 154), applies Brisson's term *dominicus* to a species of the yellow-billed section, which, although no description is given, I can hardly doubt is the same as the new species I now propose to describe; so that our respective attempts to employ old names instead of new ones may, I

\* Orn. iv. p. 110.

fear, result in some confusion, unless steps are taken to explain how the matter stands, as I now propose to do in the following list of all the species of the group, as far as I am acquainted with them.

I may remark that there is one species, given in Cabanis and Heine's account of the group, which I have not yet come across. This is *Coccyzus cinereus*, Vieillot, founded upon Azara's "*Ceniciento*" (Pax. ii. p. 368). There is stated to be an example of this bird in the Berlin collection obtained by Sello in Monte Video.

The following diagnoses are for the more easy identification of the eight species which I have examined:—

A. rostro inferiore ad basin flavo.

- a. ventre albo, { major, alis extus rufis ..... 1. *americanus*.  
                   { minor, alis extus dorso concoloribus ..... 2. *bairdi*.  
 b. ventre fulvescente, minor, subtus dilutior ..... 3. *nesiotes*.  
   major, subtus saturatior ..... 4. *seniculus*.

B. rostro toto nigro.

- a. fuscus, pileo dorso concolore ..... 5. *erythrophthalmus*.  
 b. fuscus, pileo cinereo, { corp. subtus fulvescente ..... 6. *melanocoryphus*.  
                                   { pect. rufo, ventre albo ..... 7. *pumilus*.  
 c. rufus, pileo plumbeo, subtus flavo-ferrugineus ..... 8. *landsbergi*.

I now add the principal synonyms and geographical ranges of each species:—

A. *Species rostro inferiore partim flavo.*

1. COCCYZUS AMERICANUS.

*Cuculus americanus*, Linn. S. N. i. p. 170.

*Cuculus carolinensis*, Wils. Am. Orn. iv. p. 13, pl. 28. f. 1.

*Coccyzus pyrrhopterus*, Vieill. Enc. Méth. p. 1343.

*Coccyzus americanus*, Bp. Consp. p. 111; Sclater, P. Z. S. 1860, p. 252; Newton, Ibis, 1859, p. 149.

*Coccygus americanus*, Baird, B. N. Am. p. 76; Cab. et Hein. Mus. Hein. iv. p. 75.

*Hab.* North America, Eastern States to Missouri plains (*Baird*); Jamaica (*Gosse*); S. Croix (*Newton fr.*); Trinidad (*Brit. Mus.*).

*Mus.* Brit. et P. L. S.

2. COCCYZUS BAIRDI, sp. nov.

*Coccyzus dominicus*, Baird, Pr. Acad. Sc. Phil. 1863, p. 154 (nec Brisson, nec Sclater).

*Similis* C. americano, sed minor, subtus magis candidus, supra alis extus dorso fere concoloribus, colore fulvo vix extus apparente et caudæ rectricibus 3 extimis albo terminatis, quarto pare ad ipsum apicem vix albo limbatis.

Long. tota 9·5, alæ 25·3, caudæ 5·3 poll. Angl.

*Hab.* In Jamaica.

*Mus.* P. L. S.

The single specimen which I possess of this species has been kindly presented to me by Mr. Alfred Newton. It formerly formed one of a small collection of birds obtained in Jamaica by the Rev. J. M. Philipps, of Spanish-town, and sent by him to Mr. J. H. Gurney.

I have little doubt that it is the species called by Prof. Baird (*l. c.*) *Coccyzus dominicus*, a name which I have already given my reasons for rejecting. It is not, however, Gosse's Yellow-billed Cuckoo (Birds of Jamaica, p. 279), as suggested by Prof. Baird; for I have one of Mr. Gosse's specimens in my collection, and that is the true *Coccyzus americanus*. Mr. Gosse also states that his May-bird is but a summer visitor to Jamaica; whereas Mr. March tells us (referring, as I suppose, to *Coccyzus bairdi*) that this bird "is a constant resident in the island, and more common in the lowlands during the summer than *C. seniculus* (i. e. *Coccyzus nesiotus*). It breeds from March to July, and builds in the low branches of trees or shrubs. The nest is a structure of a few dry sticks, so loosely put together that it falls to pieces on any attempt to remove it: three, rarely four, eggs are laid; they are glaucous green, oval, generally (though not always) round at both ends, and vary in size from  $1\frac{1}{4}$  by  $\frac{7}{8}$  to  $1\frac{3}{8}$  by 1 inch."—*Proc. Acad. Phil.* 1863, *l. c.*

### 3. COCCYZUS NESIOTES.

*Coccyzus seniculus*, Gosse, B. Jam. p. 281; Newton, Ibis, 1859, p. 150; Sallé, P. Z. S. 1857, p. 234; Sclater, P. Z. S. 1861, p. 79 (nec Lath.).

*Coccyzus minor*, Baird, B. N. Am. p. 78.

*Coccyzus dominicus*, Sclater, Cat. Am. B. p. 323.

*Coccyzus nesiotus*, Cab. et Hein. Mus. Hein. iv. p. 78; Taylor, Ibis, 1864, p. 170.

*Hab.* Jamaica (*Gosse et Osburn*); St. Croix (*Newton*); St. Domingo (*Sallé*); Porto Rico (*Taylor*).

*Mus.* Brit. et P. L. S.

### 4. COCCYZUS SENICULUS.

*Cuculus minor!*, Gm. S. N. i. p. 411 (ex Buff. Pl. Enl. 813).

*Cuculus seniculus*, Lath. Ind. Orn. i. p. 219.

*Coccyzus seniculus*, Vieill. Enc. Méth. p. 1346; Sclater, Cat. Am. B. p. 323; Taylor, Ibis, 1864, p. 170.

*Coccyzus helciventris*, Cab. in Schomb. Guian. iii. p. 714.

*Coccyzus seniculus*, Cab. et Hein. Mus. Hein. iv. p. 78.

*Hab.* Guiana (*Schomb.*); Cayenne; Trinidad; Chiriqui (*Capt. Kellett*); Dominica (*Taylor*); Guadeloupe et Martinique (*Mus. Paris.*).

*Mus.* Brit. et P. L. S.

I have compared my skin of this species with others in the British Museum from Chiriqui, Cayenne, and Trinidad, and believe them identical. The Chiriqui specimen is rather paler below. Mr. Taylor's examples from Dominica are not different.

B. *Species rostro nigro.*

## 5. COCCYZUS ERYTHROPHthalmus.

*Cuculus erythrophthalmus*, Wils. Am. Orn. iv. p. 16, pl. 28. fig. 2.

*Coccyzus erythrophthalmus*, Bp. Consp. p. 111; Sclater, P. Z. S. 1859, p. 252, et Cat. Am. B. p. 323.

*Coccygus erythrophthalmus*, Baird, B. N. Am. p. 77; Cab. et Hein. Mus. Hein. iv. p. 76.

*Hab.* Eastern United States to Missouri plains (*Baird*); Mexico (*Sallé*); Guatemala (*Salvin*); Panama (*M'Cleannan*); Bogota; Ucayali (*Hauxwell*).

*Mus.* Brit. et P. L. S.

This bird ranges all through Central America and New Granada into the valley of the Amazon. I have compared specimens from all the localities above given, and believe them identical.

## 6. COCCYZUS MELANOCORYPHUS.

*Coccyzus melanocoryphus*, Vieill. Nouv. Dict. viii. p. 271, et Enc. Méth. p. 1344; Sclater, Cat. Am. B. p. 323.

*Cuculus melanorhynchus*, Cuv. in Mus. Par.; Less. Tr. d'Orn. i. p. 141.

*Cuculus seniculus*, Max. Beitr. iv. p. 348.

*Coccyzus seniculus*, Burm. Syst. Ueb. ii. p. 267.

*Coccygus melanocoryphus*, Cab. et Hein. Mus. Hein. iv. p. 77.

*Hab.* S.E. Brazil; Ucayali (*Hauxwell*).

*Mus.* Brit. et P. L. S.

I am not sure about the locality of the specimen of this species in my collection said to be from Cayenne. It would seem to be a more southern species. Cabanis and Heine say, "Brazil, Paraguay, Monte Video, and La Plata." Hauxwell's skin from the Ucayali is certainly referable here,

## 7. COCCYZUS PUMILUS.

*Coccyzus pumilus*, Strickl. Orn. Contr. 1852, p. 28, pl. 82; Sclater, Cat. Am. B. p. 323; Cab. et Hein. Mus. Hein. iv. p. 79.

*Hab.* Trinidad.

*Mus.* Brit. et P. L. S.

## 8. COCCYZUS LANDSBERGI.

*Coccyzus landsbergi*, Bp. Consp. p. 112; Cab. et Hein. Mus. Hein. iv. p. 79.

*Hab.* New Granada, Santa Martha.

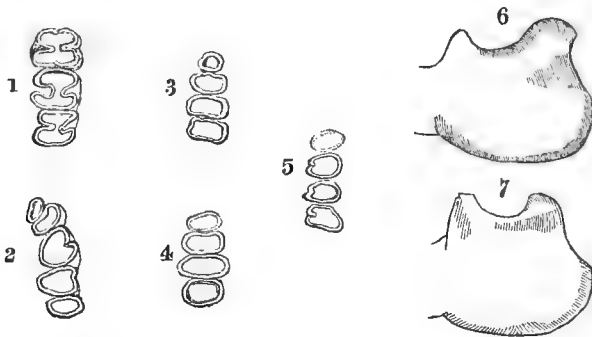
A fine specimen of this well-marked species is in the British Museum. It was received through the Messrs. Verreaux of Paris from Santa Martha, in New Granada. Bonaparte gives "*Bogota*" as the locality; but I have examined many thousands of Bogota skins, and have never seen a specimen of this bird amongst them. Bonaparte's diagnosis of this species is quite accurate.

## 7. NOTES ON THE SPECIES OF SAND-MOLES (GEORYCHUS).

BY DR. J. E. GRAY, F.R.S., ETC.

Dr. Selater having requested me to determine two Sand-Moles (*Georychus*) brought home by Capt. Speke, I have been induced to re-examine all the specimens of the genus in the British Museum.

The species may be divided into two groups according to their fur. Thus the fur of *G. capensis*, *G. albifrons*, and *G. unicolor* is very similar, being soft, long, and fluffy; while the fur of *G. cæcutiens*, *G. damarensis*, and *G. holosericeus* is also much alike, but differs from the fur of the other species in being shorter, rather more rigid, apparently closer.



The genus may be divided into four groups by the form of the grinders, thus:—

- A. Grinders  $\frac{3-3}{3-3}$ . The crown of the upper and lower grinders nearly square, with a fold or groove on the inner and outer edges. GEORYCHUS. (Fig. 1.)

1. GEORYCHUS CAPENSIS, Gray, Cat. B.M. p. 148; see Waterhouse, Ann. N. H. viii. t. 2. f. 2.

The perforation on the side of the skull in front of the orbit oblong, subtrigonal, almost as wide as high; forehead with a slight wing-like expansion over the front of the orbit; the hinder wing of the lower jaw longer than high, with a slightly rounded outline beneath. (Fig. 6.)

*Hab.* Cape of Good Hope.

2. GEORYCHUS ALBIFRONS, n. s.

Fur ashy grey, with a large white spot on the forehead.

*Hab.* E. Africa (*Capt. Speke*).

This species is very like *G. capensis*, both in the colouring of the fur and in the form of the grinders, but is not more than one-third the size, and it has a large white spot on the forehead, and no white on the cheeks. There is the same difference in the size of the skull; and the teeth are more worn, showing that it is as old. The brain-box of the skull is much more ventricose. The teeth have a distinct

fold on the inner side, but scarcely so on the outer; but then they are much worn. The expansion on the hinder part of the lower jaw is nearly of the same form as that of *G. capensis*.

Dr. Peters, in his 'Nat. Reise nach Mossambique,' t. 35. f. 3, gives a figure of the top of what he believes to be a young specimen of *Bathyergus cæcutiens*. It is something like the skull of this species; but it may be the skull of the species to which Dr. Peters refers it, for unfortunately the teeth, which would determine the question, are not figured.

B. Grinders  $\frac{4-4}{4-4}$ . Crown of the front upper small, oblong, transverse, simple; of second, third, and fourth subtriangular, with a distinct fold or groove on the broader inner side; the second tooth the smallest: the first lower oblong, small; the second square; the third triangular; the hinder side the smallest, with a subtrifoliate crown. The hinder wing of the lower jaw broad, nearly as high as wide, with a strongly arched outline below. HELIOPHOBIUS, Peters. (Figs. 2 & 7.)

### 3. GEORYCHUS PALLIDUS. (Teeth, fig. 2; jaw, fig. 7.)

Rufous grey; side of face, chin, and beneath paler yellow-grey.

Hab. E. Africa (Capt. Speke).

I have very little doubt that this is the animal figured by Dr. Peters (Reise nach Mossambique, t. 31) under the name *Bathyergus argenteo-cinereus*, and of which the skull is the skull figured as *Heliofobius argenteo-cinereus* (t. 35. f. 2), and described under the latter name in the 'Bericht,' 1846, p. 159; but he specially describes it as having six grinders in each jaw, where we have only four. I think that must have been an anomaly in his specimen; indeed the figure does not show six well-formed teeth.

Dr. Peters describes, and his figure represents, the fur as of a uniform colour. Our specimen is paler on the cheeks and underpart of the body.

C. Grinders  $\frac{4-4}{4-4}$ , all nearly similar and of nearly equal size, the hinder being only slightly the smallest. The crown of the upper ones is oblong, rounded, and with a central fold on the outer side. The crown of the lower with a fold in the middle of each side, the outer fold of the last one being almost, if not quite, obsolete on the outer side. The wing of the hinder part of the lower jaw longer than high, with a nearly straight lower edge. CRYPTOMYS. (Figs. 3 & 6.)

### 4. GEORYCHUS HOLOSERICUS, Wagner.

Hab. S. Africa.

D. Grinders  $\frac{4-4}{4-1}$ . The upper grinders oblong, transverse, wider than long, the front the largest; the hinder very small, nearly



*circular. The lower grinders oblong, much wider than long; the three front subequal; the hinder smaller, nearly circular. The posterior wing of the lower jaw longer than high, with a nearly straight lower margin. CÆTOMYS. (Figs. 4 & 6.)*

5. GEORYCHUS CÆCUTIENS, Gray, Cat. Mam. B.M. 149. (Teeth, fig. 4.)

*Bathyergus cæcutiens*, Licht.

? *B. hotentottus*, Lesson.

? *B. ludwigii*, A. Smith.

Fur short, close, uniform grey-brown; the perforation on the side of the nose in the front of the orbit large, oblong, erect.

*Hab.* Natal.

6. GEORYCHUS DAMARENSIS, Gray, Cat. Mamm. B. M. 149. (Teeth, fig. 5.)

*Bathyergus damarensis*, Ogilby, P. Z. S.

Fur short, uniform grey-brown, with a large white spot on the back of the head.

*Hab.* Damara-land.

This animal greatly resembles the preceding, but is larger, and has the white spot on the back of the head. The imperfect skull (with part of the teeth) in the Museum resembles the skull of the preceding in most particulars, but is rather larger in size, and the perforation in the side of the nose, at the front edge of the orbit, is smaller and not so oblong, being only a little higher than wide.

#### 8. ADDITIONAL OBSERVATIONS ON DERMATEMYS, A GENUS OF EMYDIDÆ FROM CENTRAL AMERICA. BY DR. J. E. GRAY, F.R.S., ETC.

In the 'Proceedings of the Zoological Society' for 1847, p. 53, I described a new genus of *Emydidæ*, under the name of *Dermatemys mawii*; and in the 'Catalogue of Shield Reptiles in the British Museum' I figured the shell of the animal in detail.

This genus was only established on a single shell, without any part of the animal attached to it, which was then in the Museum of this Society, having been presented by Lieut. Mawe, R.N. This specimen has since been transferred to the collection of the British Museum.

Some doubts have been expressed as to the position of the genus in the family *Emydidæ*; and one naturalist has even gone so far as to doubt the propriety of establishing a genus from the examination of the single specimen, which he was inclined to believe was only an abnormal form of a typical *Emys*. This I could not admit; for, even if it were an accidental monstrosity, we did not know an *Emys* to which it could be referred.

M. Bibron, when in England, named the specimen in the MS. Catalogue of the Zoological Society *Emys mawii*, a name which I adopted when I originally described it.

More lately the Museum at Paris appears to have received a specimen with the animal, for I find it shortly noticed in M. A. Duméril's 'Catalogue of the Paris Museum' under the name of *Emys berrardi*, with the following account of the animal:—"Head uniform brown, flat, broad, rather large; jaws toothed; toes broadly webbed; tail strong, rather long." It was sent from M. Berrard from Vera Cruz. *Emys berrardi* is also described and figured by A. Duméril in the sixth volume of the 'Archives du Muséum,' p. 231, t. 15.

It is to be observed that in the short notice of the species in the 'Catalogue of the Paris Museum' the series of large shields on the external symphysis, which is a peculiarity of *Dermatemys mawii*, is not mentioned; and they are to be looked for in vain in the longer description in the 'Archives du Muséum,' or in the plate which accompanies that paper. Yet there can be no doubt that both the descriptions and figure are intended for the animal under discussion, as M. Duméril admits that they received one specimen from Lieut. Mawe, or "Maw," as it is printed, which no doubt they obtained from the Zoological Society when M. Bibron was in London. However, the figure is more beautiful as a work of art than accurate as a natural-history drawing; but then herpetologists must by this time have become accustomed to M. Auguste Duméril's want of attention to such details.

Professor Agassiz, probably deceived by these inaccuracies, observed:—"E. berrardi seems to belong to the genus *Ptychemys*, judging from the description and figure of the jaws." (Contrib. p. 432.)

In Mr. Salvin's collection there is a specimen of this Tortoise, with the animal; but, unfortunately, the specimen is not well preserved: it seems to have been allowed to get dry from evaporation of the spirit, and then to have been placed in spirit again. However, it is in a sufficiently good condition to allow of a description of the more prominent characters of the animal; and it shows that the peculiar disposition of the sternal plate, on which the genus was described (though overlooked by M. Duméril), belongs to the normal characters of the animal. The head is rather large, flat above, and covered with a soft, thin, continuous skin; the nose shelving upward, conical; nostril terminal; mouth inferior, considerably behind the end of the nose; beak horny, rather sinuated at the sides; chin not bearded; the limbs strong, well developed; the legs covered with small scales; the front of the fore legs with numerous, unequal, very slender, band-like cross shields; feet large, broad; the toes very long, rather slender, with a wide web to the base of the claws; the outer edge of the fore leg and foot, and the hinder edge of the hind leg and foot, with a broad thin fringe, covered with large smooth plates; the claws 4—5, elongated, acute; tail short, thick, angular, the upper surface flat, granular, with a ridge on each side of the base con-

verging towards the centre, where the ridges unite and form a single central ridge of granules to the horny tip of the tail.

This genus has all the characters of the more typical aquatic Terrapins. The feet are broad, the toes elongated and well webbed; and the alveolar edges of the jaws, according to the figure of M. A. Duméril (*l. c.* t. 15), have distinct dentated ridges, like the genera *Pseudemys* and *Batagur*. M. Duméril's figure seems to have been taken from a badly preserved stuffed specimen. There is a second specimen of this very interesting Terrapin now alive in the Zoological Gardens.

In my description of the genus I have described the axillary and inguinal plates as absent. In Mr. Salvin's specimen they are very small, but yet distinctly present, but are more developed on one side than on the other, showing that they are variable in this animal.

9. DESCRIPTION OF A NEW SPECIES OF STAUROTYPUS (*S. SALVINII*) FROM GUATEMALA. BY DR. J. E. GRAY, F.R.S., ETC.

Among the interesting series of Tortoises brought by Mr. Salvin from Haumanchal, Guatemala, and deposited in the British Museum, are two specimens of a Tortoise of the genus *Staurotypus*, but differing from the normal form of that genus in the sternum being narrowed and acute in front, like the sternum of *Chelydra*, which genus it resembles in having a crested though short tail.

I would propose to divide the genus thus:—

A. *Sternum broad and truncated in front.* STAUROTYPUS.

1. STAUROTYPUS TRIPORCATUS, Gray, Cat. Shield Rept. B. M. 47, t. 20 b.

*Hab.* Mexico (*Wiegmann*); Vera Cruz (*Sallé*).

B. *Sternum narrow, tapering, acute in front.* STAUREMYS.

This subgenus has the form of the sternum and the crested tail of *Chelydra*, with the sternal shields of *Staurotypus*.

2. STAUROTYPUS (*STAUREMYS*) SALVINII.

*Hab.* Haumanchal, Guatemala (*Salvin*).

Head very large, swollen, crown covered with a thin soft skin; face conical, rather produced; nose terminal; mouth inferior; beak large, dentated on the edge; chin with two beards; throat warty; skin of body and limbs granular; the fore legs have several slender, very broad, arched, band-like shields across the inner side, the middle one being the broadest; toes well developed, strong; upper surface covered with a single series of band-like shields, united to the claws by a wide, well-developed web; claws 4—5, strong, elongate, acute; tail short, conical, angular above, with a central

and a lateral series of tubercles, forming three short crests; the thorax oblong, covered with three short, continuous keels; marginal shields rather narrow, elongate; sternum cross-like, small compared with the dorsal disk, narrow, slightly rounded before, acute behind, united to the dorsal disk by a narrow lateral process; sternal plates seven, thin, four pairs and a single odd one behind; the first pair elongate, longer than broad (probably the two first pair of other *Emydæ* united); the second pair broad, produced on the side, so as to cover the greater part of the cross-like sternum; the third pair elongate, narrow; the hinder plate rhombic, rather longer than broad, acute in front and behind; the axillary and inguinal plate large, covering the space between the outer lateral edge of the second pair of shields and the marginal plates. The front lobe of the sternum is very moveable at the suture between the first and second pairs of sternal plates, in the young specimen, and has a considerable amount of mobility in the adult specimen.

The shell is brown; the head is dark olive; the temple and the side of the neck pale-marbled; underside of the limbs whitish.

Wagler represents the anal shields of *S. triporcatus* as divided. In the large specimen in the British Museum they are united into a single rhombic shield, as in *S. salvinii*.

10. ON THE GENERA OF CHELYDIDÆ AND THE CHARACTERS FURNISHED BY THE STUDY OF THEIR SKULLS. BY DR. J. E. GRAY, F.R.S., ETC.

It has been very generally observed that the characters which separate the genera of the family *Chelydidæ* are very slight. This only arises from the genera having been hitherto characterized by some easily seen external peculiarities, which are often, as in this case, mere superficial indications of very different internal organizations.

This apparent slightness disappears when the skulls and other parts of the skeletons of the different genera are examined, as may be proved by consulting the figures of the skulls and skeletons given in the Atlas of Plates to Wagler's 'System of Amphibia,' published in 1830, which has been too much neglected by more recent writers on the subject.

Unfortunately we have the bones of only a few examples of the family in the collection of the British Museum, and there are only two skeletons in the Museum of the College of Surgeons; nor do I know of any other osteological collections which have more. These, however, and the figures of Cuvier and Wagler before referred to, are sufficient to show the outlines of an improved arrangement of the genera, and to afford more important characters for them.

I refer to my 'Catalogue of the Shield Reptiles in the British Museum' for the description of the species and more lengthened generic characters, and to the articles by me in the 'Proceedings of

the Zoological Society' for some additional observations on certain genera.

The typical *Chelydidæ* form the first section.

A. *Head depressed, covered with a soft skin, which is sometimes more or less divided on the surface into numerous polygonal plates. The skull depressed, without any or only a very rudimentary zygomatic arch. Temporal depression large, with a more or less wide bony arch at the back, from the ear-bones to the middle of the occiput; the temporal muscles only covered with a skin. Lower jaw weak, slender. The alveolar surface of the jaws thin, with a more or less distinct submarginal ridge.*  
Typical CHELYDIDÆ.

a. *The head very much depressed; beak covered with flesh; lips bearded. Skull very depressed, abnormal; temporal muscles very large, only covered with skin, without any central bony crown to the head; auri-occipital arch very slender, small; lower jaw very slender, weak.* CHELYDINA.

1. CHELYS, Daud.; Gray, Cat. Shield Rept. 60.

*Matamata*, Merrem.

CHELYS MATAMATA, Gray, *l. c.* 60.

Skeleton in Mus. Coll. Surg. no. 960, described by Owen, Cat. p. 187. Figured in Wagler's N. S. Amph. t. 3. f. 5, 15. Skull figured in Cuvier's Oss. Foss. v. 2, t. 11. f. 21-25, t. 12. f. 41.

b. *Head rather depressed, not fringed; beak naked; chin sometimes bearded; skull rather depressed, of normal form, with a distinct central bony crown, and a more or less strong auri-occipital arch; the auri-occipital arch very slender, weak; the temporal depression very large, covered with skin, separated by a very narrow ridge-like crown; shell very depressed, thin.*  
HYDRASPIDINA. (Fig. 1.)

2. HYDRASPIS, Gray, *l. c.* 54.

Intergular and nuchal plate on the margin. Chin two-bearded. Auri-occipital arch distinct.

*Hab.* Tropical America.

\* *Head very large, depressed, with small tessera.*

1. HYDRASPIS RANICEPS, Gray, *l. c.* 55. t. 23. (Skull, figs. 1, 2.)

*Hab.* Brazil.

Skeleton in British Museum.

Fig. 1.

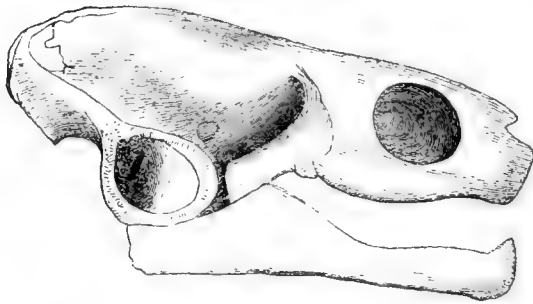
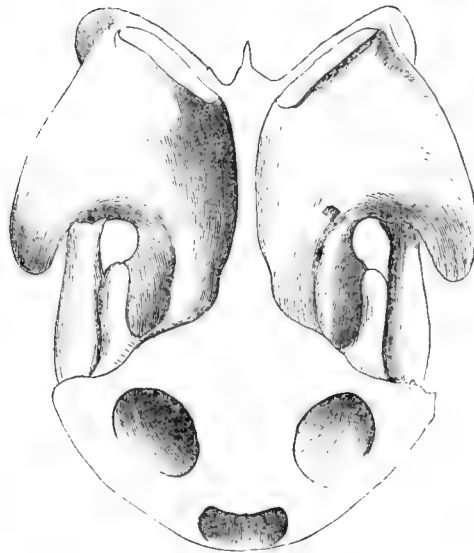


Fig. 2.

Skull of *Hydraspis raniceps*.

\*\* *Head moderate; crown subshielded.* RHINEMYS.

2. *HYDRASPIS GIBBA*, Gray, *l. c.* 55; Dum. et Bib. Erp. Gén. t. 20. f. 2.

*H. nasuta*, Gray, *l. c.* 55.

\*\*\* *Head moderate; occipital and superciliary shields enlarged.*  
Phrynops.

3. *HYDRASPIS GEOFFROYANA*, Gray, *l. c.* 57.

*Phrynops geoffroyana*, Wagler, N. S. Amph. t. 5. f. 47-51.

The species of this genus are very imperfectly known, owing to the want of more specimens of the animals in different states of growth, some having been established from adult, but the chief from only young examples. I am convinced that they cannot be deter-

mined with accuracy until the osteology of the different species has been compared in the different states of growth. I believe that the three species above named are types of distinct forms.

3. CHELODINA, Gray, Cat. Shield Rept. 58.

Intergular plate within the margin of the sternum. Chin not bearded.

*Hab.* Australia.

\* *Shields of disk very thin, veined.*

1. CHELODINA LONGICOLLIS, Gray, *l. c.* 58.

Skeleton in Mus. Coll. Surg. (no. 961). Shortly noticed by Owen (Cat. Osteol. Col. p. 187).

*Hab.* New Holland.

2. CHELODINA OBLONGA, Gray, *l. c.* 58, t. 24.

*Hab.* North and West Australia.

3. CHELODINA COLLIEI, Gray, *l. c.* 59.

*Hab.* Swan River.

\*\* *Shields of thorax hard; horny.*

4. CHELODINA SULCIFERA, Gray, *l. c.* 59, t. 25. f. 2.

*Hab.* Australia.

4. HYDROMEDUSA, Wagler; Gray, Cat. Shield Rept. 59.

Nuchal plate long, like a vertebral, and within the margin of the thorax. Intergular marginal. Chin not bearded.

*Hab.* Tropical America.

1. HYDROMEDUSA MAXIMILIANI, Gray, *l. c.* 59.

Skeleton figured in Wagler's 'N. S. Amph.' t. 3. f. 2-42.

2. HYDROMEDUSA FLAVILABRIS, Gray, *l. c.* 59.

c. *The auri-occipital arch broad; skull solid; the temporal depression moderate, covered with skin, separated by a broad, flat, bony crown.*

5. PLATEMYS, Wagler; Gray, Cat. *l. c.* 53.

Thorax depressed, light; cavity wide. Crown of head with a continuous skin; temple scaly. Skull rather slight. Chin two-bearded. Legs with large scales.

*Hab.* Tropical America.

PLATEMYS PLANICEPS, Gray, *l. c.* 54.

Skeleton figured in Wagler's N. S. Amph. t. 4. f. 1, 2, 3.

6. CHELYMYS, Gray, Cat. Shield Rept. 57.

Thorax convex, solid; cavity contracted and strengthened by two

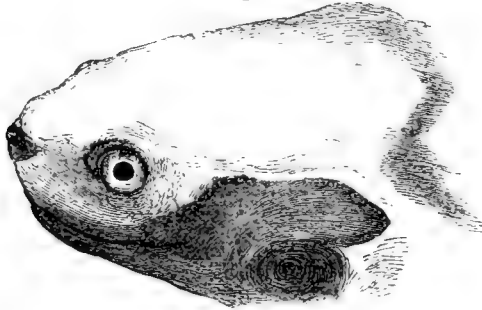
erect bony folds in front. Crown of head with numerous polygonal tesserae. Skull solid. Chin not bearded. Legs with small scales.

*Hab.* Australia.

\* *Nuchal shield broad and well developed; hinder margin of shell entire.*

1. CHELYMYS MACQUARIA, Gray, *l. c.* 57; *Ann. & Mag. N. H.* 1863, xii. 98. (Head, fig. 3.)

Fig. 3.



*Chelymys macquaria.*

\*\* *Nuchal shield none; hinder margin of the young shell dentated; vertebral plate nodulose.*

2. CHELYMYS DENTATA, Gray, *Ann. & Mag. N. H. ser. 3. xii. p. 98.*  
*C. elseyi*, Gray.

*Hab.* North Australia (*Mr. Elsey*).

B. *Head covered with hard, symmetrical horny plates. The skull with a largely developed zygomatic arch, which is often dilated posteriorly, so as to cover the upper hinder part of the temporal muscle with a bony case. Lower jaw strong. Beak naked. Nuchal and gular plate marginal.*

a. *Head depressed, with a deep longitudinal frontal groove. The skull depressed. Zygomatic arch moderately developed. Temporal muscles covered with hard dermal shields. Alveolar surface of the jaws thin, with a small submarginal ridge. Claws 5—5. Africa. Emydoid Chelydidæ.*

7. STERNOTHÆRUS, Gray, *Cat. Shield Rept.* 51; *P. Z. S.* 1863, p. 192.

Front lobe of sternum mobile, with an internal process on each side.

*Hab.* Africa and Madagascar.

\* *Crown-shield on a line with the back of the tympanum. Tanoa.*

1. STERNOTHÆRUS SINUATUS, Gray, *P. Z. S.* 1863, p. 193 (figure of head).



2. STERNOTHÆRUS DERBIANUS, Gray, *l. c.* 52, t. 22; P. Z. S. 1863, p. 194.

*Pentonyx gabonensis*, A. Dum. Arch. d. Mus. x. p. 164.

\*\* *Crown with oblong shields, and small scales behind over the tympanum.* Notoa.

3. STERNOTHÆRUS SUBNIGER, Gray, *l. c.* 52; P. Z. S. 1863, p. 195. *Var.* Ann. & Mag. N. H. 1863, xii. 405.

*S. castaneus*, Dum. et Bib. Erp. Gén. t. 20. f. 1.

\*\*\* *Crown with three shields. Head elongate.*

4. STERNOTHÆRUS NIGER, Gray, *l. c.* 51; P. Z. S. 1863, p. 196. *Hab.* Madagascar.

8. PELOMEDUSA, Gray, Cat. Shield Rept. 52.

Lobes of sternum solid, immoveable.

*Hab.* Africa.

\* *Pectoral shields small, short, triangular; humeral large; occipital with small shields.* Pentonyx.

1. PELOMEDUSA GEHAFIÆ, Gray, *l. c.* 53.

\*\* *Pectoral and humeral shields equal, oblong, four-sided; occipital largely shielded.* Pelomedusa.

2. PELOMEDUSA SUBRUFÆ, Gray, *l. c.* 53.

3. PELOMEDUSA NIGRÆ, Gray, Ann. & Mag. N. H. 1863, xii. 99. *Pentonyx du cap*, A. Duméril, Arch. du Mus. xiii. t. . f. 3.

b. *Head swollen. Skull very solid. Zygomatic arch much dilated posteriorly, so as to cover the temporal muscles with a bony case to the occiput. Alveolar surface of the jaws wide, callous, with several ridges. Claws 5—4. America. Chelonoid Chelydridæ.*

9. PODOCNEMIS, Gray, Cat. Shield Rept. 61.

Head subdepressed. Nose with a central groove. Temporal muscle partially covered with skin. Skull figured and described in Owen's Cat. Osteol. Mus. Col. Surg. p. 203, no. 1056.

\* *Alveolar surface of the upper jaw with three ridges: the hinder broad, low, margining the edge of the inner nostrils; the two front sharp-edged, diverging to the end of the maxillary edge; the first one short. Head broad, short.* Podocnemis.

1. PODOCNEMIS EXPANSA, Wagler, N. Syst. Amph. t. 4; Gray, Cat. Shield Rept. 61, t. 27 (shell), t. 37. f. 1 (skull).

\*\* *Head elongate, narrow. Alveolar surface of the upper jaw with two sharp edges; ridges parallel to the edge of the jaw and the opening of the inner nostrils; the hinder ridge thinnest, and nearly on the margin of the opening of the inner nostrils.*  
Chelonemys.

2. *PODOCNEMIS DUMERILIANA*, Wagler, N. Syst. Amph. 135; Gray, Cat. 62, t. 28.

*Emys expansa*, Cuvier, Oss. Foss. v. pt. 2, t. 11. f. 9-12 (skull), not Dum. et Bib.

The two species of *Podocnemis* are well distinguished by the shape of the dorsal disk, and by the smaller size and more elongated shape of the head of the animal; but I am not aware that the distinction which exists between the two species in the structure of the skull has been before recorded.

In the British Museum there are two skulls of each species, received from Mr. Bates, from Ega. And it is important to observe that the skull figured by Cuvier (Oss. Foss. vol. v. part 2, t. 11. f. 9-12) as *Emys expansa* is one species, and that figured by Wagler (N. Syst. Amph. t. 4) as *Podocnemis expansa* and by me in the 'Catalogue of Shield Reptiles in the British Museum' (t. 37. f. 1) is the other.

They are very similar externally; but the skulls of *P. expansa* are much larger and much broader, compared with their length, than those of *P. dumeriliana*. The frontal plate of the latter species is much larger compared with the size of the head, and it is also longer and narrower, than the same plate in *P. expansa*. The ridges on the alveolar surface of the upper jaws of the two species are very distinct; and this distinction seems permanent, as it has been observed on three specimens of the skull of *P. expansa*.

In *P. expansa* there are three ridges; the two front ones are nearly parallel, and they diverge from the centre towards the hinder end of the maxillary edge, so that they are at an angle both with the maxillary edge and with the edge of the internal nostrils; the front of these two ridges only half the length of the hinder one. The third ridge is scarcely raised, broad, rugose on the edge of the concave cavity for the internal nostril.

In *P. dumeriliana* there are only two ridges, both of which are parallel to the edge of the jaw and the edge of the palatine cavity, which are nearly parallel to each other. The front of the two ridges is much the strongest and largest; the hinder one is shorter, narrower, but well developed and very near the edge of the palate-opening, as is well represented in Cuvier's figure of the skull of *Emys expansa* (Oss. Foss. t. 11. f. 9-12).

In the skull of the older *P. expansa* the two front ridges become higher, more tubercular, and do not increase in length with the size of the skull; so they appear shorter in proportion, and the tubercular ridge on the margin of the opening to the internal nostril is less distinct. The skull of a very young specimen of this species is

figured by Wagler in his Atlas to his N. Syst. Amph. (t. 4. f. 5-9) as *Podocnemis expansa*, and the skull of a full-grown but not adult specimen in plate 27. f. 1, in my 'Catalogue of Shield Reptiles in the British Museum;' but, unfortunately, in the latter figure the artist, in the otherwise very accurate figure, has scarcely made the two front ridges at a sufficient angle with the edge of the jaws and the opening of the internal nostrils.

In the 'Archives du Muséum' (vol. vi. p. 242), M. Auguste Duméril describes a third species of *Podocnemis*, under the name of *P. lewyana*, which was received from Bogota and Venezuela, which appears by the figure (that is to say, if it is correct) to have an oblong, broad, transverse instead of a long frontal plate; but, unfortunately, there are no details of the skull given.

10. PELTOCEPHALUS, Dum. et Bib. ; Gray, Cat. Shield Rept. 61.

Head high, subcompressed. Nose produced, on a level with the forehead, rounded above, without any groove; nostril apical. Temporal muscles entirely covered with bone.

*Hab.* Tropical America.

PELTOCEPHALUS TRACAXA, Gray, *l. c.* 61; Spix, Test. Bras. t. 4, 5.

The skull of this genus bears some resemblance to that of the *Cheloniadae*, in having a vaulted bony arch covering the temporal depressions, which is entirely formed of the parietal bones. It differs from the skull of the Marine Turtle in the vomer not being ossified, and hence the internal nostrils are not divided by a septum (see Owen, Cat. Osteol. p. 203).

Both in *Emydidæ* and *Chelydidæ* there is a large-headed group; and both the large-headed Terrapins are, at the same time, provided with a bony case for the temporal muscle. This may be to protect the head, which is too large to be contracted within the thorax; but this is not usually the case, as the true small-headed genera of *Chelydidæ* have the temporal muscle more naked than any genus of *Emydidæ*, yet the animals never withdraw their head, and only shelter it by placing it when at rest under the sides of the shell.

11. DESCRIPTION OF THE NEW LIZARD (*SPATALURA CARTERI*, GRAY), FROM LIFE\*. BY HENRY CARTER, ESQ.

"Noticing that, in your specific description of *Spatalura carteri* (P. Z. S. 1863, p. 236), you have inserted in a parenthesis the words 'dry from spirits,' I am inclined to think that you would be glad of more information on the colour-markings of this Lizard when fresh, which the following extract from my MS. Journal, written when the animal was caught, will, I hope, afford:—

" "Ground cinereous, six pairs of white spots between the back of

\* Extracted from a letter to Dr. J. E. Gray.

the head and root of the tail, symmetrically placed; six to eight lines of red spots on each side, broken and terminating in small points towards the belly; buff-coloured irregular spots on the sides among the red lines; belly bright yellow, passing into cinereous towards the roots of the posterior and anterior extremities; legs and tail spotted with red towards their proximal ends, with white spots towards their extremities; head irregularly marked with red and white spots having a transverse direction. Iris light cinereous, tympanum sunken and covered with loose skin.'

"This is a homely description, but I give it to you *verbatim* as it is in my Journal, and am sorry that I had not the latter to refer to in London when I left you the specimen.

"Lastly, I notice, p. 237, in the fifth paragraph from the top, *l. c.*, that an error has crept into my statement, in the word 'Anthrophagi,' which ought to have been 'Chelonophagi' (Turtle-eaters). It will not do to make mistakes of this kind; and these poor people, degraded as they are, I trust will never come to this."

12. REMARKS ON A SPECIES OF SHELL BELONGING TO THE FAMILY DENTALIIDÆ. BY W. BAIRD, M.D., F.L.S.; WITH NOTES ON THEIR USE BY THE NATIVES OF VANCOUVER'S ISLAND AND BRITISH COLUMBIA, BY J. K. LORD, F.Z.S.

Amongst the objects of natural history and ethnology brought from Vancouver's Island and British Columbia by Mr. Lord is a belt composed of numerous specimens of a species of *Dentalium* strung together. The species bears an exceedingly close resemblance to that described by Linnæus as *Dentalium entalis* (*Entalis vulgaris* of Risso and of Dr. Gray's 'Guide to Mollusca'), and appears to me, notwithstanding the difference of habitat, to be undistinguishable from that European species. It has, however, been described by the late Mr. Nuttall as *Dentalium pretiosum*; and a figure has been given of it by Mr. Sowerby in one of his late Numbers of the 'The-saurus Conchyliorum.'

From a careful comparison of the typical specimens of *D. pretiosum* in Mr. Cuming's collection, there can be no doubt of the identity of that species with the specimens brought by Mr. Lord from Vancouver's Island; those in Mr. Cuming's collection are said to be from California. In examining the old graves on the banks of the Columbia River, along with numerous other articles, such as human bones, flint instruments, &c., Mr. Lord found a number of specimens of a species of *Dentalium* considerably eroded and worn, which I have compared with some in Mr. Cuming's collection, and find identical with the *Dentalium striolatum* of Stimpson, from Newfoundland. I strongly suspect that both this species (*D. striolatum*) and *D. pretiosum* are only very slight varieties of the old Linnæan species *Dentalium entalis* (*Entalis vulgaris*). The habitats of all three (species?) are very different from each other; but, notwithstanding

this, in the absence of distinct specific characters, I should hesitate very much making distinct species of them. However that may be, the history of the specimens brought by Mr. Lord is very interesting; and these few observations must be considered only as introductory to the very instructive notes drawn up by that gentleman, a perusal of which will prove the best apology for these brief preliminary remarks.

*Notes on the above, by Mr. J. K. Lord.*

It is somewhat curious that these shells (*Entalis pretiosus*, Nuttall, sp.; *Entalis vulgaris*?) should have been employed as money by the Indians of North-West America—that is, by the native tribes inhabiting Vancouver's Island, Queen Charlotte's Island, and the mainland coast from the Straits of Fuca to Sitka. Since the introduction of blankets by the Hudson's Bay Company, the use of these shells as a medium of purchase has to a great extent died out, the blankets having become the money, as it were, or the means by which everything is now reckoned and paid for by the savage. A slave, a canoe, or a squaw is worth in these days so many blankets; but it used to be so many strings of *Dentalia*. In the interior, east of the Cascade Mountains, the Beaver-skin is the article by which everything is reckoned—in fact, the money of the inland Indian.

The value of the *Dentalium* depends upon its length: those representing the greater value are called, when strung together end to end, a "Hi-qua;" but the standard by which the *Dentalium* is calculated to be fit for a "Hi-qua" is, that twenty-five shells placed end to end must make a fathom, or six feet, in length. At one time a "Hi-qua" would purchase a male slave, equal in value to fifty blankets, or about £50 sterling. The shorter and defective shells are strung together in various lengths, and are called "Kop-kops." About forty "Kop-kops" equal a "Hi-qua" in value. These strings of *Dentalia* are usually the stakes gambled for.

The shells are generally procured from the west side of Vancouver's Island, and towards its northern end; they live in the soft sand, in the snug bays and harbours that abound along the west coast of the island, in water from three to five fathoms in depth. The habit of the *Dentalium* is to bury itself in the sand, the small end of the shell being invariably downwards, and the large end close to the surface, thus allowing the fish to protrude its feeding- and breathing-organs. This position the wily savage has turned to good account, and has adopted a most ingenious mode of capturing the much-prized shell. He arms himself with a long spear, the haft made of light deal, to the end of which is fastened a strip of wood placed transversely, but driven full of teeth made of bone, resembling exactly a long comb with the teeth very wide apart. A squaw sits in the stern of the canoe and paddles it slowly along, whilst the Indian with the spear stands in the bow. He now stabs this comb-like affair into the sand at the bottom of the water, and after giving two or three stabs draws it up to look at it; if he has been successful, per-

haps four or five *Dentalia* have been impaled on the teeth of the spear. It is a very ingenious mode of procuring them, for it would be quite impracticable either to dredge or net them out; and they are never, as far as I know, found between tide-marks.

At one period, perhaps a remote one, in the history of the inland Indians these *Dentalia* were worn as ornaments. I have often found them mixed with stone beads and small bits of the nacre of the *Haliotis*, of an irregular shape, but with a small hole drilled through each piece, in the old graves about Walla-walla and Colville. In all probability, these ornaments were traded from the coast Indians; but, as these graves were quite a thousand miles from the sea, it is pretty clear the inland and coast Indians must have had some means of communication.

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March 22, 1864.

Dr. J. E. Gray, F.R.S., in the Chair.

The Secretary called the attention of the Meeting to some recent important additions to the Society's Menagerie. These consisted, first, of a selection from a large importation of living animals lately received by a London dealer from Para, amongst which were the following species:—

A female Monkey of the genus *Pithecia*, probably referable to *Pithecia satanas*, Hoffm. This rather scarce Monkey from the Upper Amazon had not been previously represented in the Society's living collection for many years. The present specimen was nearly black, but with a decided brownish tinge on the back.

2. A Red-throated Falcon (*Hypotriorchis ruficularis*).
3. Two Blue-bearded Crows (*Cyanocorax cyanopogon*).
4. Four Ground-Cuckoos (*Guira piririgua*).
5. One Green Trumpeter (*Psophia viridis*, Spix).
6. One Green Bittern (*Butorides virescens*).
7. Crimson-billed Teal (*Querquedula ipecutiri*, Vieill.).
8. Two Red-billed Whistling-Ducks (*Dendrocygna autumnalis*).
9. An immature specimen of the American Jabiru (*Mycteria americana*).
10. Two young Maguari Storks (*Ciconia maguari*).
11. Two Cassiques (*Cassicus persicus*), together with several other birds of less interest.

A second important arrival had taken place on the 17th ultimo, in the shape of a new present from the Society's Corresponding

Member the Bābu Rajendra Mullick, of Calcutta, of the following living animals :—

Eleven Shawl-Goats of the diminutive Cashmere breed, which was believed not to have been previously introduced into this country.

Four Rufous-tailed Pheasants (*Euplocamus erythrophthalmus*), one male and two females.

One pair of Crowned Pigeons (*Goura coronata*).

Three Nicobar Pigeons (*Caloenas nicobarica*).

Ten Green-winged Doves (*Chalcophaps indica*).

Five Barred Turtledoves (*Geopelia striata*).

Six Dwarf Turtledoves (*Turtur humilis*).

Two Indian Turtledoves (*Turtur gelastes*).

Four Porphyrios (*Porphyrio smaragnotus*).

Five Bengal Chikor Partridges (*Perdix gularis*).

Four Francolins (*Francolinus vulgaris*).

Two Indian Grey Partridges (*Perdix ponticeriana*).

These birds had been safely transmitted to this country by the Overland Mail, under arrangements concluded by the Council with J. J. Stone, Esq.

Mr. Leadbeater exhibited a series of antlers of the Cariboo Reindeer of North America (*Tarandus rangifer*), which had been presented to H. R. H. the Prince of Wales during his travels in Canada.

The following papers were read :—

1. NOTES ON THE DIDUNCULUS STRIGIROSTRIS, OR TOOTH-BILLED PIGEON. BY DR. GEORGE BENNETT.

Having fortunately obtained by purchase a living pair of those singular and rare birds, the Tooth-billed Pigeon (*Didunculus strigirostris*), which had been brought from the Samoan or Navigators' Islands to Sydney, New South Wales, an opportunity has been afforded to me of attentively watching their habits in captivity. To guard against the event also of these valuable birds dying, I availed myself of the services of Mr. C. Thomas, who made an accurate drawing of them from life in their most natural attitudes; and his drawing conveys an excellent idea of the peculiar expression of these remarkable birds when alive. I have sent a tracing of this drawing for insertion in the 'Illustrated London News;' and should the bird now on its way to England die, I shall be able to send the Society an accurate coloured representation of the living birds. The *Didunculus*, like the Dodo, has a very limited range, having only been found inhabiting the Samoan or Navigators' Islands. In the contour of the bill, the form and position of the nostrils, and several other characters, the *Didunculus* differs from any other living species at present known; and, although a smaller bird in size, it approximates the nearest in all its characters to the extinct Dodo, and, like it, combines the character of a rapacious bird with that of the harmless Pigeon.

The Dodo also inhabited a very limited space of land, as the remains of that bird and allied genera have only been found on the small islands of the Mauritius, Bourbon, and Rodriguez. The *Didunculus* may therefore be regarded as the nearest living ally of the extinct Dodo. Although the mandibles of the *Didunculus* are powerful in structure, yet the beak is never used as an offensive weapon; for when the hand is placed in the cage, or the bird is seized for removal from one cage to another, it never attempts to bite the aggressor, but, on the contrary, is so timid, that after fluttering about or running into a dark corner of the cage in its efforts to escape, it soon becomes subdued and is easily taken.

In all the families of Pigeons a diversity in the form of the beak is found. In the Fruit-eating Pigeon the beak is stronger, stouter, and the corneous portion is strongly arched and compressed, bearing a great resemblance to the structure in certain rapacious birds; and this form of beak is carried to the greatest extent in the *Didunculus*, yet the living birds in captivity were never observed to crush hard seeds or nuts. They would nibble into minute bits the seeds of loquats, almonds, and hemp-seed, with the same action as observed in the Parrot tribe when feeding. When I first had the birds, boiled potatoes and stale bread formed their diet. The boiled potatoes were torn and swallowed in large pieces at a time, being soft; but the stale bread they would place their feet upon and tear with the hooked beak into small bits. A piece of apple was also eaten; but the bananas placed in the cage were never touched, although it is said that in a wild state they live on berries, and are very fond of the mountain-plantain. Both the birds were regularly fed twice daily—early in the morning and about four in the afternoon. It was supposed at one time that these birds did not drink water; but I soon found that this assertion was incorrect.

It was early in June 1863 that the first *Didunculus* arrived at Sydney; and on the 15th of that month and following days I examined the bird, which I found in good health, very timid, and a young bird in immature plumage, and the teeth of the lower mandibles not yet developed. It was about the size of the Nicobar Pigeon, but rounder and more plump in form. It kept steadily looking at me during the time I was examining it, uttering occasionally a plaintive *coo, coo, coo*, or *goo, goo, goo*. This bird had been captured on the island of Upolu, not more than five miles from the settlement of Apia, by a native. It has now been in captivity for some time, and is considered to be at this time (January 1864) two years old. It has attained the full plumage of the adult bird, and the teeth of the lower mandibles are also fully developed. When any one approaches the cage, it will sometimes retire to an obscure corner, and at other times will remain quiet on the perch, watching attentively every movement of the spectator, and occasionally changing its position. It invariably feeds in the light, but will not do so if any one is present; the only opportunity we had of observing its mode of feeding was through the window, when the bird was placed in the verandah of the house, when we could watch its actions with-



out being seen by the bird. It usually kept on the low perch, but when disturbed would sometimes jump on the ground, run rapidly about, and then take refuge in the darkest part of the cage. In its physiognomy it is a stupid-looking bird, with, at the same time, a remarkable peculiarity of expression, which the artist has succeeded in obtaining. The bird has nothing particular in its plumage to attract the attention of the common observer; but the head of a rapacious bird on the body of a Pigeon would excite the attention of the most ordinary spectator. The plumage of this bird is of a chocolate-red colour, deeper on the back, tail, and the primaries and secondaries of the wings, and barred over the breast, throat, and wing-coverts with light brown. The upper part of the head is rather bare of feathers, but those remaining are of a dark slate-colour. The base of the beak is of an orange-red, and the rest of the mandibles yellowish. The legs and feet are of a bright orange-red. The cere round the eyes is of a flesh-colour. The irides are of a dark reddish brown. The form of the beak and the bright eyes impart to the bird very much the character of a rapacious bird. The above is the state of the plumage in the young bird.

On the 24th of July another *Didunculus* was brought to Sydney from the Island of Savaii (one of the largest and most mountainous of the Navigators' group). I found it was a full-grown bird in adult plumage, with the teeth of the lower mandibles well developed; the head, neck, breast, and upper part of the back was of a greenish black; back, wings, tail, and under tail-coverts of a chocolate-red. The legs and feet were of a bright scarlet. The mandibles are of a bright orange-red, shaded off near the tip with very light yellow. The cere around the eyes is also of a bright orange-red colour; the irides brownish black. I was informed that these birds are nearly extinct, from having been formerly eaten by the natives in great numbers, and of late years from being destroyed by wild cats; and it is said that most of the Ground-Pigeons are following the fate of the *Didunculus* from the same causes. Indeed, from my observation of the living birds, they are very timid and stupid. On the following day I examined the birds together. They are both moulting; and the young bird has grown very much since I last saw it, and is now larger in size than the adult specimen recently arrived. As there is no sexual distinction in the plumage, it is probable that size may be a distinguishing mark of the sexes; and if so, these birds may prove to be male and female. On the 21st of August I completed my purchase of these birds for a very high price. I must thank the Council of the Acclimatization Societies of Sydney and Melbourne for the liberal resolutions passed by them to unite with me in the purchase of these rare birds, on account of the very high sum demanded for them, and to join with me in presenting them to the Zoological Society of London; but, on mature reflection, considering the casualties to which they would be liable, I considered it would be more satisfactory to take upon myself the sole responsibility and expense. The adult bird often runs wildly about the cage, flapping its wings, and, when the door is open to receive food, makes every

effort to escape. These birds run with great rapidity, elongating the body and depressing the head, and in the action of running resemble the Grouse. On the 12th of September the older bird refused food, which continued to the morning of the 14th of September, when several fits carried it off in the course of the day. I placed the bird entire in spirits, to enable a complete anatomical description of this bird to be given by my distinguished friend Professor Owen. The young bird seems tamer and more lively since the death of its companion; it is probable the old bird being so wild terrified it. I observed a quantity of white powder (epithelium) about the cage lately, and also discolouring the water; it resembled the same kind of powder often observed from the White Cockatoos. On the 4th of October the bird did not feed well; so we gave it some loquats (*Eriobotrya japonica*), a fruit naturalized and abundant in New South Wales. The bird enjoyed the change; it did not devour the pulp, but picked out the seeds, and cracked them into minute bits; what portion was eaten I could not ascertain, but a pint of loquats was used daily in this way, as well as occasionally a little boiled potato. On the 7th of October the *Didunculus* was in excellent health, and the plumage is very much changed, as the head, neck, and breast is now of a slate-colour tinged with dark bottle-green. The bill has become of a bright orange-red, and the legs are nearly a bright scarlet colour: the bird has evidently assumed the adult plumage. When the bird is seen, and does not perceive the observer, it leaps from the perch, runs about the cage, and then commences feeding; but on a visitor approaching, it again takes to the perch, and remains watching the intruder, giving deep guttural growls, followed afterwards by a vibration of the whole body from the head to the tail, uttering at the same time its plaintive notes of *goo, goo, goo*, repeated in quick succession. On the 23rd of October, the bird looks well; it has not eaten for the last two days, but has taken a large quantity of gravel. We find the bird requires a large supply of that material for the purpose of aiding digestion. As it was considered the loquat-seeds might have disagreed with the bird, they were discontinued. On the 25th it appeared worse; and fearing it might die, I placed it in a Parrot-cage to enable the artist to finish the drawing from life, as in a cage of that description he could have a good view of the plumage, &c., over every part of the bird; when, to our great surprise, it jumped from the perch to the bottom of the cage and commenced eating what, on examination, was found to be hemp-seed; and from that time it has been fed on that kind of food. It soon regained its usual health, the diet of hemp-seed being occasionally diversified by some bleached almonds; stale bread is also placed in the cage, but it eats but very little, if any, of it. This circumstance points out the difficulty of arranging a diet for a bird with whose habits we are unacquainted, as at one time it thrives well upon a certain diet, on a sudden appears to be dying, and then becomes in good health from a change of food accidentally discovered, as in this instance. Since then, the *Didunculus* has continued in most excellent health; and has now just been placed on board the ship 'La Hogue,' Captain





J Wolf, del. et lith

M & N Hanhart Im

SMITHORNIS RUFO-LATERALIS

Williams, under the care of Mr. Broughton, the steward, from whose experience in the management of birds there is every chance of this rare bird arriving safe at its destination in the Gardens of the Zoological Society in the Regent's Park. The 'La Hogue' sailed from Sydney early on the morning of the 12th of January, 1864.

The whole of the time the bird was in my possession it never became domesticated, nor evinced the slightest attachment to the lady who daily fed it: it was the same to her as to strangers; and I do not consider the *Didunculus* a bird that will be readily domesticated or reconciled to captivity. For some period of time this bird would be very tame comparatively, and then, without any apparent cause to account for the change, would become very wild. At that time the cleaning of the cage was attended with some difficulty, from its violent fluttering on any one approaching for the purpose, in which it evinced no little power of wing.

2. ON A NEW SPECIES OF SMITHORNIS. BY GEORGE ROBERT GRAY, F.L.S., ETC.

(Plate XVI.)

I beg to call the attention of the Society to a new species of bird belonging to the interesting genus *Smithornis*, which was established by the late Prince Bonaparte on the *Platyrhynchus capensis* of Sir A. Smith.

It is characterized as follows, under the name of

SMITHORNIS RUFOLATERALIS, sp. nov. (Pl. XVI.)

Head and occiput deep black; lores white; nape with a narrow collar of orange-brown; back black, varied with white and orange-brown; scapulars and upper tail-coverts orange-brown; wing-coverts black, tipped with white; beneath the body white, but with the breast and sides of abdomen more or less streaked with narrow stripes of black along the shaft of each feather; each side of the breast with a patch of pale rusty colour. Upper mandible black, lower one yellow; feet pale horn-colour.

Length 4" 6''' ; wings 2" 4''' .

This bird differs from the typical and only hitherto known species *Smithornis capensis* (Smith) in being of a smaller size, and in possessing a greater variety of colours.

The British Museum possesses, through Mr. Gould, a single specimen of *S. rufolateralis*, which was stated to have been brought from West Africa; but the exact locality is unknown.

3. REPORT OF A COLLECTION OF FISHES MADE BY MESSRS. DOW, GODMAN, AND SALVIN IN GUATEMALA. BY ALBERT GÜNTHER, M.A., M.D., PH.D., F.Z.S.

*Part First.*

The following paper contains a report on a collection of fishes made by Messrs. Salvin and Godman during their travels in Guatemala and in adjacent countries, in which they were assisted by Capt. Dow, a gentleman whose name is already familiar to all interested in ichthyology. I give at present diagnoses of those new species which are not included in the third, fourth, and fifth volumes of the 'Catalogue of Fishes.' Full descriptions, with notes on the localities where the collections have been made, and with a complete list of the species collected, will be published in the 'Transactions' of this Society.

**CENTROPOMUS MEDIUS.**

A. 3/7. L. lat. 57. Eight longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is contained thrice and three-fourths in the total length (without caudal); the length of the head twice and four-fifths. Præorbital finely serrated; suboperculum produced into a flap, which does not extend to the vertical from the origin of the dorsal fin. The intermaxillary extends somewhat beyond the anterior margin of the orbit. Dorsal spines strong; the third is longer than the fourth, and half as long as the head. The second anal spine long, but a little shorter than the third, and equal in length to the distance between the extremity of the upper jaw and the præopercular margin. The length of the ventral fin is much more than one-half of its distance from the anal fin. Lateral line black.

Two specimens, 13 inches long, from Chiapam.

**CENTROPOMUS NIGRESCENS.**

A. 3/6. L. lat. 70. Ten longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is contained four times and a half in the total length (without caudal); the length of the head twice and four-fifths. Præorbital not serrated; suboperculum produced into a short flap, which does not extend to the vertical from the origin of the dorsal fin. The intermaxillary extends a little beyond the middle of the orbit. Dorsal spines rather feeble; the third and fourth are equal in length, two-fifths of the length of the head; the second and third anal spines also are equal in length, and not longer than the dorsal spines mentioned. The length of the ventral fin is scarcely more than one-half of the distance of its base from the anal. Air-bladder without appendages anteriorly. Silvery; upper parts and fins blackish; lateral line black.

One specimen, 14 inches long, from Chiapam.

This species is allied to *C. appendiculatus*, Poey, but differs externally in its considerably more feeble and shorter fin-spines.

We take here the opportunity of describing another species of this genus, the typical specimen of which is in the British Museum.

*CENTROPOMUS BREVIS.*

A.  $\frac{3}{6}$ . L. lat. 50. Eight longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is two-sevenths of the total length (without caudal); the length of the head two-fifths. Præorbital strongly serrated; suboperculum produced into a long flap, which extends beyond the vertical from the origin of the dorsal fin. The intermaxillary extends to below the middle of the orbit. Dorsal spines strong; the third is scarcely longer than the fourth, its length being equal to the distance between the hinder margin of the orbit and the extremity of the lower jaw. The second anal spine is very long, considerably longer than the third, and two-thirds of the length of the head; if laid backwards, it extends beyond the root of the caudal. The length of the ventral fin is two-thirds of the distance of its base from the origin of the anal. Vent much nearer to the anal than to the ventral. Lateral line greyish.

We have only one specimen, 6 inches long, of this species; we do not know from what part of Tropical America it comes.

*CENTROPRISTIS MACROPOMA.*

D.  $\frac{10}{12}$ . A.  $\frac{3}{7}$ . L. lat. 52. L. transv.  $\frac{6}{16}$ .

Closely allied to *C. radialis*, Q. & G.; but whilst that species has a notch above the spiniferous angle, the present has its præopercular margin not interrupted, the long spines of the angle gradually passing into the finer serrature. There are six series of scales between the eye and the angle of the præoperculum. The maxillary extends nearly to the vertical from the posterior margin of the orbit. Dorsal fin with a notch, the ninth spine being considerably shorter than the tenth. A series of rather small brownish spots above and below the lateral line.

Three specimens were collected by Messrs. Dow and Salvin on the Pacific coast of Panama.

*MESOPRION ARATUS.*

D.  $\frac{11}{13}$ . A.  $\frac{3}{8}$ . L. lat. 45. L. transv.  $\frac{4}{12}$ .

The height of the body equals the length of the head, and is contained thrice and two-fifths in the total (without caudal). The maxillary does not extend backwards to the vertical from the centre of the eye. Præoperculum finely serrated, with scarcely a trace of a posterior notch. Dorsal spines of moderate strength; the third and fourth are the longest, two-fifths of the length of the head; the eleventh is scarcely longer than the tenth, which is rather more than half as long as the fourth. Caudal fin emarginate, two-thirds scaly; anal spines short, rather feeble, the third longer than the second, and equal in length to the last dorsal spine. Upper and lateral parts

brownish olive, each scale with a pearl-coloured spot, the spots forming together very distinct longitudinal stripes; no black lateral spot; hind part of the root of the pectoral brown. Lower parts salmon-coloured.

We have four examples: two, 15 inches long, were collected by Mr. Salvin at Chiapam; and two young ones were sent by Capt. Dow from the Pacific coast of Panama.

**PRISTIPOMA CHALCEUM.**

D.  $\frac{12}{15}$ . A.  $\frac{3}{12}$ . L. lat. 56. L. transv. 11/19.

The height of the body is contained twice and two-thirds in the total length (without caudal); the length of the head thrice and a third. The diameter of the eye is nearly equal to the width of the interorbital space, and two-thirds of the extent of the snout. The maxillary does not extend backwards to the vertical from the anterior margin of the orbit. Præoperculum minutely serrated behind, with the angle rounded, but not produced. There is no notch between the spinous and soft portions of the dorsal fin, the hinder spines being only a little shorter than the anterior rays; dorsal spines of moderate strength, the fourth being the longest, not quite half as long as the head; anal spines short, the second being only a little longer than the third, two-sevenths of the length of the head. Caudal fin subtruncated, scarcely emarginate. Dorsal and anal perfectly scaleless. The pectoral fin extends to the vertical from the vent. Bronze-coloured, shining silvery, perfectly immaculate; vertical fins blackish, with an indistinct light band along the base.

One specimen, 8 inches long, was discovered by Messrs. Dow and Salvin on the Pacific coast of Panama.

**PRISTIPOMA MACRACANTHUM.**

D.  $11\frac{1}{13}$ . A.  $\frac{3}{8}$ . L. lat. 47. L. transv. 6/13.

The height of the body equals the length of the head, and is one-third of the total (without caudal). The diameter of the eye equals the width of the interorbital space, and is two-thirds, or somewhat less than two-thirds, of the extent of the snout. Hind margin of the anterior nostril with a broad flap. Snout somewhat produced; the maxillary does not extend to below the anterior margin of the eye. Præoperculum with the hind margin rather concave, and with stronger teeth at the angle, which is rounded. The spinous and soft portions of the dorsal fin are separated by a deep notch, the spine of the soft portion being much longer than the preceding, which is somewhat longer than the second. Dorsal and anal spines exceedingly strong; the fourth dorsal spine is the longest, its length being contained twice and a third in that of the head. The second anal spine much longer and stronger than the third, and even than the fourth dorsal spine. Caudal fin truncated. Each soft ray of the vertical fins is accompanied by a series of minute scales. The pectoral fin extends to the vent. Scales smooth. Silvery, with several



very indistinct dark cross bands on the back, which appear to be arranged as in *P. leuciscus*.

Two specimens, 11 and 14 inches long, were collected by Mr. Salvin at Chiapam.

#### PRISTIPOMA LEUCISCUS.

D.  $11\frac{1}{15}$ . A. 3/7-8. L. lat. 51. L. transv.  $\frac{5-6}{10}$ .

The height of the body is contained thrice or thrice and a third in the total length (without caudal), the length of the head thrice and a fourth. The diameter of the eye is equal to, or more than, the width of the interorbital space, but less than the extent of the snout. The maxillary does not quite extend backwards to the vertical from the anterior margin of the orbit. Præoperculum finely serrated behind, with the angle rounded, and with the hind margin slightly curved. The spinous and soft portions of the dorsal fin are separated by a deep notch, the spine of the soft portion being nearly twice as long as the preceding. Dorsal spines long, of moderate strength: the third is the longest, and one-half, or more than one-half, as long as the head. Anal spines rather strong: the third is a little longer than the second, equal to the seventh dorsal spine, and more than one-third of the length of the head. Caudal fin emarginate. Each soft ray of the vertical fins is accompanied by a series of minute scales. The pectoral fin extends to the vertical from the origin of the anal in the younger example, but is shorter in adult ones. Scales smooth, bright silvery; young specimens with several very indistinct dark cross bands on the back, the first from the nape of the neck to the gill-opening, the second below the seventh dorsal spine, the third below the last dorsal spine; old specimens with the marginal membrane of the operculum black.

One specimen,  $7\frac{1}{2}$  inches long, was found by Mr. Salvin at San José. Three others, from 11 to 12 inches long, are from Chiapam.

#### CONODON PACIFICI.

D.  $11\frac{1}{13}$ . A.  $\frac{3}{10}$ . L. lat. 47. L. transv. 7/13.

The spinous teeth at the angle of the præoperculum are not much stronger than the others. The height of the body is contained twice and two-fifths in the total length (without caudal).

One specimen,  $12\frac{1}{2}$  inches long, was collected by Mr. Salvin at Chiapam.

#### HÆMULON MARGARITIFERUM.

D.  $\frac{12}{17}$ . A.  $\frac{3}{11}$ . L. lat. 55. L. transv. 6/15.

The height of the body is one-third of the total length (without caudal), the length of the head two-sevenths. The diameter of the eye is two-sevenths of the latter, and equal to the extent of the snout and to the width of the interorbital space, which is very convex. The maxillary extends beyond the vertical from the anterior margin of the eye. Præoperculum emarginate behind. Dorsal fin scarcely

notched, with the soft portion very low; its spines are moderately strong, the fourth is the longest, not quite half as long as the head. Anal spines strong; the second is longer and stronger than the third, and equal to the eighth of the dorsal. The soft vertical fins enveloped in scales; caudal forked, with the upper lobe longest. The pectoral fin does not extend to the vent. Greenish olive above, each scale with a pearl-coloured centre; sides silvery; a blackish spot above in the axil.

One specimen, 12 inches long, was obtained by Messrs. Dow and Salvin on the Pacific coast of Panama.

*UPENEUS TETRASPILUS.*

D. 8|9. A. 7. L. lat. 33. L. transv. 2/6.

The height of the body equals the length of the head, and is contained thrice and two-fifths in the total (without caudal); the width of the interorbital space is two-thirds of the length of the snout. Teeth in both jaws in two series, the outer series of the upper jaw being formed by very obtuse and partly confluent teeth. The maxillary is dilated and rounded behind, and bent upwards into a sort of hook; the barbels extend to the vertical from the root of the pectoral. The third and fourth dorsal spines are subequal in length, longer than the second, and nearly three-fourths of the length of the head. Greenish olive above, each scale above and below the lateral line with a large pearl-coloured spot; sides yellow; a rose-coloured band on each side of the belly. A large blackish blotch on the lateral line, behind the hind part of the spinous dorsal fin. A second smaller blackish spot behind the orbit; the latter is sometimes very indistinct.

Two specimens,  $8\frac{1}{2}$  inches long, were collected by Messrs. Dow and Salvin on the Pacific coast of Panama.

This species would belong to the division which has been called *Mulloides*.

*POLYNEMUS MELANOPOMA.*

D.  $7|\frac{1}{12}$ . A.  $\frac{2}{13}$ . L. lat. 73.

Nine free pectoral appendages, the longest of which extends to the vent. Præoperculum finely serrated, with a small spine above the angle. The vomerine teeth form a rounded patch; the band of palatine teeth is as broad anteriorly as the front part of the intermaxillary band. Operculum black.

A single specimen, 15 inches long, was obtained by Mr. Salvin at San José.

*UMBRINA ELONGATA.*

D.  $10|\frac{1}{24}$ . A. 1/7. L. lat. 70. L. transv. 7/22.

The height of the body is contained four times and a third in the total length without caudal, and five times if the caudal is included; the length of the head is two-sevenths of the total, or one-fourth if

the caudal is included. The depth of the head is contained once and three-fourths in its length. Snout long; the diameter of the eye is two-fifths of the length of the snout, and one-fourth of the postorbital part of the head. Symphysial barbel very short, as long as the posterior nostril. Præoperculum without distinct serrature. The length of the second dorsal spine is one-half of that of the head. Posterior margin of the caudal *f*-shaped, the upper lobe being pointed, the lower rounded; anal spine very feeble. The maxillary extends to the vertical from the anterior margin of the orbit. Upper parts blackish, shining silvery, the lower white.

One specimen, 17 inches long, was found by Mr. Salvin at Chiapam.

#### MICROPOGON ALTIPINNIS.

D.  $10\frac{1}{22}$ . A. 2/7. L. lat. 48-50. L. transv. 7/15.

The height of the body is contained thrice and two-thirds in the total length (without caudal); the length of the head thrice and a half. The maxillary extends scarcely beyond the vertical from the anterior margin of the eye. A series of five minute barbels along each side of the mental groove. Two short, strong, divergent spines at the angle of the præoperculum. The third and fourth dorsal spines are long, their length being three-fifths of that of the head; anal spine of moderate strength, not quite one-fourth of the length of the head. Nearly uniform silvery.

Two specimens were procured by Mr. Salvin—one, 17 inches long, at Chiapam, and another, 14 inches long, at San José.

#### OTOLITHUS ALBUS.

D.  $10\frac{1}{21}$ . A. 2/9.

Scales rather irregularly arranged; there are seven series between the origin of the dorsal fin and the lateral line. The height of the body is one-fourth of the total length (without caudal), the length of the head two-sevenths. The extent of the snout is one-fourth of the length of the head; the maxillary extends somewhat beyond the vertical from the posterior margin of the eye. Præopercular angle not produced behind. The spinous dorsal is much longer than high; its spines are feeble, the length of the fourth being two-fifths of that of the head. Caudal fin rounded, with the middle rays produced. The second anal spine is truly spinous, not flexible, two-fifths of the length of the first soft ray. The pectoral fin extends as far backwards as the ventral, being more than half as long as the head. Immaculate, silvery, back greenish. (Pseudobranchiæ present.)

One specimen,  $14\frac{1}{2}$  inches long, was obtained by Mr. Salvin at Chiapam.

#### OTOLITHUS RETICULATUS.

D.  $10\frac{1}{26-27}$ . A. 11(2/9).

Closely allied to *O. carolinensis*. Scales rather irregularly ar-

ranged; there are nine series between the origin of the dorsal fin and the lateral line. The height of the body is contained four times and a third in the total length (without caudal); the length of the head thrice and a third. The extent of the snout is two-sevenths of the length of the head; the maxillary does not extend backwards to the vertical from the posterior margin of the eye; præopercular angle somewhat produced behind, membranaceous, striated; the posterior margin of the præoperculum obliquely descending backwards. The spinous dorsal is much longer than high; its spines are feeble, the fourth being the longest, two-fifths of the length of the head. Caudal fin subtruncated, the middle rays somewhat produced. The first anal ray is quite rudimentary; the second as long as the eye, flexible, scarcely spinous. The pectoral fin extends as far backwards as the ventral, being more than half as long as the head. Back and sides with an irregular network of brown undulated streaks; fins immaculate.

Two specimens were collected by Mr. Salvin—one, 15 inches long, at San José, the other, 13 inches long, at Chiapam.

#### TRACHYNOTUS GLAUROIDES.

D.  $6\frac{1}{20}$ . A.  $2\frac{1}{18}$ .

Closely allied to *T. glaucus*, but with the body more elevated. The height of the body is one-half of the total length (without caudal); the length of the head two-sevenths. The maxillary extends to below the middle of the eye. Anterior dorsal and anterior anal rays, and the caudal lobes, much prolonged, the length of the latter being two-sevenths of the total. The ventral fin does not extend to the vent. Five narrow blackish vertical bars across the lateral line.

One specimen, 7 inches long, was obtained by Mr. Salvin at San José.

Mr. Gill (Proc. Acad. Nat. Sc. Philad. 1863, p. 86) describes a *Trachynotus fasciatus*, which he distinguishes by its colours. "The second vertical band between the fourth and fifth (spines), and the third under the fourth and fifth rays." If the distribution of the bands is a specific character, that species cannot be identical with ours, which has the second band under the third spine, and the third immediately in front of the spine of the soft dorsal fin.

#### THALASSOPHRYNE RETICULATA.

D.  $2\frac{1}{24}$ . A. 24. V.  $1\frac{1}{2}$ . P. 16.

The length of the head is two-sevenths of the total length (without caudal). The teeth on the palate are in a single series, very short, obtuse, incisor-like. Pectoral very large, extending backwards to the sixth anal ray. Head, body, and fins brown, with a network of yellowish lines; vertical and pectoral fins with a white margin.

In other respects this species agrees with *T. maculosa*; so that we may refer to the description of that species given in 'Catal. Fish.' iii. p. 175. One specimen has been found by Messrs. Dow and Salvin on the Pacific coast of Panama; it is  $10\frac{1}{2}$  inches long.

**ANTENNARIUS LEOPARDINUS.**

D. 3|13. A. 7. P. 11.

Skin very rough, covered with minute spines; anterior dorsal spine (tentacle) not longer than the second, terminating in a small, flat disk; the third is separate from the soft dorsal. Brownish grey, marbled with rose-colour, and with brown dots on the sides; a black ocellus edged with rosy in the middle of the side, another larger one on the base of the ninth and tenth dorsal rays, and one or two small ones on the side of the tail. Belly covered with round brown spots; caudal with ovate black spots, arranged in three transverse series; all the other fins with similar spots.

One specimen,  $2\frac{1}{2}$  inches long, was found by Capt. Dow on the Pacific coast of Panama, and presented to Mr. Salvin.

**ELEOTRIS LONGICEPS.**D. 6| $\frac{1}{10}$ . A.  $\frac{1}{10}$ . L. lat. 66.

Vomerine teeth in a broad subcrescentic band, which is more than half as broad as that of the intermaxillaries. Thirty-six series of scales between the occiput and the anterior dorsal fin; twenty between the origin of the posterior and the anal. The height of the body is nearly one-half of the length of the head, which is more than one-third of the total (without caudal). The maxillary extends to below the middle of the eye; teeth cardiform. Caudal fin obtusely rounded, one-sixth of the total length. Brownish black, marbled with brown and black; fins with roundish blackish spots.

This species differs from the others, which have been referred to the division of *Philypnus*, in having a comparatively longer head. One specimen, 8 inches long, was given to Mr. Salvin by Capt. Dow, who found it in the Lake of Nicaragua.

**AMBLYOPUS BREVIS.**

D. 21. A. 15. The height of the body is one-eighth of the total length (without caudal); the length of the head two-ninths. Eyes minute. Lower jaw with a series of longish, widely set teeth. Caudal fin black.

One specimen, 3 inches long, was found on the Pacific coast of Panama by Messrs. Dow and Salvin.

**ATHERINICHTHYS GUATEMALENSIS.**D. 4| $\frac{1}{9}$ . A.  $\frac{1}{22}$ . L. lat. 36. L. transv. 7.

Anterior dorsal fin very small, inserted behind the vertical from the commencement of the anal fin. The height of the body is contained five times in the total length (without caudal); the length of the head four times and a fourth. The silvery band occupies the third upper series of scales. The lower caudal lobe rather longer than the upper.

Several examples, from 2 to  $2\frac{1}{2}$  inches long, were collected by Mr. Salvin in the Lakes of Huamuchal.

## GERRES AXILLARIS.

D. 9|10. A. 3/8. L. lat. 34. L. transv. 5/10.

Allied to *G. plumieri*, but with considerably shorter fin-spines. The height of the body is contained twice and a fourth in the total length (without caudal). Præorbital finely serrated. Snout as long as the eye; the groove for the intermaxillary processes is very broad, scaleless, extending backwards to the vertical from the centre of the eye. Dorsal fin notched, the last spine being not much longer than the eye; dorsal spines strong, the second as long as the head without snout; the second anal spine stronger, but scarcely longer than the second of the dorsal fin. The pectoral extends to the vertical from the third anal spine. Caudal deeply forked, with the lobes equal in length to each other and to the pectoral. A blackish streak along each series of scales; the hinder side of the axil, and sometimes the anterior, blackish.

Three specimens, from 8 to 9 inches long, were collected by Mr. Salvin at Chiapam.

## GERRES BREVIMANUS.

D. 9|10. A. 3/8. L. lat. 39. L. transv. 6/11.

Præorbital minutely serrated. The height of the body is contained twice and two-fifths in the total length (without caudal); the length of the head twice and a half. Snout as long as the eye; the groove for the intermaxillary processes is broad, scaleless, not extending backwards to the vertical from the centre of the eye. Dorsal fin notched, the last spine being longer than the eye; dorsal spines strong, the length of the second equals the distance between the end of the operculum and the anterior nostril; the second anal spine stronger, but much shorter, than the second of the dorsal fin. The scaly sheath of the anal fin leaves the outer half of the last ray uncovered. The pectoral extends scarcely to the vertical from the vent. Caudal scaly, deeply forked, with the lobes equal in length, each being one-fourth of the total. Three or four blackish streaks along the series of scales below the lateral line; the spinous dorsal fin black.

One specimen, 10 inches long, was found by Mr. Salvin at Chiapam.

## HEROS GUTTULATUS.

D.  $\frac{17}{13}$ . A.  $\frac{6}{9}$ . L. lat. 33. L. transv.  $\frac{4\frac{1}{2}}{12}$ .

The fold of the lower lip is interrupted in the middle. The height of the body is contained twice and three-fifths in the total length (without caudal); the length of the head thrice and a fifth. The upper profile of the head descending in a gentle curve. Scales on the cheek in four series. The first dorsal spine is inserted behind the vertical from the upper end of the gill-opening. Dorsal spines rather feeble, the length of the twelfth being two-sevenths of that of the head. Pectoral two-thirds as long as the head. Upper parts blackish, each scale with a black base; lower parts reddish, with a

broad blackish band from behind the pectoral to the base of the caudal; many scales within or below the band with a black spot in the upper or lower angle; each scale on the side of the head with a black spot; chin and throat violet. The spinous dorsal black, with yellowish margin; the soft parts of the vertical fins with blackish spots.

One specimen, 6 inches long, was collected by Mr. Salvin on the Pacific coast of Guatemala.

#### HEROS MACRACANTHUS.

D.  $\frac{14-15}{12-13}$ . A.  $\frac{5}{9-10}$ . L. lat. 31. L. transv.  $\frac{5\frac{1}{2}}{15}$ .

The lower lip is interrupted in the middle. The height of the body is two-thirds of the total length (without caudal) in adult specimens, but only one-half in immature; the length of the head is one-third of the total. Upper profile of the head very steep, not concave. Scales on the cheek in five series. The first dorsal spine is a little before the vertical from the upper end of the gill-opening. Dorsal and anal spines strong, the tenth of the dorsal fin being two-fifths of the length of the head. Pectoral as long as the head. Dark greenish, many scales with a pearl-coloured spot in the upper or lower angle. Vertical and ventral fins black. Immature specimens with six very indistinct dark cross bands, the third of which has a blackish blotch below the lateral line; an indistinct blackish spot at the root of the caudal fin.

About a dozen specimens, from 3 to 9 inches long, were collected by Mr. Salvin at Chiapam and Huamuchal.

#### HEROS CITRINELLUS.

D.  $\frac{16-17}{12}$ . A.  $\frac{7}{8-9}$ . L. lat. 30. L. transv. 6/13.

The fold of the lower lip is continuous in the middle. The height of the body is contained twice and a fifth in the total length (without caudal); the length of the head twice and seven-eighths; nape of the neck very convex; interorbital space broad, its width being two-fifths of the length of the head. Snout not obtuse; scales on the cheek in four series. The first dorsal spine is inserted above the upper end of the gill-opening. Dorsal and anal spines slender, the tenth of the dorsal fin being two-fifths of the length of the head. Pectoral nearly as long as the head. Lemon-coloured, either nearly uniform or with the back black, which colour sometimes forms irregular blotches on the vertical fins.

Three specimens, from 7 to 8 inches long, were collected by Capt. Dow in the Lake of Nicaragua.

#### HEROS NICARAGUENSIS.

D.  $\frac{19}{11}$ . A.  $\frac{7}{9}$ . L. lat. 35. L. transv. 5/13.

The fold of the lower lip is interrupted in the middle. The height of the body is contained twice and two-fifths in the total length

(without caudal); the length of the head twice and one-fifth. Head much higher than long, in consequence of an adipose swelling above the eye, which renders the shape of the head *Coryphæna*-like. Scales on the cheek in six series, rather irregularly arranged. The first dorsal spine is inserted above the upper end of the gill-opening. Dorsal and anal spines slender, the sixteenth of the dorsal fin being one-half of the length of the head. Pectoral not quite as long as the head. Brownish olive above, yellowish below; back with five black cross bands, not extending downwards to beyond the middle of the side; many scales with a brown vertical marginal streak. The soft vertical fins with brown spots.

One specimen,  $6\frac{1}{2}$  inches long, was collected by Capt. Dow in the Lake of Nicaragua.

#### HEROS DOVII.

D.  $\frac{18}{11-12}$ . A.  $\frac{6}{9-10}$ . L. lat. 35. L. transv.  $\frac{5\frac{1}{2}}{13}$ .

The fold of the lower lip is continuous in the middle. The height of the body is contained thrice in the total length (without caudal); the length of the head twice and three-fifths. Snout pointed, with the lower jaw very prominent. Both jaws with a pair of fangs, those of the upper pair being close together in the middle of the jaw, whilst the lower are separate. Scales on the cheek small, rather irregularly arranged, in about eight series. The first dorsal spine is inserted behind the vertical from the upper end of the gill-opening. Dorsal and anal spines slender, the length of the twelfth of the dorsal fin being one-fourth of that of the head. Pectoral three-fifths as long as the head. Brown, irregularly marbled with darker; fins black; an indistinct black band along the operculum and the side of the trunk; an oblique blackish band descends from the eye towards the root of the pectoral; a black spot behind the angle of the mouth.

This species is allied to *H. friedrichsthalii*, *H. salvini*, &c. Two specimens, 6 inches long, were collected by Capt. Dow in the Lake of Nicaragua.

#### HEMIRHOMBUS OVALIS.

D. 86. A. 69. L. lat. 58.

The height of the body is scarcely less than one-half of the total length (without caudal). Interorbital space concave, its width being one-third of the vertical diameter of the eye. Body nearly uniform reddish olive.

One specimen, 7 inches long, was collected by Messrs. Dow and Salvin on the Pacific coast of Panama.



4. ON A POISON-ORGAN IN A GENUS OF BATRACHOID FISHES.  
 BY DR. ALBERT GÜNTHER.

Many fishes are known which, provided with long, bony, and sometimes serrated spines, are justly feared on account of the dangerous wounds they inflict. The Sting-Rays, many Siluroids, and some scaly fishes, like the Weevers, are thus armed. Although the effects ascribed to such wounds have doubtless been exaggerated in many cases, natives and fishermen, as well as travellers, agree in the belief that some poison must be communicated. However, with the exception of a single instance, viz. that of the Weevers\*, comparative anatomists have never pointed out a trace of an organ secreting or conducting a poisonous substance; and consequently the poisonous nature of the wound has been doubted, the worst cases being explained by the mechanical effect of a serrated spine, by the influence of the climate, or by the peculiarity of the constitution. Thus in all the hand-books of comparative anatomy the presence of a poison-organ in the class of fishes is denied, and even Bleeker† (than whom no naturalist has had better opportunities of observing such fishes during life) expressly says that they were unjustly reputed poisonous.

On the other hand, I have heard of so many positive facts from highly educated travellers and excellent observers (some of whom, being medical men, had treated cases of this nature), that it appeared to me necessary to give every attention to this subject. Especially it seemed probable that a sac with a more or less wide opening in the axil of the pectoral fin of many Siluroid and of some other fishes would contain a fluid which might be introduced into a wound by means of the pectoral spine, which would be covered with it, like the barbed arrow-head of a bushman.

Whether this secretion is equally poisonous in all the species which are provided with that axillary sac is a question which can only be decided by experiments made in the tropics; but I can hardly doubt its poisonous nature, after discovering in a genus of fish a poison-organ which structurally is the same as in the venomous

\* Dr. J. E. Gray has directed my attention to a paper by Mr. Byerley, contained in the Proceedings of the Literary and Philosophical Society of Liverpool, No. 5, 1849, p. 156. In this paper Mr. Byerley demonstrates, in the most convincing manner, that the double-grooved opercular and dorsal spines of the Weevers are poison-organs. Although the structure of the spines, with their external grooves, were known to previous writers, it is Mr. Byerley's merit to have shown the presence of a cavity within the substance of the spines which is the proper depository of the poison before its ejection. But, at present, I cannot agree with him that the body found in the cavity and in the groove is a gland; it appears to me that what he considered to be a gland was the poisonous fluid itself, coagulated and hardened by the action of the spirits in which the specimens had been immersed in order to render "the gland more opaque and denser." I formed this opinion from examinations of specimens of *Trachinus draco* as well as of *T. vipera*, which, however, had been in spirits for a considerable period. Nevertheless there is no doubt that the poison-apparatus of *Trachinus* is homologous with that of *Thalassophryne*, only in the latter it is developed to as great a perfection as in the fang of a viper.

† Atl. Ichthyol. Silur. p. 21.

snakes. This genus, belonging to the family of Batrachidæ, was described by me in the Catal. Fish. iii. p. 174, with a single species, *Thalassophryne maculosa*. The typical specimen being small and having been in spirits for a long time, I did not observe the openings in the venom-spines, although I now perceive them to be present, as in the second species found by Messrs. Dow and Salvin, which I have described above (p. 150) as *Thalassophryne reticulata*. The specimen is  $10\frac{1}{2}$  inches long.

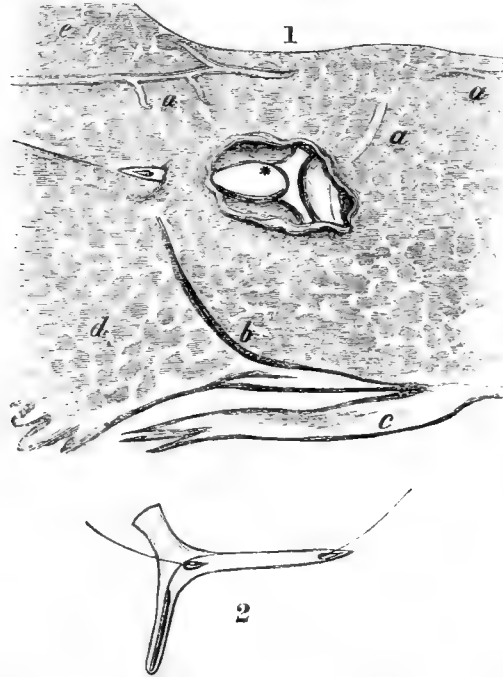


Fig. 1. Hind half of the head, with the venom-sac of the opercular apparatus *in situ*. \* Place where the small opening in the sac has been observed. *a*. Lateral line and its branches. *b*. Gill-opening. *c*. Ventral fin. *d*. Base of pectoral fin. *e*. Base of dorsal fin.

Fig. 2. Operculum, with the perforated spine.

The structure of the poison-organ is as follows:—

1. *The opercular part*.—The operculum is very narrow, vertically styliform, and very mobile; it is armed behind with a spine, eight lines long, and of the same form as the venom-fang of a snake; it is, however, somewhat less curved, being only slightly bent upwards; it has a longish slit at the outer side of its extremity, which leads into a canal perfectly closed, and running along the whole length of its interior; a bristle introduced into the canal reappears through another opening at the base of the spine, entering into a sac situated on the opercle and along the basal half of the spine; the sac is of an oblong-ovate shape, and about double the size of an oat-grain. Though the specimen had been preserved in spirits for about nine months, it

still contained a whitish substance of the consistency of thick cream, which on the slightest pressure freely flowed from the opening in the extremity of the spine. On the other hand, the sac could be easily filled with air or fluid from the foramen of the spine.

No gland could be discovered in the immediate neighbourhood of the sac; but on a more careful inspection I found a minute tube floating free in the sac, whilst on the left-hand side there is only a small opening instead of the tube. The attempts to introduce a bristle into this opening for any distance failed, as it appears to lead into the interior of the basal portion of the operculum, to which the sac firmly adheres at this spot.

2. The *dorsal part* is composed of the two dorsal spines, each of which is 10 lines long. The whole arrangement is the same as in the opercular spines; their slit is at the front side of the point; each has a separate sac, which occupies the front of the basal portion; the contents were the same as in the opercular sacs, but in somewhat greater quantity. A strong branch of the lateral line ascends to the immediate neighbourhood of their base.

Thus we have four poison-spines, each with a sac at its base; the walls of the sacs are thin, composed of a fibrous membrane, the interior of which is coated over with mucosa. There are no secretory glands imbedded between these membranes, and these sacs are merely the reservoirs in which the fluid secreted accumulates. The absence of a secretory organ in the immediate neighbourhood of the reservoirs (an organ the size of which would be in accordance with the quantity of the fluid secreted), the diversity of the osseous spines which have been modified into poison-organs, and the actual communication indicated by the foramen in the sac, lead me to the opinion that the organ of secretion is either that system of muciferous channels which is found in nearly the whole class of fishes, and the secretion of which has poisonous qualities in a few of them, or at least an independent portion of it\*.

The sacs are without an external muscular layer, and situated immediately below the loose thick skin which envelopes the spines to their extremity; the ejection of the poison into a living animal, therefore, can only be effected by the pressure to which the sac is subjected the moment the spine enters another body.

Nobody will suppose that a complicated apparatus like the one described can be intended for conveying an innocuous substance, and therefore I have not hesitated to designate it as poisonous; and the greatest importance must be attached to it, inasmuch as it assists us in our inquiries into the nature of the functions of the muciferous system, the idea of its being a secretory organ having lately been superseded by the notion that it serves merely as a stratum for the distribution of peripheric nerves. Also the objection that the Sting-Rays and many Siluroid fishes are not poisonous, because they have no poison-organ, cannot be maintained, although the organs con-

\* This, of course, must be demonstrated by further preparations; for I would not sacrifice the single (typical) specimen, the less as we may confidently hope that Capt. Dow will furnish us with ample materials before long.

veying their poison are neither so well adapted for this purpose nor in such a perfect connexion with the secretory mucous system as in *Thalassophryne*.

Finally, I have to add that neither *Batrachus* nor *Porichthys* has the spines perforated, and that also in *Thalassophryne* the poison-organ serves merely as a weapon of defence. All the Batrachoids with obtuse teeth on the palate and in the lower jaw feed on Mollusca and Crustaceans.

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April 12, 1864.

E. W. H. Holdsworth, Esq., in the Chair.

The Secretary announced the safe arrival by the ship 'La Hogue,' on the previous day, of the living specimen of *Didunculus strigirostris*, presented to the Society by Dr. George Bennett of Sydney, as announced in previous communications of that gentleman to the Society.

By the same vessel several other species of interest had been received, amongst which were an Australian Pelican (*Pelecanus conspicillatus*) and a Top-knot Pigeon (*Lopholæmus antarcticus*), the latter having been presented to the Society by the Acclimatization Society of New South Wales.

In the same vessel had been shipped from Sydney a living example of a rare Parrot from the Feejee Islands—the *Pyrrhulopsis splendens* (*Aprosmictus splendens*, Peale, Cassin, U. S. Expl. Exp. i. p. 237, pl. 20), which had unfortunately died on the passage home.

Mr. Sclater observed that four species of this peculiar group of Parrots had been distinguished by Mr. Cassin, but that he was only acquainted with three of them, namely—

1. *P. personata*, G. R. Gray, which had been twice alive in the Society's Menagerie (see P. Z. S. 1862, p. 141, et P. Z. S. 1848, p. 21, pl. III.). A specimen of this bird in the British Museum had been obtained by Mr. Rayner, the Naturalist of H. M. S. 'Herald,' in the island of Viti Levu, Feejees.

2. *P. splendens*, Cassin, *l. c.*; also, as stated by Mr. Peale, from Viti Levu, or Great Feejee Island.

3. *P. atrigularis*, Peale, easily distinguishable from the last by its black throat; and obtained by Mr. Rayner at Ngau Island, Feejees.

The *P. tabuensis*, Gm., from the island of Tongataboo or Eooa, might probably be different from the two preceding, as also possibly the *P. anna* of authors.

Dr. Crisp exhibited a wax cast of the tongue, larynx, trachea, heart, lungs, and thyroid gland of a young Lion at birth. This ani-

mal, with two others, was born dead at the Gardens about a month since. The cubs were all well-formed, and healthy apparently in every part except the thyroid gland, which was about twenty times its natural size; and Dr. Crisp believed that death was occasioned by pressure upon the recurrent laryngeal nerves *at the time of birth*. The most singular and remarkable circumstance connected with this enlargement of the thyroid gland was the fact that two lionesses whelped on the same day: one had two cubs, and the other one, and the thyroid in all these cubs was equally enlarged; and the same lesion had occurred before, although formerly the most common defect was a malformed palate.

Dr. Crisp said that up to the present time no Lion had been reared at the Gardens, although at Wombwell's and other private menageries a great number attained the adult state. He thought that after the lioness had access to the male she should be entirely secluded from the public gaze, and placed in a suitable den which did not communicate directly with the external air.

Dr. Crisp likewise exhibited an ear of barley, which, with many others, was produced by cutting down oats three times just before they came into ear. The experiment was performed by Mr. Kersy Cooper, of Euston, Suffolk. Although not a zoological specimen, Dr. Crisp thought that it had a most important bearing upon zoology, and especially upon the origin of species; and on this account he brought the matter before the Society.

Mr. Fraser, having visited several Zoological Gardens within the last month, read the following list of specialities which he had observed in them.

#### THE JARDIN DES PLANTES, PARIS.

<i>Elephas africanus</i> , Cuv. Two very small. <i>Gazella subgutturosa</i> , Güld. White-faced. — <i>arabica</i> , Kemp. <i>Gypaëtus barbatus</i> (Linn.). <i>Vultur auricularis</i> (Daud.).	<i>Vultur occipitalis</i> , Burch. <i>Ramphocelus brasilius</i> (Linn.). <i>Cassicus persicus</i> (Linn.). <i>Garrulus cervicalis</i> . From Al- geria. <i>Siredon humboldtii</i> .
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#### JARDIN ZOOLOGIQUE D'ACCLIMATATION, PARIS.

<i>Ovis tragelaphus</i> , Linn. <i>Ovis</i> —. Yemen Sheep. <i>Damalis albifrons</i> (Burch.). <i>Catoblepas gnu</i> (Gmel.). <i>Macropus major</i> , Shaw. <i>Cacatua ducorpsii</i> , Homb. et Jacq. <i>Phasianus sæmmeringii</i> , Temm. <i>Cerionis temminckii</i> (Gray).	<i>Euplocamus prælatu</i> s, Bonap. <i>Francolinus perlatus</i> (Gmel.). Siam. <i>Coturnix coromandelica</i> (Gmel.). <i>Crax albertii</i> , Fraser. <i>Casarca rutila</i> (Pall.). — <i>tadornoides</i> , Jard. et Selb. <i>Siredon pisciformis</i> . Mexico.
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## THE EMPEROR'S GARDEN AT SCHÖNBRUNN, NEAR VIENNA.

*Felis chaus*, Güld.  
 — *catus*, Linn. From Sclavonia.  
*Cervus tarandus*, Linn.  
 — *alces*, Linn. European.  
*Camelopardalis giraffa* (Linn.).  
*Ovis musimon*, Schreb.  
*Capra beden*, Försk.  
 — *nubiana*. Arabian Ibex.  
*Oryx leucoryx* (Pall.).  
*Gazella* —. White-faced.

*Gazella arabica*, Hempr.  
*Bos brachyceros?* (called *Bos caffer*, Sparrm.).  
*Asinus tæniopus*, Heugl.  
*Conurus cyanolyseos* (Mol.).  
*Ardea comata*, Pall.  
 — *garzetta*, Linn.  
 — *alba*, Linn.  
*Ibis falcinellus*, Temm.  
*Carbo pygmæus*, Temm. Little Cormorant.

## THE NEW ZOOLOGICAL GARDEN, VIENNA.

*Oreas canna* (Pall.).  
*Bos grunniens*, Linn.  
*Asinus tæniopus*, Heugl.  
*Spermophilus citillus*.

*Vultur cinereus*, Gmel.  
*Falco lanarius*, Linn.  
*Cacatua triton* (Temm.).  
*Caccabis saxatilis*, Meyen.

## THE ZOOLOGICAL GARDENS, ROTTERDAM.

*Paradoxurus leucomystax*, Gray.  
 From Borneo.  
*Felis temmincki*, V. & H. Sumatra. Very fine.  
*Felis viverrina*, Benn. Java.  
*Ursus japonicus*, Schleg. Male and female, very fine.  
*Cervus equinus*, Cuv.  
 — *tarandus*, Linn.  
*Anoa depressicornis*.  
*Bos taurus*, Linn., var. Spanish Ox, very fine.  
*Sus pliciceps*, Gray.  
*Dendrolagus inustus*, Müll.  
 — *ursinus*, Temm.  
*Gryx rueppellii*.  
*Anadina erythrocephala*, A. Smith.

*Psittacus erithacus*, Linn. Some twenty in very fine condition: these have been kept without artificial heat for two years, their only protection being shutters at night.  
*Cacatua citrinocristata*, Fraser.  
*Goura coronata* (Linn.).  
 — *victoriae*, Fraser.  
*Euplocamus lineatus* (Vig.).  
*Gallus domesticus*, Linn. Dyed yellow, green, and blue.  
*Phasianus sæmmeringii*, Temm.  
*Crocodilus frontatus*, Murray.  
 About 4 feet long.  
*Chamæleo* —. From Java.

## THE ROYAL ZOOLOGICAL GARDENS, DUBLIN.

*Cebus* —. Black, white whiskers.  
*Felis leo*, Linn. Seven cubs, born April 2, 1864. These gardens have been very successful in breeding and rearing these animals.

*Vultur cinereus*, Gmel.  
*Athene passerina* (Linn.).  
*Cacatua* —. White crest; blue cere; red eyes.  
*Tetrapteryx virgo*, Vieill.  
*Chelydra serpentina*. Very large.

The following papers were read :—

1. NOTES ON THE UROTRICHUS. BY J. K. LORD, F.Z.S.

UROTRICHUS GIBSII, Baird.

*Hab.* Western side of Cascade Mountains, Sumass Prairie, near Fraser River.

This singular little animal, which appears to be an intermediate link between the Shrew and the Mole, is at present only known as an inhabitant of two parts of the world, widely removed from each other—the one spot being the western slope of the Cascade Mountains in North-west America, the other Japan. There are, as far as I know, but two specimens extant from the Cascade Mountains,—one in the Smithsonian Museum at Washington; the other, a very fine specimen, that I have recently brought home, and which is now in the British Museum. I have carefully compared the Japanese *Urotrichus* with his brother from the western wilds, and can find no difference whatever, either generically or specifically; in shape, size, and colour they are exactly alike.

The *Urotrichus* is of a bluish black when *fresh*, but in the dried specimens sooty brown. The hair is lustrous and where it reflects the light has a hoary appearance, and, like that of the Mole, can be smoothed in either direction. This is a wise and admirable arrangement, as it enables him to back through his underground roads, as well as to go through them head first. His nose or snout is very curious, and much like that of a pig, only that it is lengthened out into a cylindrical tube covered with short thick hairs, and terminating in a naked fleshy kind of bulb or gland; this gland is pierced by two minute holes, which are the nostrils. Each nostril has a little fold of membrane hanging down over it like a shutter, effectually preventing sand and small particles of dust from getting into his nose whilst digging. This curious nasal appendage is to him not only an organ of smell, but also serves the purpose of hands and eyes. His fore feet, as I shall by-and-by show you, are wholly digging-instruments, and, from their peculiar horny character, not in any way adapted to convey the sense of touch. Eyes he has none, and but a very rudimentary form of ear; so that his highly sensitive, moveable nose serves him admirably in the dark tunnels in which his time is passed to feel his way and scent out the lower forms of insect-life on which he principally feeds. Had he eyes, he could not see, for the sunlight never peeps in to cheer his subterranean home; and sound reaches not down to him; but his nose in every way compensates for all apparent deficiencies. His fore feet are, like the Mole's, converted into diggers; the strong scoop-shaped nail, like a small garden-trowel, at the end of each toe enables him to dig with wonderful ease and celerity. The hind feet are shaped into a kind of scraper, by the toe being curiously bent. The length of the hind foot is about two-thirds more than that of the fore or digging hand.

When I come to speak of his habits as differing from the Mole, I shall be able to demonstrate the use of this strange scraper-like form

of hind foot. So far, I have endeavoured to give an outline of his general personal appearance, differing from the Shrew in the peculiar arrangement of his feet, and from the Mole in having a long hairy tail. His nearest relative is the *Condylura* (Star-nosed Mole), whose nose has a fringe of star-shaped processes round its outer edge, about twenty-two in number.

The first and only place I ever met with this strange little fellow was on the Chilukweyuk Prairies. These large grassy openings or prairies are situated near the Fraser river, on the western side of the Cascade Mountains. In the sandy banks on the edge of the Chilukweyuk River and the various little streams winding through the prairie-grass, lives the *Urotrichus*; his subterranean home is a large space or hole excavated like a small cave, and lined with bits of dry grass and leaves. From the central residence roads are tunnelled away, radiating from it like the spokes of a wheel. His tunnels are not like those of the Mole; he never throws up heaps or mounds of earth in order to get rid of the surplus material; he digs as the Mole, but makes open cuttings at short intervals, about four or five inches long.

And now we shall see the use of those curiously formed scraper-like hind feet. As he digs out the tunnel with his trowel-hands, he throws back the earth towards his hind feet. These, from their peculiar shape, enable him to back the dirt out of the hole, using them like two scrapers, only that he *pushes* the dirt instead of pulling it towards him. Having backed the dirt clear of the mouth of the hole, he throws it over the edge of the open cutting. After having dug-in some distance, and finding, I dare say, the labour of backing out rather irksome, he digs up through the ground to the surface, makes another open cutting, and then begins a new hole or tunnel, and disappears into the earth again. When he has gone as far from his dormitory as he deems wise, he again digs up through and clears away the rubbish. This road is now complete; so he goes back again to his central mansion, to begin others at his leisure. It is very difficult to watch the movements and discover the feeding-time and food of an animal that lives almost wholly underground in the daytime; but I am pretty sure these tunnels are made for and used as roadways, or underground trails, for the purpose of hunting. He is a night feeder, and exposed to terrible perils from the various small Carnivora that prowl about like bandits in the dark—Stoats, Weasels, Martins, and Skunks. So to avoid and escape these enemies, he comes quietly along the subterranean roadways, and cautiously emerging at the open cutting, feels about with his wonderful nose, and, I doubt not, guided by an acute sense of smell, pounces upon larvæ, slugs, beetles, or any nocturnal creeping things he can catch, and so, traversing his different hunting-trails during the night, manages in this way to fare sumptuously, safe from danger.

It is scarcely possible to imagine a more skilfully contrived hunting-system, to avoid danger and to facilitate escape, than are these tunnel-trails with open cuttings; for the sly little hunter has, on the slightest alarm, two modes of flight at his disposal, one before and



the other behind; and the fur, as I have already mentioned, lying as smoothly when stroked from tail to head as it does when turned in the natural direction, enables him to retreat tail first into his hole as easily as he could go adopting his usual mode of progression.

2. NOTICE OF A PORTION OF A NEW FORM OF ANIMAL (MYRIOSTEON HIGGINSII), PROBABLY INDICATING A NEW GROUP OF ECHINODERMATA. BY DR. JOHN EDWARD GRAY, F.R.S., F.L.S., ETC.

Four or five years ago the Rev. H. H. Higgins, of Liverpool, purchased in London a specimen which was shown at the time to several naturalists, and was pronounced by some to be the tail of a Ray (perhaps of *Urogymnus africanus*); and this determination seems to have been so far satisfactory that up to this period it has not been further described.

During a recent visit to the Free Museum at Liverpool the specimen attracted my attention, and Mr. Moore, the intelligent Curator of that institution, placed it in my hands for examination and determination; and the trustees of that institution have most kindly presented it to the British Museum. I was soon satisfied that it could not be the tail of a Ray, nor, indeed, a part of any vertebrated animal. The outer surface (and, indeed, the whole substance) is made up of a number of calcareous concretions, united together by anastomosing processes placed on the outside of an internal rather thick coat formed of longitudinal fibres, which is rather hard and firm when dry. The interior of the tapering tube is quite empty, without any septa or other divisions.

It is very unlike the skin of a cartilaginous fish, which is always a good firm skin, more or less studded with hard, imbedded, bony scales or processes, or the case of an *Ostracion*, which is formed of cartilaginous or horny tesseræ. The rounded surface, which has been regarded as the upper surface of the tail, is pierced with two series of small, rather unequal-sized, oblong holes, which look very like irregular ambulacra for the passage of the feet or tentacles of the animal which formed the body, as in the case of the Star-fishes; and yet, at the same time, these holes are very different from the ambulacral pores of those animals, which are always in pairs and surrounded by some special ossicles. Besides the holes on the rounded or upper edge, there are a few similar perforations, but smaller in size, on the sides of the thicker part of the tube.

The entire surface of the external skeleton is cribellated with small pores between the ossicles, as is the case with many *Asteriadae* and *Echinidae*. This porousness of the surface induced one of the naturalists to whom it was shown to suggest that it might be the shell of a gigantic Foraminifer, or the coral of one of the Polyzoa; but this opinion cannot be entertained, as the pores are very unlike the pores of those animals, and the large continuous internal cavity, which has been evidently occupied by some part of a larger animal, is totally opposed to such a theory.

I therefore propose to give it a name, in hopes that it may lead to a more perfect knowledge of the animal, and to characterize it thus:—

MYRIOSTEON, gen. nov.

Body, entire form unknown. The part alone known (fig. 1) is elongate, tapering, straight, rather compressed, rounded above, and flattened beneath; the sides and upper surface formed of convex tetragonal ossicles, united by short radiating branches; with four or five round pores round each ossicle; ossicles of nearly equal size in all parts of the surface.

The lower surface flat (figs. 2, 3, & 5), formed of smooth flat-topped tesserae, which are very close together, forming a nearly continuous surface, with circles of six triangular radiating pores near the margin of each ossicle—the ossicles near the thickest part of the body being the largest, and very gradually diminishing in size towards the top.

The ossicles are all placed on a rather solid, thick, hard internal layer, which is formed of closely intertwined short longitudinal fibres, or opaque bone-like spicula, which seem to give considerable rigidity to the body.

The convex upper edge has two longitudinal series of oblong pores, rather unequal in size, and sometimes placed so close together as to run nearly into one another, and at others separated from each other by a considerable interval. The larger pores are surrounded by a slightly raised edge, showing that some tentacle or other body is emitted through them. There are also a few smaller circular pores scattered on the sides of the tube.

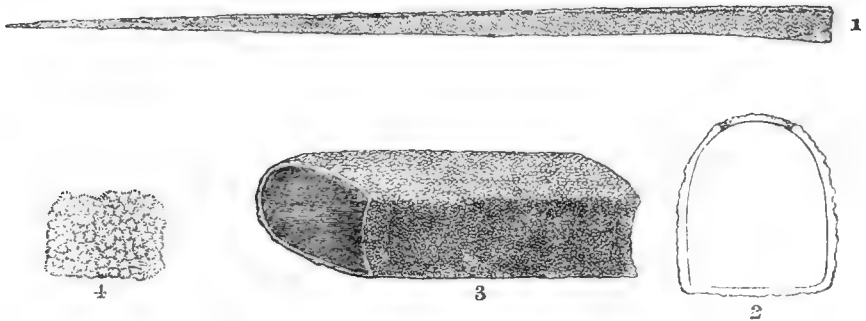


Fig. 1. The entire specimen, greatly reduced.  
2. Cross section of the specimen, natural size.  
3. Side view, showing the flat under surface.  
4. Figure of the surface, natural size.

MYRIOSTEON HIGGINSII, sp. nov. (Figs. 1–5.)

*Hab.* — ?

The fragment of this animal, which alone is known, is  $26\frac{1}{2}$  inches long and 3 inches in circumference at the base, tapering to a rather blunt end, which is pervious; but it is evidently imperfect, and may be closed in the perfect state. The flattened part of the base is rather more than half an inch wide at its widest part.

I have named the specimen after the Rev. H. H. Higgins, one of

the trustees of the Derby Museum at Liverpool, well known for his attachment to science.

I was soon convinced that the specimen was not the tail of a Ray, nor indeed any part of a vertebrated, annulose, or molluscous animal, so that it must belong to the radiated groups; and the question is to which part of the group it is most nearly allied.

The formation of the external skeleton and the general form of the parts which alone have as yet been examined lead me to believe that it is the part of an Echinoderm, being probably the single ray of a radiated body. The structure of the external skeleton resembles more closely that of one of the more tessellated forms of the cylindrical-rayed Starfish than that of any other animal that has occurred to me; but it differs from the arms of these animals in not being provided with regular ambulacra, which is the essential character of the Starfish.

I am therefore induced to believe that the specimen may indicate a new group of radiated animals, nearly allied to *Asterias*. It appears to be much more rigid than the Starfish are in general; and it will at any rate form a new family, for which the name of *Myriosteidæ* may be given.

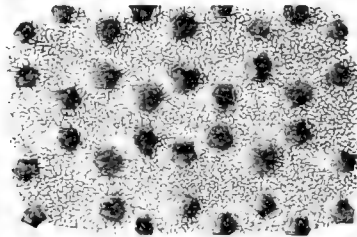
I do not recollect to have seen any fossil that has any resemblance to the specimen, or to the separate parts of it.

The ossicles differ also from those of *Asterias* in not being covered with granules, and from the *Asteriadae* and *Echinidae* in not being provided with spines on moveable joints.

The lateral edges of the flat portion of the specimen are more or less distinctly marked, and in some places, especially near the small end, are raised up into an irregular margin, formed by irregularities on the surface of the ossicles, which at these places are more or less confused together.

The centre of the upper part of the smaller end of the specimen is marked with scattered concavities, which appear as if formed by its having been attached to some shell or other more or less convex surface. These concavities are produced by the flattening of the surface of the ossicles of the part. They may have been produced by parasites which have affixed themselves to the surface of the specimen, or by the specimen itself having been attached by the end of this part of the body to some fixed body. The pores on the back are more symmetrical and equal near the end of the arm, and those

Fig. 5.



Magnified figure of the under surface, showing the large pores placed in hexagons.

in each series are generally opposite to each other; but there are many exceptions to this arrangement and symmetry.

The *Myriosteon* can have no affinity to the Polyzoa, for there are no cells for the reception of the animal. The celebrated French zoologist who suggested that it might possibly belong to that order compared it with *Eschara*, the cells of which are obliterated by age; but then the cells are always well developed in the younger part of the coral.

The specimen under examination is clearly not a coral gradually increasing in size by the development of new cells, but a definitely-shaped part of some regularly formed body; so that the idea of its being a Polyzoon is scarcely worthy of as much consideration as I have given to it.

### 3. ON THE CHANGE OF COLOUR IN THE COMMON TROUT (*SALMO FARIO*). BY EDWARDS CRISP, M.D., F.Z.S., ETC.

During a walking tour over Dartmoor in July last, I was surprised to find that out of a large number of Trout caught many were of a very dark colour, and others of the usual hue, as shown by the drawings which I place before the Society.

The dark-coloured Trout were all taken from dark and deep portions of the stream, whilst those of the normal appearance were in clear water. But a more interesting circumstance connected with these Trout was the nature of their food. I opened the stomach and intestines of more than a hundred, and in a great many I found the *Ephemera* and its larva, caterpillars of moths that had fallen from the bushes that overhung the stream, and a great many click or skip-jack beetles (*Elateridæ*), which, as is well known, are the parents of the wire-worm, one of the most destructive insects to our grain and root crops. In the stomachs of some of the Trout as many as six or seven of these beetles were present (as shown in the drawing). I am not aware that this fact has been before noticed, and it serves to show that some fishes, like many members of the feathered creation, play an important part in the destruction of noxious insects.

### 4. ON TWO NEW SPECIES OF BIRDS FROM NEW GRANADA. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

In a small series of bird-skins lately received by M. Verreaux, of Paris, from Bogota, and submitted to my examination, are two specimens which I consider to belong to species not hitherto characterized. These are

#### 1. *BASILEUTERUS CINEREICOLLIS*, sp. nov.

*B. olivaceus*, pileo nigricante, crista media aurea: subtus flavus, gutture toto et pectore cinereis; lateribus olivaceo-virescentibus: rostro corneo, pedibus pallide brunneis.

Long. tota 5·0, alæ 2·7, caudæ 2·5 poll. Angl.

*Hab.* In Nova Granada interiore.

*Obs.* Similis *B. coronato* Tschudii, sed crista flava nec castanea et gula cinerea nec albicante distinguendus.

This *Basileuterus* makes the eighteenth species of this pretty group of *Mniotiltidæ* now in my collection, seventeen having been already registered in my 'Catalogue of American Birds.' I may take this opportunity of remarking that the locality therein attributed to *B. uropygialis* (as also in these 'Proceedings,' 1861, p. 128) is, no doubt, erroneous. Relying on the correctness of M. Verreaux's labels, I have hitherto considered this to be a Brazilian species; but Mr. O. Salvin has recently received specimens of the same bird from Panama, and I have no doubt that that is its correct *patria*,

## 2. THRIPOPHAGA GUTTULIGERA, sp. nov.

*Brunnescenti-olivacea, pileo nigricante, dorsi plumis struis medialibus ochraceis, quasi celatis: alis nigris, rufo limbatis: cauda unicolore castanea: subtus brunnescenti-olivacea, ochraceo crebre guttulata, plumis ochraceis, fusco circumcinctis; gula omnino ochracea: rostro superiore corneo, inferiore flavo; pedibus clare brunneis: subalaribus rufescenti-ochraceis.*

Long. tota 5·5, alæ 2·5, caudæ 2·5, tarsi ·75.

*Hab.* In Nova Granada interiore.

*Obs.* Aff. *T. striolata* ex Brasilia, sed crassitie multo minore et colore capitis obscuriore.

This little Dendrocolaptine might be arranged either as a *Thripophaga* or as a *Heliobletus*, and serves to connect these not very strongly distinguished forms. Its general structure is exactly that of *Thripophaga striolata*, but it is not much larger than the diminutive *Heliobletus superciliosus*. In the latter bird, however, the bill is proportionately rather shorter and straighter.

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April 26, 1864.

John Gould, Esq., F.R.S., in the Chair.

The Secretary read the following extract from a letter addressed by George Latimer, Esq., Austrian Consul at Porto Rico, to Lieut.-Col. C. P. Cavan, F.Z.S., and stated in relation thereto that he had obtained the necessary permit from the R. M. Steam Company for the conveyance of a tank from St. Thomas's to Southampton:—

“ St. John's, Porto Rico.

“ As you are a Fellow of the Zoological Society, in whose collection, in their Gardens in the Regent's Park, I know you take great interest, I write to inquire if the Society would like to have a specimen or specimens of the *Manatus* or Manatee, commonly called the 'Sea Cow;' and if so, then for it to obtain a standing order from

the Directors of the Royal Mail Steam Company to the commanders of their ships which may call here, to receive the same on board in a tank which I would have prepared for their conveyance to England. These animals eat grass, and there will be no great trouble in carrying them safely : the most would be in changing the water every day ; but on board a steamer, with pumps and hose, that would be next to nothing. I have at present two specimens of the Manatee (a male and a female), which I keep in a large tank with holes in the sides and bottom (open at top), so as to admit the flow of water. Thus I have no trouble in keeping them. They are curious creatures, and respectively  $8\frac{1}{2}$  and  $6\frac{1}{2}$  feet long by  $3\frac{1}{2}$  and 3 feet broad, and  $4\frac{1}{2}$  feet and  $3\frac{1}{2}$  feet in diameter at the broadest part, weighing about 500 and 350 lbs. Those I now have I have offered to the Commissioners of the Central Park in New York ; but if your Society would like specimens, I shall have great pleasure in trying to procure them. I have a second tank now ready, and have told all the fishermen, should any more be taken, not to kill them, but to bring them to me, and that I will pay them their full value. They are usually killed ; and the meat, which resembles beef or rather veal, is much sought after by the lower class of people ; the skin also has many (supposed) virtues. They are caught in the ' corals ' made for catching fish, at the mouths of the rivers emptying into this harbour."

The Secretary announced that Mr. James Thompson, the Society's Head Keeper, had reached Calcutta by the ' Hydaspes ' in safety, and that he had been singularly successful in taking out the birds presented by the Society to the Baboo Rajendra Mullick, having delivered them all alive and in first-rate condition, with the exception of a single Curassow.

Mr. Fraser exhibited two pairs of Horns, male and female (belonging to Capt. Stewart, now in India, but lent by Mr. Lillicrapp), of that extremely rare and extraordinary Ruminant, the *Budorcas taxicolor*, Hodgson, described in the ' Journal of the Asiatic Society of Bengal ' (vol. xix. p. 65, pls. 1, 2, 3, 1850).

The Secretary read the following extracts from a letter addressed to him by Mr. R. Swinhoe, F.Z.S., dated Formosa, February 9th, 1864 :—

" As I passed through Amoy, I was so fortunate as to secure for the Society a pair of Dampier Straits Pigs (wild species), a Sumatran Jungle-Cock (*Gallus furcatus*), and a Mantchurian Deer, apparently of a new species, intermediate between *Cervus sika* of Japan and the *Cervus tivanus*. It was procured at Newchwang. These four animals I transmit to Hong Kong for transmission to England, and I hope they may eventually reach the Society all safe. At Hong Kong I saw a pair of the large Summer-Palace Deer, heads of which were exhibited to the Society by Mr. Leadbeater, and which Dr. J. E. Gray pronounced to be identical with *Cervus elaphus* of Europe. The pair in Hong Kong were two years old, and an inspection of them convinced me, from their similarity to the older and larger

specimens procured by Col. Sarel in the Summer Palace Grounds, that the large form is quite distinct from the small one, which last Dr. Gray identified as the *C. pseudaxis* of certain French authors. At the time I fully believed that the smaller one with indistinct spots was merely the miniature of the larger animal. I now agree with Dr. Gray in considering it distinct, but cannot believe that it is to be referred to the *C. pseudaxis*. *C. pseudaxis* is from the Malayan archipelago, whence I have frequently heard of spotted *Axis*-like Deer.

“The three skins of two bucks and one doe that I sent home are now in the British Museum, and the oldest buck has been figured in the ‘Proceedings’ of the Society for 1861. I should think *C. hortulorum* would be an appropriate name. In the gardens of Messrs. Jardine, Matheson, and Co. in Hong Kong I saw several bucks and does of *C. sika* and *C. taivanus*, as also of *C. axis* in winter dress. The bucks of the two former had manes about the neck; *C. sika* was spotless, *C. taivanus* with indistinct spots, while *C. axis* was of a rich yellowish-brown colour, with distinct white spots. The latter had long, thin, reddish tails, and, I think, are identical with the true *C. axis*. They are from Hankow, interior China. The bucks of *C. sika*, otherwise similar, differed a good deal in size; they were, I believe, from different islands of Japan, the smaller from Nippon, the larger from Yesso.

“The Deer from China may therefore thus be enumerated, as follows:—

“*Cervus dama*, L. In gardens at Canton.

“*C. axis*, L. From Hankow, Central China.

“*C. elaphus*, L. Summer Palace Gardens.

“*C. wallichii*. Tartary, beyond the Great Wall (horns seen by me at Peking).

“*C. swinhoii*, Selater. Island of Formosa.

“*C. hortulorum*, Swinhoe (“*C. pseudaxis?*”, Gray). Gardens of Summer Palace.

“*C. taivanus*, Blyth. Island of Formosa.

“*C. sika*. Island of Japan.

“*C. mantchuricus*. Manchuria. Size larger than *C. taivanus*, with horns short in the stem, and more resembling those of *C. sika*. Colouring very similar (in winter coat) to that of *C. taivanus*. Red patch on occiput, on each shoulder, and on side of neck. Black line down back somewhat indistinct; mane from side and back of neck rather long, thick, shaggy, and dark-coloured. Belly pale reddish white. Thighs light reddish brown.”

Dr. Selater exhibited a series of bird-skins, being a selection from the collection made by the Rev. H. B. Tristram’s expedition in Palestine; and called particular attention to the following species, considered by Mr. Tristram to be new to science:—

(1.) PASSER MOABITICUS, Tristram.

*Ex cinereo isabellinus, tectricibus alarum læte castaneis: super-*

*ciliis et dorso medio cum remigum et reetricum marginibus rufescenti-isabellinis: dorso medio nigro striato: gutture medio cum cervice nigris; macula suboculari et gutturis vitta utrinque laterali albis: macula cervicali utrinque flava: ventre albo, crisso rufescente: rostro superiore plumbeo, inferiore cum pedibus flavis.*

Long. tota 3·8, alæ 2·3, caudæ 1·8 poll. Angl.

(2.) CAPRIMULGUS TAMARICIS, Tristram.

*Cinerascenti-isabellinus, nigro minute vermiculatus: fascia colliari postica et maculis humeralibus rufescenti-isabellinis: mento et fascia gulari albis: alarum primariis nigris, vitta lata alba; secundariis rufis, nigro transfasciatis: alis intus et tectricibus subalaribus pallide rufis: caudæ reetricibus duabus utrinque externis pallide rufis, nigro frequenter et irregulariter transfasciatis, apicibus late albis; ceteris dorso concoloribus.*

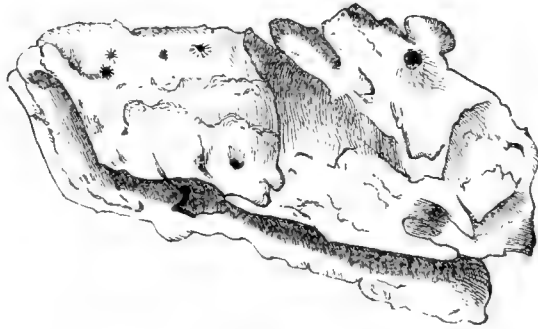
Long. tota 9·0, alæ 5·6, caudæ 4·2.

The following papers were read:—

1. NOTE ON THE BONNET OF THE RIGHT WHALE.  
BY DR. J. E. GRAY, F.R.S., F.L.S.

Mr. Holdsworth has presented to the British Museum a specimen which had been received from an American whaler, as “the Bonnet of *Balæna mysticetus*, obtained at the Sandwich Islands.”

I have shown the specimen to Professor Owen. He states that a similar specimen is in the Museum of the College of Surgeons, and that he considers it as “a diseased action or tumour of the outer layers of integument.”



The specimen is oblong, 11 inches long, and 8 inches wide, very irregular in the outline, with a very rough pitted surface, four of the pits being much larger than the rest, and dividing the surface into six prominences. The whole substance seems to be formed of irregular horny layers placed one under the other, the lowest layer being the one last formed, and each of these layers is more or less crumpled and plicated on the surface, giving the irregular appearance to the mass.



The lower layer is attached to the skin of the whale, a part of the skin being attached to the inner surface of the mass or bonnet, as it is called.

On showing the specimen to a foreign zoologist, he stated that it was an excrescence on the skin of a whale, formed by the adhesion of the barnacles called *Coronula*, and that the irregularities on the surface of the bonnet were caused by the attachment and wearing-action of these animals.

This is quite a mistake, the *Coronulæ* sink themselves into the epidermis of the whale, as is also the case with the genus *Tubicinella*. I have seen numerous specimens of both these animals *in situ*, and the skin round the cirripedes is scarcely altered in structure, and offers no resemblance to the horny excrescence called the bonnet. Any one who examines the bonnet will find that the plate of horn of which it is formed is plicated and folded when deposited; and this explains the irregularity of the general form of the body.

The zoologist referred to has since said that he believes it is caused by the irritation of the whale-louse, and that the irregularities on the surface are caused by them. This may perhaps have arisen from the surface of the specimen being covered with whale-lice when it was first procured from the whaler; but this may be only because the hollow on the surface forms a good hiding for them; and I think the supposition that they are the origin of the wart or horn requires further observation.

Mr. Holdsworth has since sent to the Museum a much smaller specimen, also obtained at the Sandwich Islands, which is oblong, elongate, and more symmetrical; but the upper surface is not so evenly channelled. It is 6 inches long and  $2\frac{1}{2}$  wide. It is spoken of by the whalers as a wart on the tip of the nose, and is commonly called the "Whale's bonnet."

I do not recollect observing any account of this "*bonnet*," or giant corn, or rudimentary frontal horn, as it may be regarded in any account of the "Right Whale," nor in that of the "Spermaceti Whale." I have specially searched for it again in the works by persons who have seen these Whales alive, but without success.

It has been suggested by Mr. Holdsworth that the bonnet may be a natural development, and possibly characteristic of the species; he thinks that the "pale prominence" on the nose of *Balæna antarctica*, as figured in 'Fauna Japonica,' pls. 28 & 29, may be intended to represent it. In the description this part is only described as "une forte proéminence teinte de blanc."

In the excellent drawing of the male Whale from the coast of New Zealand, which I figured under the name of *Balæna antipodarum*, in Dieffenbach's 'New Zealand,' vol. ii. t. 1, there is a rough roundish prominence on the front of the lower jaw, as well as on the front of the upper one.

I believe that a prominence of the kind is to be observed in all the species of the genus *Balæna*, although I have never seen them described as hard and horny; but that is no reason why this may not be the case.

2. LIST OF A COLLECTION OF BIRDS PROCURED BY MR. GEORGE H. WHITE IN THE VICINITY OF THE CITY OF MEXICO. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

Mr. George H. White has lately placed in my hands for examination a series of bird-skins which were obtained during his recent residence in the city of Mexico by several collectors in the vicinity of the capital. The majority of them are from the valley of Mexico and the neighbouring hills in the immediate vicinity of the city, but some probably are from the *tierra caliente*.

As this is the first collection of birds from this locality that has come under my notice, I have had great pleasure in examining it with care, and drawing up the following list of the species which it contains. These amount to 156 in number, and amongst them are several additions to the Mexican avifauna, concerning which I have added a few remarks.

The nomenclature employed for the Passeres, Fissirostres, and Scansores is that of my 'Catalogue of American Birds;' in the other orders I have mostly followed 'Baird's Birds of North America.'

Fam. TURDIDÆ.

1. CATHARUS MEXICANUS (Bp.).
2. TURDUS ASSIMILIS, Cab.
3. T. GRAYI, Bp.
4. T. MIGRATORIUS, Linn.
5. T. PINICOLA, Sclater.
6. HARPORHYNCHUS LONGIROSTRIS (Lafr.).

Fam. SYLVIIDÆ.

7. REGULUS CALENDULA (Linn.).

Fam. PARIDÆ.

8. PSALTRIPARUS MELANOTIS (Hartl.).

Fam. TROGLODYTIDÆ.

9. CATHERPES MEXICANUS (Sw.).
10. CISTOTHORUS PALUSTRIS (Wils.).

Fam. MNIOTILTIDÆ.

11. DENDRÆCA AUDUBONI (Townsh.).
12. D. ÆSTIVA (Gm.).
13. MNIOTILTA VARIA (Linn.).
14. SETOPHAGA RUTICILLA (Linn.).

- 15. *S. MINIATA*, Sw.
- 16. *CARDELLINA RUBRA*, Sw.

## Fam. HIRUNDINIDÆ.

- 17. *HIRUNDO HORREORUM*, Barton.
- 18. *PETROCHELIDON THALASSINA* (Sw.).

## Fam. VIREONIDÆ.

- 19. *ICTERIA VIRIDIS* (Gm.).
- 20. *CYCLORHIS FLAVIVENTRIS*, Lafr.

## Fam. LANIIDÆ.

- 21. *LANIUS EXCUBITOROIDES*, Sw. : Baird, B. N. A. p. 327.

Having now a North-American specimen of the true *L. ludovicianus*, I am enabled to state that the Mexican bird, which in my catalogue (p. 46) I have called *mexicanus*, is *L. excubitoroides*, as distinguished by Prof. Baird from *L. ludovicianus*. Mr. White's specimen agrees with mine.

## Fam. AMPELIDÆ.

- 22. *AMPELIS CEDRORUM* (Vieill.).
- 23. *PHAINOPEPLA NITENS* (Sw.).
- 24. *PTILOGONYS CINEREUS*, Sw.

## Fam. CÆREBIDÆ.

- 25. *DIGLOSSA BARITULA*, Wagler.
- 26. *CÆREBA CARNEIPES*, Sclater.

## Fam. TANAGRIDÆ.

- 27. *CHLOROPHONIA OCCIPITALIS* (Du Bus).
- 28. *EUPHONIA ELEGANTISSIMA* (Bp.).
- 29. *TANAGRA ABBAS*, Licht.
- 30. *T. DIACONUS*, Less.
- 31. *PYRANGA HEPATICA*, Sw.
- 32. *P. ERYTHROCEPHALA*, Sw.
- 33. *P. ERYTHROMELÆNA* (Licht.).
- 34. *PHÆNICOTHTRAUPIS RUBICOIDES* (Lafr.).
- 35. *BUARREMON ALBINUCHUS* (D'Orb. et Lafr.).

36. *B. BRUNNEINUCHUS* (Lafr.).
37. *SALTATOR ATRICEPS*, Less.
38. *S. MAGNOIDES*, Lafr.
39. *S. GRANDIS* (Licht.).
40. *PITYLUS CELÆNO* (Licht.).

## Fam. FRINGILLIDÆ.

41. *HEDYMELES LUDOVICIANUS* (Linn.).
42. *H. MELANOCEPHALUS* (Sw.).
43. *GUIRACA CÆRULEA* (Linn.).
44. *VOLATINIA JACARINA* (Linn.).
45. *PHONIPARA PUSILLA* (Sw.).
46. *CYANOSPIZA CYANEA* (Linn.).
47. *JUNCO CINEREUS* (Sw.).
48. *SPIZELLA SOCIALIS* (Wils.).
49. *ZONOTRICHIA LEUCOPHRYS* (Forst.).
50. *MELOSPIZA FALLAX*, Baird.

This specimen agrees with a Californian specimen in my collection (no. 684 *a*), which I believe must be referred to *M. fallax*; but I have not yet had the advantage of comparing it with authentically determined specimens of Prof. Baird's species.

51. *CHONDESTES GRAMMACA* (Say).
52. *PLECTROPHANES MELANOMUS*, Baird.
53. *LOXIA AMERICANA* (Wils.).

This is the second specimen I have examined of a Crossbill from Mexico. In this example the bill is scarcely larger than in a specimen of *L. americana* from Nova Scotia, and I see little reason for keeping the so-called *Loxia mexicana* distinct, although in the Mexican bird the coloration is certainly rather brighter, and general size rather larger, than that of northern specimens.

54. *CHRYSOMITRIS NOTATA* (Du Bus).
55. *C. PINUS* (Wils.).

## Fam. ALAUDIDÆ.

56. *EREMOPHILA CHRYSOLÆMA* (Wagl.).

## Fam. ICTERIDÆ.

57. *CASSICULUS PREVOSTI* (Less.).

- 58. *ICTERUS BALTIMORE* (Linn.).
- 59. *I. ABEILLII* (Less.).
- 60. *I. AFFINIS* (Lawr.).
- 61. *I. CUCULLATUS* (Sw.).
- 62. *I. PARISORUM*, Bp.
- 63. *I. AUDUBONI*, Giraud.
- 64. *AGELÆUS GUBERNATOR* (Wagl.).
- 65. *XANTHOCEPHALUS ICTEROCEPHALUS* (Bp.).
- 66. *STURNELLA MEXICANA*, Sclater.
- 67. *QUISCALUS MACRURUS*, Sw.
- 68. *Q. SUMICHRASTI*, De Sauss.

## Fam. CORVIDÆ.

- 69. *CYANOCITTA DIADEMATA*, Bp.

This species agrees with one in my collection which I have called *diademata*, as apparently the bird indicated by Prince Bonaparte in his 'Conspectus' (p. 377) under that name. But I am not without suspicion that Bonaparte has misplaced the two names, and that his *diademata* is the true *coronata* of Swainson, being the bird of the tableland, while *C. coronata* (as described by Bonaparte) inhabits the *tierra caliente* and descends to Guatemala.

- 70. *CYANOCITTA UNICOLOR* (Du Bus).
- 71. *C. ORNATA* (Less.).
- 72. *CYANOCORAX LUXUOSUS* (Less.).

## Fam. DENDROCOLAPTIDÆ.

- 73. *SCLERURUS MEXICANUS*, Sclater.
- 74. *AUTOMOLUS CERVINIGULARIS*, Sclater.
- 75. *SITTASOMUS SYLVIODES*, Lafr.
- 76. *PICOLAPTES AFFINIS* (Lafr.).

## Fam. FORMICARIIDÆ.

- 77. *GRALLARIA MEXICANA*, Sclater.

## Fam. TYRANNIDÆ.

- 78. *SAYORNIS NIGRICANS* (Sw.).
- 79. *LEGATUS VARIEGATUS*, Sclater.

- 80. MYIOZETETES TEXENSIS (Giraud).
- 81. PITANGUS DERBIANUS (Kaup).
- 82. MYIODYNASTES LUTEIVENTRIS (Bp.).
- 83. PYROCEPHALUS MEXICANUS, Sclater.
- 84. P. OBSCURUS, Gould.

I think it probable that this very curious bird (which is of a uniform chocolate-colour, with one or two scattered scarlet points and a rosy tinge on the vent) may be an abnormal form of *Pyrocephalus mexicanus*; for I have never seen it in any other plumage, and it seems evidently not in adult dress. This is the first example of it I have seen from Mexico.

- 85. TYRANNUS VOCIFERANS, Sw.

Fam. COTINGIDÆ.

- 86. TITYRA PERSONATA, Jard. & Selb.
- 87. HADROSTOMUS AGLAIÆ (Lafr.).
- 88. PACHYRHAMPHUS MAJOR (Cab.).

Fam. MOMOTIDÆ.

- 89. MOMOTUS CÆRULEICEPS, Gould.

Fam. ALCEDINIDÆ.

- 90. CHLOROCERYLE CABANISI (Tsch.).
- 91. C. SUPERCILIOSA (Linn.).

Fam. TROGONIDÆ.

- 92. TROGON CALIGATUS, Gould.
- 93. T. PUELLA, Gould.

Fam. CAPRIMULGIDÆ.

- 94. NYCTIDROMUS GUIANENSIS (Gm.).

Fam. TROCHILIDÆ.

- 95. CAMPYLOPTERUS HEMILEUCURUS (Licht.).
- 96. EUGENES FULGENS (Sw.).
- 97. LAMPROLÆMA RHAMI (Less.).
- 98. HELIOPÆDICA MELANOTIS (Sw.).
- 99. TROCHILUS COLUBRIS, Linn.

100. T. ALEXANDRI, Bourc. & Muls.  
 101. SELASPHORUS RUFUS (Gm.).  
 102. S. PLATYCERCUS (Sw.).  
 103. S. HELOISÆ (Less. & Delattr.).  
 104. CALOTHORAX LUCIFER (Sw.).  
 105. PETASOPHORA THALASSINA (Sw.).

106. AMAZILIA BERYLLINA (Licht.).

Mr. White informs me that this species is very abundant in the gardens in the city of Mexico.

107. CIRCE LATIROSTRIS (Sw.).

Fam. CUCULIDÆ.

108. PIAYA MEHLERI, Bp.  
 109. COCCYZUS AMERICANUS (Linn.).  
 110. GEOCOCCYX MEXICANUS (Gm.).

Fam. RAMPHASTIDÆ.

111. AULACORHAMPHUS PRASINUS (Licht.).

Fam. PICIDÆ.

112. CAMPEPHILUS GUATEMALENSIS (Hartl.).  
 113. PICUS BAIRDI, Sclater.  
 114. P. JARDINII, Malh.  
 115. SPHYROPICUS VARIUS (Linn.).  
 116. CHLORONERPES OLEAGINEUS (Licht.).  
 117. C. ÆRUGINOSUS (Licht.).  
 118. MELANERPES FORMICIVORUS (Sw.).  
 119. CENTURUS SANTACRUZI, Bp.  
 120. C. ELEGANS (Sw.).  
 121. COLAPTES MEXICANUS (Sw.).

Fam. PSITTACIDÆ.

122. CONURUS HOLOCHLORUS, Sclater.  
 123. C. LINEOLA, Cassin.

*Psittacula lineola*, Cassin, Pr. Acad. Philad. vi. p. 372.

*Myiops catharina*, Bp. C. R. xlv. p. 538.

There can be no doubt that Prince Bonaparte's *Myiops catharina* is identical with Mr. Cassin's *Psittacula lineola*, the type of the latter having been obtained at Puente Nacional in Mexico. Whether the Venezuelan *Myiopsitta tigrina*, Sonancé (Rev. de Zool. 1856, p. 144), is distinct I am not able to say, never having seen Venezuelan examples of this form.

#### Order ACCIPITRES.

- 124. TINNUNCULUS SPARVERIUS (Linn.).
- 125. ASTURINA MAGNIROSTRIS (Gm.).
- 126. A. NITIDA (Lath.).
- 127. ACCIPITER FUSCUS (Gm.).
- 128. CIRCUS HUDSONICUS (Linn.).
- 129. SCOPS FLAMMEOLA, Kaup.

#### Order COLUMBÆ.

- 130. COLUMBA FLAVIROSTRIS, Wagl.
- 131. LEPTOPTILA ALBIFRONS, Bp.
- 132. MELOPELIA LEUCOPTERA.
- 133. PERISTERA CINEREA.
- 134. SCARDAFELLA INCA, Bp.
- 135. CHAMÆOPELIA PASSERINA.

#### Order GALLINÆ.

- 136. PHILORTYX FASCIATUS.
- 137. DENDRORTYX MACRURUS.

#### Order GRALLÆ.

- 138. SQUATAROLA HELVETICA (Linn.): Baird, B. N. Am. p. 697.  
I have not previously seen Mexican examples of this widely diffused species.
- 139. ÆGIALITES VOCIFERUS (Linn.).
- 140. HIMANTOPUS NIGRICOLLIS (Vieill.).
- 141. RHYACOPHILUS SOLITARIUS (Wils.).
- 142. TRINGOIDES MACULARIUS (Linn.).
- 143. TRINGA WILSONI (Nutt.): Baird, B. N. Am. p. 721.
- 144. GALLINAGO WILSONI, Bp.
- 145. NUMENIUS LONGIROSTRIS (Wils.).



146. PHALAROPUS WILSONI, Sabine.

A specimen of this beautiful bird in full summer plumage.

147. GARZETTA CANDIDISSIMA (Gm.).

148. IBIS ORDII, Bp.

149. RALLUS LONGIROSTRIS (Bodd.).

150. PORZANA CAROLINA (Linn.).

151. GALLINULA MARTINICA (Linn.).

152. FULICA AMERICANA, Gm.

#### Order ANSERES.

153. CHROICOCEPHALUS ATRICILLA (Linn.).

154. HYDROCHELIDON PLUMBEA (Wils.).

155. RHYNCHOPS NIGRA, Linn.

156. PODICEPS CALIFORNICUS, Heerm. Proc. Acad. Phil. 1854, p. 179; Coues, *ibid.* 1862, p. 231.

This bird is very closely allied to the European *P. nigricollis*—commonly but erroneously called *P. auritus*. Mr. Coues has pointed out, *l. c.*, the slender differences that distinguish the two birds. Mr. White's collection contains one example of this Grebe in full summer plumage. I have not before seen it from Mexico.

### 3. DESCRIPTION OF A NEW SPECIES OF ELAPS FROM MALABAR. BY CAPT. R. H. BEDDOME, OFFICIATING CONSERVATOR OF FORESTS, MADRAS.

#### ELAPS CERASINUS.

Rostral slightly produced back between the anterior frontals; anterior frontals only half the size of the posterior ones, the latter touch the orbit; no anteocular and no loreal nostril between two nasals; seven upper labials; third, fourth, and fifth very high; third and fourth enter the orbit; one small postocular, vertical, six-sided, elongated, pointed behind; superciliaries small; occipitals large, elongated, pointed behind, with a pair of large temporals on the side of each; anal entire. Back purplish brown, with a shining nacreous lustre, with transverse, broad, irregular-shaped, black bands extending to the tip of the tail (about forty) at nearly equal distances, and which are continued, though not so broad, underneath the belly and tail, but never quite meet. Sides (two or two and a half of the lowest row of scales) and belly of a brilliant cherry-colour; head black in front; neck with the fifth, sixth, and seventh labials and a portion of the occipitals cherry-coloured. Total length  $21\frac{1}{2}$  inches; girth

$1\frac{1}{8}$  inch; length of tail 2 inches. Abdominals 228; subcaudals 31; rows of scales 13.

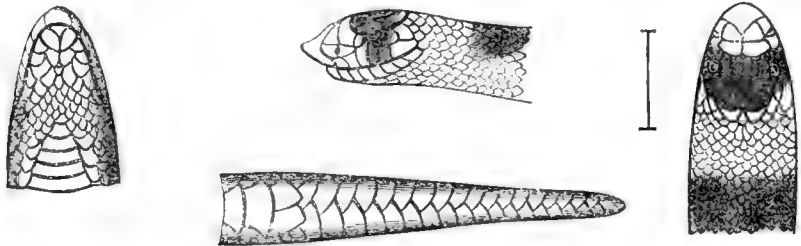
*Hab.* Manantoddy (Malabar). Rare.

This species differs from all others of the genus in the absence of an anteocular shield.

#### 4. DESCRIPTION OF THREE NEW SPECIES OF AUSTRALIAN SNAKES. BY GERARD KREFFT.

*SIMOTES AUSTRALIS*, sp. nov.

Scales in 17 rows. Ventrals 160 to 163. Anal bifid. Subcaudals 18/18. Total length  $11\frac{1}{2}$ " ; tail  $1\frac{1}{8}$ ".



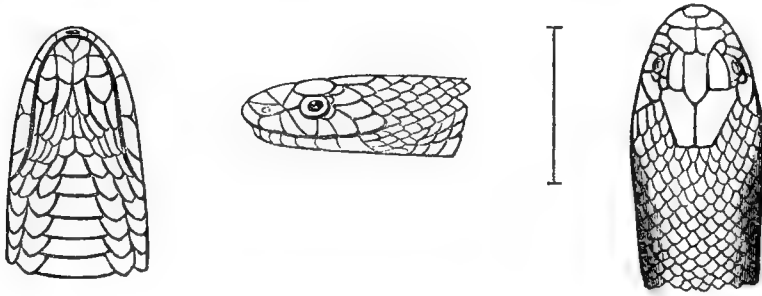
Body cylindrical, rounded; head short, conical, not distinct from neck; tail short, ending in a blunt point. Rostral shield much produced, flat in front, pointed behind, reaching backwards to between the anterior frontals, slightly grooved at its base. Two nasals, nostrils between, one anterior, two posterior oculars; two temporals (in one specimen a third smaller one behind). Eye small; pupil subelliptical, erect; no loreal, replaced by the posterior nasal and anterior ocular; six upper labials, the third and fourth coming into the orbit; occipitals short, not much rounded behind, and but slightly forked. The general colour is red, very bright on the posterior part of the body and tail; all the scales are slightly margined, some, much darker than others, have a whitish (in spirits) spot in the middle, and form into a series of half rings, of which there are about fifty-six upon the body and tail. The head is covered by a black band across the occiput, leaving the snout free, commencing from below the eye, and marking the fourth and fifth upper labials, the vertical, and nearly the whole of the occipitals; this black band is divided from a second band covering the neck by a whitish space.

I believe the present species is the first *Simotes* discovered in Australia; and I am much indebted to Dr. James C. Cox, who found it in the neighbourhood of Port Curtis. A second specimen, taken on the banks of the Clarence River, was given to me a few days ago by Judge Francis.

*HOPLOCEPHALUS RAMSAYI*, sp. nov.

Scales in 15 rows. Anal bifid. Ventrals 164. Subcaudals 51. Total length  $10\frac{1}{2}$ " ; tail 2".

Body rather elongate and rounded ; head scarcely distinct from neck, rather high and elongate, with obtuse muzzle ; rostral just



reaching to the surface of crown ; anterior frontals moderate, rounded in front ; posterior ones larger, bent down on the sides ; one anterior, two posterior oculars, the lower forming about one-fourth of the orbit ; vertical narrow, six-sided, much longer than broad ; superciliaries nearly the same size as the vertical ; occipitals moderate, not forked behind ; six upper labials, the third and fourth forming the lower part of the orbit ; no loreal, replaced by the elongate nasal, second and third upper labial, anterior ocular, and bent down anterior frontal. One nasal, pierced by the nostril ; scales moderate, rhomboid, in fifteen rows ; tail rather short, scarcely distinct from trunk, tapering ; eye moderate, pupil rounded ; grooved fang in front, some smaller smooth teeth behind.

Dark olive-green above, each scale tipped with reddish, in particular those on the sides ; crown and a narrow vertebral line, one scale wide, somewhat darker than the other parts ; this line extends to the root of the tail ; upper labials and chin-shields whitish, marked with olive-brown in the upper corners. Beneath yellow, each ventral scale with a blackish margin ; subcaudals nearly black.

Mr. E. P. Ramsay discovered this new Snake in the neighbourhood of Braidwood, N. S. Wales ; it is apparently a young specimen, its total length not exceeding  $10\frac{1}{2}$  inches.

#### HOPLOCEPHALUS NIGRO-STRIATUS, sp. nov.

Scales in 15 rows. Anal entire. Ventrals 180. Subcaudals 62. Total length 11'' ; tail  $2\frac{1}{2}$ ''.

Body and tail as in *H. nigrescens* ; belly flat ; tail moderate, not distinct from trunk ; head not distinct from neck, depressed, rounded ; rostral moderate ; anterior frontals broad, hinder edges just touching the nostril ; posterior frontals much larger, rounded behind ; vertical moderate, six-sided, very broad ; occipitals rather narrow, elongate, much forked and pointed behind ; one anterior, two posterior oculars ; superciliaries and eyes small ; pupil elliptical, erect ; six upper labials, third and fourth touching the eye. Upper part of posterior half of tail covered with large hexagonal scales ; sides and beneath

yellowish white; crown and a vertebral line running from the neck to the tip of the tail black.

*Hab.* North-east Australia, neighbourhood of Rockhampton.

##### 5. NOTES ON AUSTRALIAN FRESHWATER FISHES, AND DESCRIPTIONS OF FOUR NEW SPECIES. BY GERARD KREFFT.

The scanty knowledge which we possess of the fishes inhabiting our freshwater streams has induced me to pay some attention to this subject; and I now furnish a list of species of the several rivers from which I have received specimens. To begin with our immediate neighbourhood, I find that up to the present time not more than four species have been captured in the streams emptying into Port Jackson and Botany Bay:—namely, *Eleotris australis*, sp. nov.; *Mugil dobula*, Gthr.; *Anguilla australis*, Rich.; and *Galaxias scriba*. These four species we find in almost every stream, swamp, and lagoon, *Galaxias scriba* even in old wells or other water-holes on the top of hills, which have no connexion with any of the running streams. *Anguilla australis* is also frequently found in detached pools of water; whilst *Eleotris australis* frequents the clearer streamlets. I have never had an opportunity of examining the creeks which are situated upon the north shore of Port Jackson, nor have I ever received specimens captured there; but I have reason to believe that, besides the four kinds of fish mentioned, there exists a larger freshwater species, commonly called “Perch,” probably a *Therapon*, which is not found in the salt water of the harbour.

With regard to the fishes of the Nepean or Hawkesbury, its tributaries, and the swamps and lagoons with which this river is occasionally connected during high floods, I am enabled to give a better account. I have drawn the seine in the Hawkesbury between Windsor and Richmond, about fifty miles from its mouth, where the water is as fresh as that of any mountain-stream; and the result was, at a haul, about 200 so-called “Mulletts” (two species, *Mugil dobula*, Gthr., and *Mugil compressus*, Gthr.), two “Eels” (*Anguilla australis*, Rich.), a “Perch” (*Lates colonorum*, Gthr., Ann. N. H. 1863, xi. p. 114), and a “Rock Cod” (*Dertropogon robustus*, Gthr.). How this last fish managed to go so far up a freshwater river I could not understand. It has all the appearance of a true sea-fish; and yet I took it subsequently much further up the river, between the mountains, whilst I have also received two specimens captured with hook and line in Mr. Pitt’s lagoon near Bronte—a lagoon which, Mr. Pitt informs me, has not been flooded during the last four years. There is another fish, called a “Bream” by the settlers, which we did not succeed in capturing (this is probably *Beryx affinis*), and a second species of Perch, which may prove to be new. At a second haul a true Flat-head (*Platycephalus tasmanius*, Rich.) was secured, besides the usual amount of “Mullet” and “Perch.” The smaller fry, as *Galaxias scriba*, Rich., and the so-called Sprat

(*Megalops setipinnis*, Rich.), were taken with hook and line. The last-mentioned species affords a good deal of sport, as it will rise to a fly. I mention this fact, as some authors have denied that fly-fishing existed in Australia.

The genus *Eleotris* I found well represented in this river; and I give a short description of four new species.

**ELEOTRIS COXII**, sp. nov.

D. C.  $\frac{1}{9}$ . A.  $\frac{1}{9}$ . L. lat. 36 to 38.

Twelve series of scales between the origin of the posterior dorsal and the anal. Head scaly; snout obtuse, with the lower jaw prominent. The height of the body is contained five times and a quarter in the total length; the length of the head more than four times; the horizontal diameter of the eye is one-fourth of the length of the head, and equal to the width of the interorbital space.

Coloration bright yellow; upper part and sides finely punctured with black, forming a broad, sometimes indistinct streak upon the sides. Dorsals and pectorals bright yellow at the base, the first punctured with black; belly whitish. Teeth villiform, in broad bands. Anal papilla large, somewhat longer than broad.

Total length  $5\frac{1}{4}$  inches.

*Hab.* Lagoon near Bronte, Upper Hawkesbury River.

**ELEOTRIS AUSTRALIS**, sp. nov.

D.  $7\frac{1}{8}$ . A.  $\frac{1}{8}$ . L. lat. 32.

Eight series of scales between the origin of the posterior dorsal fin and the anal. Head scaly, as far as the snout, obtuse; lower jaw prominent; teeth in villiform bands. The height of the body is contained four times and a half in the total length, and the head four times and a quarter; the horizontal diameter of the eye is one-half the width of the interorbital space. General coloration yellowish brown, covered with minute black spots, which form five or six longitudinal lines upon the sides; base of pectorals with a narrow bright yellow band; all the rays of the caudal spotted with black; second dorsal with three or four narrow, sometimes indistinct bands. Anal papilla as long as the horizontal diameter of the eye, and nearly as broad. Total length 5 inches.

*Hab.* Creeks near Sydney, Hawkesbury River and its tributaries, Hunter River, and Clarence River.

**ELEOTRIS GRANDICEPS**, sp. nov.

D.  $7\frac{1}{9}$ . A.  $\frac{1}{9}$ . L. lat. 38 to 40.

Twelve series of scales between the origin of the posterior dorsal fin and the anal. Head very large, broad, depressed, without any apparent scales; lower jaw prominent; teeth villiform. The height of the body is contained five times in the total length, and that of the head three times and a half. The diameter of the eye is one-fifth of the length of the head, and nearly one-half of the interorbital

space ; the pectorals reach to the origin of the anal fin. General coloration yellowish, punctured with black in particular on the upper part and sides ; snout blackish ; lower jaw sometimes punctured with black also ; beneath whitish. Anal papilla very small. Total length  $3\frac{1}{2}$  inches.

*Hab.* Upper Hawkesbury River ; freshwater lagoons near Bronte and Richmond, Eastern Creek, and other tributaries of the Hawkesbury.

There are just twelve species of fishes from the Nepean and Hawkesbury ; but I am assured by Mr. George M. Pitt, jun., to whom I am chiefly indebted for my specimens, that the river contains more than twenty different kinds of fish : the remaining species I hope to capture during the course of this summer, and I shall furnish an account of them in due time. Of our northern rivers, the Hastings, the Richmond, and the Clarence, I know but little ; that they team with fish there is no doubt, and that many new genera and species will be found amongst them is certain. Many of the settlers upon the banks of these streams have promised their co-operation ; and Mr. James F. Wilcox, who resides on the Clarence River, has supplied me already with many interesting specimens. I received from him *Oligorus macquariensis*, Cuv. & Val., *Therapon unicolor* (?), *Galaxias scriba*, Rich., *Eleotris mogunda*, Rich., and *E. compressus*, sp. nov., which may be described as follows :—

**ELEOTRIS COMPRESSUS, sp. nov.**

D. C.  $\frac{1}{9}$  to 10. A.  $\frac{1}{10}$ . L. lat. 28/30.

Eight series of scales between the origin of the posterior dorsal fin and the anal. Body cyprinoid, compressed ; the height of the body is contained three times and three-quarters in the total length, and the head four times ; the horizontal diameter of the eye is one-fourth of the length of the head, and is contained once and a half in the interorbital space ; the snout is short, lower jaw longest ; mouth rather small ; head scaly.

Coloration reddish brown, with five or six indistinct cross bands, formed of the close-dotted black spots with which the scales are covered. The second dorsal and the anal are rather long, and more or less marked with black at the base and top ; besides this, the hinder part of the second dorsal is speckled with white. Anal papilla of moderate size and forked. Total length  $3\frac{1}{2}$  inches.

*Hab.* Clarence River, and creeks near Port Denison. Discovered by Mr. James F. Wilcox.

**6. DESCRIPTION OF A NEW SPECIES OF THE GENUS MERGUS.  
BY JOHN GOULD, F.R.S., ETC.**

**MERGUS SQUAMATUS, Gould.**

Crown of the head, lengthened crest, and neck rusty brown ; upper surface brownish grey ; tuft of feathers at the insertion of the wing

grey, passing into white near the tip, and broadly margined with black; lesser wing-coverts grey; greater coverts grey at the base, passing into black about the middle of the feathers, beyond which they are creamy white; primaries very dark or blackish brown; lower part of the throat and all the under surface pale buff; sides of the breast and the whole of the flanks down to the tail deep rich buff, with two narrow irregular crescentic bands of blackish brown on each feather, one within the other, the outer one near the edge, the inner one near the middle; a similar style of marking pervades the space behind the legs, the lower part of the back, and the upper tail-coverts, but the markings in those parts are wider, of a greyer tint, and intermingled with each other; tail greyish brown, the central feathers freckled on their margins with greyish white.

Total length 23 inches; bill  $2\frac{3}{4}$ ; wing 10; tail  $4\frac{1}{2}$ ; tarsi 2.

*Hab.* China.

*Remark.*—The above description was taken from an example which I consider to be either immature or in its winter livery. In size it is intermediate between *Mergus castor* and *M. merganser*. Whenever a specimen is procured in its nuptial dress, it will doubtless prove to be a bird of great beauty. This new species is at once distinguished from the other members of its genus by the squamate form of the markings on the flanks, which has suggested the specific name assigned to it.

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May 10, 1864.

Dr. E. Hamilton in the Chair.

The following papers were read:—

1. ON A NEW RAT FROM FORMOSA. BY ROBERT SWINHOE,  
F.Z.S.

*MUS CONINGA*, n. sp.

*M. corpore supra rufo, setis nigris spinosis sparso, subtus abrupte albo: auribus rotundis, fuscis: cauda longa, squamosa, setosa: pedibus albis.*

Corp. long. 8 poll., caud. 9 poll.

Upper parts reddish brown, sprinkled with stiff black bristles, more especially on the back, where the fur is also often a little dark; ears and fore part of legs deep brown; tail composed of short rings of scales set with short stiff bristles, deep brown on its upper parts, whitish on the lower and for about  $1\frac{3}{4}$  inch of tip; a ring of black runs round the lids of the eye; whiskers on sides of muzzle and a few hairs on sides of the forehead very long and glossy black; fore teeth rufous sienna, those on lower jaw long; chin, breast, under

fore paws, belly, and under thighs pure white; paws white, the hinder ones large.

In a young animal, measuring  $6\frac{1}{2}$  inches in trunk, the tail measured 6 inches; head to fore root of ear  $1\frac{1}{2}$  inch; between ears  $\cdot 7$  inch; length of ear  $\cdot 8$  inch; greatest breadth of ear  $\frac{1}{2}$  inch; hind foot, from tibial joint to end of nails,  $1\cdot 4$  inch. As the animal attains its full size, the tail exceeds the trunk in length. I have examined about thirty-five specimens of different ages; the younger the animal, the fewer spinous bristles: of these the males carry most; they are sharp and very stiff. Amongst these specimens there is, as usual, an amount of variation; but in proportions it is not very appreciable, except in so far as to be accounted for by age. In colour, on the contrary, varieties abound: the most strongly marked are the following:—

1. Sides strongly freckled with olive-yellow.
2. Brown, with more or less reddish; fur softer, with few bristles.
3. Similar to 1, but with brown instead of white fur.
4. Similar to 1, with white and brown feet and white-patched tail.
5. Characters of nos. 2 and 1 united.

These five varieties are so linked together by intermediate forms that there is no drawing a line between them. When I received the first soft-furred brown Rat, I thought I had got a distinct creature; but I soon procured others combining the characters of both. The colour and softness of its fur led me to conjecture that it might be a race of which the ancestors had hybridized with *Mus decumanus*, because I received a specimen of this last animal from the same locality. But the acquisition of further specimens showed me that, from the unsullied whiteness of its belly and the intermediate tinges of the upper parts of many others, the difference only consisted in a slight variation in the colour and appearance of the fur, the other characteristics of the species remaining unaltered. This Rat is not now found in the vicinity of towns, whence, like the indigenous Rats of most countries, it has fallen back before the usurpation of the stronger hordes of the commercial Rat (*Mus decumanus*); and it is now only found in the isolated hamlets of the interior, whither its enemy appears gradually to be extending its sway. It is difficult to understand how so large and strong a Rat has been ousted out of its rights by a not much stronger usurper. This species must have occurred formerly in towns in pretty considerable numbers, as it still does in country places. The imported hordes of *Mus decumanus* could not have been in larger numbers, but I should fancy must have employed a superior cunning to deprive these of their territory—much the same sort of advantage, probably, that civilization gives the Chinaman in this country, and the whites in Australia, which enables them to drive into the mountains and bush the rightful but less expert possessors of the land of their fathers. This Rat is allied to the aboriginal Rat of Southern China (*Mus flavescens*, Gray), and doubtless of the same stock; but it attains a larger size, is robuster, has larger hind feet, larger ears, and is otherwise distinguished by its







M. & T. Hancock Imp.

CACATUA TUGORPSE

feet being white, and by the pure abrupt white of its under parts. The bristles of its upper parts are also more numerous and more spinous. It was, perhaps, originally brought over by Chinese junks, and drove before it some other species, of which some few may yet be found lingering about the huts of the savages of the interior. For, in former days, before the accession of western commerce, *M. flavescens* was doubtless the chief Rat of the towns of Southern China; and special circumstances may have caused it to vary; or its pedigree may perhaps be carried further back to the time when there must have been more territorial connexion between this island and the main, when *Lepus sinensis*, *Cervulus reevesii*, and others managed to get across and remain to this day in either country identical and unchanged in form. These, however, are merely conjectures; but the facts remain that *Mus coninga* is allied to *M. flavescens*, and that both have been banished from their accustomed haunts by the cosmopolite usurper, *M. decumanus*.

The Formosan Rat is distinguished by the Chinese colonists from *M. decumanus*, which they call *Laou chee*, by the name *Pay-ba*, or white belly. The country-people attribute medicinal properties to its flesh, and value its carcase at fourpence a piece. I propose to name the animal after the powerful pirate chief who seized the island from the Dutch, and whose nightly rest this indigenous species must have as greatly disturbed as do its commercial successors those of the present trading community.

2. ON A NEW SPECIES OF WHITE COCKATOO LIVING IN THE SOCIETY'S GARDENS. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XVII.)

In April of the year before last the Society obtained from the ship 'La Hogue' (as recorded in the 'Proceedings' for May 13, 1862)\* a pair of a fine large species of White Cockatoo, new to the collection. Somewhat influenced, I must confess, by the information that they had been brought to Sydney from the Salomon Islands, I was induced to refer these birds to the *Cacatua ducorpsii*, obtained by MM. Hombron and Jacquinot in that group of islands, and described by those naturalists in the Zoology of the 'Voyage au Pôle Sud,' although they did not quite agree with the characters and figure there given of that species.

On its return voyage this year the same ship has brought over a pair of smaller White Cockatoos, received at Sydney from the island of Guadalcanar, of the Salomon group. As soon as I saw them, I was at once convinced that I had made a mistake in referring the former pair of birds to *Cacatua ducorpsii*, and that the latter pair were rightfully entitled to that designation. It thus becomes neces-

\* See P. Z. S. 1862, p. 141.

sary to give a new name to the Cockatoo which I have heretofore erroneously called *ducorpsii*, and figured under that name in the 'Proceedings' for 1862. I propose, therefore, to call it *Cacatua ophthalmica*, as its most distinguishing characteristic when living is the blue naked skin which surrounds the eye, and renders it at first sight distinguishable from every other bird of the genus.

Before giving the specific characters of this new species, I may remark that the White Cockatoos, of the genus *Cacatua*, may be divided into two very easily distinguished sections. The first embraces those species which have a narrow medial head-crest, with the slender point recurved at the extremity, and appearing above the surface of the adjoining feathers when the crest is in a state of repose. The second contains those species which have the crest broadened and comprising the greater part of the head-feathers, rising when erect into a sphere more or less pyramidal in shape, but showing when in a state of repose no recurved point. The following diagnoses may assist in determining the species:—

Sect. A. *Crista angustata ad apicem recurva.*

Majores candidæ, crista flava .....	{	1. <i>galerita</i> , ex Australia.
Minores candidæ, crista aurantiaca...		2. <i>triton</i> , ex Nov. Guinea et Molucc.
	{	3. <i>citrino cristata</i> , ex Timor.
crista flava .....		4. <i>sulphurea</i> , ex Timor, Flores, Lombock et Celebes.
Major, crista tricolore .....		5. <i>æquatorialis</i> , ex Nov. Guin. et Molucc.
		6. <i>leadbeateri</i> , ex Australia.

Sect. B. *Crista lata incumbente.*

Candida major; crista alba .....	7. <i>cristata</i> , ex Ternate.
crista rubra .....	8. <i>moluccensis</i> , ex Ceram, Batchian et Ternate.
crista limonacea ...	9. <i>ophthalmica</i> , ex ins. Salomon.
minor; crista alba, intus limonaceo tincta ...	10. <i>ducorpsii</i> , ex ins. Salomon.
genis rubro tinctis ..	11. <i>sanguinea</i> , ex Australia.
crisso rubro .....	12. <i>philippinarum</i> , ex ins. Philipp.
Rosacea .....	13. <i>roseicapilla</i> , ex Austral.

The new species may be shortly characterized as follows:—

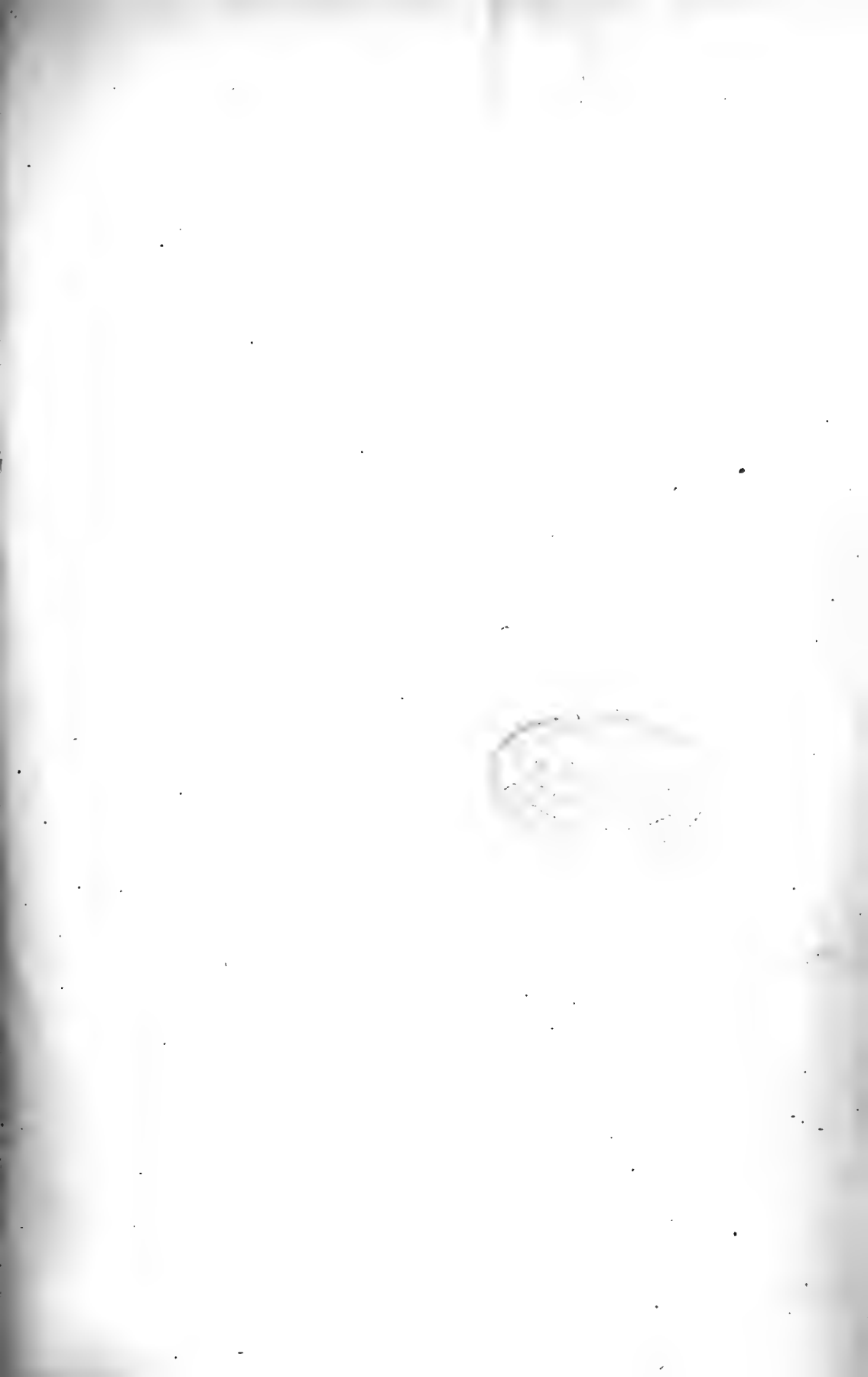
*CACATUA OPHTHALMICA*, sp. nov.

*Cacatua ducorpsii*, Sclater, P. Z. S. 1862, p. 141, pl. xiv.

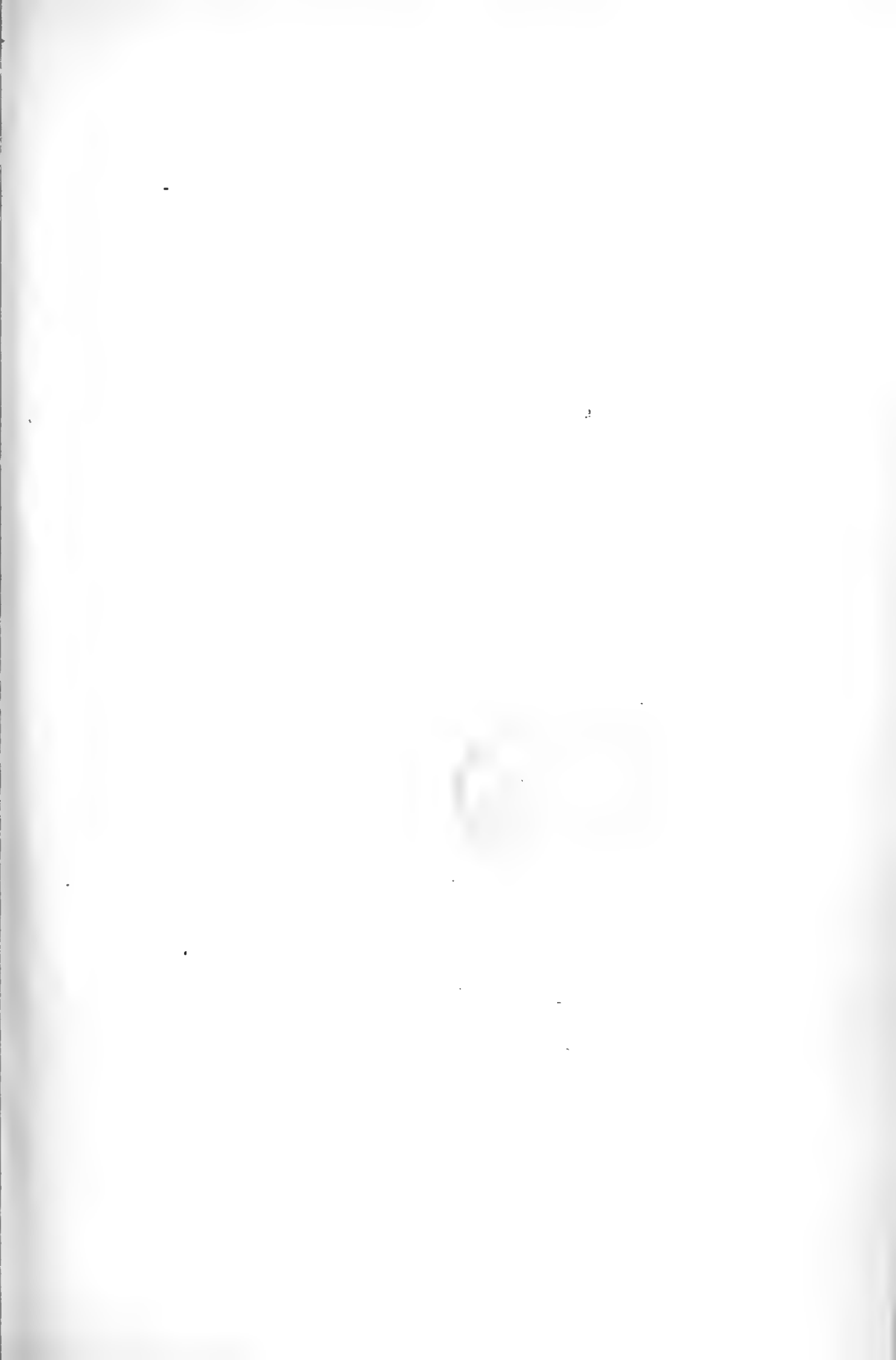
*Alba*: *cristæ plumis elongatis, intus pallide limonaceis: subalaribus et caudæ tectricibus inferioribus limonaceo tinctis: rostro et pedibus nigris: annulo oculari in ave viva cæruleo: crassitie vix minore quam in Cacatua cristata.*

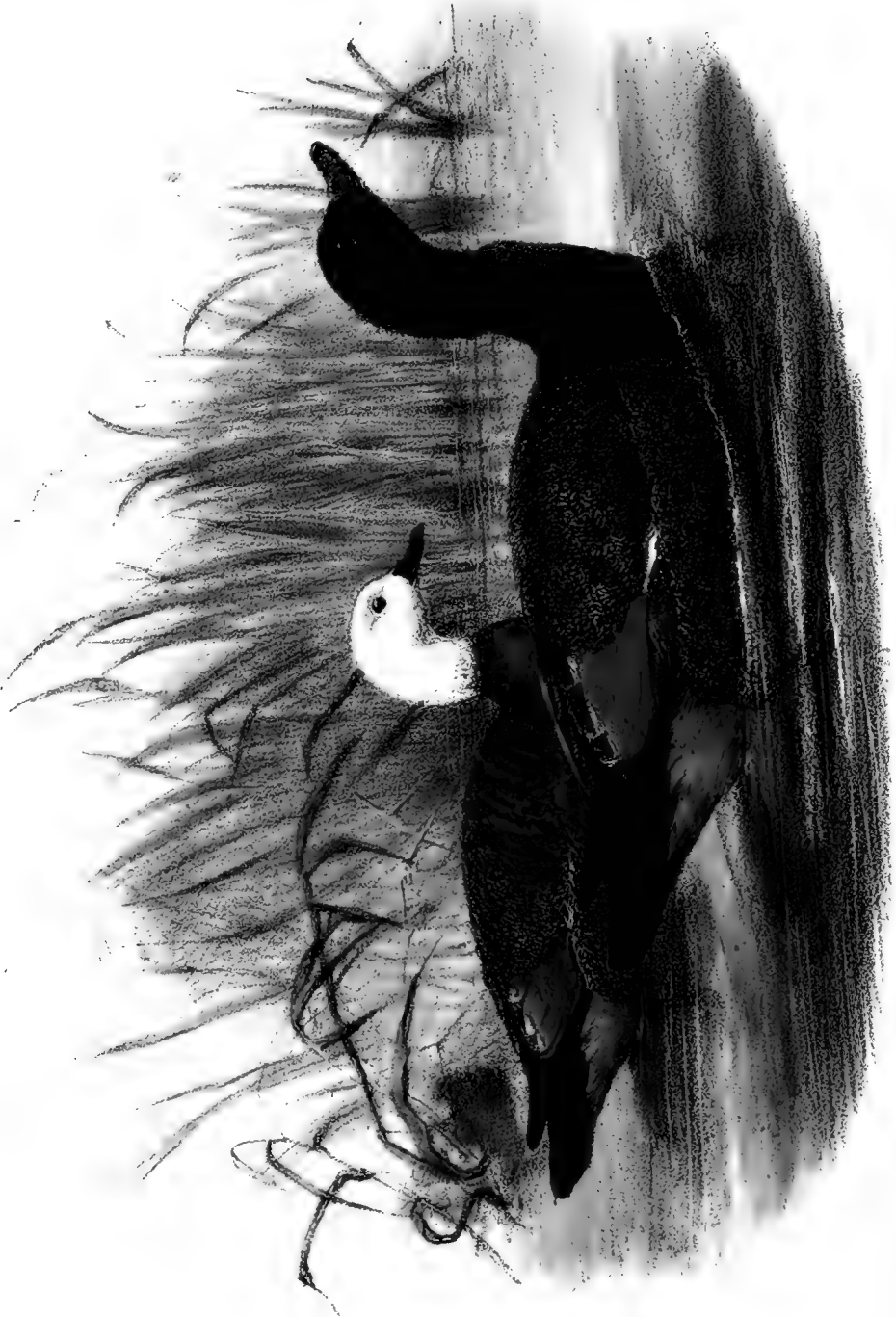
*Hab.* In ins. Salomon.

In conclusion I may remark that the Society's living series of Cockatoos contains examples of nine out of the thirteen known species, the deficiencies being only four, namely, *C. triton*, *C. sulphurea*, *C. sanguinea*, and *C. philippinarum*.











To show the distinctive characters of the true *C. ducorpsii*, Mr. Wolf has drawn a figure of this bird (Pl. XVII.), which may be compared with the figure of *C. ophthalmica* (P. Z. S. 1862, pl. xiv.), there erroneously called *C. ducorpsii*.

3. NOTES ON THE SPECIES OF TADORNA LIVING IN THE SOCIETY'S MENAGERIE. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plates XVIII. and XIX.)

The presence in the Society's Gardens of pairs of no less than four species of the highly ornamental water-fowl which constitute the genus *Tadorna* of naturalists has induced me to offer a few remarks on the variation of colouring in the sexes and on the geographical distribution of these birds, as I believe I am now able to give more correct information on one or two points connected with these matters than has yet been obtained.

The genus *Tadorna* should, in my opinion, include the species usually separated under the name *Casarca*, as the structural differences between these groups are very slight, and their habits, mode of nidification, and general physiognomy agree in every particular. They, however, constitute two well-marked sections, to which the subgeneric terms *Tadorna* and *Casarca* may be applied.

The following table will serve as a guide for the differentiation of the species:—

Sect. A. *Tadorna*.

Sexus similes: rostro majore, latiore, flavo.

1. *vulpanser*: capite colloque toto nigris.
2. *radjah*: capite colloque toto albis.

Sect. B. *Casarca*.

Sexus dissimiles: rostro minore, angustiore, nigro.

α. Dorso unicolore castaneo.

3. *rutila*: capite maris castaneo; fœm. facie albicante.
4. *cana*: capite maris cineraceo; fœm. facie alba.

β. Dorso nigro rufo minute variegato.

5. *tadornoides*: capite nigro; fœm. facie antica et regione oculari albis.
6. *variegata*: capite maris nigro, fœm. albo.

A. *Tadorna*.

1. TADORNA VULPANSER.

*Anas tadorna*, Linn.

*Tadorna vulpanser*, Fleming.

*Hab.* Europe; Western Asia to Indus: not common in Lower Bengal, more so on Indus (*Blyth*); China (*Swinhoe*),

This well-known species is always to be found in the Society's collection. The sexes scarcely differ, except in the slightly larger

size of the male and in the fleshy protuberance at the base of the bill, which, at the approach of the breeding-season, increases in size in the same sex.

The Common Sheldrake has not of late years bred in the Society's Gardens, although burrows have been constructed for its use, with the hope of inducing it to do so.

## 2. TADORNA RADJAH.

*Anas radjah*, Less. Voy. Coq. Zool. p. 602.

*Tadorna radjah*, Eyt. Mon. Anat. pl. p. 106; Gould, B. Austr. vii. pl. 8.

*Hab.* Northern and Eastern Australia (*Gould*); Batchian, East Gilolo, Bouru, Ceram, and Salawatty (*Wallace*).

"Seen in Aru Islands" (*Wallace*).

"Breeds in trees, in hollow branches and boles" (*Gould*).

We have not yet succeeded in getting living examples of this very beautiful species.

## B. *Casarca*.

### 3. TADORNA RUTILA.

*Anas casarca*, Linn.

*Tadorna rutila*, Boie, Isis, 1822, p. 563.

*Casarca rutila*, Bp. Geogr. List, p. 56; Salvin, Ibis, 1859, p. 362.

*Hab.* South-eastern Europe; Africa, north of Atlas (*Tristram*); India, common (*Blyth*); China (*Swinhoe*).

I am not aware that the Ruddy Sheldrake ever bred in this Society's Gardens until 1859, when a pair, received from Egypt as long ago as May 1850, bred in one of the boxes in what are called the "Garganeys' Ponds" near the Refreshment-rooms. Four young birds, the produce of this pair, were hatched on the 13th of May of that year. In the following year (1860) four young birds were hatched on May 18th. In 1861 the male bird died; but the old female paired with one of her offspring, and two young birds were hatched on June 2nd. In 1862 three birds were hatched on June 1st. In 1863 four were hatched on May 15th. At the present moment the female of this same pair is sitting.

Regarding this bird's breeding in a free state, Mr. Salvin's interesting notes in the first volume of 'The Ibis' (p. 362) may be referred to.

### 4. TADORNA CANA.

*Le Canard à tête grise*, Brown, Ill. Zool. pls. 41, 42.

*Anas cana*, Gm. S. N. i. p. 510.

*Casarca cana*, Blyth, Cat. Mus. A. S. B. p. 302; Sclater, Cat. Vert. p. 83; P. Z. S. 1859, p. 442.

*Hab.* South Africa; Cape Colony.

Of this Sheldrake, which is the "Berg-Ente" of the Boers of the Cape colonists, I believe only one example has ever been alive in the Society's Gardens. This was the female purchased at the sale of the late Lord Derby's collection in 1851, having been imported about

two years previously. She died in 1862. In a previous communication to the Society\* I have already recorded the facts relative to the breeding of this rather remarkable bird. Her first mate was a Ruddy Sheldrake (1855 and 1856); her second, one of her own hybrid offspring, formed by the cross between herself and that bird (1857, 1858); and third (1859), a Common Sheldrake.

5. *TADORNA TADORNOIDES.* (Pl. XVIII.)

*Anas tadornoides*, Jard. & Selb. Ill. Orn. ii. pl. 62.

*Casarca tadornoides*, Eyt. Mon. Anat. p. 171; Gould, B. Austr. vii. pl. 7.

*Hab.* Tasmania and Southern and South-western Australia (*Gould*).

“Breeds on alluvial flats and also in holes of trees” (*Gould*).  
“Mountain Goose” of settlers.

Of this species four examples were first received by the Society in April 1862, having been kindly forwarded from Adelaide (S. A.) and presented to the collection by the Hon. J. C. Hawker, Speaker of the House of Assembly. Unfortunately these turned out to be all four females. Last year, however, additional examples of both sexes were transmitted to the Society by the Acclimatization Society of Melbourne, and we have now two fine pairs of this species.

Mr. Gould, in his great work on the ‘Birds of Australia,’ gives a good figure of the male of this species; but the female (in the background) is not quite so correctly portrayed, nor are his notes on the difference of the sexes quite exact. The female is in fact distinguishable at first sight from the male, as is the case with all the species of this section.

The male is considerably larger; his head is wholly black, glossed with bronzy green; a broad ring of white encircles his neck; a broad band round the lower neck and whole of breast are of a yellowish-rufous or fawn-colour, divided from the densely black freckled back and belly by a sharp line of demarcation.

In the female a line round the bill and the ocular regions are white; but the white neck-collar is not so distinct as in the male; the breast and lower neck are of a dark chestnut (instead of fawn-colour), and graduate gently into the densely freckled back and belly.

6. *TADORNA VARIEGATA.* (Pl. XIX.)

*Anas variegata*, Gm. S. N. i. p. 505.

*Anas cheneros*, Forst. Desc. An. p. 92.

*Casarca castanea*, Eyt. Mon. Anat. pl. 19, p. 108 (fœm. vix adult.).

*Casarca variegata*, G. R. Gray, Birds of N. Z. p. 15, pl. 16 (♂).

*Hab.* New Zealand, Dusky Bay (*Forster*).

A pair of this Sheldrake were presented to the Society in August last by Mr. Sharpley, and are, I believe, the first examples of this curious species that have been brought to Europe alive. The pure white hood of the female and dark bronzy hood of the male offer a

\* See P. Z. S. 1859, p. 442.

very striking contrast ; and although this peculiarity is well described by Forster and the older authors, I was at one time inclined to think they had united two different species under one name.

There is a specimen of a male *Casarca variegata* in the British Museum which has not the chestnut termination of the secondaries observable in other specimens and in our bird. This I look upon as probably a melanoid variety.

By some authors the curious *Anas nævosa*, figured in Mr. Gould's 'Birds of Australia' (vii. pl. 10), has been arranged as a *Tadorna*. But although this species somewhat resembles the Sheldrakes in the form of the bill, its short legs render it readily distinguishable ; and the bird may better be called by Bonaparte's term for it, *Stictonetta* (Compt. Rend. xliii. p. 649), or left as an *Anas* until we know more about it.

#### 4. DESCRIPTIONS OF NEW GENERA AND SPECIES OF CHITONIDÆ FROM THE AUSTRALIAN SEAS, IN THE COLLECTION OF GEORGE FRENCH ANGAS. BY HENRY ADAMS, F.L.S., AND G. F. ANGAS, CORR. MEM. Z. S.

##### 1. LEPIDOPLEURUS VARIEGATUS, nob.

*L. testa oblonga, convexa, albida, viridi maculata et irregulariter fusco ornata, maculis ad latera confertioribus ; valvis terminalibus minute divaricatim striatis, ad margines radiatim costatis et concentricè sulcatis ; valvis mediis subcarinatis ; areis dorsalibus minute divaricatim striatis ; areis lateralibus vix elevatis, nonnullis tuberculatis, costis radiatis, ad margines concentricè sulcatis, interstitiis minute granulatis. Limbus pallido-fuscus, squamulis parvis confertis obtectus.*

Long. 18, lat. 8 mill.

*Hab.* York's Peninsula (*Coll. Angas.*).

##### 2. LEPIDOPLEURUS SPECIOSUS, nob.

*L. testa elongata, fulva, dorso longitudinaliter rubro-fusco ornata, ad marginem cingulis latis, concentricis, viridibus ; valvis terminalibus et areis lateralibus concentricè costatis, costis pustulosis, interstitiis minute granulatis, areis lateralibus subelevatis ; valvis mediis carinatis ; areis dorsalibus crebre divaricatim rugoso-striatis. Limbus pallido-fuscus, squamis medio-cribus imbricatis obtectus.*

Long. 35, lat. 20 mill.

*Hab.* Port Lincoln (*Coll. Angas.*).

##### 3. LEPIDOPLEURUS LIRATUS, nob.

*L. testa parva, elongata, convexa, flavido-fusca, pallide fusco maculata ; valvis terminalibus et areis lateralibus concentricè remote sulcatis, dense et minute radiatim liratis, liris confertim pustulosis, valva postica elevata, areis lateralibus vix elevatis ;*

*valvis mediis obtuse carinatis; areis dorsalibus longitudinaliter liratis, liris confertim pustulosis. Limbus pallido-fuscus, squamulis minutis dense obsitus.*

Long. 8, lat. 4 mill.

*Hab.* York's Peninsula (*Coll. Angas.*).

#### GENUS STENOCHITON, nob.

*Testa elongata, angusta, convexa. Valvæ longiores quam latæ, non carinatæ; apex posterioris valvæ subcentralis; laminæ insertionis parvæ, valvarum terminalium multis fissuris, intermediarum utrinque 5 fissuris. Limbus squamulis minutissimis, politis, imbricatis obtectus.*

#### 4. STENOCHITON JULOIDES, nob.

*S. testa elongatissima, angusta, antice angustiore, rufo-fusca, minute albo maculata et ornata; valvis angustis, longioribus quam latis, valde convexis, non carinatis, marginibus lateralibus vix rotundatis, politis; areis lateralibus elevatis et ad margines concentricè sulcatis. Limbus angustus, pallido-fuscus, atro-fusco maculatus, squamulis minutissimis, politis, imbricatis obtectus.*

Long. 25, lat. 6 mill.

*Hab.* Holdfast Bay, South Australia (*Coll. Angas.*).

This species, from its narrow convex form and polished surface, has much the general appearance of a Myriapod, which has suggested the name we have attached to it.

#### 5. CHÆTOPLEURA CONSPERSA, nob.

*C. testa oblongo-ovata, convexa, albida, viridi-fusco parce irregulariter maculata; valva antica radiatim costata et concentricè rugoso-striata; valva postica et valvis mediis transversim rugose et undulatim striatis; areis dorsalibus subcarinatis, medio sublævibus; areis lateralibus planis, ab areis dorsalibus costis prominentibus divisis, marginibus posterioribus elevatis et ad extremitates valde callosis. Limbus pallido-fuscus, atro-fusco maculatus, spiculis brevibus, albis, corneis sparsim obsitus.*

Long. 22, lat. 14 mill.

*Hab.* Port Lincoln (*Coll. Angas.*).

#### 6. LORICA ANGASI, H. Ad.

*L. testa ovata, postice coarctata et angulata, pallido-fusca, viridi variegata; valva antica concentricè striata et costis pustulosis radiata; valva posteriore angustata, transverse sulcata et dense longitudinaliter lirata; valvis mediis subcarinatis; areis dorsalibus dense liratis et transverse sulcatis; areis lateralibus elevatis, radiatim liratis, liris pustulosis. Limbus mediocris, olivaceus, squamis minutis obsitus.*

Long. 40, lat. 26 mill.

*Hab.* Rapid Bay, South Australia (*Coll. Angas.*).

This species is very interesting from presenting us with another example of a peculiar Australian form. It differs from *L. volvox* and *L. cimolia* of Reeve in the valves being much broader and less raised at the hinder parts, and in having the scales of the mantle smaller.

Genus MICROPLAX, nob.

*Testa elongata. Valvæ partibus externis parvis, cordiformes, disjunctæ; laminæ insertionis magnæ. Limbus nudus.*

In this genus the exposed parts of the valves are very small, and are completely disunited, the distance between them in *Microplax grayi* being nearly equal to the length of the valves.

7. MICROPLAX GRAYI, nob.

*M. testa elongata, convexa, fusca; partibus externis valvarum minutis, late cordiformibus, carinatis, valde granulatis, interstitiis longitudinem valvarum vix æquantibus; areis lateralibus costa distinctis. Limbus mediocris, corneus, lævis.*

Long. 13, lat. 5 mill.

*Hab.* Sydney Harbour, under stones at low water (*Coll. Angas.*).

8. HANLEYA VARIABILIS, nob.

*H. testa oblonga, albida, atro-fusco variegata; valvis latis, carinatis; areis dorsalibus longitudinaliter dense costatis, costis confertim pustulosis; areis lateralibus vix elevatis, transverse et undulatum costatis, costis confertim pustulosis. Limbus ad marginem spiculis brevibus, albis, corneis instructus, fasciculis spiculorum pallidorum.*

Long. 16, lat. 10 mill.

*Hab.* York's Peninsula (*Coll. Angas.*).

9. ACANTHOCHITES CARINATUS, nob.

*A. testa elongata; valvis mediocribus, valde carinatis, postice mucronatis, albidis, rufo-fusco maculatis, creberrime pustulosis, medio atro-fuscis, lævibus; areis lateralibus indistinctis. Limbus spiculis minutis albis obsitus, fasciculis spiculorum pallidorum.*

Long. 30, lat. 16 mill.

*Hab.* Sydney (*Coll. Angas.*).

10. ACANTHOCHITES COSTATUS, nob.

*A. testa elongata; valvis mediocribus carinatis, angulatim cordatis, granulatis, pallido-fuscis; areis lateralibus ab areis dorsalibus costis prominentibus divisis; areis dorsalibus medio lævibus, albidis. Limbus spiculis brevibus, albis, fugaceis obsitus, fasciculis spiculorum alborum longiorum instructus.*

Long. 18, lat. 7 mill.

*Hab.* Sydney (*Coll. Angas.*).

May 24, 1864.

Prof. Huxley, F.R.S., V.P., in the Chair.

Mr. Leadbeater exhibited a remarkable pair of tusks of the Indian Elephant from the collection of Sir Victor Brooke, Bart., F.Z.S.

The following papers were read:—

I. ON THE CETACEA WHICH HAVE BEEN OBSERVED IN THE SEAS SURROUNDING THE BRITISH ISLANDS. BY DR. JOHN EDWARD GRAY, F.R.S., ETC.

There is no series of large animals more difficult to observe and to describe than the Whales and Dolphins; they are unwieldy to collect and compare. It is almost impossible to preserve their skins; and when preserved, they are difficult to keep without deterioration, and on account of their odour.

They are only seen at distant periods, and generally either isolated or each kind and age in the same school or herd. They are only seen alive at a distance from the observer, and generally in rapid motion and under unfavourable circumstances for study.

When the larger kinds are cast ashore, they are seized on by the lord of the manor or some other person and sold for their blubber, and their bones are often sold for manure. The preparing of the oil and the putrefying of the flesh render them by no means desirable neighbours; so that it is not to be wondered at that they are usually got rid of as soon as they can be, and that the naturalist has seldom the opportunity of examining them. Yet they are objects of general interest; and when they are cast ashore near populous places, they are often shown for a time, and the smaller species are sometimes even carried far inland and exhibited.

The only chance that the zoologist has of examining fresh specimens of these animals is to watch for their occurrence, and hasten to see them while they are in a more or less complete state.

We have until lately been chiefly indebted to Sibbald, John Hunter, and Dr. Knox for the history and anatomy of the British species.

Mr. Scoresby gave some very interesting particulars on the habits and manners of the animals which came under his observation as an Arctic whaler.

Dr. Trail, Mr. Patrick Neil, Dr. Barclay, Dr. Fleming, Mr. Brightwell, and I have described some isolated specimens which have occurred to us, and which had not before been observed in the British seas.

During the last twenty years I have never allowed an opportunity to pass when I could examine a recent-caught Cetacean animal or its bones, whether they consisted of an entire skeleton or only a skull or some isolated bones; and I have from time to time, in the 'Monograph on Cetacea,' in the 'Zoology of the Erebus and Terror,' in the 'Catalogue of Cetaceans in the Collection of the British Mu-

seum,' and in papers in the 'Proceedings of the Zoological Society' and in the 'Annals and Magazine of Natural History,' brought the results of my labours before the scientific public. The result of these examinations has been to increase very greatly the number of species now known to inhabit the British seas, beyond those hitherto recorded as found in them in the different works on the British fauna, and further to establish those species by personal examination and the comparison of specimens collected on our coast or in our estuaries with the specimens obtained from foreign neighbours or distant regions. I have had the good fortune to be able to examine specimens or osteological remains of all the British species here recorded, except *Physeter tursio* and *Steno rostratus*.

This is the more important, as Dr. Fleming is the only author of a British Fauna that appears to have seen a British whale in the flesh, or to have examined its bones; he describes one species in the 'Wernerian Transactions.' The accounts of these animals in our British Faunas are merely compilations, and those of the larger Whales are almost entirely derived from the work of Sibbald. Some of the authors regard the individual he described as a species; and others, as Bell, in his 'British Animals,' deem the three or four specimens which have been regarded as species by other authors as a single species, without more reason than his predecessors had had for separating them.

The species of the different families have a very great similarity when examined externally and as a whole; and the best characters for the discrimination of genera and species are to be obtained from the examination of their skeletons, and especially of their skulls, cervical vertebræ, and the bones of their fore limbs. But here, as in other vertebrate animals, it requires great care to observe the external characters of the animal and the peculiarities of their osteology, so that the outer form, colour, &c., may be known at the same time as the osteological characters.

To give some idea of the progress of our knowledge of British Cetacea, I have compiled the following table. The number in a column shows the number of the species in the work of the author cited; the same number repeated in a column shows that the author regarded the species as the same. The letters S and H indicate that they occur in the Scandinavian or Dutch fauna:—

	Turton, 1807.	Fleming, 1828.	Jenyns, 1835.	Bell, 1837.
S. H. 1. <i>Balæna mysticetus</i> .....	48	48	73	12
S. 2. <i>Megaptera longimana</i> .....	50?	.....	75, part	13
S. 3. <i>Physalus antiquorum</i> .....	49-51	45-47	74-76	13
4. — <i>duguidii</i> .....	.....	.....	.....	13
5. — <i>sibbaldii</i> .....	.....	.....	.....	13
6. <i>Benedenia knoxii</i> .....	.....	.....	.....	.....
7. <i>Sibbaldus laticeps</i> .....	.....	.....	.....	.....
7* — <i>borealis</i> .....	.....	.....	.....	.....
S. 8. <i>Balænoptera rostrata</i> .....	52	46, part	.....	13



	Turton, 1807.	Fleming, 1828.	Jenyns, 1835.	Bell, 1837.
H. 9. <i>Catodon macrocephalus</i> .....	53-55	59	71	10
10. <i>Physeter tursio</i> .....	56	57, 58	72, 72.2	11
H. 11. <i>Steno rostratus</i> .....				
S. H. 12. <i>Delphinus delphis</i> .....	59	52	63	1
S. 13. — <i>euphrosyne</i> .....				
S. H. 14. — <i>tursio</i> .....	16	53	64	2
S. 15. <i>Lagenorhynchus leucopleurus</i> .....				10
S. 16. — <i>albirostris</i> .....				
17. — <i>acutus</i> .....				
S. H. 18. <i>Hyperodon butskopf</i> .....	61	55	70	7
19. <i>Lagenocetus latifrons</i> .....				
H. 20. <i>Ziphius sowerbiensis</i> .....	57		70, part	8
S. H. 21. <i>Globiocephalus svineval</i> .....		51	67	5
22. — <i>affinis</i> .....				
23. — <i>incrassatus</i> .....				
S. H. 24. <i>Orca gladiator</i> .....	60	50	66	4
25. — <i>crassidens</i> .....				
26. <i>Grampus cuvieri</i> .....				
S. H. 27. <i>Phocæna communis</i> .....	58	49	63	3
S. 28. <i>Beluga catodon</i> .....	54, 18	54-60	68, 71.2	6
S. 29. <i>Monoceros monodon</i> .....	47	56	69	9

Turton indicates as British 18 species of Cetacea, which are reduced by Fleming to 16, by Jenyns and Bell to 14 species. In this paper the number is increased to 30, belonging to 20 genera.

The British seas seem to be particularly rich in these animals, or our zoologists have been more industrious in collecting them than others; for, while our fauna contains 30 species, Schlegel, in his 'Fauna of Holland,' 1862, gives only 10 species, viz., 1. *Delphinus delphis*; 2. *D. rostratus*; 3. *D. tursio*; 4. *D. orca*; 5. *D. phocæna*; 6. *D. melas*; 7. *D. micropterus*; 8. *D. hyperodon*; 9. *Physeter* —? 10. *Balæna physalus*.

Nilsson, who had studied my essay in the 'Zoology of the Erebus and Terror,' in his 'Scandinavisk Fauna,' 1847, enumerates 16 species, viz., 1. *Delphinus delphis*; 2. *D. euphrosyne*, Gray; 3. *D. obscurus*; 4. *D. leucopleurus*; 5. *D. ibsenii*; 6. *D. tursio*; 7. *D. orca*; 8. *D. globiceps*; 9. *D. leucas*; 10. *D. phocæna*; 11. *Monodon monoceros*; 12. *Hyperodon borealis*; 13. *Balæna rostrata*; 14. *B. physalus*; 15. *B. boops*; 16. *B. mysticetus*.

I have given here the more important synonyms of the species, paying particular attention to the descriptions and figures of British specimens, and the names derived from them. For more extended synonyms and for the general observations on the genera and the species I must refer the student to the 'Catalogue of the Cetacea in the British Museum,' where he will find recorded some of the difficulties which occur in referring with any certainty to preceding authors, even in the case of the most common and generally known species; and at every new reference to authors fresh difficulties occur.

## Suborder I. CETE.

Skin smooth, bald. Teats two, inguinal. Limbs clawless; the fore limbs fin-shaped; hinder limbs united, forming a forked horizontal tail. Nostrils enlarged into blowers. *Carnivorous*.

The size of the head, compared with that of the body, varies greatly according to the age of the specimen. In the newly-born whales the head is small; and it enlarges regularly, but at a more rapid rate than the body, as the whale increases in size. In the Greenland Whale, the adult head is two-fifths of the length of the body.

**Sect. I. MYSTICETE.** *Palate furnished with transverse fringed horny plates of baleen or whalebone. Teeth none in adults. Head large, depressed. Nostrils separate, longitudinal. Gullet very contracted. Tympanic bones large. Lachrymal bone none. Living on Mollusca and fish.*

The skulls of the different genera differ considerably in external form, from being nearly as wide as the lower jaw, as in *Sibbaldus*, to being very narrow so as only to form a narrow central arch, as in *Balæna*. The genera may be thus arranged according to the width of the skull:—1. *Sibbaldus*. 2. *Balænoptera* (Gray, Zool. E. & T.). 3. *Rorqualus* (Rudolphi, Berlin Acad. 1829). 4. *Megaptera* (Eschricht, Nord. Hvaler, t. 3. f. 2). 5. *Physalus* (Eschricht, l. c. t. 3. f. 3). 6. *Eubalæna* (Cuv. Oss. Foss.). 7. *Balæna* (Eschricht, l. c. t. 3. f. 1).

The width chiefly depends on the lateral expansion of the maxilla. In *Balæna* it is band-like; and in *Sibbaldus* very broad, being more than twice as wide as the intermaxillary bones.

## Fam. 1. BALÆNIDÆ.

Dorsal fin none; belly smooth; baleen elongate, slender. Vertebrae of neck anchylosed. Pectoral fin broad, truncated at the end. Tympanic bone rhombic. Maxillary bones narrow, linear, rounded; the maxilla narrow, linear, rounded. Lower jaw with only a rudimentary ramus. Scapula higher than wide, with a distinct coracoid process.

“They roar like an enraged bull. The females are generally the largest” (Beal, 13, 14).

As the elongated form of the periotic bones and the more or less rhombic form of the tympanic bone are characteristic of the Right Whales or the family *Balænidæ*, so the tympanic portion of each species has a peculiar and specific form, and may be used for the specific character of the species, in the same manner as I have shown, in the ‘Zoology of the Erebus and Terror,’ that the existence of several species of Right Whales may be proved, and, indeed, the species characterized, by the form and the internal structure of the baleen.

Unfortunately, when species are determined from these characters, the outer form of the animal is unknown; and, unless the ear-bones and baleen are obtained from the same specimen, there is

the fear that one may be giving two names, one characterized by the ear-bone, and the other by the baleen of the same animal, and *vice versâ*.

Yet I think it is so important that we should avail ourselves of every assistance in determining the species of these animals which are so difficult to observe, that one must run the risk of making such a mistake, as it can easily be corrected when the opportunity occurs to some competent naturalist to examine a specimen containing both the baleen and the ear-bones.

Professor Owen, in the 'Hist. Brit. Fossil Mammals,' has named and figured the ear-bones of the genus *Balæna*, which have been observed in the Crag; he has named them as if he regarded the following as distinct species:—1. *Balæna affinis*, fig. 221; 2. *B. definita*, fig. 222; 3. *B. gibbosa*, fig. 223; 4. *B. emarginata*, fig. 224. These bones are all very imperfect, and the figures of the two latter are not sufficient even to decide whether they belong to the genus *Balæna* or to *Physalus*.

### 1. BALÆNA.

Skull high and contracted behind; the frontal very narrow, marginal, directed backwards; tympanic bone rhombic, large; orbits small (see Cuvier, *Oss. Foss.* v. t. 25. f. 9, 10, 11). Baleen tough, flexible; enamel thick; internal fibres few, very slender, forming a beautiful thin flaccid fringe. Cervical and the first dorsal vertebræ united by their bodies (see Cuv. *Oss. Foss.* v. p. 380, t. 26. f. 18). Blade-bone much higher than broad, with a broad acromium (Cuv. t. 26. f. 8). Pelvis of three bones (Cuv. t. 26. f. 25).

Head about one-third of the entire length. The frontal bone short, broad, and band-like, obliquely truncated over the orbit. The upper maxillary bone and intermaxillaries are very narrow, linear. The nasal rather large. The lower jaw is thick and rounded, with scarcely any ramus near the base (Eschr. & Reinh. *Nord. Hvaler*, t. 5. f. 1). The pectoral fin moderate, with five short unequal fingers, and a short spur on the inner side at the base of the first finger; the middle finger longest, then the second, then the first; the outer or little finger very short and rudimentary (see Eschr. & Reinh. *op. cit.* t. 2. f. 1, & fig. p. 578).

The five first cervical vertebræ are united into a mass by the bodies; the sixth free, with rudimentary inferior lateral processes; the seventh free, without any inferior process (see Eschr. & Reinh. *op. cit.* t. 2. f. 3).

The bladebone three-sided, nearly equal-sided, with a small anterior coracoid process (see Eschr. & Reinh. *op. cit.* t. 2. f. 1, & fig. p. 574).

### BALÆNA MYSTICETUS. The Right Whale.

*Balæna mysticetus*, Linn.; Gray, *Zool. E. & T.* 15, 47, t. 1. f. 4 (baleen); Cat. *Cetacea*, B.M. 12, 1850; Bell, *B. Quad.* 514. fig.; Nilsson, *Scand. Fauna*, 642; Turton, *B. Fauna*, 15; Fleming, *B. A.* 33; Jenyns, *Man.* 46.

“*De Balænis hujusmodi*,” &c., Sibbald, Bal. 27.

*The Right or Whalebone Whale*, Dudley, Phil. Trans. xxxiii. 256; Scoresby, Arctic Reg. p. 448, t. 12. f. 1.

*Balæna mysticetus borealis*, Knox, Cat. Anat. Prep. Whales, 21.

*Nordhval*, Eschricht & Reinhardt, Kong. Dansk. Videns. 1861, 46 (anatomy).

*Hab.* North Sea. Skull and lower jaw in the British Museum. Peterhead, 1682 (*Sibbald*). ?Tynemouth (*Willughby*). Coast of Zetland, occasionally (*Barclay*; see Bell, B. Q. 518).

In the Museum there are the cervical vertebræ united into one mass. Dredged at Bridport, 1860.

A skull and a complete skeleton from Greenland in the Museum of the College of Surgeons.

There is a dried foetus of this Whale in the Derby Museum at Liverpool; the upper lip is very large and dependent. And a similar dried foetus in the Museum of the Philosophical Society of Hull: I could not observe any appearance, even a rudiment, of the baleen; but the mouth is closed.

In the skeleton of the adult, which is  $41\frac{1}{2}$  feet long, figured by Eschricht and Reinhardt (t. 2), the head occupies two-fifths of the entire length of the skeleton. In the new-born specimen figured on the first plate of their interesting essay, the body is much longer, and the head only occupies about two-sevenths of the entire length, showing that the head increases in length at a greater rate than the body. This seems general in Whales; for the skull of the foetal *Balæna australis*, figured by Professor Huxley in his ‘Elements of Comparative Anatomy’ (fig. 107, on p. 270), is short and broad for the genus, the skull of the foetal and young *Physalus antiquorum*, figured by Eschricht, is shorter than the adult skull, and that of the foetus is very short indeed.

The ear-bones, with the tympanic *in situ*, are represented by Eschricht (Nord. Hvaler, t. 5. f. 4). The tympanic bone is sub-rhombic; the upper surface flat, with a large, subangular, rugose prominence occupying about two-thirds of the upper inner side; the upper margin rounded, the outer edge rather sharp and slightly arched; the lower edge flat, truncated, with a sharp upper and lower edge, which is angulated at the lower outer corner. There is a deep groove between the inner dorsal prominence and the lower edge. The lower surface convex, with a large oblong opening of nearly equal width the whole length.

The specimen in the British Museum is rather sea-worn and polished; but I have compared it, through the kindness of Mr. W. Flower, with the ear-bone of the skeleton which the College of Surgeons have just received from Greenland.

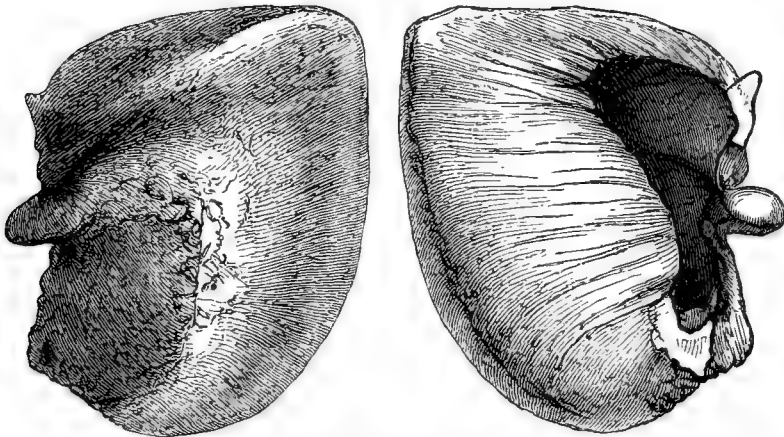
In the British Museum there is a pair of ear-bones very like the former, which evidently came from the same animal, and must belong to this or a very nearly allied species. They chiefly differ from the ear-bones of *B. mysticetus*, above described, in the whole surface being smooth, with only a little rugosity on the dorsal prominence on the inner edge, and in the angle of the outer upper and lower

hinder edges being sharper and more marked; the outer hinder angle of the dorsal surface is also more concave. I propose to regard it for the present as a variety, *B. m. angulata* (fig. 1).

These bones are said to have been found in the Orkneys; but I have not much confidence in the accuracy of this habitat, as they were by some means confounded with the ear-bones of *Physalus duguidii* which were sent from Orkney by Mr. Heddle.

In the British Museum there are two tympanic bones, which differ from all the above in the hinder end being flattened above, bevelled off, narrow, and rounded on the edge; but they are so imperfect that I do not think I am justified in noticing them more particularly, though I believe they indicate another species of *Balæna*. They are both without any locality, and were purchased of dealers, one along with the ear-bone of the Greenland *B. mysticetus*.

Fig. 1.



Tympanic Bones of *Balæna mysticetus*, var. *angulata*.

The Right Whale of the Bay of Biscay (*B. biscayensis*) is regarded as a different species by Eschricht and Van Beneden.

## 2. EUBALÆNA.

Skull broad and depressed behind. The frontal bones broad, band-like, transverse (see Cuvier, *Oss. Foss.* v. p. 375, t. 25. f. 1-4 of young, and f. 5-8 of adult animal). Tympanic bones rhombic, large. Baleen thick, rather brittle; enamel thin; internal fibres numerous, thick, rather intertwined, forming a thick rigid fringe.

Cervical vertebræ all united by the neural apophyses into a single crest (Cuv. *l. c.* t. 26. f. 13).

Ribs 15/15, the four last pairs not reaching the vertebræ. Sternum (Cuv. t. 26. f. 11). Blade-bone flat, higher than broad, with a single prominent acromion (t. 26. f. 7). Arm-bone short. Fingers five, short, the middle longest (t. 26. f. 23). Os hyoides (Cuv. t. 26. f. 14.)

## EUBALÆNA AUSTRALIS.

The tympanic bone is subcubical and rugose, the back is very much swollen, the inner edge is very protuberant, and forms an angle with the surface nearer the outer margin; the upper portion is very prominent and subangular, and separated from the lower portion by two irregular depressions; the hinder margin is very thick, convex, and rounded. The lower surface is rather flattened, with an irregular-oblong, rather kidney-shaped aperture, which is very strongly plaited on the hinder margin, and nearly as long as the bone.

*Hab.* Sea near the Cape of Good Hope.

The periotic bones, with the tympanic bones *in situ*, are figured by Prof. Huxley in 'Elem. Comp. Anat.' fig. 109, from a specimen presented to the College of Surgeons by Dr. G. Bennett.

We have three specimens similar to this figure in the British Museum:—two, presented by H. H. Russell, Esq., as the ear-bone of the Sperm Whale; one from South Africa, presented by G. Byham, Esq., to the Palæontological Department.

Var.? In the British Museum there is a specimen of the periotic bones, with the tympanic bones attached, which we received without an habitat from Dr. Mantell. In several particulars it is very like the specimen of *B. australis*; but the hinder edge of the tympanic bones, instead of being very thick and rounded, is much thinner than any part of the bone, and the periotic bones are much broader and more expanded. It may be only a variety of *B. australis*. I think it is better to give a short notice of it, for the sake of drawing the attention of future observers to the peculiarity.

Var.? In the British Museum there is another imperfect worn tympanic bone, without any habitat, which resembles those of *B. australis* in general appearance; but the hinder margin is shelved off and thin, instead of broad and rounded as in the typical specimens of that species. This may indicate an allied species, or only a variety.

The Whalebone Whales may be thus characterized by their tympanic bones:—

\* *Tympanic bone rhombic; aperture oblong, only slightly contracted at the upper end, and about two-thirds of the length of the bone.* BALÆNA and EUBALÆNA.

\*\* *Tympanic bone irregular rhombic; aperture irregular, much contracted at the upper end, and the wide part not half the length of the bone.* CAPEREA.

BALÆNA (CAPEREA) ANTIPODARUM, Gray, Zool. E. & T. t. 1. 3

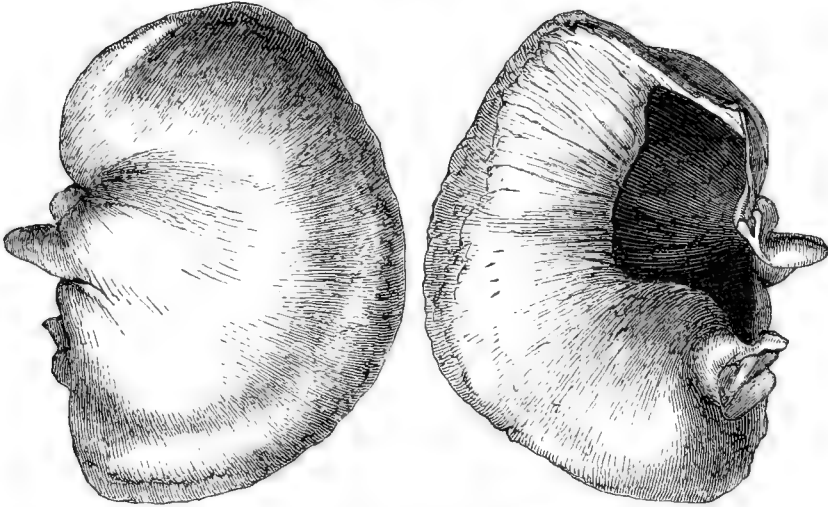
The tympanic bone oblong, rugulose; the upper and outer margin thick and rounded; the lower edge truncated; the back regularly convex, with a smooth, broad, slightly depressed portion just above the middle.

The lower truncated end very broad, with a regular convexity on the inner half, and keeled on the outer half of the upper margin; the lower margin angular. The lower surface is moderately convex, the aperture very irregular, narrow, and contracted above, truncated below (see fig. 2).

*Hab.* New Zealand, Otago (*Mr. Stuart*).

This is most probably the ear-bone of the Whale described by me as *Balæna antipodarum*, in Dieffenbach's Journal, t. 1.

Fig. 2.



Tympanic Bones of *Caperea antipodarum*.

## Fam. 2. BALÆNOPTERIDÆ.

Dorsal fin distinct. Belly plaited. Baleen short and broad. Maxillary bones broad, expanded, sharp-edged. Pectoral lanceolate. Vertebrae of neck free; first and second rarely anchylosed. Tympanic bone oblong ovate. Frontal bone flat, expanded, broad over the orbit; orbit large. Scapula broader than high, with or without a coracoid.

Martens (Spitz. 125, t. ii. f. c) figures a whale, under the name of *Fin-fish*, which agrees in all points with this group; but, as there are no folds on the belly in the figure, Ray, and after him Brisson and Linnæus, established for it a species under the name of *Balæna physalus* (S. N. i. 186). As, however, the name *Fin-fish*, used by Martens, is the one now given by the Greenland whalers to these fin-backed whales with plaited bellies, and as Martens does not mention the colour, nor say a word about the belly, and as Scoresby says, from report, that the skin of the *Fin-fish* is smooth, "except about the sides of the thorax, where longitudinal rugæ or sulci occur," I think there can be little doubt that this whale was only a common finner, and that the absence of the plaits arose from a mistake of the artist. This renders the existence of the section which Lacépède

calls *Rorquals à ventre lisse*, and which Dr. Fleming transformed into a genus under the name of *Physalus*, very doubtful.

Lacépède referred to the smooth-bellied Rorquals the "Hunch-back" of Dudley, who distinctly says the belly is "reeved;" but Lacépède did not understand that word to be synonymous with plaited.

Sibbald (*Balæuologia Nova*, 1692) figures two specimens of Finners, caught on the coast of Scotland. Ray (*Hist. Piscium*, 17) noticed these specimens. Brisson and Linnæus regarded them as separate species. Linnæus designated the one with the skin under the throat dilated, probably by the gas in the abdominal cavity, *B. musculus*, and the other with this part contracted and flat *B. boops*; and these species have been retained by Turton, Fleming, Jenyns, and other authors who have compiled works on the British fauna, except Bell, who cut the Gordian knot by uniting them and the *Balæna rostrata* of Hunter into a single species! The author who appears to have best understood the British species is Dr. Knox, who took some pains to examine these animals and their anatomy.

It is only necessary to refer to Dr. Jacob's very interesting paper in the 'Dublin Journal of Science' for 1825, p. 332, where he attempts to prove that all the Finner Whales found in the North Sea are of one species. To show how dangerous it is to reason on such subjects, his arguments are scattered to the wind directly that a reference and comparison is made to specimens. The examination and comparison of the skeleton, after making every allowance for changes which may take place in the development of the bones during the growth and the variations that may occur in individuals of the same species, show that the species of Finner Whales which inhabit the northern hemisphere are much more numerous than was formerly suspected; and it is probably the same with those that inhabit the southern half of the globe.

Professor Eschricht, in 1846, had so little confidence in the number of species of Whales inhabiting the North Sea that he considered that he had made an advance when he thought it was proved that there were at least three different species having their abode in the North Sea (4th Mem. p. 157).

Cuvier, in his essay in the 'Ossements Fossiles,' admits three kinds of Finner; each of them now forms the type of a genus: Rorqual du Cap=*Megaptera*; Rorqual de la Méditerranée=*Physalus*; Rorqual du Nord=*Sibbaldus* and *Balænoptera*. Van Beneden, in 1861, progresses one step further; he admits four—that is, separates the Rorqual du Nord into two species: thus,—1. *Pterobalæna minor*=*Balænoptera*; 2. *Pterobalæna communis*=*Physalus* (and perhaps *Benedenia*); 3. *P. gigas*=*Sibbaldus*; 4. *Kyphobalæna longimana*=*Megaptera*. (See *Nouv. Mém. Acad. Roy. Brux.* 1861, xxxii. 38.)

I. *Dorsal fin low, broad. Pectoral fin elongate, with four long fingers. Blade-bone broader than high, with only a small or no coracoid process. Cervical vertebræ often anchylosed. Frontal bone broad, narrowed at the orbital end; orbit moderate.*



*Nuchal arch high, subcircular.* MEGAPTERINA. Hunchbacked Whales.

### 1. MEGAPTERA.

Pectoral fin elongate, about one-fifth of the entire length of the animal. Dorsal fin low, truncate; second cervical vertebra with two short truncated lateral processes; first rib simple-headed, without any internal process.

*Megaptera*, Gray, Zool. E. & T. 16; Cat. Cetac. 23.

*Hunch- or Humpbacked Whales*, Dudley and the whalers.

*Kyphobalæna*, Eschricht, Nord. Wallthiere, 1845.

*Megapteron*, Gray, Zool. E. & T. 61.

The upper maxillary bone is rather broad, with a convex outer margin; the intermaxillaries are moderately broad; the nasal very small. The frontal bone is broad, much and gradually narrowed and contracted over the orbit. The lower jaw slender, subcylindrical, with a compressed ridge-like ramus near the base (see Eschr. & Reinh. f. a, p. 542). The atlas vertebra with an oblong body, and with a large and short broad lateral process from the upper part of each side. The upper and lower lateral processes of the second cervical vertebra very thick, short, blunt, and separated at the ends; of the other cervical vertebræ slender, more elongate, separate. Neural arch of the cervical vertebræ strong, high, with a large subcircular cavity for the spinal marrow. The bodies of the cervical vertebræ oblong, roundish, or subquadrangular, rather wider than high. The scapula short and broad, without any, or a very small, coracoid process. The arm-bone long; wrist with a broad flat spur; the fingers four, elongate, very unequal in length, the third longest, the second rather shorter, the fourth much shorter, and the first shortest; the longest is formed of eight joints (see Eschr. Dan. Trans. 1845, t. 2. f. D, & t. 3. f. 4). The front ribs thick, oblong, compressed, without any swelling or compressed dilated part near the condyle.

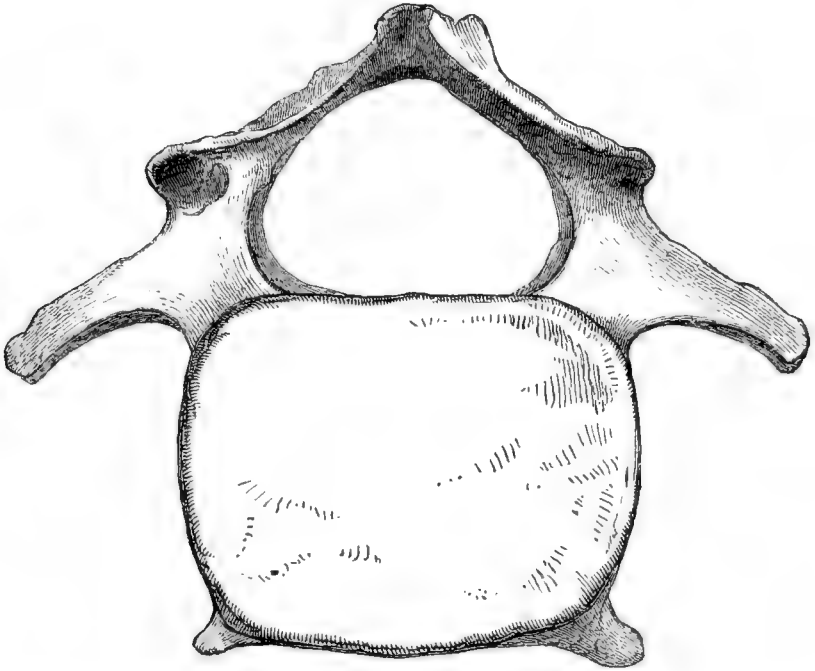
In the 'Catalogue of Cetacea,' p. 24, by a slip of the pen, the first rib is incorrectly said to be forked at the end near the vertebra.

The cervical vertebræ are liable to be more or less anchylosed together. In two specimens, one of *M. longimana*, in the Museum, all the cervical vertebræ are free. In the young specimen in the Derby Museum at Liverpool, which is probably *M. longimana*, the second and third cervical vertebræ are very thin and anchylosed, both by the body and the neural arch. In the specimen of *M. poseskop* in Paris, according to Cuvier, the second and third cervicals are united by the upper part of their body; and in a specimen, apparently of the same species, from the Cape, in the British Museum the second and third cervical vertebræ are only anchylosed by *one side* of the neural arch, and free everywhere else. The breast-bone is irregular rhombic; in one specimen of *M. longimana* from Greenland it is pierced with a large central perforation; in another adult specimen of the same species it is imperforate.

Professor Eschricht, who seems to have formed a theory that the number of species of Whales was very limited, states that he could not find any distinction in the skeleton of the Cape specimen in the Paris Museum to separate it as a species from the Greenland examples. I cannot make any observation as regards the Paris skeleton; but it is said to have been brought by Lalande from the Cape, and is probably from those seas.

M. Van Beneden, in his "Researches on the Cetacea of Belgium," also regards the Cape species as the same as the Greenland one (see *Nouv. Mém. Acad. Roy. Bruxelles*, xxxii. 38, 1861).

Fig. 3.



The fifth Cervical Vertebra of *Megaptera lalandii*.

The cervical vertebræ which are in the British Museum (see fig. 3), received direct from the Cape, present several most important characters, especially the square form of the body of the vertebra, which afford most striking specific distinctions; but perhaps Professor Eschricht may not have been able to examine the form of this part, as the skeleton in the Paris Museum is articulated, and the articular surface of the cervical vertebræ not shown. According to Cuvier, it differs from the Greenland *Megaptera* in the following particulars:—

Cervical vertebra (Cuv. t. 26. f. 19); axis distinct (t. 26. f. 19); second and third cervicals united by spinous apophyses (t. 26. f. 20); the fourth (t. 26. f. 21), fifth, sixth, and seventh free. Blade-bone short, much broader than high, with a small acromion (Cuv. t. 26. f. 9). Humerus short, thick; the forearm-bones elongated; hand

very long; fingers four, very long, the two middle much the longest (Cuv. t. 26. f. 22). Pelvis crescent-shaped (Cuv. t. 26. f. 24).

The genus may be thus divided:—

\* *Blade-bone without any coracoid process; the body of the cervical vertebræ oblong, subcircular. North Sea. MEGAPTERA.*

1. MEGAPTERA LONGIMANA.

\*\* *Blade-bone with small coracoid process; the body of the cervical vertebræ nearly square, with the angles rounded, &c. South Sea. POESCOPIA.*

2. MEGAPTERA LALANDII. (Fig. 3.)

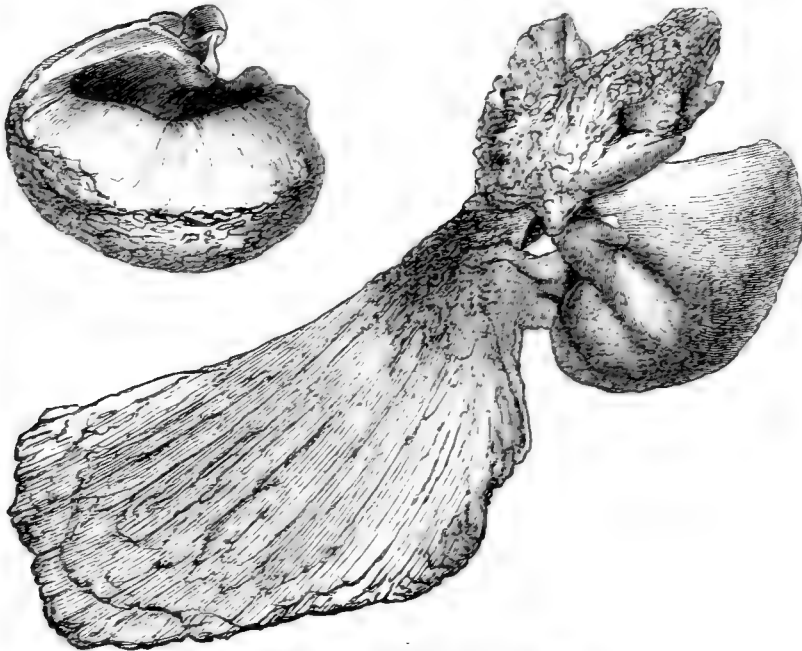
*Balæna lalandii*, Fischer.

3. MEGAPTERA NOVÆ-ZELANDIÆ. (Fig. 4.)

The tympanic bones very like those of *M. longimana*, but shorter and more swollen, and the periotic bone broad and expanded; the rest of the skeleton, unfortunately, is unknown.

*Hab.* New Zealand.

Fig. 4.



Ear-bones of *Megaptera novæ-zelandiæ*.

In the British Museum there is a specimen of the bones of the ear, with tympanic bones attached, sent from New Zealand by Mr. Stuart, which are very like these bones in the *Megaptera longimana*

from Greenland in the Museum collection, but differ in the tympanic bone being rather shorter and more swollen. The latter is nearly regularly oblong, and very convex at the upper part, with a somewhat hemispherical outline and rather wider below.

The bones attached to the tympanic are broad and expanded, very unlike the same bones in the Greenland species.

It may be the same as the one from the Cape; but it is well to indicate the existence of a Humpbacked Whale in this district, in the hope of inducing some naturalists to give an account of it, or to send a skeleton of it to England for comparison.

M. Van Beneden states that there is the incomplete skull of a *Megaptera*, brought from Java by Professor Reinhardt, in the Leyden Museum, showing that the genus is very generally distributed; and it is to be observed that whenever specimens of Whales can be procured from distant localities to be compared, it is proved that each species has only a limited habitation, each probably making a more or less large migration within its district.

*MEGAPTERA LONGIMANA.* (Figs. 5, 6, 7.)

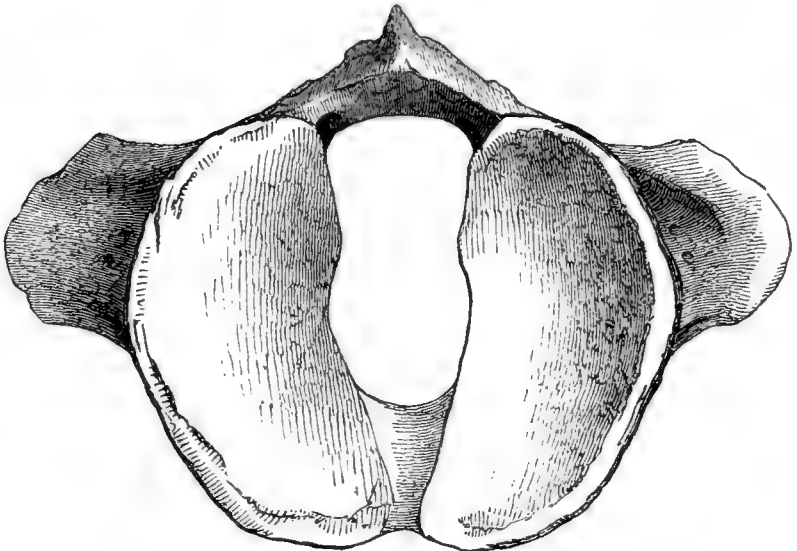
*Balæna boops*, O. Fab. Fauna Grœnl.; Turton, Brit. Fauna, 16; Nilsson, Scand. Fauna, 639.

*Whale*, Johnson, Trans. Nat. Hist. Soc. Newcastle, vol. xvi. t. 1, female, on its back.

*Balæna longimana*, Rudolphi, Mem. Acad. Berlin, 1829, 133. t. 12, male.

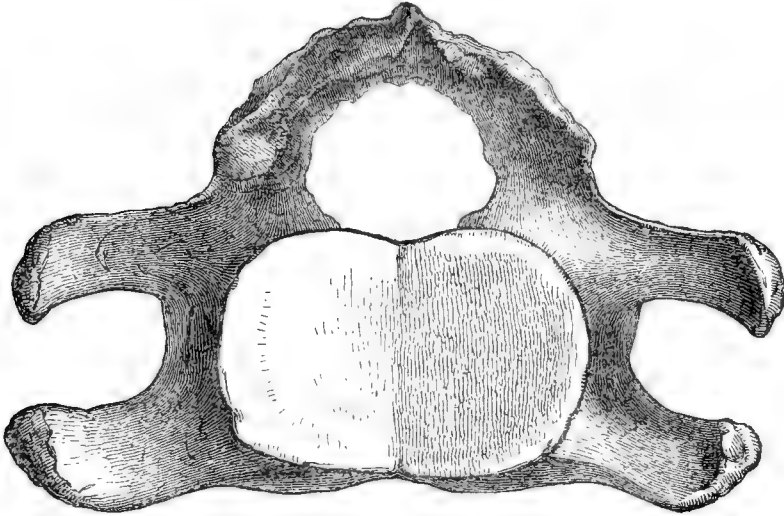
*Balæna boops* (*Keporkak* or *Langhaandede Finhval*), Eschricht, K. Dansk. Vet. Selskab. Afh. 1845, t. 1, 2, 3, 4.

Fig. 5.



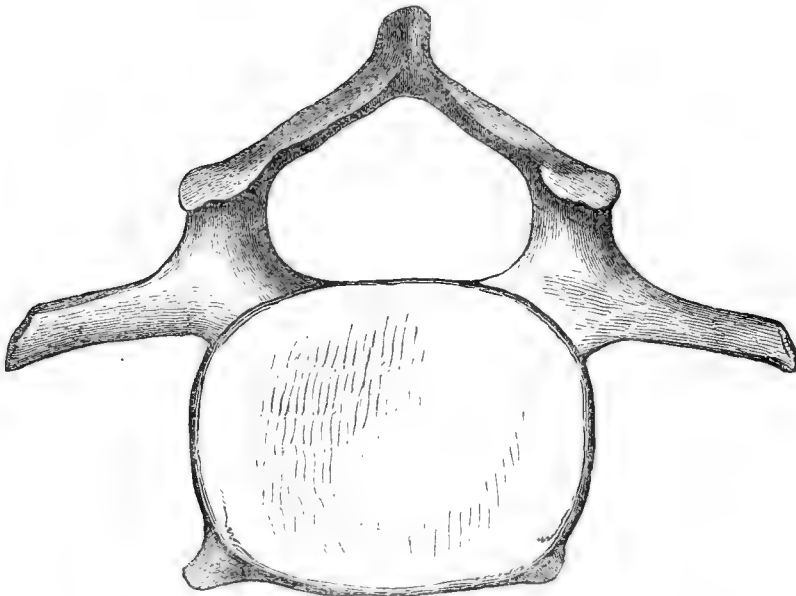
Atlas vertebra of *Megaptera longimana*.  
Extreme width 20 inches; height 13 inches.

Fig. 6.



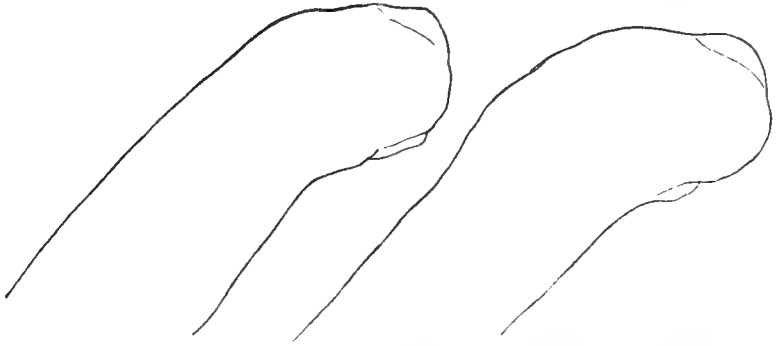
Second Cervical Vertebra of *Megaptera longimana*.

Fig. 7.



Fifth Cervical Vertebra of *Megaptera longimana*.

Fig. 7 a.

Top of the First and Second Rib of *Megaptera longimana*.

*Kyphobalæna boops*, Eschricht, Nord. Wallthier. 1849.

*Megaptera longimana*, Gray, Zool. E. & T. 17; Cat. Cetacea, 36.

*Hab.* North Sea; estuary of the Dee (*T. Moore*), young female skeleton in Derby Museum. (Greenland, *Eschricht*, skeleton in Brit. Mus.)

Var. 1. The cervical vertebræ are all free; the second cervical is very thick; the third, fourth, fifth, sixth, and seventh are thicker and of nearly equal thickness, the seventh being rather the thickest. The upper lateral processes are developed and nearly equal in all of them, those of the third and fourth being directed backwards, the fifth straight out; and those of the sixth and seventh are directed backwards at the end. The lower lateral processes are generally wanting; the fourth and fifth vertebræ have a rudimentary process on each side; the processes are of very unequal length on the two sides of the same vertebra, the largest not being more than an inch and a half long, and the rest mere rounded tubercles. The breast-bone is irregular, subrhombic, with a large central perforation.

In a second imperfect skeleton in the British Museum, which had been mounted, the cervicals are all free. Fourth cervical like that in the Greenland specimen; but it has elongated, simple, straight lower lateral processes on each side. Seventh like the seventh in the Greenland specimen, without any lower lateral process.

Sternum rhombic, without any central perforation. The tympanic bone is oblong, ventricose, smooth, very solid, with a rough depression on the convex outer side. It is very like that of the genus *Physalus*, but shorter, more ventricose, and more solid.

Var. 2. MOOREI. The second and third cervical vertebræ very thin, ankylosed together by the body and neural arch. The body of the cervical vertebræ oblong, transverse, much wider than high. The neural arch rather slender, with a subcircular oblong cavity, which is fully two-thirds as high as wide.

*Hab.* Estuary of the Dee (1863, *Thos. Moore*). Skeleton in Derby Museum, Liverpool; a young female 31 feet long.

The atlas is very thick; the second cervical nearly as thick as the atlas, with the upper and lower lateral processes separate, short; the fifth, sixth, and seventh cervical all similar to the third and fourth; the fifth thin, and the seventh the thickest. The second cervical vertebra has two short broad thick processes, with a rounded interrupted perforation between them; the third and fourth have a thin long shelving-down upper, and a short straight lower process; the fifth, sixth, and seventh are similar, but have only an upper lateral process; the fifth is the thinnest, and the seventh the thickest. The arms were 10 feet long; the cartilage between the bones of the arms and the fingers is nearly half as long as the arm-bones; there are four bones immersed in it, small, variously shaped and sized; the cartilage between the elongated finger-bones is nearly half as long as the phalanges; the phalanges nearly all of the same oblong shape, and subsymmetrical in form. The bones of the skull are so fragile as scarcely to bear their own weight.

Moore, in the lithographic 'Naturalist's Scrap-Book' (printed in Liverpool) for July 17, 1863, observes, "It yielded no oil; the blubber was like a cow's udder, as exposed in the market for sale in Liverpool. Length 31 feet 4 inches. Bought by a manufacturer of oil and grease, who made nothing of it." "All black; belly mottled and streaked with white; pectoral fins milk-white, with a black blotch here and there. Baleen very closely packed together, thirty-eight blades in a foot; the largest blade was nearly 2 feet long." "Female: length 31·4, of gape 8·0, from snout to eye 8·0, of eye 0·3, from snout to base of pectoral 11·0, of pectoral 10·0; extreme width of tail 11·0, from snout to beginning of hump 18·0, of hump 3·3, from snout to cloaca 21·0." "Stomach contained shrimps."

Eschricht figures a new-born specimen of this species from Greenland, which was 35 inches long; it has several series of bristles on the lips, parallel with the gape (see K. Dansk. Vid. Selsk. xi. t. 3. f. 1, and the teeth as seen in the jaws t. 4).

II. *Dorsal fin erect, compressed, falcate. Pectoral fin moderate, about one-eighth of the entire length of the animal; fingers short; phalanges few; scapula broad, with a long coracoid process; the neural arch broad, low, much broader than high.*  
PHYSALINA.

a. *The dorsal fin about two-thirds the entire length from the snout; cervical vertebræ free.*

## 2. BENEDENIA.

Second cervical vertebra with two short truncated lateral processes; first rib simple-headed, with a compressed internal process.

*Physalus*, § *Rorqualus*, Gray, Cat. Cet.

Pectoral fins moderate; dorsal fin falcate; skull rather broad;

maxillæ broad, with nearly straight outer margins. The second cervical vertebra (fig. 8) with two separate, broad, strong, nearly equal-sized lateral processes, which are rather expanded and truncated at the tip (as in *Megaptera*). The third, fourth, fifth, and sixth cervical vertebrae with elongated slender upper and lower lateral processes, which are attenuated and separated at the end (not forming rings). The bodies of the cervical vertebrae oblong, transverse; the canal of the neural arch low, oblong, transverse, much wider than high. The scapula short, broad, with a strong, well-marked coracoid process.

Vertebrae 60. Ribs 15, all simple; the front ones compressed and dilated at the end; the first with a broad rounded lobe on the inner side; the second with an elongate, slender, rounded internal process.

This genus is only described from the skeleton of a young specimen; it combines the characters of *Megaptera* and *Physalus*. Its second cervical vertebra has the form of that of *Megaptera*; and it has the low neural arch and the oblong transverse canal for the spinal marrow, the blade-bone with the strong anterior process, the same kind of front ribs, and the short pectoral fins of the genus *Physalus*.

It has been suggested to me by a comparative anatomist of considerable experience that perhaps the lateral processes of the cervical vertebrae of this Whale might be lengthened in the adult age, and the end of the upper and lower processes united into a broad expanded plate as in the genus *Physalus*.

In the skeleton of the small foetus of *Balænoptera*, only 9 inches long, figured by Eschricht in the 'Royal Danish Transactions' for 1846, t. 14. f. 2, the lateral processes of the second vertebra are very nearly of the same shape as in the adult, forming a broad expansion, with a perforation at its base. The cervical and other vertebrae of this foetus seemed to agree, in all details of form, with the same bones in the adult.

I do not deny that the lateral process of the first cervical vertebra may not be continued in cartilage, and be of the same form as that of the genus *Physalus*; but at any rate we have no proof, if this be the case, that the cartilage at the end ever becomes ossified in this genus any more than in the genus *Megaptera*, both genera agreeing in the equality of the thickness and strength and shortness of the lateral processes.

BENEDENIA KNOXII. (Figs. 8, 8 a.)

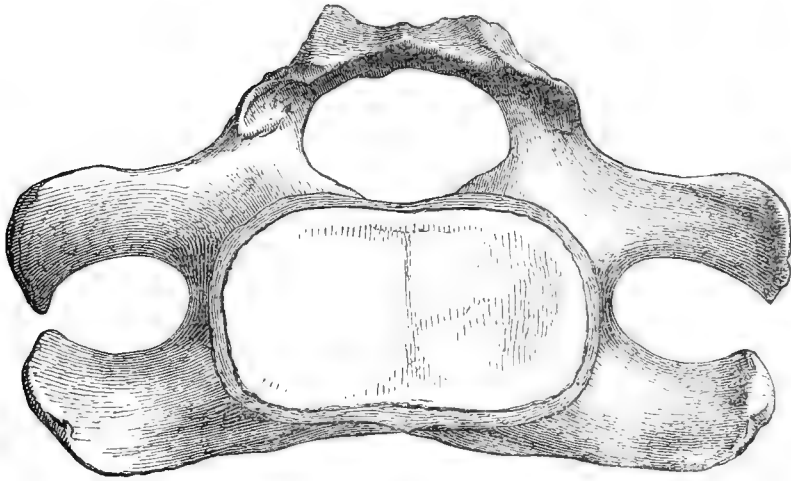
*Physalus (Rorqualus) boops*, Gray, P. Z. S. 1847, 91; Cat. Cetac. 41.

*Hab.* North Sea; coast of North Wales, towed into Liverpool, 1846; skeleton, 30 feet long, in the British Museum.

Cervical vertebrae all free; the upper lateral processes bent down; the lower ones ascendant at the end, with a more or less acute angle on the lower edge near the base. The second cervical vertebra moderately thick. The third, fourth, fifth, sixth, and seventh rather thin, and all nearly of the same thickness. The upper lateral processes

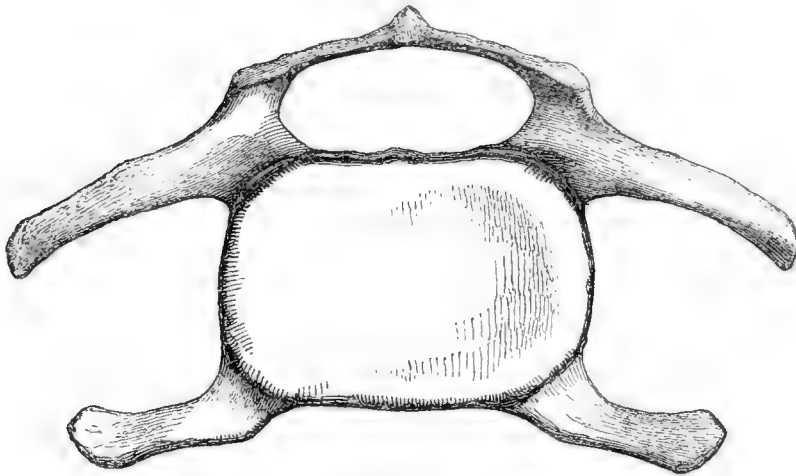


Fig. 8.



Second Cervical Vertebra of *Benedenia knoxii*.  
Extreme width 19 inches; height 10 inches.

Fig. 8 a.

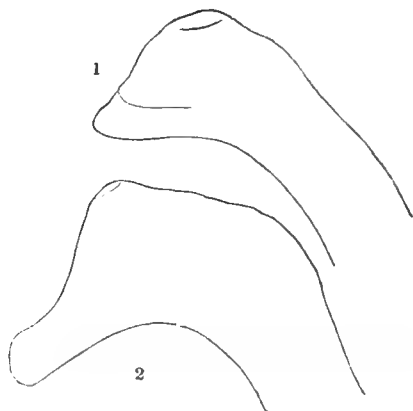


Fifth Cervical Vertebra of *Benedenia knoxii*.

of the third and fourth very slightly bent back at the end; of the fifth similar, but nearly straight; of the sixth and seventh broader and stronger to the end, and rather bent forwards towards the head at the end. The lower lateral process of the third, fourth, and fifth vertebræ compressed, high, nearly similar, and nearly equally strong, with an obscure angular prominence on the lower edge near the base; of the sixth vertebra not so long, high, and compressed at the base, tapering at the end, and with a decided angular projection on the lower edge, where the end bends up. The seventh vertebra without any lower lateral process on either side.

The breast-bone broad above, with an arched upper edge, narrow and rather produced below, with concave sides, and without any central perforation. The front (first, second, and third) ribs thin, compressed, dilated at the end; the first with a short, broad, rounded, the second with a larger, slender, produced process on the inner side.

Fig. 8 b.

First and Second Rib of *Benedenia knoxii*.

This Whale has also probably been caught on the coast of France and Spain. M. Van Beneden, having met with skeletons of whales, one at Bayonne and the other at Abbeville, which he considered the young of *Physalus antiquorum*, observes that, in both, the two apophyses of the axis were not yet united; the ribs, he observes, are wanting (Nouv. Mém. Acad. Roy. Bruxelles, xxii. 37)\*.

I am aware that Eschricht and Reinhardt (Essay on the Northern Whale) seem to doubt the distinctness of this species. Unfortunately I do not understand Danish sufficiently to quite make out what is their objection; but I feel that, excellent as is their essay on the animal which they describe, some part of their argument would be much modified if they had been able to examine a larger collection of skeletons from different localities, and if they could have examined those in other museums and from other localities more in detail; but unfortunately they give their opinions on specimens which they have not seen, and, like many other Continental naturalists, without making sufficient allowance for the very large extent of the collection in England, or considering that the species here described are not separated until after careful consideration and comparison.

There is unfortunately an inclination in most of the Continental naturalists to believe that all the species they do not possess are the same as, or only slight variations of, those they have—an idea that is a fertile source of confusion and error in reasoning.

\* Perhaps, if he had examined the cervical bones separately, he would have observed that the perforation was situated in a different part of the lateral processes, and was of a different form from that of *Physalus antiquorum*.

This theory of the limited number of species of Whales greatly destroys the value of M. Eschricht's observations on the anatomy of Whales, in his papers in the 'Danish Transactions;' for he constantly speaks of variations which would only be true if they were found in the same kind of Whales, but are peculiarities and important differences when they are found in different species or kinds of animals.

### 3. PHYSALUS.

Pectoral fin moderate. Dorsal fin falcate, three-fourths the entire length from nose. Cervical vertebræ all free; the second with a broad, expanded lateral process, with a large hole in the upper part of its base. Tympanic bone oblong, elongate. Vertebræ 54-64. First ribs simple, compressed, not divided, with a compressed internal process near the condyle.

*Physalus*, Lacép.; Gray, P. Z. S. 1847, 88; Cat. Cetac. 34, 1850.

*Physalis*, Fleming, B. A. 1828.

*Physelus*, Rafin.

*Balæna tripennis*, Ray (Razorback).

*Balænopterus*, sp., Lacép.

*Balænoptera*, sp., Lacép.

*Pterobalæna*, sp., Eschr.

The upper maxillary bone is rather broad, gradually tapering, with a straight outer edge; the intermaxillaries are moderate, and the nasal very small. The frontal bone is broad and short, suddenly narrowed on the outer side, and truncated over the orbit. The lower jaw slender, arched, with a distinct elevated ramus near the base (see Eschr. & Reinh. p. 544). The atlas vertebra with a sub-circular body; the lateral processes cylindrical and near the middle of the side. The second cervical vertebra has a broad, more or less elongated lateral process, which is pierced near the base with an oblong perforation. The upper margin of the perforation is narrow, and the lower edge much broader. The other cervical vertebræ have two lateral processes, which are often united at the ends into a more or less broad ring. The body of the cervical vertebræ is oblong, transverse, broader than high. The neural arch is long, with an oblong transverse canal for the spinal marrow, which is much broader than it is high. The front ribs compressed, thin, with a broad, more or less elongated expansion on the inner edge near the condyle. The scapula high, with a broad coracoid process near the joint.

The baleen forms three or four concentric lines on the palate, the rows forming transverse lines. The plates of the inner rows are short, of the outer elongate triangular; they are all fringed on the inner oblique side. (See Ravin, Ann. Sci. Nat. v. 270, t. 11. f. 5-10; see also Rosenthal, Abhandl. K. Acad. Berlin, 1827, 127.)

The shape of the lateral process of the second cervical vertebra seems to be a good character of the genus. The perforation at the base of it is rather above the middle of the base of the process, so

that the upper margin is narrower than the lower. In the genus *Balænoptera* it is nearly in the centre of the base.

The genera *Megaptera* and *Rorqualus* have separate, short upper and lower lateral processes, which are rather dilated and truncated at the end, having an interrupted circular perforation between their inner bases. It has been suggested that, in the latter genus at least, the separated processes may be only the imperfectly developed state of the broad lateral process of the genus *Physalus*, the end that is wanting in the skeleton probably existing in the living animal in the state of cartilage. But if this should be the case (which I much doubt), the form of the margin of the perforation and the perforation itself must undergo great change during the ossification of the end of the process for there to be any resemblance between the lateral processes of these genera and that of the genus *Physalus*. From what I have observed, I believe that no such change does take place, and that the form of the processes and the situation of the perforations afford good characters for the separation of the species into groups and the species from each other.

- \* *The upper and lower lateral processes of the third, fourth, fifth, and sixth cervical vertebræ elongate, united, forming a ring; the body of the cervical vertebra oblong, transverse, much wider than high; the upper and lower edge nearly straight; the lateral process of the second cervical elongated.*

PHYSALUS ANTIQUORUM. The Razorback. (Figs. 9, 10, 11, 12.)

*Balæna maximus borealis*, Knox, Cat. Whales.

*Great Northern Rorqual* (Knox), Jardine, Nat. Lib. t. 6 (skeleton).

*Physalus antiquorum*, Gray, P. Z. S. 1847, 96; Cat. Cetac. 38; Heddle, P. Z. S. 1855, 195, fig. verteb. bad.

*Rorqual de la Méditerranée*, Cuvier, Oss. Foss. v. 370, t. 26. f. 5.

*Balæna antiquorum*, Fischer, Syn. 525 (from Cuvier).

*Balænoptera antiquorum*, Gray, Zool. E. & T. 50.

*Balæna physalus*, Turton, B. F. 15; Jenyns, Man. 47; Nilsson, Scan. Fauna, 636.

*Balænoptera boops* (part), Fleming, B. A. 31; Jenyns, Man. 47.

*Balæna musculus*, Turton, B. F. 16; Jenyns, Man. 47.

*Balænoptera musculus*, Flem. Brit. Anim. 30.

*Balænoptera acuto-rostrata*, Scoresby, Arct. Reg. i. 485, t. 13. f. 2.

*Balænoptera boops*, Bell, B. Quad. 520, f. 1.

*Balænoptera physalus*, Schlegel, de Dieren, 101, t. 20.

*Fin Whale*, Neil, Wern. Mem. i. 201.

*Balæna physalus*, O. Fab. F. G. 35.

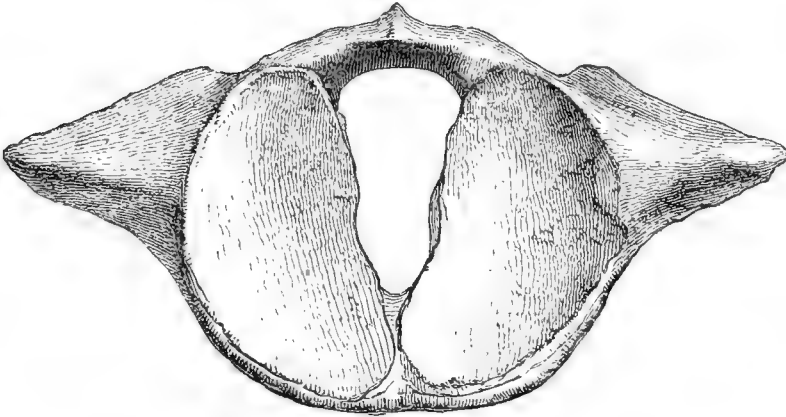
*Physalus vulgaris*, Fleming, B. A. 32.

*Balænoptera gibbar*, Scoresby, Arctic Reg. i. 478.

*Pterobalæna communis*, Eschricht, Van Beneden, Bull. Acad. Brux. ser. 1, 1857, i. 390; Nouv. Mém. Acad. Brux. xxxii. (1861) 37.

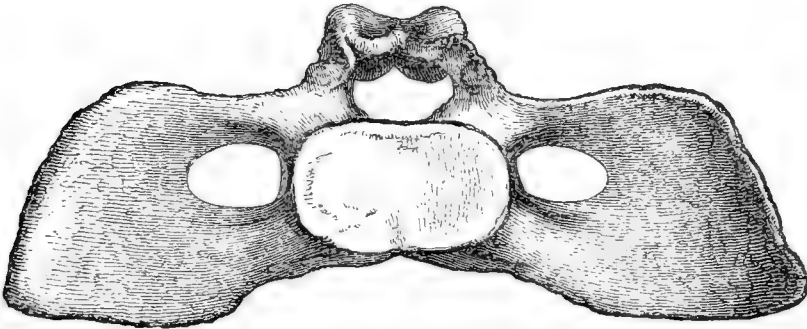
*Hab.* North Sea; North Berwick, 1831 (*Dr. Knox*); skeleton

Fig. 9.



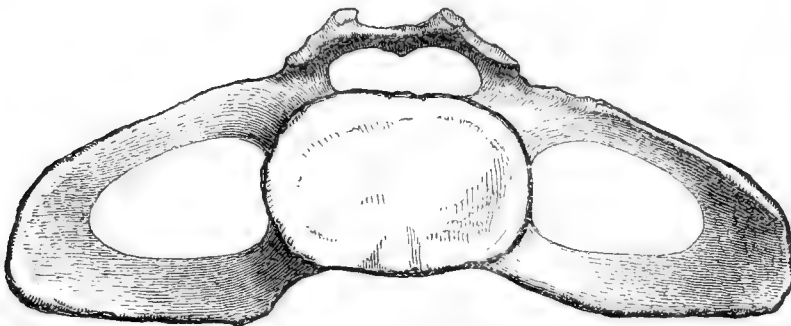
Atlas Vertebra of *Physalus antiquorum*, from Devonshire.  
 Extreme width 26 inches; height 13 inches.

Fig. 10.



Second Cervical Vertebra of *Physalus antiquorum*, from Devonshire.  
 Extreme width 43 inches; height  $13\frac{1}{2}$  inches.  
 Width of articular surface 10 inches; height 8 inches.

Fig. 11.



Fifth Cervical Vertebra of *Physalus antiquorum*, from Devonshire.  
 Extreme width  $35\frac{1}{2}$  inches; height  $10\frac{1}{2}$  inches.  
 Width of articular surface 12 inches; height  $7\frac{1}{2}$  inches.

Fig. 12.

Tympanic Bones of *Physalus antiquorum*, from Devonshire.

at Zoological Gardens, Edinburgh. Coast of Hampshire, 1842; skeleton at Black Gang Chine. Plymouth, 1831; skeleton in British Museum. The Hope Reach, near Gravesend, 1858 or 1859?; skeleton at Rosherville Gardens, 1864. Alloa, Frith of Forth (*Neil*), male. Burnt Island, 10th June, 1862 (*Walker*). Plymouth, 1863 (*Gerrard*); skeleton in Alexandra Park.

Skeleton in Zoological Gardens, Antwerp (see Bull. Acad. Roy. Brux. xxiv. 3). Skeleton not mounted, Museum Paris. Skeleton, Museum Louvain, 1836, 60 feet long. Holland, 1836.

In the normal state of the cervical vertebræ of this species, both the upper and lower lateral processes of all of them are developed and united into rings. This is the case in the skeleton in the British Museum, and in that, from the Thames, in Rosherville Gardens. But this is subject to some variation: in the specimen from Plymouth, prepared by Messrs. Gerrard, now in Alexandra Park, the lower processes of the sixth and seventh cervical vertebræ are abortive, in the sixth they are reduced to small tubercles, and are entirely wanting in the seventh.

The different English skeletons of this Whale which I have examined and which are adult, or at least nearly of the same size (that is, from 70 to 80 feet long), show considerable variation in the form and in the size of the perforation, and in the development of the rings of the lateral processes of the hinder cervical vertebræ, showing that there are several species, or, what is more probable, that their bones are liable to a considerable amount of variation.

The skeleton which is now in the British Museum is said to

have been found dead, floating in the sea, at Plymouth on the 2nd of October 1831, and to have been 102 feet long and 75 in circumference. The cervical vertebræ are all free and separate; the second with a broad lateral expansion, pierced at the base; the third, fourth, fifth, and sixth with rings, the ring of the third being the broadest; the seventh with only a superior lateral process, without a small tubercular rudiment of a lower process; the lateral processes of the second and third cervical bent backwards, of the fourth straight, and of the fifth and sixth bent forwards. The hinder vertebræ large and heavy. Caudal vertebræ without chevrons 7, with chevrons 10, lumbar 17, dorsal 13, and cervical 7=54. The sternum is sinuous; but the front edge is truncated, on a line with the widest part, without the subtrifoliate front edge; it is 18 inches wide and  $14\frac{1}{2}$  inches long.

The skeleton at Black Gang Chine is said to be 75 feet long. Ribs 14/14. Vertebræ: caudal 18, lumbar 15, dorsal 14, cervical 7=54. Baleen blue-grey, white-streaked on the narrow inner side. The second cervical vertebra with a broad lateral expansion, pierced with an oblong hole; the third, fourth, fifth, and sixth cervical with ring-like lateral expansions.

In the skeleton from Plymouth, prepared by Mr. Gerrard, now in the Alexandra Park, the lateral processes of the second cervical are large, produced, obliquely truncated, with a moderate-sized oblong perforation, not half the length of the process, on a line with it, and not more than one-third the length of the lower edge; of the third, fourth, and fifth vertebræ ring-like, not quite so long as those of the second vertebra, slender, thin, and weak; the processes of the fifth vertebra are the thickest and strongest, especially below; the sixth has upper processes only, which are very thin and slight; in the seventh they are like the sixth, but much thicker and larger, and bent back so that the two processes are close together at the upper edge: the sixth vertebra has small short tubercles in the place of the lower lateral process; none are present in the seventh vertebra. The sternal bone is subtrifoliate, much broader than high, with an elongated strap-like process below, and without any central perforation. The bodies of the second and third cervical vertebræ are oblong transverse, much broader than high.

The skeleton at Rosherville is said to be 70 feet long, and was taken in the Hope Reach in 1858 or 1859. The lateral process of the second cervical is large, elongate, produced, obliquely truncated at the upper edge; the perforation is moderate, not half the length of the process, on a line with the lower edge of the opening. The lateral processes of the third, fourth, fifth, and sixth cervical vertebræ are narrow, ring-like, thin, with a large central cavity; the seventh, like the dorsal, has only an upper lateral process. Lower jaw 13 feet; paddle 14 feet.

The young male, 42 feet long, caught near the mouth of the Somme, on the coast of France, described and figured by Ravin, Ann. Sci. Nat. x. 266, t. 11, xv. 337, t. 9, under the name of *Balenoptera rostrata*, from the form of the skull, seems to be a species of the

genus *Physalus*, probably *P. antiquorum*; but the details of the skeleton have not been given. The tympanic bones are drawn of a very small size (*l. c. t. 9. f. 2 r, 3 r*).

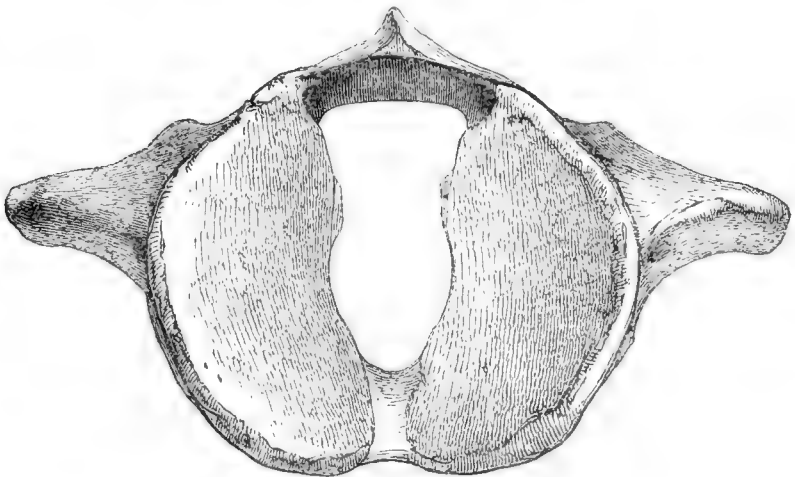
Lacépède (*Cétac. t. 5, 7*) describes and figures a whale stranded near the Isle of Marguerite in 1797. It is described as 61 feet long; distance from nose to pectoral  $14\frac{1}{2}$ , thence to dorsal  $10\frac{3}{4}$ , and from dorsal to caudal  $8\frac{3}{4}$ . But there must be some mistake, as this accounts for only 34 feet. The pectorals are 5 feet long (that is, only one-twelfth of the total length), and all black. Cuvier figured the skull of this whale (*Oss. Foss. t. 26. f. 5*), and founded on it his *Rorqual de la Méditerranée*. M. F. Cuvier (*Cétac. 334*) regarded this as the type of his *Balæna musculus*.

M. Campango notices a whale cast ashore near St. Cyprien. The entire length was 82 feet, of the head 16 feet; and the pectoral was 13 feet long. Vertebrae 61, viz. cervical 7, dorsal 14, lumbar 15, caudal about 25. It was dark grey, with the throat and sides of the pectoral white; the belly blue, white-banded; the pectoral greyish. M. F. Cuvier refers this to the *B. musculus*, or Mediterranean Rorqual. The skeleton was at Lyons in 1835.

M. Van Beneden (*Ann. Sci. Nat. n. s. vi. 159*) says the tympanic bones brought from Iceland by M. Quoy belonged to the *B. musculus* of Cuvier.

\*\* *The upper and lower lateral processes of the third, fourth, fifth, and sixth cervical vertebrae elongate, slender, free at the ends; the upper one bent down; the lateral process of the second cervical large, truncated. Body of the cervical vertebrae oblong, ovate, not much broader than high; the upper edge concave; the lower very slightly convex.*

Fig. 13.

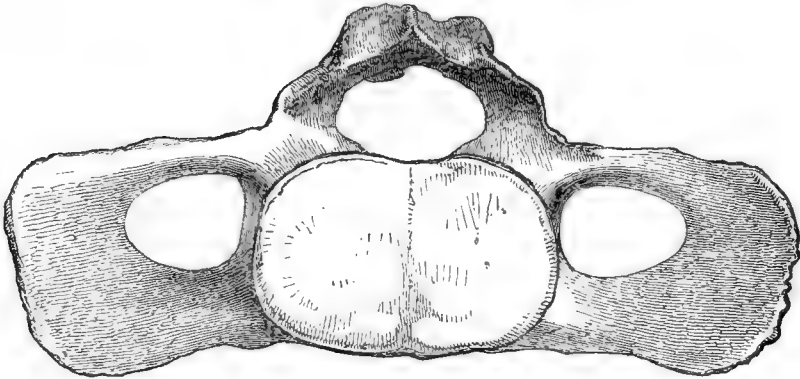


Atlas of *Physalus duguidii*.

Extreme width 21 inches; height  $12\frac{1}{2}$  inches.

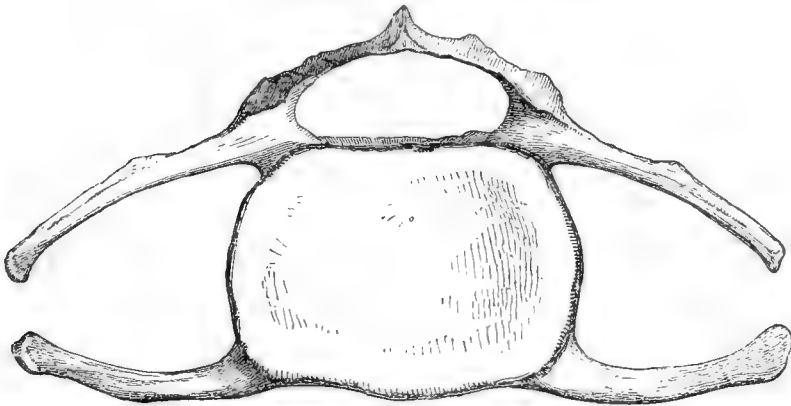


Fig. 14.

Second Cervical Vertebra of *Physalus duguidii*.

Extreme length, measured by a cord,  $25\frac{1}{2}$  inches; height 12 inches.  
Articulating surface: height 7 inches; width 11 inches.

Fig. 15.

Fifth Cervical Vertebra of *Physalus duguidii*.

**PHYSALUS DUGUIDII.** (Figs. 13, 14, 15.)

*The Orkney Whale (Physalus duguidii)*, Heddle, Proc. Zool. Soc. 1856, 187, Mamm. t. 44 & t. 45, anat. ♂ & ♀.

*Hab.* Orkney (*Heddle*); cervical and part of dorsal vertebræ and the baleen in the British Museum. Length 50 feet.

The upper lateral processes of the third, fourth, and fifth cervical vertebræ are very slender and bent down, with two slight angular ridges on the outer edge; the lower processes are much thicker and bent up at the end, with a broad flat lower edge near the base, which forms an angle at the end. The bodies of the cervical vertebræ are roundish oblong, rather wider below than above, about one-fourth the width wider than they are high. The form of the body and the slenderness and form of the lateral processes of the cervical vertebræ seem to separate this species from *P. antiquorum*, as well as the sepa-

rate form of the lateral processes. In the Plymouth specimen of the latter in the Museum, the bodies of the cervical vertebræ are oblong, transverse, being one-third the width broader than high.

The short baleen forms the front part of the series, in which the layer in the middle is dark slate-coloured, and the intermediate-sized blades are more or less slate-coloured on the outer and white on the inner side. The breast-bone is lozenge-shaped, with a large central perforation.

Mr. Heddle gives a long account of this species in his paper in the 'Proceedings of the Zoological Society' above referred to.

\*\*\* *The upper and lower lateral processes of the third, fourth, and fifth cervical vertebræ short, strong, separate, directed laterally; the lateral process of the second cervical short, truncated.*

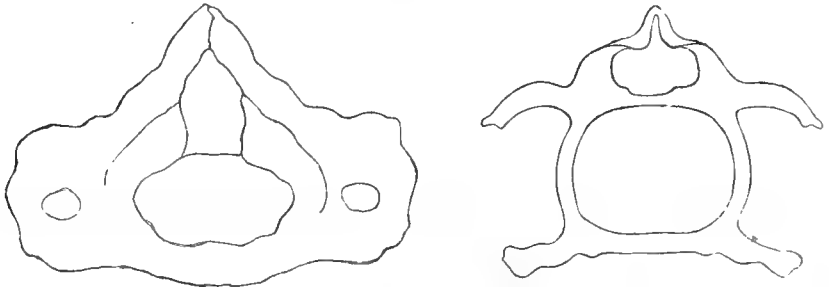
**PHYSALUS SIBBALDII.** (Fig. 15 a.)

*Physalus (Rorqualus) sibbaldii*, Gray, P. Z. S. 1847, 92; Cat. Cetac. 42.

*Hab.* North Sea, ascending rivers; in the Humber, Yorkshire; skeleton in Museum of the Hull Royal Institution and Literary and Philosophical Society. Length 50 feet.

The skeleton in the Hull Philosophical Society's Museum is 47 feet long, and evidently of a young animal; the arm or paddle is rather more than 6 feet long. The baleen is all black. The cervical vertebræ are all separate; the second cervical vertebra has a broad lateral expansion, and is oblong, obliquely truncated from the wide upper to the narrow lower edge, and with a small oblong subcentral perforation near the base; the third, fourth, fifth, sixth, and seventh cervical vertebræ have a straight, rather elongate lateral process, which projects straight out from the body of the vertebra, and the upper and lower ones are of nearly equal length. The end of the first rib, near the vertebra, has a single head; and the second rib has a compressed internal process.

Fig. 15 a.



Second and Fifth Cervical Vertebræ of *Physalus sibbaldii*. (From a sketch by Mr. Harrison, of Hull.)

**4. SIBBALDUS.**

The pectoral fins moderate. The second cervical vertebra with

a broad elongated process, perforated at the base. The front ribs double-headed.

*Balænoptera*, sp., Gray.

*Pterobalæna*, sp., Eschricht, Van Beneden.

Pectoral fin one-eighth the entire length; and the dorsal fin, "opposite the opening of the vent," nearly three-fourths the entire length from the nose. Skull very broad. Maxillary bones very broad, gradually tapering, with nearly straight outer edges. The intermaxillaries moderate, linear. The frontal bones broad, band-like, with a wide sinuous edge over the orbits. Nasal bones small. The lower jaw slightly arched, compressed, with a conical ramus near the condyle. The lateral process of the second cervical vertebra expanded, with a basal perforation (Rudolphi, Berl. Trans. 1822, t. 1. f. 2). Tympanic bone oblong, ventricose (see Dubar, t. 4. f. 1; Rudolphi, t. 3. f. 6). The lateral processes of the second to the sixth cervical vertebræ separate, elongate. The scapula broad, with a large, well-developed coracoid process in front. The hand with four rather short fingers; the second and third equal and longest; the inner or fourth rather shorter than the first. Vertebræ fifty-four. Ribs thirteen or fourteen. The first rib slender, with a process on the side near the condyle, as if the rib was divided into two somewhat similar lobes above (Rudolphi, t. 5. f. 6). According to Dubar, the first rib is articulated to the first and second dorsal vertebræ.

The under jaw less curved; but the great character is that the front rib is split into two separate parts near the condyle, or double-headed, as Dubar calls it. The tympanic bones are short, oblong, swollen (figured *in situ* in the skull, Rudolphi, *l. c.* t. 3. f. 6).

SIBBALDUS LATICEPS. (Figs. 16, 17.)

Ribs 13/13.

*Balæna rostrata*, Rudolphi, Berl. Abhand. 1820, t. 1 (not Hunter).

*Rorqual du Nord*, Cuvier, Oss. Foss. v. 564, t. 26. f. 6 (cop. from Rudolphi).

*Balænoptera laticeps*, Gray, Zool. E. & T., from Rudolphi.

*Balæna borealis*, Fischer, Syn. 524, from Cuvier.

*Hab.* North Sea; Holstein, 1819 (*Rudolphi*); skeleton in Mus. Berlin, 31 feet long. Zuyderzee, 1816, skeleton in Mus. Leyden.

There is also the first rib of a whale of this genus in the Museum of the College of Surgeons, which seems to indicate a fourth species. The origin of the specimen is unknown.

M. Van Beneden, who regarded this as the young of the following, observes that the skeleton in the Berlin Museum from Holstein is not quite adult; and also states that there is a skeleton, not quite adult, in the Leyden Museum from the Zuyderzee.

SIBBALDUS BOREALIS. (Fig. 18.)

Ribs 14/14.

*Baleine d'Ostende*, Van Breda, 1827, 341; Dubar, *Ostéographie*, Bruxelles, 8vo, 1828, t. 1-10.

Fig. 16.

First Rib of *Sibbaldus laticeps*. (From Rudolphi.)

Fig. 17.

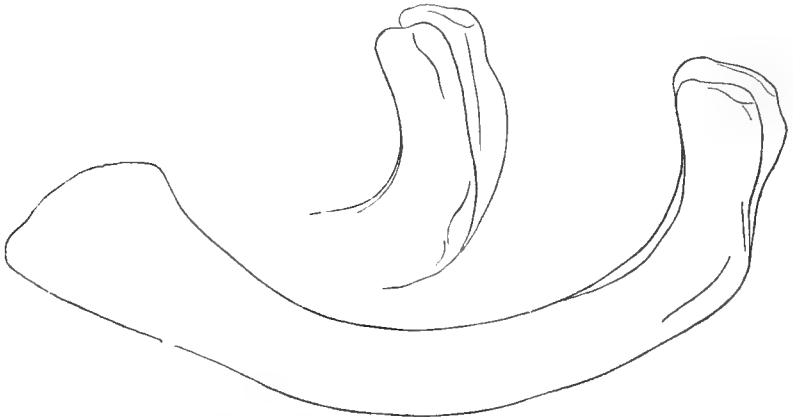
First Rib of a *Sibbaldus laticeps*?, in Mus. Coll. Surgeons.

Fig. 18.

First Rib of *Sibbaldus borealis*. (From Dubar.)

*Baleinoptère d'Ostende*, Van der Linden, 1828, Bruxelles, 8vo.

*The Ostend Whale*, Guide to the Exhibition at Charing Cross, with drawings by Scharff; Bernaert, 'Notice sur la Baleine échouée près d'Ostend,' Paris, 1829.

*Great Northern Rorqual*, "*R. borealis*, Lesson," Jardine, Nat. Lib. 125, t. 5, from Scharff.

*Balæna borealis*, part, Fischer, Syn. 524, from Dubar.

*Balænoptera rorqual*, Dewhurst, London Mag. N. H. 1832, v. 214.

*Balænoptera gigas*, Eschr. & Reinh. Nat. Bidrag, af Groenland, 1857.

*Pterobalæna gigas*, Van Beneden, Mém. Acad. Roy. Sci. Brux. 1861, xxxii. 37.

*Balænoptera boops*, Yarrell, Proc. Zool. Soc. 1840, p. 11.

*Balænoptera tenuirostris*, Sweeting, Mag. Nat. Hist. 1840, p. 342.

*Hab.* North Sea.

"A Whale was observed floating dead in the North Sea between Belgium and England," and towed into the harbour of Ostend on the 4th of November, 1827. The skeleton was exhibited at Charing Cross, and is now, I believe, in the United States.

The specimen was 102 feet long, the lower jaw  $21\frac{1}{2}$  feet long, and the fins  $13\frac{1}{2}$  feet long. Vertebrae 54. Ribs 14/14.

The atlas (Dubar, t. 6. f. 1): the second cervical vertebra with large lateral processes, pierced with a large hole; the third, fourth, and fifth with two lateral processes on each side, which are not formed into a complete ring as in the second; the fifth offers a rudiment of a spinal apophysis. The first rib double-headed, articulated to the first and second dorsal vertebrae. Bones of the ears (Dubar, t. 5. f. 1); os hyoides (t. 5. f. 2); breast-bone (t. 6. f. 4) not pierced, short and broad, with a broad hinder portion. The vertebral column 37. Dubar's figures represent the second, third, and fourth cervical vertebrae as with a ring, and the fifth, sixth, and seventh with deflexed upper and straight lower separate lateral processes. Ribs, first (t. 8. f. 1) with two heads, very broad at lower end; second (f. 2) with rather elongate internal process; fourteenth (f. 3) quite simple. Pelvic bones (t. 9. f. 1, 2). Shoulderblade short and very broad on the external edge, with a large lobe for the ridge (t. 10). Pectoral fin and bones (t. 11). Fingers four; the second and third nearly of equal length, and longest; the fourth or outer shorter, longer than the first or inner.

Mr. Yarrell (Proc. Zool. Soc. 1840, p. 11) notices a female of this genus under the name of "*Balænoptera boops*." It was stranded at Charmouth, Dorsetshire, on Feb. 5, 1840. It had no warts about the lips; back black; underside white; pupil oval, without any eyelashes. Length 41 feet. Pectoral fin  $5\frac{1}{2}$  feet long, base  $10\frac{3}{4}$  from tip of nose, and  $1\frac{1}{2}$  foot wide. Dorsal small, conical, 11 feet in advance of the tail. Skeleton 40 feet long, head 10 feet. Vertebrae 60, viz. 7 cervical, 15 dorsal, 16 lumbar, 15 caudal, and with 7 caudal bones. Ribs 14/14; the first *double-headed*, and attached to the first two vertebrae; each of the other ribs is attached to a single vertebra, and has a single head. The dorsal vertebrae exceed the ribs by one. "The subcutaneous layers of fat varied in thickness from 3 to 5 inches." In other details the skeleton agreed with Dewhurst's description of the "Ostend Whale."

"Head, back, tail, and outside of the pectoral fins black; inside of the pectoral fins, throat, breast, and belly beautiful white; inside of the under jaw black; tongue, palate, and the spaces intervening between the reefs on the belly pink. The under jaw the widest, and projecting 9 inches beyond the upper one; end of both jaws rounded. The muzzle longer and more attenuated than in *Balæna*. The spiracles longitudinal, like slits or fissures, nearly meeting in front, and

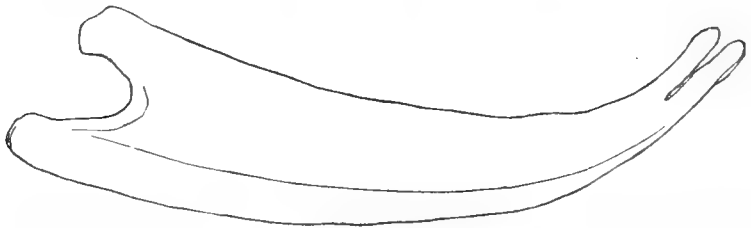
gradually diverging behind to a distance of about 3 inches. Baleen bluish black and yellowish white. Female 42 feet long, weighing 25 tons. Blubber varied in thickness from 3 to 5 inches; yielded three hogsheads of oil."—*Sweeting, Mag. N. Hist.* 1840, p. 342.

The accounts in the 'Mag. of Nat. Hist.' and in the 'Proc. Zool. Soc.' 1840, p. 11, are evidently from the same animal, but there are some discrepancies between them. Mr. Sweeting says, breadth 21 feet; Mr. Yarrell says, girth 21 feet. Mr. Sweeting, total weight 25 tons; Mr. Yarrell, probable weight between 20 and 25 tons. Mr. Sweeting, length of skeleton 41, and head 11 feet; Mr. Yarrell, 40, and head 10 feet. Mr. Sweeting says, for the discrepancy, "As to the number of vertebræ, &c., I am of opinion that this species has not been described before, and I have proposed for it the name *Balænoptera tenuirostris*." (Mag. N. Hist., 24th March, 1840.)

The skeleton here described was sold, about sixteen years ago, for five pounds, to Mr. Freane, and it was stated to have been sent to London as a present to the British Museum, but it has never been received, and I cannot find any further account of it; probably it was sold for manure.

One of the true Whales, *Balæna australis* (Temm. Fauna Japonica, t. 28, 29), has the first rib with a double head (fig. 19, a sketch by Gerrard from the skeleton in Mus. Leyden.).

Fig. 19.



First Rib of *Balæna australis*.

- b. *Dorsal fin two-thirds of the entire length from the nose; cervical vertebræ sometimes united.*

##### 5. BALÆNOPTERA.

Pectoral fin moderate. Dorsal fin falcate, two-thirds of the entire length from nose. Vertebræ 50; last very small. The first pair of ribs undivided near the condyle.

The lateral process of the second cervical vertebra elongate, pierced at the base; of the third, fourth, and fifth cervical elongate, slender, separate; the lower with an angular bend below. The front ribs simple, thick, with only a slight swelling on the inner edge near the condyle. Tympanic bones obovate, short, ventricose.

The lateral process of the second cervical vertebra expanded, broad, with a large ovate perforation in the *middle* of its base; the upper and lower margins being broad and of nearly equal width, the upper

being, if anything, rather the broadest of the two, very unlike the lateral process of the same bone in *Physalus*. The neural arch high, acute, with a rather high subcircular canal for the spinal marrow. The body of the atlas vertebra oblong, transverse, with a subcylindrical lateral process produced from the middle of the side.

*Balænoptera*, Gray, P. Z. S. 1847, p. 89.

*Balænoptera*, § 1, Gray, Zool. Er. & T. 50.

*Pterobalæna*, part, Eschricht.

*Rorqualus*, part, F. Cuvier.

The lateral processes of the cervical vertebræ are generally free and tapering at the tip; but some of them are sometimes united, forming a ring. Eschricht described those of the fifth and sixth vertebræ as sometimes united. In the specimen in the College of Surgeons the lateral processes of the sixth cervical vertebra are united on one side and free on the other.

In all these cases the form of the processes are not altered; the end is only elongated and united. The cervical vertebræ are sometimes quite free, as is the case with Hunter's specimen in the Museum of the College of Surgeons. The second and third vertebræ are often united by more or less of the surface of the neural arches; and this seems to be the normal state. In the specimens from Cromer, lately acquired by the College of Surgeons, the third and fourth cervical vertebræ are united by the neural arches; and the second and third free.

The elongated processes on the end of the front ribs have two muscles attached to them, one arising from each of the two neighbouring vertebræ. Eschricht, in his essay above cited, figured the fœtus and a new-born specimen, which was 34 inches long, and gave the anatomy of it, with details of its skeleton (see Eschr. K. D. Vid. Selsk. 1846, fig. p. 309). They have a single series of bristles parallel with the lips (see K. Dansk. Vid. Selsk. xi. t. 1 & 2). Tympanic bones oblong, swollen, rounded above and below and at each end. They are figured *in situ* in the skull by Eschricht in the 'Danish Transactions,' vol. xii. t. 11. f. 2 *g* in the fœtus, t. 9. f. 2 & 4 *g*, & t. 10. f. 2 *g*, in the more adult state.

In the 'Royal Danish Transactions' for 1846, Eschricht gives a detailed comparison of the bones of the head of a fœtal specimen, and one 6½ and one 34 feet long (see t. 9-11), and the details of the skeleton of a fœtus 9 inches long (t. 14).

It may be observed that the form of the cervical and other vertebræ of the skeleton seems to be nearly identical with that of those of the adult animal. The lateral processes of the second cervical process, for example, are united into a broad expanded blade, with a perforation near the body of the vertebra, which is so characteristic of the genus.

**BALÆNOPTERA ROSTRATA.** The Pike-Whale. (Figs. 20-24.)

*Balæna rostrata*, O. Fab. ?; Hunter, Phil. Trans. lxxvii. t. 20-23; Turton, B. Fauna, 16; Nilsson, Scand. Fauna, 632.

*B. musculus*, part, et *B. boops*, part, Fleming, B. A. 30, 31.

*B. musculus*, part, Jenyns, Man. 47.

*B. boops*, Giesecke, Edin. Encyl.; Newman, Zool. i. 33, fig.; Turner, Cat. Ost. Mus. Col. Surg. n. 1194 (Hunter's spec.?). North Sea.

*B. minimus borealis*, Knox, Cat. Whale, 1.

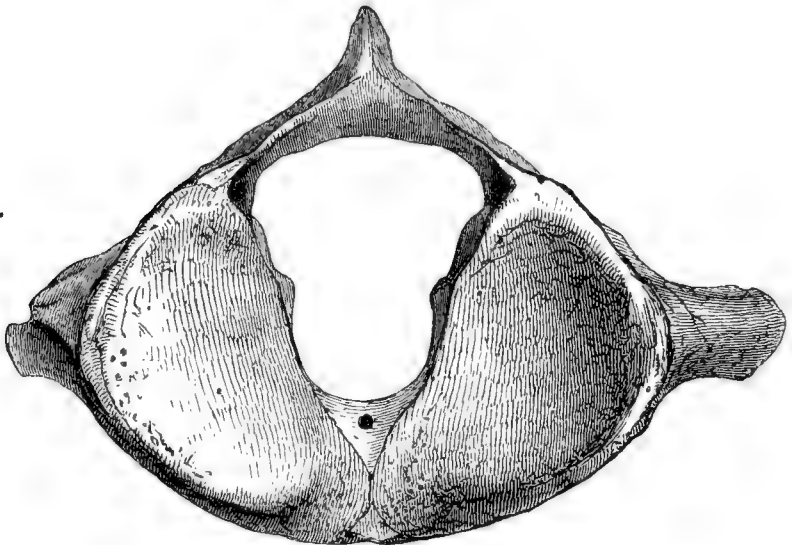
*Rorqualus minor*, Knox, Jard. Nat. Lib. 142. 7; Gaimard, Voy. Iceland, Mam. t. 13 (skeleton); t. 14 (skull).

*Balænoptera boops*, part, Fleming, B. A. 31; Bell, B. Quad. 520, fig. p. 521 (from Hunter).

*Hab.* Ascending the mouth of rivers; Thames at Deptford (Hunter), skeleton in Mus. Coll. Surg.; Frith of Forth, near Queensferry, 1834 (Knox); Cromer (Gurney), skeleton in Mus. Coll. Surg.; Thames opposite Deptford Creek, Oct. 23, 1842 (Illustrated London News, i. 388; Zoologist, 1842), skeleton in British Museum; Jutland, 1837, skeleton in Mus. Louvain; skeleton Mus. Bremen, head figured by P. Camper; Bergens, skeleton Mus. Paris, Charante.

The student must not run away with the idea that, because the characters of the genera here given are taken from a few parts of the skeleton, they are the only differences that exist between the skeletons of the different genera and species. The form of the head and the peculiarities of the cervical vertebræ of the ribs and of the bladebone have been selected after a long and careful comparison of the skeletons, as the parts which afford the most striking characters, that can be most easily conveyed to the mind of the student in a few words, and therefore best adapted for the distinction of the genera and species.

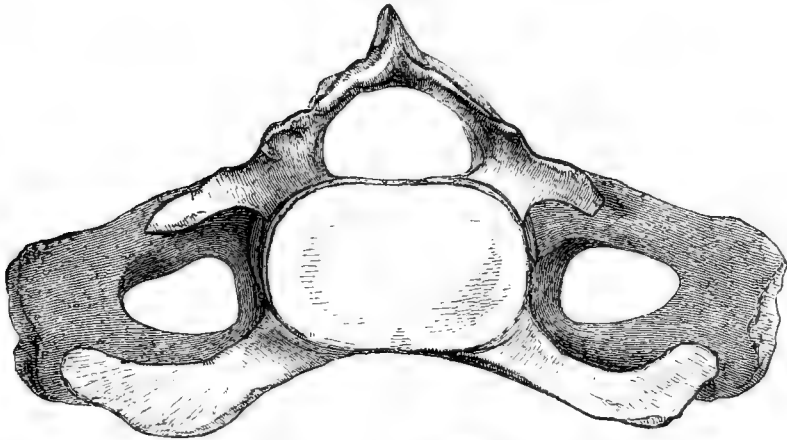
Fig. 20.



Atlas Vertebra of *Balænoptera rostrata*.  
Extreme width 9 inches; height  $9\frac{1}{2}$  inches.



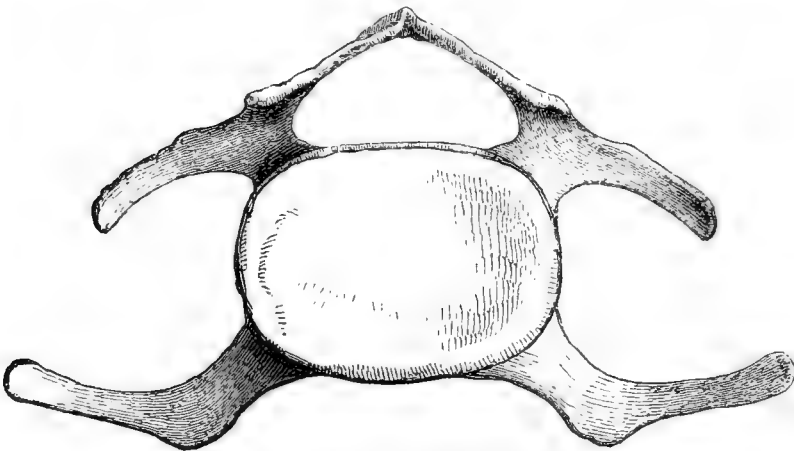
Fig. 21.



Second and Third Cervical Vertebrae of *Balænoptera rostrata*, united by the crural arch.

Extreme width 12 inches; height 6 inches. Articular surface: width 4 inches.

Fig. 22.



Fifth Cervical Vertebra of *Balænoptera rostrata*.

The careful examination of many skeletons has proved to me that almost every bone of each genus is peculiar—that is to say, that no bone is exactly alike in any two genera; but the difference between them is often very slight, so slight that it would be almost impossible to convey an accurate conception of it to the reader by words alone, yet it is permanent and characteristic. Though the same bones of the different skeletons of the same species of *Megaptera* or *Physalus*, which I have examined, offer a certain amount of variation in minor particulars, yet almost every bone of each species has a character of its own; so that a person conversant with the subject, and fresh from the study and comparison, can say at once to which

Fig. 23.

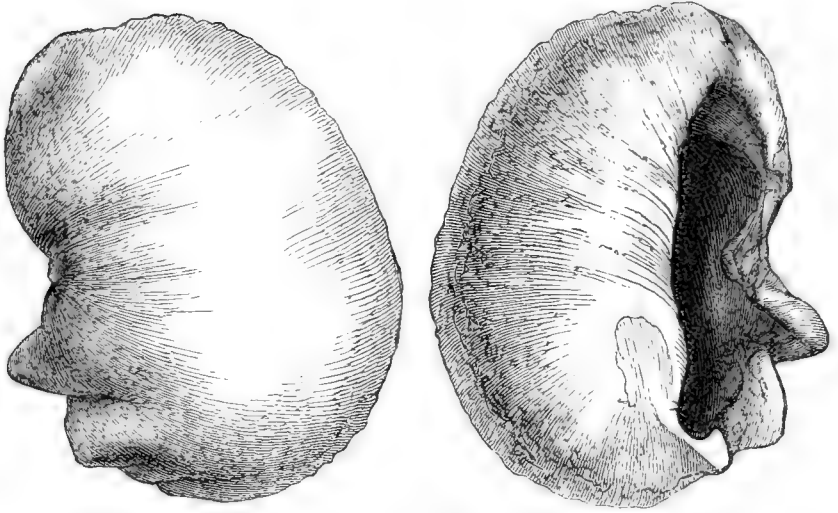
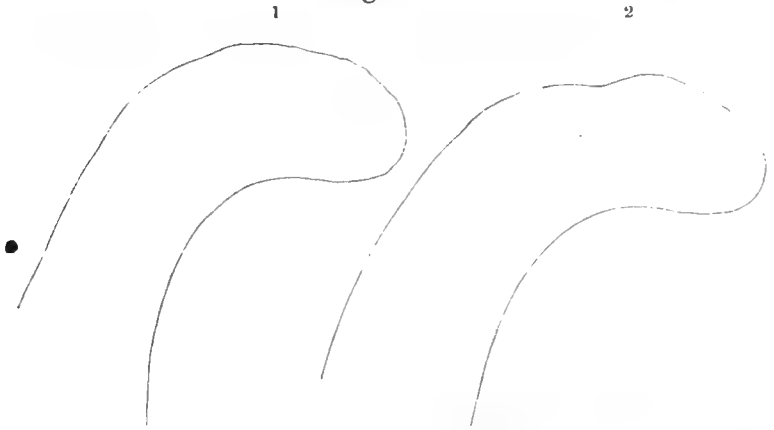
Tympanic Bones of *Balænoptera rostrata*.

Fig. 24.

Top of First and Second Ribs of *Balænoptera rostrata*.

genus or species any bone that might be shown to him belongs, even if it were only a phalange or a rib.

The ear-bones of each genus, as far as I have been able to examine, seem to afford very good characters; but, unfortunately, they are often sent to the Museum separate from the skull and other bones of the animal to which they belong.

Skeletons of whales are shown in museums and gardens, without any large and expensive building; indeed slight special buildings are best, permitting more ventilation. In Paris, the whale's skeleton is exhibited under a glass roof in the quadrangle of the Museum; at Antwerp, it is shown in a building formed of galvanized iron; and

they are shown in a similar manner at Edinburgh, at the Isle of Wight, and in other localities.

Sect. II. DENTICETE. *Teeth in one or both jaws, rarely deciduous. Palate lined with a hard membrane, without any baleen. Gullet large. Head more or less compressed. Tympanic bones small; lachrymal bone distinct.*

I. *Nostrils longitudinal, parallel or diverging, covered with a valve, one often larger and more developed. Pectoral broad, truncate.*

### Fam. 3. CATODONTIDÆ.

Head large, subcylindrical, blunt. Lower jaw narrow. Teeth large, in the lower jaw only, fitting into pits in the gums of the upper one. Nostrils separate, one often abortive. The hinder edge of the maxillary elevated, forming a concavity on the forehead of the skull. Pectoral broad, truncated.

\* *Head compressed, truncated; nostril in front of the truncated head; dorsal hump rounded.*

#### 1. CATODON. . Spermaceti Whale.

Head very large, one-third of the entire length of the animal.

*Catodon*, Artedi; Gray, Zool. E. & T.; Cat. Cetac. 45.

*Physeter*, Wagler.

*Physalus*, Lacép.

CATODON MACROCEPHALUS. Northern Sperm Whale.

*Trumpo*, Phil. Trans. i. 132.

*De Balæna macrocephala*, &c., Sibbald, Bal. 12.

*Balæna macrocephala bipennis*, Raii Pisc. 15.

*Catodon macrocephalus*, Lacép. Cét. t. 10. f. 1; Fleming, B. A. 39.

*Sperm Whale*, Anderson, Cambridge Phil. Trans. ii. 250, t. 12-14.

*Spermaceti Whale*, Dudley, Phil. Trans. xxxii. 258; Gent. Mag. 1794, p. 33, t. 1.

*Blunt-headed Cachalot*, Robertson, Phil. Trans. lx. t.

*Physeter trumpo*, Bonnat. Cét. t. 8. f. 1, cop. Robertson.

*Physeter macrocephalus*, Turton, Fauna, 16; Jenyns, Man. 44; Bell, B. Quad. 506. fig., 511. fig.

*Hab.* North Sea; Teignmouth (*Gesner*, 1532); Whitstable Bay, 1794; Scotland (*Sibbald*; *Robertson*); Orkney (*Lowe*); mouth of the Thames, coast of Essex and Kent, Feb. 1788, twelve males; Holderness, Yorkshire, 1825 (*Beale*); skeleton of adult at Burton Constable Castle, near Hull, described by *Beale*; Sandy Side Bay, Thirso, 1863, skeleton in the British Museum, supposed to have been brought by the Gulf-stream—was decayed when discovered. Coast of Yorkshire (*Dr. Anderson*), described in Cambridge Phil. Soc. Trans. 1825; 58½ feet long; teeth 24/24.

The Spermaceti Whale frequently comes ashore in Orkney; one was caught at Hoy, 50 feet long (“Lowe,” Flem. B. A. 29).

A male, 52 feet long, with a dorsal fin, was found at Limekilns, in the Forth, in Feb. 1689, and described by Sibbald (Bal. 33, t. 1).

After a hard gale of wind northerly, no less than twelve male whales, which undoubtedly came out of the Northern Ocean, were towed and driven on shore, all dead and in a high state of putrefaction, excepting one; six were found upon the coast of Kent, two on the coast of Holland. One at the Hope Point, in the River Thames, was the only one seen alive; he ran aground and smothered himself in the mud, and was afterwards made a show of in the Greenland Docks. (*Letter from Walderwick, on the coast of Suffolk, 7 March 1788*, in Sir Joseph Banks’s copy of Phil. Trans. in B. M. library.)

Whitstable, Kent, Feb. 16, 1829 (P. Hunter & H. Wood, Mag. N. Hist. ii. 197). A male, 62 feet long and 16 feet high. The skeleton of this animal, which had been prepared by Mr. J. Gould, was presented by Messrs. Enderby and Sturge to the Zoological Society; but being claimed as a “royal fish,” it was left on the shore (H. Wood, *l. c.*).

“The head is very thick and blunt in front, and is about one-third of the whole length of the animal; at its junction with the body is a large protuberance on the back, called the ‘*hunch of the neck* ;’ immediately behind this, or the shoulders, is the thickest part of the body, which from this point gradually tapers off to the tail; but it does not become much smaller for about another third of the whole length, when the ‘*small*’ or tail commences; and at this point on the back is a large prominence of a pyramidal form, called the *hump*, from which a series of small processes run halfway down the *small* or tail, constituting what is called the *ridge*; the body then contracts so much as to become not thicker than a man’s body, and terminates in the *flukes* or tail. The two *flukes* constitute a large triangular fin. The chest and belly are narrower than the broadest part of the back, and taper off evenly and beautifully towards the tail, giving a *clear run*. The depth of the head and body is in all parts, except the tail, greater than the width; the head, viewed in front, presents a broad, somewhat flattened surface, rounded and contracted above, considerably expanded on the sides, and gradually contracted below, so as in some degree to attain a resemblance to the cutwater of a ship. At the angle formed by the anterior and superior surface on the left side is placed the *single* blow-hole or nostril, which in the dead animal is a slit or fissure in the form of an S, extending horizontally. In the right side of the nose and upper surface of the head is a large, almost triangular-shaped cavity, called the *case*, which is lined with a beautiful glistening membrane, and covered by a thick layer of muscular fibres and small tendons running in various directions, finally united by common integuments. This cavity is for the purpose of secreting and containing an oily fluid, which is, after death, converted into a granulated substance of a yellowish colour—the *spermaceti*.

“Beneath the *case* and nostril, and projecting beyond the lower

jaw, is a thick mass of elastic substance—the *junk*, which is formed of a dense cellular tissue, strengthened by numerous strong tendinous fibres, and permeated with very fine oil and spermaceti.

“The mouth extends nearly the whole length of the head; both jaws, but especially the lower, are in front contracted to a very narrow point; and when the mouth is closed, the lower jaw is received within a sort of cartilaginous lip or projection of the upper one—but principally in front; for further back at the sides and towards the angles of the mouth both jaws are furnished with well-developed lips. In the lower jaw are forty-two large conical teeth; in the upper are no teeth, but depressions corresponding to and for the reception of the ends of the teeth in the lower jaw. Sometimes a few rudimentary teeth may be found in the upper jaw, never projecting beyond the gum, and upon which those in the lower jaw strike when the mouth is closed. The tongue is small, white; the throat capacious, very unlike the contracted gullet of the Right Whale. Mouth lined with a pearly-white membrane, continuous at the lip, which is bordered with the black external skin. Eyes small, with eyelids, the lower one most moveable, placed a little behind and above the angle of the gape, at the widest part of the head. Ears very small, without any external appendage, a short distance behind the eyes. The swimming-paws or fins are placed behind, not far from the angle of the mouth; they are not much used as organs of progression, but as giving direction and balancing the body in sinking suddenly, and occasionally in supporting their young.”

The full-grown male of the largest size is about as follows:—entire length 84 feet; depth of head 8 or 9 feet; breadth 5 or 6 feet; depth of body seldom exceeds 12 or 14 feet, so that the circumference rarely exceeds 36 feet; the fins about 6 feet long, and 3 feet broad; the tail or flukes 12 or 14 feet wide.

The atlas is distinct; the rest of the cervical vertebræ are ankylosed into one piece (Cuv. Oss. Foss. v. 346, t. 24. f. 12, 13). Ribs 14/14. Vertebra 60 (see Cuv. Oss. Foss. *l. c.* t. 24. f. 15–18). Bladebone higher than wide, with a large coracoid (*l. c.* t. 24. f. 11). Humerus and cubitus ankylosed, short and thick (t. 24. f. 14). Os hyoides very wide (Cuv. t. 25. f. 15?).

Skeleton of adult male 56 feet long, at Burton Constable (Turnstall in Holderness, Yorkshire, 1825), was articulated by Mr. Wallis (see Beale, 73). The skeleton is 49 feet 7 inches long; cranium 18 ft.  $\frac{1}{2}$  in.; lower jaw 16 ft. 10 in. Teeth 24/24. Ribs 10/10, nearly circular; the first with one, the second, third, fourth, fifth, sixth, seventh, and eighth with two articulating surfaces, each articulated to two vertebræ. Cervical vertebræ 2—that is, atlas and another united; dorsal vertebræ 10; lumbar and caudal 32: = 44. Pelvis two flat bones; sternum of three bones; clavicles none; bladebone flat, without any spine; but with two projecting coracoid processes near the articulation; bones of pectoral fins 4 ft. 4 in. long; carpus of seven loose square bones; the phalanges five, the three middle ones each of four and the two outer each of three bones. The os hyoides  $2\frac{1}{4}$  feet long (Beale).

The tympanic bone is small, scroll-like, oblong, ankylosed to a somewhat similar-shaped tegmen tympani and pars mastoidea (see Owen, Hist. Brit. Fossil Mam., fig. of natural size (not half the natural size, as marked on the plate).

When the young Cachalot has attained the length of 3½ feet, its teeth are perfectly formed, though not visible until it exceeds 28 (Bennett, P. Z. S. 1836).

Mr. Bennett found eight rudimentary teeth on each side of the upper jaw in two instances, which, "though not visible externally in the young Cachalot, may be seen upon the removal of the soft parts from the interior of the jaw" (Proc. Zool. Soc. 1836).

Professor Huxley has figured the skull of a fœtal specimen that is in the Museum of the College of Surgeons, at fig. 118, on page 275 of his 'Elem. Comp. Anat.' 1864.

In the fœtal skull the right præmaxilla is much larger than the left, extending far back upon the right frontal, while the left does not reach the left frontal; the left nostril, on the other hand, is much more spacious than the right (see Huxley, Elem. Comp. Anat. 276. f. 110 a).

\*\* *Head depressed, rounded in front; nostrils in the forehead; dorsal fin falcate.*

## 2. PHYSETER.

Head very large, one-third of the entire length of the animal, rounded, convex above. Teeth conical, compressed. Skull elongate.

*Physeter*, sp., Linn. S. N.; Illiger, Prodr. 143; Gray, Z. E. & T.; Cat. Cet. 53.

*Tursio*, Fleming, Phil. Zool. 211.

*Cetus*, Oken.

Cuvier (Oss. Foss. v. 328, 338) erroneously regards Sibbald's account as a bad description of a Sperm Whale. This error is important, as it vitiates many of his subsequent observations.

PHYSETER TURSIO. The Blackfish.

*Physeter tursio*, Gray, Cat. Cetac. 56.

1. *Balæna macrocephala quæ tertiam*, &c., Sibbald, Bal. t. 1. f. A, B, C.

*Balæna major*, &c., Raii Pisces, 15.

*Physeter microps*, Artedi, Syst.; Turton, B. F. 17; Fleming B. A. 38; Jenyns, Man. 46.

*Physeter macrocephalus*, Cuvier, Oss. Foss. v. 331, 334.

*Tursio microps*, Fleming, Phil. Zool. 21.

2. *Balæna macrocephala tripinna*, &c., Sibbald, Bal. t. 2. f. 1, 2, 4, 5, teeth; Raii Pisces, 16.

*Physeter tursio*, Artedi, Syst.; Linn. S. N. i. 107.

*Physeter* — ?, Schlegel, Dieren, 96. t. 19; Turton, B. F. 17; Fleming, B. A. 38; Jenyns, Man. 45; Bell, Brit. Quad. 512.

*Delphinus globiceps* or *D. grampus*?, Cuvier, Oss. Foss. v. 331.

*Hab.* North Sea, Scotland (*Sibbald, Barclay*).

A female came ashore in Orkney in 1687, which was described by Sibbald (Bal. 43):—"The dorsal fin was erect, like a mizen mast."

Mr. Barclay, of Zetland, states that "the *Physeter tursio*, or High-finned Cachalot, is frequently seen on these coasts in summer, and is easily distinguished by the long perpendicular fin on its back" (Bell, Brit. Quad. 513). Coast of Cornwall?, May 1850 (*Mr. Couch*); Ireland, Coast of Wexford (*Thompson*); West Coast, Ireland (*Templeton*).

The greatest desideratum of zoology is the power of examining some specimens of the genus *Physeter*, or Blackfish, as it is called by the whalers. There is not a bone, nor even a fragment of a bone, nor any part that can be proved to have belonged to a specimen of this gigantic animal to be seen in any museum in Europe. This is the more remarkable as the animal grows to the length of more than 50 feet, is mentioned under the name of the Blackfish in almost all the Whaling Voyages; and two specimens of it were examined by Sibbald, having occurred on the coast of Scotland. The only account which we have of the animal, on which zoologists can place any reliance, is that furnished by Sibbald in his little tractate on Scotch Whales.

Otho Fabricius describes the Ardluk, under the name of *Physeter microps*, as being rather abundant in the seas of Greenland. He calls it "one of the smaller Whales;" and it is very doubtful if he has not described the Killer (*Delphinus orca*) under this name—though he states the skin is black, and says nothing of the very distinctive white marks on the under side of the Killer.

II. *Nostrils united into a single transverse or crescent-shaped blower. Head moderate, more or less beaked. Teeth in both jaws, one or both sets often deciduous. The pectoral fin lanceolate, tapering.*

#### Fam. 4. DELPHINIDÆ.

Head more or less beaked, smooth. Teeth simple, cylindrical, conical, smooth. Back rounded. Dorsal fin distinct, falcate, rarely wanting.

A. *Head more or less beaked; beak of the skull as long or longer than the brain-cavity. Bottlenoses.*

a. *Pectoral fins moderate, lanceolate, far apart on the sides of the chest; teeth in both the jaws permanent. Delphinina.*

##### 1. STENO.

Beak of the skull rather compressed, higher than broad. Symphysis of the lower jaw rather elongate. Dorsal fin medial.

*Steno*, Gray, Zool. E. & T. 43; Cat. Cet. 127.

STENO ROSTRATUS. The Beaked Dolphin.

*Dauphin de Breda*, Cuv. Oss. Foss. i. 278, 296. v. 400, t. 21. f. 7, 8.

*Delphinus rostratus*, Cuvier, Ann. Mus. xix. 9; Cuv. Mam. Lithog. t.; Schlegel, Dieren van Nederland. 85, t. 11.

*Delphinus bredanensis*, Fischer, Syn. 505, from Cuvier.

*Delphinus oxyrhynchus*, Jardine, Nat. Lib. t. 27, from Cuvier.

*D. planiceps*, Breda, Verh. Nederl. Hist. 1829, p. 263, t. 1, 2; Schlegel, Abh. 27, t. 4. f. 8.

*Steno? rostratus*, Gray, Zool. E. & T. 43; Cat. Cetac. 131.

*Hab.* North Sea, Holland (*Breda*); Brest (D'Orbigny); England (*Sowerby*).

I have not been able to find the skull of this animal, which was in Mr. Sowerby's Museum in Mead Place, Lambeth.

The figures of the skull in Cuvier and Schlegel show it is a *Steno*. The skull in Paris is very like *Steno frontatus* of India.

## 2. DELPHINUS.

Beak of the skull rather depressed, convex above. Dorsal fin medial.

*Delphinus*, Gray, Spic. Zool. & Zool. E. & T. 36; Cat. Cetac. 105; P. Z. S. 1863.

a. *Head longly beaked; nose of skull slender, light, rather depressed, especially in front, much larger than the brain-cavity.*

*Teeth*  $\frac{40}{40}$  to  $\frac{60}{60}$ . *Delphinus*.

\* *Skull roundish; triangle just to the tooth-line; palate with a deep groove on each side, and a high central ridge behind.*  
*Delphis*.

DELPHINUS DELPHIS. Dolphin.

Beak once and a half the length of brain-cavity. *Teeth*  $\frac{42}{42}$  to  $\frac{50}{50}$ .

*Dolphin*, Borlase, Cornwall, 264, t. 27. f. 1; Hunter, Phil. Trans. 1787, p. 373, t. 18.

*Delphinus delphinus*, Pliny, Belon.

*Delphinus antiquorum*, Ray, Pisc. 28, t. a 1. f. 1.

*Delphinus delphis*, Linn. S. N.; Schlegel, Dieren, 82, t. 10; Turton, B. F. 17; Flem. B. A. 35; Jenyns, Man. 40; Bell, Brit. Quad. 463, fig.; Nilsson, Scand. Faun. 591.

*Delphinus vulgaris*, Lacép. Cét. 250, t. 14.

*Hab.* North Sea; coast of England, procured at Billingsgate Market; three specimens in the British Museum, presented by Messrs. J. & C. Grove.

According to O. Fabricius, it is not uncommon as far north as Greenland.

“They come on the Cornish coast in considerable numbers, more especially when the Pilchards and Mackerel abound; and not unfrequently are taken in the drift-nets, in the meshes of which they become entangled by the teeth. In the month of September 1845, eight or ten in a day were brought on shore in Mount's Bay for many days in succession.”—*Couch, Cornish Whales*, p. 39.



Prof. Rapp (Cetac. t. 4) has described and figured the skeleton. The scapula with a broad dilated coracoid process, and a broad dilation on the front edge of the condyle. Fingers five, short; the fourth longest; the third rather short; the fifth shorter; the first very short, shorter than the second. The spinal processes of the dorsal vertebræ with a distinct subbasal anterior process; the caudal vertebræ with a similar process on the hinder part of the spinal process; but the greater part of the lumbar vertebræ are without them; the lateral process of the lumbar vertebræ slender.

\*\* *Skull flattened behind; triangle to the tooth-line; palate flat, not grooved on the side.* Clymene.

**DELPHINUS EUPHROSYNE.** The Euphrosyne.

*Delphinus euphrosyne*, Gray, Cat. Osteol. Spec. B.M. 147; Zool. E. & T. 40, t. 22 (skull); Cat. Cetac. 117.

*Delphinus holböllii*, Eschr. Nat. Mol. Kopenh. 1847, from Nilsson.

*Delphinus delphis*, Cat. Mus. Coll. Surg. 161. n. 1117.

*Hab.* North Sea; coast of England. Skull in Norwich Museum. Skull in Mus. Coll. Surg.

b. *Beak short; nose of skull thick, conical, convex above, half as long as the brain-cavity.* Tursio, Gray, Zool. E. & T. 37; Cat. Cetac. 109.

**DELPHINUS TURSIO.** Bottlenose Dolphin.

*L'orque (Orca)*, Belon, Aquat. f. 6.

*Bottle-nose*, Hunter, Phil. Trans. lxxxvii. t. 18.

*Delphinus tursio*, O. Fab.; Wright, Mag. N. H. 1838, ii. 609; Gray, Zool. E. & T. 37, t. 10; Cat. Cetac. 109; Schlegel, de Dieren, 86, t. 12 (var. *obtusus*, t. 13); Fleming, B. A. 35; Jenyns, Man. 41; Bell, Brit. Quad. 469. fig., 472. fig.; Nilsson, Scand. Fauna, 602.

*Delphinus nesarnak*, Lacép.

*Tursio truncatus*, Gray, List Mam. B. M. 104.

*Delphinus truncatus*, Montagu, Wern. Trans. iii. t. 5. f. 3 (aged).

*Hab.* Mediterranean and North Sea. Coast of South of Ireland, Nov. 1828 (*R. Templeton*). Mouth of the Thames, Nore, June 1828 (*Howslip*); skull, Mus. Coll. Surg. no. 1125. Orwell, May 10, 1849. Devonshire, River Dart (*Montagu*): skull Brit. Mus. Frith of Forth: skeleton, Mus. University, Edinburgh, beak flat; skeleton in Surgeons' Hall, Edinburgh, teeth acute. Holland; skeleton, Leyden. North Coast of France; skeleton at Paris. Belgium; skeleton, Ghent. Denmark; skeleton, Mus. Copenhagen.

**3. LAGENORHYNCHUS.**

Beak of the skull depressed, expanded. Head shelving in front. Dorsal fin rather posterior.

*Lagenorhynchus*, Gray, Zool. E. & T. 34; Cat. Cetac. 94; P. Z. S. 1863.

\* *Beak short; beak of skull only as long as the brain-cavity; teeth nearly to the notch.*

LAGENORHYNCHUS LEUCOPLEURUS. White-sided Bottlenose.

*Delphinus tursio*, Knox, Cat. Prepar. Whales, 29; Ann. & Mag. N. H. 1864, xiv. t. 3.

*Delphinus leucopleurus*, Rasch, Nyt Mag. for Naturv. iv. 97; Mag. Zool. 1843, p. 363; Nilsson, Scand. Fauna, 598.

*Lagenorhynchus leucopleurus*, Gray, Zool. E. & T. 34, t. 3, t. 12, t. 26. f. 3; Ann. & Mag. N. H. 1864.

*Hab.* North Sea. Orkney, May 1835 (*Knox*); skeleton, Mus. University of Edinburgh.

*Lagenorhynchus? nilssonii*. Nilsson, in the 'Scandinavian Fauna,' records a species under the name of *Delphinus obscurus*, and refers it with doubt to the description and figure of the skull, and the species under that name, in the 'Zoology of the Erebus and Terror,' and equally with doubt to *D. superciliosus* of Schlegel. Both these species are described from the same specimens, which were procured at the Cape of Good Hope, and therefore very unlikely to be of a species found also in the North Sea. Nilsson's species may very likely be found in the British Seas; so I have referred to it to draw zoologists' attention to the description. It is the only Swedish species that has not hitherto been observed here.

\*\* *Beak moderate; beak of skull only as long as the brain-cavity; teeth not quite to the notch in the beak.*

LAGENORHYNCHUS ALBIROSTRIS. White-beaked Bottlenose.

*Delphinus tursio*, Brightwell, Ann. Nat. Hist. 1846, p. 21, t. 1, 9.

*Delphinus albirostris*, Gray, Ann. & Mag. N. H. 1846; M. Clausius, Dissertat. de Lagenorhynchis, Kiliae, 1853.

*Delphinus ibsenii*, "Eschricht, 1847;" Nilsson, Scand. Fauna, 600.

*Lagenorhynchus albirostris*, Gray, Zool. E. & T. t. 10.

*Delphinus pseudotursio*, Reichb. Cetac. t. 24. f. 7, from Brightwell.

*Delphinus (Lagenorhynchus) albirostris*, Van Beneden, Nouv. Mém. Acad. R. Brux. xxxii. t. 1, 2 (animal, skeleton, and viscera).

*Hab.* North Sea, Faroe Islands. Yarmouth, 1846 (*Brightwell*); skeleton in British Museum; skull figured in Zool. E. & T. 11. Ostend, July 1851, female. Winter 1852, female (*Van Beneden*, l. c. p. 20).

Bladebone broader than high, with long acromion and a prominent articulation (t. 2. f. 9). Arm-bones very short; fingers four, short, outer longest, second rather shorter, third and fourth very short. Ear-bones large (see Van Beneden, l. c. t. 1. f. 7 & 8).

Vertebræ 90 or 94. The atlas and axis only anchylosed; the rest of the cervical vertebræ free. Scapula large. Thumb without a phalange.

Skeleton, Mus. Bruxelles; Louvain; at Mus. Copenhagen, Kiel, and Berlin.

\*\*\* *Beak moderate; beak of the skull longer than the length of the brain-cavity; teeth not reaching the notch.*

LAGENORHYNCHUS ACUTUS. Eschricht's Dolphin.

*Delphinus (Grampus) acutus*, Gray, Spic. Zool. 2 (1828).

*Lagenorhynchus acutus*, Gray, Zool. E. & T. 36, t.; Cat. Cetac. 101.

*Phocæna acutus*, Gray in Brook's Cat. 39, 1828.

*D. leucopleurus*, var., Nilsson, Scand. Fauna, 598.

*Hab.* North Sea.

*Delphinus (Lagenorhynchus) eschrichtii*, Van Beneden, Nouv. Mém. Acad. R. Brux. xxxii. 31.

*Delphinus eschrichtii*, Schlegel, Abhand. 122, t. 1, t. 2. f. 4, t. 4. f. 5; M. Claudius, Dissert. de Lagenorhynchis, 4to, Kilia, 1853; Eschricht, Compt. Rend. Acad. Sci. 1852, 12 July.

*Hab.* North Sea; skeleton, Mus. Louvain. Faroe Islands (*Schlegel*); skeleton, Mus. Copenhagen, Leyden, Frankfort. Orkney (*Brooks*); skull in Mus. Leyden.

The peculiar character of this species is, that there are 82 or 83 vertebræ; the muzzle is narrower, the shoulder-blade narrower, a phalange to the thumb, the atlas and axis are anchylosed to the third and fourth cervical vertebræ by the spinous apophysis, and the sixth cervical alone has an inferior transverse process. Teeth  $\frac{30-30}{30-30}$  (Van Beneden, *l. c.* 31).

Nilsson thinks my *L. acutus* may be only a variety of *L. leucopleurus*: the skulls are very unlike.

b. *Pectoral fins small, low down, and rather close together on the middle of the chest; upper jaw toothless; lower jaw with few teeth, sometimes deciduous.*

\* *Maxillary bones elevated into a crest on the sides behind; teeth two or four, anterior conical; eyes close to the gape. Hyperodontina.*

#### 4. HYPERODON.

Forehead convex. Gape short, only as long as the short beak. The eyes near and the ears far behind the gape. The crest of the maxillary bone thin and wide apart above. The beak of the skull descending downwards. The hinder edge of the skull as high as the crest. Lower jaw rather curved.

Bladebone triangular, with a long acromion and a posterior mar-

ginal prominence (Cuvier, Oss. Foss. 318, t. 24. f. 23). The bones of the arm short; fingers short (Cuv. 318). The opening of the blower is transverse, linear, slightly convex, forward in the middle, and slightly bent back at the ends; and this explains, I suspect, the different accounts that authors have given of this part, some looking at the middle and the others at the ends only.

It is curious that both O. Fab. and Turton should have reversed the head, or, by misprint, that each should state, in two places in the text, the teeth to be in the *upper* jaw; and Illiger's genus is founded on this error of the press.

HYPERODON BUTZKOPF. The Bottlehead.

*The Bottle-head or Flounder Whale*, Dale, Hist. Harwich, 411, t. 149.

*Beaked Whale*, Penn. Brit. Zool. t.

*Delphinus bidens*, Turton, B. Fauna, 17.

*Hyperoodon bidens*, Flem. B. A. 36; Jenyns, Man. 44; Thompson, Ann. & Mag. N. H. 1854, xiv. 347.

*Bottle-nose Whale of Dale*, Hunter, Phil. Trans. lxxvii. t. 19.

*Delphinus hunteri*, Desm. Mamm. 520.

*Cetodiodon hunteri*, Jacob, Dublin Phil. Journ. 1825.

*Hyperoodon*, Thompson, Mag. N. H. 1838, 221.

*H. butzkopf*, W. Thompson, Ann. & Mag. N. H. 1846, p. 150, t. 4 ♂, iv. 375; Gray, P. Z. S. 1862; Bell, B. Quad. 492. fig., 493. fig., 496. fig.

*Delphinus hyperoodon*, Schlegel, de Dieren, 94, t. 18.

*Hyperodon borealis*, Nilsson, Scand. Fauna, 622.

*Hyperoodon butzkopf* et *H. rostratum*, Gray, Cat. Cetac. 63, 64.

*Whale*, Illustrated London News, 18 Nov. 1860.

*Nebhvalen*, Eschricht, K. Dansk. Vid. Selsk. xi. 327, 328. fig., with details of anatomy.

*Hyperodon hunteri*, Gray, Ann. & Mag. N. H.

*Hyperoodon rostratum*, Wesmael, Nouv. Mém. Acad. Roy. Bruxelles, xiii. t. 1, 2 (very good).

*Hab.* British Seas, ascending rivers. Harwich (*Dale*). Mouth of the Thames, above London Bridge, 1783 (*Hunter*); skeleton, Mus. Coll. Surgeons. Whitstable (*Beardsworth*); skull and bones in British Museum. The Humber, near Hull, 1837 (*Thompson*); skeleton in Mus. Hull Phil. Soc. Mouth of the Dee; skeleton, Mus. Royal Institution, Liverpool. Dublin (*Jacob*); skeleton, Mus. Coll. Surg. Skull, Royal Dublin Society and Museum School of Anatomy. Belfast Lough, 29 Oct. 1845; skeleton, in Belfast Museum, of *male* 20 feet long (Ann. & Mag. N. H. 1846, xvii. 151), with four teeth in lower. Frith of Forth, 29 Oct. 1839; skeleton in Edinb. University Museum: *female* 28½ feet long, in company with young suckling female 9 feet long. Coast of Holland (*Wesmael, l. c.*).

I formerly thought there might be more than one British species of this genus, the figures and the description being so different; but I have not been able to find any specimen to establish this idea.

## 5. LAGENOCETUS.

The crests of the maxillary bones very thick and close together, especially above, where they are flat-topped. The beak of the skull horizontal. The hinder edge of the skull lower than the top of the crest. Lower jaw straight.

*Lagenocetus*, Gray, P. Z. S. 1863.

*Hyperoodon*, Gray, Cat. Cetac. 69.

This animal has been considered by Eschricht as the male of the preceding genus; but in the 'Proceedings of the Zoological Society' for 1860, p. 425, I have shown that both sexes have been observed of each genus.

## LAGENOCETUS LATIFRONS.

*Hyperoodon latifrons*, Gray, Zool. E. & T. 27, t. 4; Proc. Zool. Soc. 1860, p. 424.

*Hyperoodon butzkopf* (male), Eschricht, Ann. & Mag. N. H. 1852.

*Hab.* British seas. Moreton Bay; skull in good condition. Orkney (*Warwick*); skull in British Museum. Frith of Forth; skeleton and skull in Mus. Coll. Surgeons, Edinburgh; female accompanied by a young male (*Thompson*, Ann. & Mag. N. H. 1846, p. 153).

\*\* *Maxillary bones simple; teeth, on the sides of the lower jaw, compressed.* Ziphiina.

## 6. ZIPHIUS.

Lower jaw gradually tapering. Teeth on the sides of the jaw of the males large, compressed; and female small, conical.

*Ziphius*, Gray, Cat. Cetac. 70.

♀? *Delphinorhynchus*, Gray, Cat. Cetac. 72.

Tympanic bones large, very thick, free edge open, and much twisted (see Van Beneden, Mém. Acad. Brux. 8vo, xvi. fig. at p. 41; and Dumortier, Mém.).

## ZIPHIUS SOWERBIENSIS.

Male. *Physeter bidens*, Sowerby, Brit. Misc. t. 1, 1806, male; Turton, B. Fauna, 17.

*Diodon bidens*, Bell, Brit. Quad. 497. fig. (cop. fr. Sowerby).

*Delphinus sowerbii*, Desm. Mam.; Jardine, Nat. Lib. t. 12 (cop. fr. Sow.).

*Delphinus sowerbiensis*, Blainv. in Desm.; Eschricht, Ann. & Mag. N. H. 1852.

*Delphinorhynchus bidens*, Gray, Ann. & Mag. N. H. 1840.

*Heterodon sowerbyi*, Lesson, Man. Mam. 419.

*Ziphius sowerbiensis*, Gray, Zool. E. & T. t. 5. f. 3, 4, skull; Cat. Cetac. 71.

*Mesodiodon sowerbyi*, Duvernoy, Ann. d. Sci. Nat. xv. 55, t. 2. f. 2.

*Diplodon sowerbyi*, Gervais.

*Diodon sowerbæi*, Bell, Brit. Quad. 497. fig.

*Diodon sowerbi*, Jardine, Whales, 192. f. 13.

Female. *Mesoplodon sowerbiensis*, Gervais, Zool. et Paléont. Franc. t. 40. f. 1; Van Beneden, Mém. Acad. Brux. xvi. t. 4.

*Dauphin de Dale*, Blainv. N. Bull. Soc. Phil. 1825, p. 139; F. Cuv. Mam. Lithog. t.

*Mesiodon micropterus*, Duvernoy, l. c. 55, t. 2. f. 3.

*Nodus dalei*, Wagler, N. S. Amph. 34.

*Delphinorhynchus micropterus*, Dumortier, Mém. Acad. Brux. 1839, xii. t. 13; F. Cuv. Cétac. 114, t. 9. f. 1, t. 7; Gray, Cat. Cetac. 73.

*Delphinus micropterus*, Cuv. Règn. Anim. i. 288; Schlegel, De Dieren, 93, t. 17.

*Heterodon dalei*, Lesson, Man. Mam. 419.

*Anodon dalei*, Lesson, Ouvr. Buffon, i. 155, t. 3. f. 1.

*Hab.* Male, Elginshire (*Brodie*, 1800); skull in Museum at Oxford; casts in many museums. Female, Havre, 9 Sept. 1825 (*Blainv.*); mouth of the Orne, Calvados, 1828; head, Mus. Faculty of Sciences, Caen. Ostend, 1835 (*Dumortier*); skeleton in Museum at Ostend; and head, Mus. Paris.

In my paper "On the British Cetacea," in the 'Annals of Nat. Hist.' xvii. 82, 1846, I proposed to unite *Physeter bidens* of Sowerby with *Delphinus micropterus* of Cuvier. The French naturalists have since almost universally come to the same conclusion. The difference in the size of the teeth, which they believe to be sexual, at one time made me revise my first opinion. I now think it probable that they are the same; at any rate it is a subject that wants further examination, for at present only one male and two females of the two presumed species have been observed by naturalists.

The male was found near Brodie House, Elginshire, by James Brodie, who sent a figure and the skull to Mr. Sowerby, who figured it in the 'British Miscellany' under the above name. It was 16 feet long.

Dr. Fleming and Mr. Jenyns have most oddly confounded it with the Bottlehead of Dale (*Hyperoodon bidens*) (see Brit. Anim. p. 36, and Manual B. V. A. p. 44).

In the Mediterranean there is a species belonging to this tribe, which has been noticed under several names. It forms a genus, which may be named ALIAMA. The head is conical, tapering; upper jaw toothless; the lower jaw rather the largest, bent up at the top, with two large conical teeth in front, and sometimes a few small ones on the side just behind them. Dorsal fin falcate, three-fourths the entire length from the nose.

#### ALIAMA DESMARESTII.

*Delphinus desmarestii*, Risso, Eur. Mérid. iii. 24, t. 2. f. 3; F. Cuv. Cétac. 19.

*Epiodon desmarestii*, Bonap.

*Diodon desmarestii*, Lesson.

*Orca desmarestii*, Wagler.

- Hyperodon doumetii* et *H. desmarestii*, Gray, Cat. Cet. 68, 69.  
*Hyperodon*, sp., Doumet, Bull. Soc. Cuvier. 1842, p. 207, t. 1. f. 2.  
*Delphinus philippii*, Cocco, Erichson, Arch. 1846, p. 204, t. 4. f. 6.  
*Ziphius cavirostris*, Gervais, Ann. Sci. Nat. xix.  
*Hyperoodon gervaisii*, Duvernoy, Ann. Sci. Nat. xv. 49, 1851.  
 Hab. Mediterranean; Corsica (*Doumet*); Nice (*Risso*).  
 Grey, white streaked. Length 15 feet.

- B. *Head rounded in front, not beaked; beak of the skull scarcely as long as the brain-cavity.*
- a. *Pectoral fins falcate, elongate, low down, near together on the chest; head very swollen; intermaxillary bones very wide, covering the maxilla above; teeth conical; side of maxilla expanded horizontally.* Globiocephalina.

#### 7. GLOBIOCEPHALUS.

*Globiocephalus*, Lesson; Gray, Zool. E. & T. 32; Cat. Cetac. 86.

- \* *Palate of skull flat, or rather concave in the middle.*  
*Globiocephalus.*

GLOBIOCEPHALUS SVINEVAL. The Pilot Whale.

- Petit cachalot*, Daub. Acad. Sci. 1782, t. 1.  
*Cachalot svineval*, Lacép. Cétac. 216.  
*Narwal edente*, Camper, Cétac. t. 33, 34.  
*Delphinus melas*, Trail, Nichol. Journ. xxii. 21. t., 1809; Fleming, B. Anim. 341; Jenyns, Man. 42; Schlegel, Dieren, 92, t. 16.  
*Ca'ing Whale*, Neil, Orkney and Shetland, 221, 1836.  
*Delphinus globiceps*, Cuvier, Ann. Mus. xix. t. 1. f. 2 ♀ (1812); Nilsson, Scand. Fauna, 608.  
*D. deductor*, Trail, Scoresby, Arct. Reg. i. 496, t. 13. f. 1, 1820.  
*Grampus globiceps*, Gray, Spic. Zool. 2, 1828.  
*Delphinus grampus*, Owen, Cat. Osteol. Mus. Coll. Surg. n. 1137.  
*Globiocephalus svineval*, Gray, Zool. E. & T. 32 (fig. skull); Cat. Cetac. 87.  
*Phocæna melas*, Couch, Ann. & Mag. N. H. ix. 371, t. 6; Bell, B. Quad. 483. fig.  
*Large Grampus*, Hunter, Cat. Mus. Coll. Surg. n. 1137.  
*Black Whale, Howling Whale, Social Whale, Bottlehead.*  
 Hab. North Sea. Orkney (*Trail*); skull in Brit. Mus. Huyst, Belgium, Nov. 1859, female 20 feet long, with fœtus 5 feet long (*Van Beneden*) (N. Mém. Acad. Brux. xxxii. 5).

Van Beneden notes, the fœtus was coloured exactly like the adult; and Eschricht observes that a fœtus only a foot long has the pectoral fins of the shape so characteristic of the genus. The teeth were present, but had not cut the gums; they were 10/10, and they are evidently permanent, and not replaced.

Very common at the Faroe Islands, and called *Grindewal*. Very

many are taken annually on their passage from the Polar Seas to the Atlantic.—*Eschricht*.

**GLOBIOCEPHALUS AFFINIS.**

*Delphinus grampus*, Cat. Mus. Col. Surg. 169. n. 1138; Hunterian Coll. n. 686.

*Delphinus melas*, Owen, Cat. Osteol. Col. Surg. n. 2518; British Fossil Mammalia.

*Globiocephalus affinis*, Gray, Zool. E. & T. 32; Cat. Cetac. 89.

*Hab.* North Sea. Skull Mus. Coll. Surg.

\*\* *The palate convex, shelving on the sides.* Sphærocephalus.

**GLOBIOCEPHALUS INCRASSATUS.** Thick-palated Pilot Whale.

*Globiocephalus incrassatus*, Gray, Proc. Zool. Soc. 1861 (skull, fig. 3).

*Hab.* British Channel, Bridport, Dorsetshire (*Beecham*), 1853; skull in British Museum.

b. *Pectoral fins ovate, wide apart, lateral; intermaxillary bones moderate.* Phocænina.

† *The lateral wing of the maxilla horizontally produced over the orbit; dorsal fin distinct; teeth conical.*

**8. ORCA.**

Teeth large, conical, acute, permanent. Intermaxillaries moderately wide.

*Orca*, Rondel.; Gray, Zool. E. & T. 33; Cat. Cetac. 92.

**ORCA GLADIATOR.** The Killer.

De *Balænis minoribus*, &c., Sibbald, Bal. 6, t. 2. f. 3, tooth.

*Orca*, Rondel. 483. fig.

*Delphinus orca*, Linn. S. N.; Mag. N. Hist. iv. 329. f. 2; Schlegel, De Dieren, 87, t. 14 (good); Turton, B. F. 17; Fleming, B. A. 34; Jenyns, Man. 42; Bell, B. Quad. 477. fig. (bad); Nilsson, Scand. Fauna, 603.

*Grampus*, Hunter, Phil. Trans. 1787, t. 16.

*Delphinus grampus*, Desm. Mam. 517, from Hunter; Owen, Cat. Osteol. Coll. Surg. n. 1136.

*Cachalot d'Anderson*, Duhamel.

*Delphinus duhamelii*, Lacép. Pisc. 314, t. 9. f. 1.

*Delphinus gladiator*, Lacép.

*Hab.* North Sea. Greenwich (*Hunter*); skull Mus. Coll. Surg. n. 2515. Coast of Essex; skull in British Museum. Weymouth (*R. Pearce*); skeleton in British Museum. Lynn Harbour, Nov. 1830; skull in Mr. Bell's Museum (see Loudon's Mag. N. Hist. iv. 329). A school of ten in the Parrett, near Bridgewater, 24 March, 1864 (*J. Clark*), varying from 11 to 22 feet long. Young specimen in



the Thames at Greenwich, 1793 (*Banks in Pennant*), length 31 feet ; skeleton in British Museum and Museum of the College of Surgeons. Ostend, adult male and female and two years' adult skeleton ; Mus. Louvain. Holland, 1841, 16 feet long ; skeleton, Mus. Leyden.

ORCA CRASSIDENS. Lincolnshire Killer.

*Phocæna crassidens*, Owen, Brit. Fossil Mam. 516, f. 213, 214, 216, skull and united cervical vertebræ.

*Orca crassidens*, Gray, Zool. E. & T. 33 ; Cat. Cetac. 94.

*Pseudorca crassidens*, Reinhardt, Danish Transactions, fig.

*Hab.* North Sea, in schools. Lincolnshire (*Owen*) ; cervical vertebræ anchylosed (*Owen*, f. 214).

9. GRAMPUS.

Teeth conical, early deciduous. Intermaxillaries broad.

*Grampus*, Gray, Spic. Zool. 2 ; Zool. E. & T. 30 ; Cat. Cetac. 82.

GRAMPUS CUVIERI. Cuvier's Grampus.

? *Grampus*, Hunter, Phil. Trans. 1787, t. 17.

? *Delphinus ventricosus*, Lacép. Cét. 311, t. 15. f. 3 (from Hunter).

*Delphinus griseus*, Cuv. R. A. i. 290 ; Ann. Mus. xix. t. 1. f. 1.

*Grampus griseus*, Gray, Spic. Zool. 2.

*Grampus cuvieri*, Gray, Ann. N. H. 1846 ; Zool. E. & T. 31 ; Cat. Cetac. 83.

*Delphinus globiceps*, var. ?, Nilsson, Scand. Fauna, 608.

*Hab.* North Sea. Isle of Wight (*Rev. C. Bury*), 1845 ; skull in British Museum.

The animal is black, and not grey ; hence the inappropriateness of the name of Cuvier.

†† *The lateral wings of the maxilla shelving down over the orbit.*

\* *Teeth permanent, compressed, sharp-edged.*

10. PHOCÆNA.

Teeth compressed. Dorsal triangular, central.

*Phocæna*, Rondel. Pisc. 474 ; Gray, Spic. Zool. 2 ; Zool. E. & T. 30 ; Cat. Cetac. 81.

PHOCÆNA COMMUNIS. Common Porpoise.

*Phocæna*, Rondel. Pisc. 473.

*Phocæna rondelæti*, Willughby, Pisc. 31. t. A 1. f. 2.

*Ph. communis*, Lesson ; Gray, Spic. Zool. 2 ; Zool. E. & T. 30 ; Cat. Cetac. 81 ; Bell, Brit. Quad. 473. fig., 476. fig.

*Delphinus phocæna*, Linn. S. N. ; Schlegel, Dieren, 89. t. 15 ; Turton, B. Fauna, 17 ; Fleming, B. A. 33 ; Phil. Zool. ii. 209, t. 1. f. 4 ; Jenyns, Man. 41 ; Nilsson, Scand. Fauna, 616.

*Porposs*, Borlase, Cornw. 264, t. 27. f. 2 ; *Monro*, Phys. Fishes, 45, t. 35.

*Hab.* North Sea. Near the shore in all seasons, and ascends rivers.

“A season seldom passes without their appearance at Greenwich and Deptford, and they occasionally pass much higher up” (C. Collingwood, 1858); Battersea, Gray, 1815.

“The Porpoise enters the Baltic by the Sound in large numbers in the spring, in pursuit of the Herrings, and leaves it by the Little Belt in December and January” (Eschricht).

Professor Rapp (Cetac. t. 5) figures the skeleton of *Delphinus phocaena*. “The scapula with a broad, dilated coracoid process. Fingers five, short; the first longest; the third scarcely shorter; the second shorter; the fourth and fifth very short; the fifth slender. Spinous processes of the dorsal and lumbar vertebræ with a distinct subcentral anterior process on each side. The lateral processes of the lumbar vertebræ short and broad” (Rapp, *l. c.*).

\*\* *Teeth early deciduous, conical; dorsal fin none.*

### 11. BELUGA.

Teeth in both jaws early deciduous.

*Beluga*, Gray, Spic. Zool. 2; Zool. E. & T. t. 29. f. 3; Cat. Cetac. 77.

M. Van Beneden observes that he has seen skulls varying from  $\frac{8-8}{8-8}$  to  $\frac{10-10}{10-10}$ , and all intermediate combinations;  $\frac{9}{8}$  seem the most frequent (Nouv. Mém. Acad. Brux. xxxii. 16).

BELUGA CATODON. Beluga or White Whale.

*Balæna minor in inferiore*, &c., Sibbald, Bal. 9; Ray, Syn. Pisc. 15.

*Physeter catodon*, Linn. S. N. (from Sibbald); Turton, B. Fauna, 16; Jenyns, Man. 45.

*Delphinus leucas*, Pallas, Mem. Wern. Soc. iii. 17, t., ♂; Bell, Brit. Quad. 491; Nilsson, Scand. Fauna, 614.

*Catodon sibbaldi*, Fleming, B. A. 39.

*Beluga leucas*, Gray, Spic. Zool. 2; Bell, B. Quad. 488. fig., 491. fig.

*Beluga catodon*, Gray, Zool. E. & T. 29.

*Delphinus albicans*, O. Fab. F. G. 50; Jenyns, Man. 43.

*Delphinapterus albicans*, Fleming, B. A. 36.

*Hab.* North Sea. Scotland (*Sibbald*).

Two males were cast ashore on the beach of the Pentland Frith, some miles east of Thurso, in August 1793 (*Colonel Murie*). A specimen was killed near Sterling in June 1815, and described by Dr. Barelay and Mr. Neil in ‘Wern. Mem.’ iii. 371. t. 27. It is gregarious, entering large rivers.

### 12. MONODON.

Teeth very early deciduous. Male with a projecting spiral tusk in the upper jaw.

*Monodon*, Artedi; Linn. S. N. i. 17; Gray, Zool. E. & T. 29; Cat. Cetac. 75.

*Monoceros*, Charlet; Gray, P. Z. S. 1863 (misprint).

*Ceratodon*, Brisson; Illiger.

*Diodon* or *Diodonta*, Storr.

*Oryx*, Oken.

MONODON MONOCEROS. The Narwhal.

*Monodon monoceros*, Linn. S. N.; Fleming, Mem. Wern. Soc. i. 146; Gray, Zool. E. & T. 29; Cat. Cetac. 75; Turton, B. Fauna, 15; Fleming, B. A. 37; Jenyns, Man. 43; Bell, B. Quad. 500. fig., 505. fig.; Nilsson, Scand. Fauna, 619.

*Sea Unicorn*, Sow. Brit. Misc. t. 9.

*Hab.* North Sea; skeleton in Museum of Hull Phil. Soc.

First recorded as found in Britain by Vulpus (Obs. Med. 376, t. 18) near the Island of May (insulam Mayam) in June 1648. One was observed on the 15th of February, 1800, near Boston, Lincolnshire (see Lacépède, Hist. Nat. Cét. 159, t. 5. f. 2, and Mem. Wern. Soc. i. 147; Fleming, B. A. 37). A young male was found, on the 27th of Sept. 1808, at the Sound of Weesdale, Zetland, and described by Fleming, Wern. Mem. i. 131, t. 6.

"The tooth is characteristic of the male. Instances, however, occur, though seldom, in which the female has a tooth; one is mentioned in Linn. Trans. xiii. 620" (Flem. B. A. 28).

## Suborder II. SIRENIA.

Body rather hairy. Muzzle bristly. Nostrils two, separate, apical, lunate, valvular. Fore limbs arm-like, clawed; hinder depressed, expanded, tail-like. Teats two, pectoral. Teeth of two kinds, cutting and grinders (see Gray, Cat. Cetac. B. M. 138).

### Fam. 1. MANATIDÆ.

*Manatidæ*, Gray, Cat. Cetac. 138.

#### 1. MANATUS.

Tail rounded. Grinders tubercular.

? *MANATUS AUSTRALIS*. Manatee.

*Manatus*, Rondel. Pisc. 490.

*Trichecus manatus*, Linn. S. N. i. 49.

*Manatus australis*, Tilesius, Jahrb. i. 23.

*M. americanus*, Desm. Mam. 517.

*M. borealis*, Flem. B. Anim. 29.

*Mermaid of the Shetland Seas*, Edinb. New Phil. Journ. vi. 57, 1829; Steward, Elem. Nat. Hist. i. 125.

*Hab.* Estuaries of Tropical America; Shetland (*Steward and Fleming*).

The animal mentioned by Steward and Fleming is most probably the American Manatee, which may, under extraordinary circum-

stances, be brought by the Gulf-stream to the coast of Shetland. I have seen no specimens; but the size precludes it being the *Rhytina*, to which Fleming refers it.

“The carcase of one of these animals was, in 1785, thrown ashore near Leith: it was much disfigured; and the fishermen extracted its liver and other parts, from which a considerable quantity of oil was obtained” (Stewart, Elem. N. H. i. 125).

“Zetland Mermaid. Animal 3 feet long; upper part resembling a Monkey with short arms, and distinct, not webbed, fingers; lower part like a fish; skin smooth, grey, without hairs or scales; breast pectoral!!”—Laurence Edmondstone in Edinb. Magaz. Sept. 1823, p. 343, copied in Fleming, Brit. Anim. 30.

2. CHARACTERS OF A NEW SPECIES OF FALCON, DISCOVERED BY THE LATE DR. DICKINSON, OF THE CENTRAL AFRICAN MISSION, ON THE RIVER SHIRÉ. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

The collections of the late Dr. Dickinson, who was Surgeon to the Central African Mission until his death at Chibisa's, on the River Shiré, on the 17th March 1863, have been kindly submitted to my inspection by his brother, Mr. R. Dickinson, of Jarrow-on-Tyne.

Amongst them are three examples of a Falcon allied to *Falco ardesiacus*, Vieill., which appears to be new to science, and which I propose to name after its discoverer.

*FALCO DICKINSONI*, sp. nov.

♂. *Cineraceo-niger; capite undique pallide cinereo, hujus plumis medialiter nigro striolatis: uropygio albicante, cinereo tincto: cauda albicanti-cinerea nigro frequenter transvittata, fascia subterminali lata nigra, rectricum apicibus ipsis cinereo-albicantibus; ventre nigricante, brunneo tincto; tibiis et crisso cinerascentibus: alarum pogoniis internis albis, nigro frequenter transvittatis: rostro nigro, cera et pedibus flavis: remigibus 2<sup>ndo</sup> et 3<sup>tio</sup> æqual. et longissimis, cauda rotundata.*

Long. tota 13·5, alæ 8·2, caudæ 5·2, tarsi 1·4 poll. Angl.

♀. *Mari similis, sed major, et abdomine brunnescentiore.*

Long. tota 14·5, alæ 9·1, caudæ 6·0, tarsi 1·5.

*Hab.* In ripis fl. Shiré in Africa orientali.

*Obs.* The general form of this bird is completely that of *Falco ardesiacus* (Vieill.) of Western Africa. Together with that bird and *Falco zoniventris*, Peters, of Madagascar, it evidently forms a distinct section among the Hobbies (*Hypotriorchis*), for which I suggest the subgeneric name *Dissodectes*\*, indicating thereby the peculiarity of their doubly-toothed mandible—a feature in which they resemble the *Harpagi* of South America.

\* δισσοῦς, duplex, et δῆκτης, mordicator

### 3. NOTE ON THE SPECIES OF CUCKOOS OF THE GENUS NEOMORPHUS. BY P. L. SCLATER, M.A., PH.D., F.R.S., ETC.

In a series of bird-skins from Demerara, which Mr. J. R. Armytage has kindly allowed me to examine, is an example of a species of Cuckoo, of the genus *Neomorphus* of Gloger\* (subsequently termed *Cultrides*† by Pucheran), which has much interested me. It is the only specimen I have yet seen, besides the type in the British Museum, of the bird described and figured in these 'Proceedings,' by Mr. George Gray, as *Cultrides rufipennis*‡. Mr. Gray supposed the locality of his specimen to be "Mexico;" but Mr. Armytage's specimen having been obtained by his late brother, Mr. James Armytage, on the Lower Demerara River, in British Guiana, leaves no doubt of the latter *patria* being correct§. Moreover the same species was met with upon the Ucayali by MM. Castelnau and Deville during their voyage, and is described by the latter in the 'Revue Zoologique' under the name *Cultrides pucherani*||. At least I have very little doubt that the species is the same, although I can say but little in praise of the figures of *Cultrides pucherani* given in the Zoology of Castelnau's Voyage¶. I may observe, however, that M. O. Des Murs's supposition there expressed, that this species is the young of *Neomorphus geoffroyii*, appears to have very little foundation. On the contrary, the two species are very readily distinguishable by marked characters, as will be seen by the following diagnoses:—

#### 1. NEOMORPHUS GEOFFROYII.

*Supra læte virescens, cupreo nitens; occipite cristato chalybeo, cyaneo micante; sincipite, genis, collo, gutture et pectore fusco-brunneis, pallide cineraceo-brunnescente squamulatis; subtus vitta infrapectoralis angusta nigra; epigastrio ventreque superiore pallescentibus; hypochondriis, tibiis, ventre inferiore crissoque rufo-ferruginescentibus; rectricum splendide virescentium illis quæ summæ ceteras plerumque obtegunt pulchre violascenti-cupreo nitentibus; rostro flavido, basi pallide cærulescente; pedibus plumbeo-corneis\*\*.*

*Hab.* In Brasil. merid.-or. in vic. urbis Bahia et in ripis fl. Belmonte.

#### 2. NEOMORPHUS RUFIPENNIS.

*Supra læte virescens, occipite cristato et dorso summo purpurascens; alis extus læte rufis; tectricibus minoribus dorso concoloribus; subtus ochraceo-cinereis; torque collari lato bipollicari purpurascens-nigro; gulæ plumis cinereis, illo colore*

\* Froriep's Not. 1827, p. 278.

† Rev. Zool. 1845, p. 51.

‡ P. Z. S. 1849, p. 63, pl. 10.

§ I have never seen any Cuckoo of this form in the many collections of Mexican birds that have passed through my hands.

|| Rev. Zool. 1851, p. 211.

¶ 'Expédition de Castelnau,' Zoologie, Ois. p. 18, pls. 6, 7.

\*\* Cab. et Hein. Mus. Hein. iv. p. 92.

*marginatis* : rostro nigro, apice utriusque mandibulæ distincte pallide cornea ; pedibus corneis.

Long. tota 19·5, alæ 6·5, caudæ 10·8, tarsi 3·8.

*Hab.* In Guiana et Amazonia sup.

*Obs.* Sp. a præc. alis rufis, torque lato, et rostro bicolore primo visu distinguenda !

#### 4. ON UROCYCLUS, A NEW GENUS OF TERRESTRIAL GASTROPODOUS MOLLUSCA FROM AFRICA. BY DR. J. E. GRAY, F.R.S., ETC.

Dr. John Kirk has kindly sent to the British Museum, with some other Mollusca in spirits, a specimen of a Slug from the Zambesi.

Naked Terrestrial Mollusca seem rare in that country, for Dr. Kirk says it is the only species of Slug that he observed during his journey : he thinks that the country is probably too dry for them. It was found on some floating weed near the mouth of the River Zambesi. It was not uncommon. This Slug forms a new genus, which may be thus named and described :—

##### UROCYCLUS.

Body elongate, attached its whole length to the upper surface of the foot. Mantle shield-like, uniformly granular ; a small and round deep pit in the middle of the hinder margin. Shell — ? Subcaudal gland very large, deep, circular, surrounded by a broad transversely grooved edge. The respiratory aperture on the middle of the right side of the mantle ; orifice of generation at the base of the right tentacles. Tentacles four, retractile ; lower small.

This genus is exactly like a *Limax* or an *Arion* in external form ; but is immediately to be distinguished from either of them by the large size of the deep glandular pit, which is situated on the upper surface of the tip of the tail, and is surrounded by a broad, smooth, raised edge, marked with numerous transverse grooves.

The genus *Milax* is said to have two small pores near the hinder edge of the mantle, which may be analogous to the single pores in the mantle of this genus. The genus *Milax* is certainly destitute of any subcaudal gland or pore, and is referred to the family *Limacidae* ; while the genus here described is peculiar for the large size and general development of the subcaudal pore.

In the pores on the hinder edge of the mantle it may be allied to the *Limax noctilucus* of D'Orbigny and the *Phosphorax noctilucus* of Webb and Berthelot, of Teneriffe ; but this animal is so very imperfectly described and badly figured that it is not easy to understand it. Férussac, in the 'Bulletin d. Sci. Nat.' 1821, x. 300, in which it is first noticed under the name of *Limax noctilucus*, only observes, "it is furnished with a similar aperture in the mantle as that in *Arion extraneus*, from which escapes a phosphorescent matter." Now *Arion extraneus* is evidently a *Drusia* ; and the hole in the mantle is the space left between the reflexed edges of that organ,

exhibiting part of the shell. The figure given by D'Orbigny, in Fé-russac's 'Mollusca,' 76, t. 2. f. 8, exhibits the body contracted, and the hinder part produced into a marginal disk, which is said to be lucid green and phosphorescent in the dark. The tail is described as rounded, and no mention is made of any subcaudal gland of any kind; so that it can scarcely be the genus here described; for the large, deep subcaudal circular pit, with its large, thick, prominent rim, could not have been overlooked on the most casual examination.

I have not considered it right to cut into the single specimen which we possess of this interesting genus, either to examine the existence or form of the shell, or to describe the form, structure, and disposition of the teeth—all most important particulars, which I hope the receipt of other specimens will enable me before long to supply.

The pore near the hinder margin of the shield is deep and lined with membrane, which is swollen up and bladder-like at the base in the specimen in spirits, not showing any indication of a shell; and therefore it cannot be (as has been suggested by one zoologist, to whom I had showed the specimen) compared to the open space which is left on the upper surface of the shell by the edge of the mantle being only partially reflected over its outer surface as in the genera *Drusia*, *Girasia*, *Mærialla*, and *Parmacellus* in the Arionidæ, and *Peltella* in the Limacidæ. It is probably more properly to be compared with the luminous gland which is said to be found, but so imperfectly and differently described as existing in the genus *Phosphorax*.

The mantle is rather produced and free in front and on the front part of the sides, but does not appear to be so free as in the European species of the genus *Limax*.

#### UROCYCLUS KIRKII.



Pale brown, with minute square black spots on the sides, with a black streak on each side of the back; middle of the back with two darker brown streaks. The sides of the body with diverging sunken lines. The margin of the foot with a series of small black specks.

*Hab.* Central Africa.

#### 5. DESCRIPTIONS OF NEW SPECIES OF MOLLUSKS, OF THE GENERA REGISTOMA AND PUPINA. BY OTTO SEMPER.

##### REGISTOMA AMBIGUUM, O. Semper.

*T. imperforata, ovato-elongata, glabra, nitida, subpellucida, flavido-grisea, aperturam versus aurantiaca; spira subacuminata, mamillata; anfract. 5½, convexiusculi, superiores regulariter crescentes, mediani inflatuli, ultimus spira brevior, descendens; sutura impressa, filomarginata, callosa; columella parva, in adultis angulum obtusum cum peristomate formans, in ado-*

*lescentibus incisura obliqua a peristomate disjuncta; apertura subascendens, subcircularis, verticalis, basi non protracta; peristoma incrassatum, aurantiacum.*

*Operculum tenue, corneum, arctispirum, suturis leviter elevatis, intus medio papillatum.*

Long. 8 mm., diam. 4.25 mm., apert. intus 2.50 mm. longa.

*Hab.* Ad Cabayah et Paucian in parte septentrionali insulæ Luzon; detexit Dr. Carolus Semper.

This interesting species is not nearly allied to any of the known Philippine *Registoma* species; but in form it somewhat approaches *R. simile*, Sow. Its most striking peculiarity is the obliteration of the basal fissure in adult specimens, so characteristic of the genus *Registoma*, in this way forming a decided link between the two genera *Callia* and *Registoma*. The operculum also is extremely similar to that of *Callia lubrica* in size as well as in construction.

#### PUPINA DIFFICILIS, O. Semper.

*T. pupæformis, ovato-cylindrica, nitidissima, glabra, corneo-rubella; spira obtusula; sutura lævis, callosa, submarginata; anfr. 5, planati, ultimus spiram subæquans, valde descendens, ad aperturam brevissime ascendens; apertura circularis, subverticalis, basi protracta; lamella parietalis minuta, acuta, intrans, callo subcircumscripto, anfractu ultimo affixo ad basin columellæ decurrens, cum peristomio canalem angustum formans; columella subverticaliter dissecta; peristoma albescens, incrassatum, margine dextro intus superne subtuberculato.*

*Operculum tenue, corneum, arctispirum, suturis subelevatis.*

Long. 7 mm., diam. 3.50 mm., apertura intus 1.50 mm. longa.

Var.  $\beta$ . Minor, long. 5.50 mm.

*Hab.* In "Palaos" insulis ad "Pelelin, Aibukut;" detexit Dr. Carolus Semper. Varietas formæ typicæ ad Aibukut lecta multo sæpius, differt statura, peristomio minus incrassato, apertura basi minime protracta.

This small, lively-coloured species appears to stand near *P. bicanaliculata* and *P. keraudreni*; but I think it is different from either.

#### 6. ON A LESSER FIN-WHALE (BALÆNOPTERA ROSTRATA, FABR.) RECENTLY STRANDED ON THE NORFOLK COAST. BY W. H. FLOWER, F.R.S. ETC., CONSERVATOR OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

We have at present so little definite information upon the specific characters and geographical distribution of the Cetacea, that it is desirable that no opportunity should be lost of putting on record any facts which may contribute to the better knowledge of the natural history of even the most common species of this interesting group of the Mammalia. No further apology will therefore be necessary for placing before the Society some observations upon a specimen which has recently been added to the Museum of the Royal College of Surgeons through the kindness of Mr. J. H. Gurney, M.P.



In the month of November 1860 that gentleman received information from his gamekeeper at Northrepps that a Whalebone Whale, about 25 feet long, had been washed ashore in the adjoining parish of Overstrand, about a mile and a half S.E. of Cromer. It had evidently been dead some time, as decomposition was considerably advanced. Mr. Gurney ordered the baleen to be removed from the mouth and preserved, and the carcase to be carefully buried in an accessible place, with the intention of disinterring the bones at some future time. Mr. Gurney having presented the skeleton to the College of Surgeons, I succeeded in March last in digging it up, and removing it to London. The operation was conducted with great care; none of the bones were lost or injured; and such observations were made upon their relations to each other, while still undisturbed, as might be useful in articulating the skeleton. For instance, the different parts of the vertebral column were measured as they lay *in situ*, so as to preserve the exact thickness of the intervertebral substance in the various regions. Unfortunately, in removing some of the flesh before the carcase was buried, those most interesting bones which form the rudimentary pelvis, so rarely to be found attached even to our best-preserved museum specimens of Cetacea, had been thrown away. Some of the phalanges of both fins were also wanting; but otherwise the skeleton is perfect.

One of the greatest problems to be solved by future cetologists relates to the specific distinctions of the Fin-Whales (*Balænoptera*, Lacépède, *Physalus* and *Balænoptera*, Gray). The confusion in which the history and nomenclature of these, the largest of known animals, are involved appears inextricable. Chiefly by the invaluable labours of Eschricht, one species, however, has been definitely separated from all the larger members of the group by numerous well-marked anatomical as well as external characters. This is the Zwergwall of the Germans, the Vaagequal of the Norwegians, *Balæna rostrata* of Fabricius and J. Hunter, and *Pterobalæna minor* of Eschricht\*. Dr. J. E. Gray† goes further, and separates the species generically from the other Fin-Whales, limiting to it Lacépède's designation of *Balænoptera*, and assigning that of *Physalus* to its gigantic allies. That the specimen under consideration belongs to the genus, subgenus, or section *Balænoptera* thus limited there can be no doubt; but whether this section contains but a single species, and the osteological differences which I shall have to point out between the Cromer specimen and those previously described are merely individual characters, though highly probable, may still be held as an open question—one which can only be determined by the examination and comparison of a larger number of skeletons than are at present available for the purpose‡.

\* Opera, *passim*. See especially 'Untersuchungen über die nordischen Wallthiere,' Leipzig, 1849.

† Proc. Zool. Soc. 1847; Cat. Cetacea, Brit. Mus.

‡ Dr. Gray's comprehensive and valuable paper on the British Whales (see *ante*, p. 195), containing his most recent views on the subject referred to above, being read to the Society on the same evening as the present communication was of course unknown to the author when this was written.

The animal was a male. Its stomach contained the remains of numerous fish of considerable size; my informant thinks, cod-fish. Of its external appearance or visceral anatomy I could learn nothing satisfactory. It must have been nearly adult, as the epiphyses of the humerus and proximal end of the radius and ulna were firmly united. Those of the bodies of the vertebræ were still mostly separable. This accords well with the current statement that 30 feet is the maximum length any of the species has been known to attain.

The total length of the skeleton as it lay *in situ* was 24' 4", of which the head occupied 5' 5", the seven cervical vertebræ with their intervertebral spaces 1', the eleven dorsal 3' 11", the twelve lumbar 6' 6", and the twenty caudal (commencing with the first vertebra which bears a chevron bone) 7' 6".

In the entire number of the vertebræ, as well as in their distribution into different regions, the skeleton agrees with those described by Eschricht, with the exception that there are two additional vertebræ in the tail, making the whole number fifty instead of forty-eight. Eschricht remarks that the terminal caudal vertebræ are rarely preserved in the skeletons of whales in museums; and he gives a careful description and figure of these bones, from a young specimen at Christiania which he thought was complete. Allowing for difference of age, the vertebræ described, the forty-seventh and forty-eighth from the head (regarded by Eschricht as penultimate and terminal), correspond in characters with the forty-seventh and forty-eighth of the present skeleton. I am therefore disposed to consider that the vertebral elements corresponding to the rudimentary and ankylosed forty-ninth and fiftieth vertebræ of the latter were either not ossified or had been lost in the Christiania specimen, and that fifty must be regarded as the normal number of vertebræ in the species.

The last three vertebræ in the present skeleton are broad and depressed. The forty-eighth measures at its anterior end, from above downwards, 1"·1, from side to side 1"·6. Its length is 1"·2. It diminishes greatly posteriorly, especially in width. The epiphyses are distinctly marked, though firmly united to the body of the bone. The hinder surface has a bony union, occupying about one-fourth of its area, on the upper and left-hand corner, with the contiguous surface of the succeeding bone. This is 1"·1 in length, 0"·8 in height, and 1"·3 in width at its anterior part. It is of unsymmetrical form, the length of the left lateral margin being nearly double that of the right. This causes an obliquity of the posterior surface, and the consequent tilting to the right side of the last vertebra—a mere rounded tubercle about the size of a pea, firmly ankylosed to the penultimate.

The cervical vertebræ of the Whales are generally considered to furnish important characters, both for their generic and specific distinction, and therefore deserve close attention. Dr. Gray gives, among the generic characters of *Balænoptera*, "The second and third cervical vertebræ united by the spinous process." Under the heading of specific characters a more detailed description is given,

differing in some particulars from what is seen in the present specimen. Eschricht mentions the union of the second and third vertebræ as an exceptional occurrence, being seen in two only out of many specimens examined; and the union of the upper and lower transverse processes into a ring (not found in the specimen described by Dr. Gray) he observed in three young specimens from Greenland, but never in any, even quite adult, examples from the European coasts. In the Hunterian skeleton of an immature female, taken on the Dogger bank, and now in the Museum of the Royal College of Surgeons, all the transverse processes are separate, even those of the axis are not quite united at their extremities, and all the vertebræ are free. The present skeleton differs from any other previously described, in having the *third* and *fourth* cervical vertebræ firmly united together by the contiguous edges of their neural arches, all the others being separate.

The general direction of the largely developed transverse processes in the cervical region present in a marked degree the peculiarities seen in the other Fin-Whales. While that of the atlas stands out and turns slightly forwards, those of the remaining cervical and first dorsal converge and almost meet together at a point on a level with the body of the fifth vertebra, the anterior ones being directed backwards, and the posterior forwards. The processes of the second cervical and first dorsal considerably exceed all the intermediate ones in length and strength.

The atlas is a strong, massive bone, measuring  $12\frac{1}{2}''$  between the extremities of the transverse processes,  $7\frac{1}{2}''$  from the inferior edge of the body to the tip of the spine, and  $2\frac{1}{4}''$  in the thickness of the lower edge of its body. The two concave, oval, articular surfaces for the condyles are almost continuous below, though separated by a wide interval above. The neural canal forms an irregular triangle with the base turned upwards. The posterior surface presents two somewhat kidney-shaped irregularly convex surfaces for articulation with the axis. The laminae are broad and tolerably strong, with sharp edges, and terminated above by a short, compressed, and rounded spine, directed backwards. At its junction with the body, immediately behind the condylar articular surfaces, the arch is perforated on each side near its anterior edge by a circular foramen  $0''\cdot3$  in diameter, running from without inwards and upwards. The transverse processes, arising from the sides of the body, are broad and stout, of moderate length, truncated at their extremities, directed slightly forwards, and obliquely flattened, so that one surface looks upwards and backwards and the other downwards and forwards.

The body of the axis is about  $1\frac{1}{2}''$  in thickness, elongated from side to side, with two concave kidney-shaped articular surfaces in front, between which is a roughened surface, the posterior and broader half of which rises into a low tuberosity, the only representative of an odontoid process. On the summit of this tuberosity is a small deep oval fossa  $0''\cdot3$  long. The hinder surface of the body presents a single concave transversely elongated articular surface for the succeeding vertebra. The neural arch is strong, and roughened by

bony ridges and tubercles on its outer surface; it presents on each side near its junction with the body an articular surface, which overlaps that on the arch of the succeeding vertebra, and it terminates posteriorly in a short compressed ridge, the posterior angle of which is prolonged into a rounded spine. The chief peculiarity of this vertebra, however, is the enormous development of the transverse processes, which stand out like great wings, inclined backwards and slightly downwards, and are perforated at their base by a large oval foramen, half the length of the process. The neural canal is of transitional form, somewhat circular in front, and assuming behind the characteristic triangular shape with the base below, seen in the remaining vertebræ of the neck. The breadth of the body of the axis is 6", from tip to tip of transverse processes 17", from inferior edge of body to end of neural spine  $7\frac{3}{4}$ ".

The third and fourth vertebræ, though quite free and standing 0".2 inch apart at their bodies, are firmly united by the coalescence of the whole of the laminæ of their neural arches, which terminate above in a continuous very thin low ridge in place of a spine. The bodies of the vertebræ closely resemble each other; they are  $5\frac{1}{2}$ " broad,  $3\frac{3}{4}$ " deep, and 1".2 in thickness. They bear on each side a superior and an inferior transverse process, both directed downwards and slightly converging, but not meeting at their extremities. The superior process (diapophysis, *Owen*) springs from the pedicle of the neural arch; it is somewhat longer and much more slender than the inferior (parapophysis, *Owen*), which arises directly from the centrum. Both are much compressed from before backwards. The fifth vertebra has a body of the same thickness as the last, a spinous process slightly longer, and transverse processes similar, but longer and approaching more nearly to each other at the ends. In the sixth vertebra there is a slight increase in the thickness of the body; the spine is still longer; the inferior transverse processes are more strongly developed, especially the tuberosity near the base, which is prolonged into a blunt spine directed backwards. On the right side the ends of the upper and lower processes unite so as to form a complete ring; on the left side they approach within half an inch of each other. This want of symmetry in the two sides is a caution against laying too great stress upon minor characters derived from these processes. In the seventh vertebra the body presents a similar increase of thickness: the spinous process is still a little longer; there is no trace of inferior process; but the superior is long and strong. The first dorsal resembles the last in its general characters; but the single transverse process is much more strongly developed, and bears at its extremity a roughened surface, to which the first rib is connected.

There are eleven pairs of ribs. All articulate, by the part corresponding to the tuberosity in other mammals, directly with the ends of the transverse processes of the dorsal vertebræ; and, beyond a minute tubercle on the first and second, none have any trace of a capitular process. They differ in this respect from those of the Large Fin-Whale (*Physalus antiquorum*, Gray), of which the anterior ribs have considerably developed heads, extending towards, though gene-

rally not articulating with, the bodies of the vertebræ. The first rib is the shortest, and widens at the sternal end, where it terminates obliquely, the outer edge being produced downwards, and the inner edge forming a projection inwards. All the others are narrow at their inferior termination. The vertebral end of the first is very flat, and the angle not very distinct. The second differs from all the others in having a prominent, broad, flattened, slightly curved-backwards, and rough-edged process at the angle, which is situated close to the articular end. This process gradually subsides and recedes from the extremity of the base in the succeeding ribs. The length of the arc of the first rib is  $25\frac{1}{2}$ " , of the second  $34\frac{1}{2}$ " , of the third  $39\frac{1}{2}$ " , of the fourth and fifth  $40$ " ; after this they slowly and gradually diminish to the eleventh, which is  $35$ " long.

The chevron bones are nine in number. The first is attached to the hinder part of the thirty-first vertebra ; this is very small, and pointed posteriorly. The second is much larger and of very different shape, having a long narrow spine ; the third is the largest, being as long as the last, and much broader ; the succeeding ones rapidly diminish in size.

The characters of the skull agree with those of the specimens figured in the ' Voyage of the Erebus and Terror ' and in Eschricht's work. Its principal dimensions are as follows :—

Entire length of cranium, from tip of premaxillaries to occipital condyles. . . . .	65
Length from tip of premaxillaries to anterior end of maxillaries	3
Length from tip of premaxillaries to anterior end of vomer . .	$11\frac{1}{2}$
Length from tip of premaxillaries to anterior end of nasals. . .	41
Length of maxillary bone . . . . .	$46\frac{1}{2}$
Greatest breadth of cranium (at squamosals behind the orbit). .	35
Breadth at antorbital processes of maxillary . . . . .	31
Breadth of rostrum, 36 inches from tip . . . . .	20
Length of ramus of lower jaw (in straight line) . . . . .	62

A superficial portion of the inner side of the left ramus, near the coronoid process, has suffered necrosis, and the adjoining bone bears evidence of recent and extensive inflammatory action.

The sternum has the cross-like form characteristic of the species, the posterior being more than double the length of the anterior limb ; its greatest length is  $14\frac{1}{2}$ " , its breadth  $10$ " . The scapula is  $26\frac{1}{2}$ " in breadth, and  $15$ " in length. The humerus  $10\frac{1}{2}$ " , and the radius  $16$ " long. Although the upper ends of the radius and ulna show no trace of epiphysis, and present a smooth surface for articulation with the humerus, the rough condition of the distal extremities indicate that they terminated in cartilage ; and close to them were lying two small, transversely elongated, detached bones or epiphyses, though not large enough to cover more than half of the surfaces in contact with which they were placed. The ossifications in the carpus were five in number, three in the first and two in the second row. The metacarpals were four ; the phalanges too imperfect to afford any definite information.

The baleen of the right side of the mouth has been preserved in a nearly complete state. Of the larger or external row of plates 285 are present; but, as some are wanting at the posterior extremity of the series, their whole number may be estimated at about 300. The largest of these plates measure  $8\frac{1}{2}$ " in length, and 2" in breadth at the base. Their colour is a yellowish white; when fresh, they are said to have had a pinkish tinge. Some scattered longitudinal fine black streaks, collected chiefly at two points, one a short distance from the base and the other about 3 inches higher, give rise to two darker transverse bands, visible on each individual plate, and more distinctly along the whole series. The general light colour of the whole of the baleen appears to be a distinctive character of this species; in all the larger Fin-Whales it is wholly or partially black or brown.

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June 14, 1864.

George Busk, Esq., F.R.S., Vice-President, in the Chair.

Professor R. Owen read a Memoir on the skeleton of the Great Awk (*Alca impennis*). Prof. Owen's observations were principally founded on a specimen of the body of this bird disinterred from some guano-deposits on Funk or Penguin Island, on the coast of Newfoundland, as related by Mr. Newton at a previous meeting of this Society\*.

This communication will be printed entire in the Society's 'Transactions,' with appropriate illustrations.

The following papers were read :—

1. ON A NEW SPECIES OF PUCRASIA FROM CHINA. BY GEORGE ROBERT GRAY, F.L.S., ETC.

(Plate XX.)

The British Museum has just received, through the kindness of the Hon. Sir Fred. W. A. Bruce, K.C.B., two specimens, male and female, of a species of *Pucrasia*. This bird, though noticed by Dr. Lamprey in the 'Proceedings of the Zoological Society' for 1862, p. 221, as "another kind of Pheasant found in the Tien Tsin market," which bears out the description of the *Euplocamus pucrasia* of the Naturalist's Library," was not inserted by Mr. Swinhoe in his "Catalogue of the Birds of China," published in the 'Proceedings of the Zoological Society' for 1863. It is thought, therefore, that the description of the present examples may be acceptable to the Society,

\* See P. Z. S. 1863, p. 435.



J. Wolf del. et lith.

PTORACIA MALLI HOSPES

M. J. C. G. G. G. G. G.





as adding an interesting species to the catalogue of Chinese birds previously printed in their publications.

*PUCRASIA XANTHOSPILA*, sp. nov. (Pl. XX.)

Forehead, cheeks, throat, and the lower or lengthened part of the crest black, glossed with green; this latter is less prominent on the throat; top of head and upper or shorter part of the crest of an obscure sandy buff, which is brighter at the ends of the longer feathers; sides of the neck with a pure-white space, that is surrounded on three sides by the glossy green-black colour; behind the white space there is another space of pale sandy buff, with white down the shaft of each feather; the former colour extends round the neck so as to meet the similar space on the other side; some of the feathers have a black line along their margins; the nape, sides of the breast, back, and wings black, with a grey space down the middle of each feather, in which there is a very narrow black line down on each side of the shaft, while the outer margin of each feather is broadly bordered with grey; the feathers under the body are similarly marked, but the grey becomes more of a white colour; the castaneous colour along the middle of the breast and abdomen is not of so rich a colour as in the known species; wing-coverts black, with white down the shafts and with brownish-grey edges; primaries brownish black on their inner webs, and buff on their outer ones and at the tip of both webs; tertiaries black, with the shafts and outer margins greyish white, the black in some feathers varied with rufous; central tail-feathers grey along the black shafts, then a line of black, which is bordered outwardly by a broad greyish-castaneous colour, and this is margined very narrowly with black and then with grey; outer tail-feathers broad, of a grey colour, banded obliquely near the middle and tip with black; the first band is sometimes interrupted, while the second one is entire and broad, and each feather ends with a pure white tip; under tail-coverts black, with a prominent tip of pure white; and the vent-feathers are similar, but have a castaneous spot on each side.

The general tint of the female is of a pale brown, blotched and freckled with black, the blotches being more prominent on the back of the neck, upper part of back, and wings; lower part of back and rump pale greyish brown, varied with grey and freckled with black, and with some small blotches of black on the tail-coverts; central tail-feathers greyish brown, with interrupted bands of brownish white and black; outer tail-feathers grey, banded with black, which is varied slightly with castaneous, and each feather is tipped with pure white; throat buffy white, irregularly spotted beneath the lower mandible with black: the feathers on the sides of the buffy white margined with black spots; breast pale rufous brown, with the tip of each feather white, and the base and outer side black, not distinctly seen unless the feathers are moved; feathers on the thighs black, down the shafts and at the tips white, some of them are varied with pale rufous; under tail-coverts black, marked on their sides with castaneous, and prominently tipped with pure white.

Mr. Gould has figured three species of the genus *Pucrasia* in the sixth number of the 'Birds of Asia.' From these species, however, the present bird is easily distinguished by the sandy-buff space on the sides of the neck, by the distinct markings and colours of the feathers of the upper parts of the body, and, especially, of those of the tail.

The same box contained two examples, male and female, of the *Crossoptilon mantchuricum*. The sexes are exactly alike in size and colour, and therefore entirely dispell the probability of the first example, which was that of a female, being that sex of the *Crossoptilon auritum*. It may therefore now be considered that the genus *Crossoptilon* is constituted of three species, viz.—

*Crossoptilon auritum* (Pall.).

—— *mantchuricum*, Swinhoe.

—— *tibetanum*, Hodgs.

The last two species are contained in the collection of the British Museum, the last one being, we believe, the only specimen at present in Europe.

2. SUR QUELQUES ESPÈCES INÉDITES DE SQUALIDÆ DE LA TRIBU ACANTHIANA, GRAY, QUI FRÉQUENTENT LES CÔTES DU PORTUGAL. PAR J. V. BARBOZA DU BOCAGE, DIRECTEUR DU MUSÉUM D'HISTOIRE NATURELLE DE LISBONNE, MEMBRE ÉTRANGER DE LA SOC. ZOOL. DE LONDRES, ETC.; ET F. DE BRITO CAPELLO, AIDE-NATURALISTE AU DIT MUSÉUM.

Les recherches que nous avons entrepris depuis quelque temps sur la faune ichthyologique du Portugal nous ont amenés à reconnaître l'existence de plusieurs espèces dont il nous a été impossible de trouver aucune indication antérieure. C'est de quelques unes de ces espèces que nous allons donner une esquisse rapide afin d'appeler sur elles l'attention des ichthyologistes.

Pour le moment c'est d'une petite division de la famille des *Squalidæ*, nommée par Mr. Gray *Acanthiana*, que nous allons nous occuper. Nous avons à y inscrire cinq espèces nouvelles.

Trois de ces espèces appartiennent au genre *Centrophorus*, Müll. & Henl.; ce qui porte à cinq le nombre des espèces du Portugal comprises dans ce genre; à savoir:—

1. CENTROPHORUS SQUAMOSUS, Müll. & Henl.

Connus de nos pêcheurs sous le nom de "Arreganhada." Commun.

2. CENTROPHORUS GRANULOSUS, Müll. & Henl.

Appelé vulgairement "Barroso." Également commun.

3. CENTROPHORUS LUSITANICUS, nob. (Fig. 1.)

*C. granuloso valde affinis, sed diversus: violaceo-nigricans, rostro brevior, pinnis pectoralibus ad apicem rostri propioribus, pinna dorsali anteriore latiore atque magis retrorsum producta, spinis pinnarum dorsalium brevioribus ac gracilioribus.*

Fig. 1.

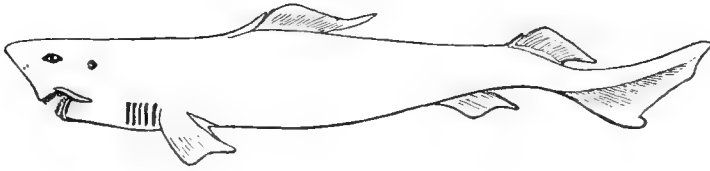


Fig. 2.

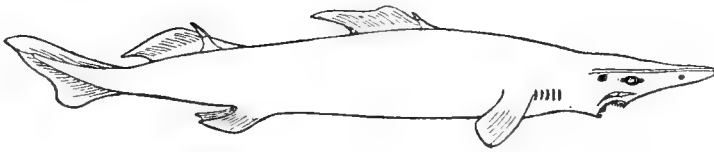


Fig. 3.



Fig. 4.



Fig. 5.



Nous avons d'abord pris cette espèce pour le *C. granulatus*; mais ayant pu les comparer à l'état frais, nous leur avons trouvés des différences qui nous semblent assez tranchées pour qu'on doive les séparer. Ils se distinguent par leur coloration, qui chez le *C. granulatus* est d'un grisâtre pur sur le dos, légèrement carminé sur les flancs, et d'un noirâtre violacé chez le *C. lusitanicus*, et encore par d'autres caractères dont nous avons résumé les principaux dans notre caractéristique. Ainsi le *C. lusitanicus* a, par rapport au *C. granulatus*, le museau plus court, les nageoires pectorales plus concaves à leur bord postérieur et placées à moindre distance de l'extrémité du *rostrum*, la dorsale antérieure plus large à la base et se prolongeant davantage en arrière par sa pointe, les épines des nageoires dorsales plus courtes et plus faibles, &c.

La taille du *C. lusitanicus* semble être plus forte que celle du *C. granulatus*.

Nos pêcheurs distinguent parfaitement ces deux espèces, et ils ont un nom particulier pour chacune: ils appellent le *C. granulatus* "Barroso," et le *C. lusitanicus* "Lixa-de-lei."

#### 4. CENTROPHORUS CREPIDALBUS, nob. (Fig. 2.)

*C. cinerascens, corpore subtriangulati, fusiformi; rostro valde producto, depressissimo, spatulato; capite postice brevi; pinnis dorsalibus magnis, latis, fortiter lobatis, spinis longis validissimis instructis; squamis magnis, rudibus, erectis.*

Par les caractères que nous venons d'indiquer, cette espèce nous semble établie de manière à éviter toute confusion. Elle n'est pas rare dans nos mers, et nos pêcheurs la connaissent très-bien sous le nom de "Sapata-branca," que nous avons tâché de rendre par les mots latins *crepidalbus* (*crepida, alba*).

An *Acanthidium calceus*, Lowe?

#### 5. CENTROPHORUS CREPIDATER, nob. (Fig. 3.)

*C. rufo-fuscus; corpore rotundato; capite brevi, rostro elongatulo, depresso; pinnis dorsalibus brevibus, truncatis, spinis mediocribus munitis; squamis horizontalibus, juxtapositis, fere imbricatis.*

C'est encore un nouveau type spécifique qui nous paraît très-distinct de ses congénères. Son nom vulgaire est "Sapata-preta," que nous avons littéralement traduit par *crepidater* (*crepida, ater*).

A toutes ces espèces conviennent essentiellement les caractères sur lesquels on a établi le genre *Centrophorus*; à savoir: tête peu distincte du corps; museau plus ou moins déprimé; narines situées des deux côtés du museau en dessous, à moitié de la distance entre le bout du museau et l'œil; pli de l'angle de la bouche à découvert, assez marqué et profond, présentant deux cartilages; événements situés derrière les yeux et munis d'une valve interne; dents de la mâchoire d'en haut en nombre impair, à portion libre triangulaire tranchante sur les bords, dent médiane symétrique et équilatérale, les autres dents s'inclinant à droite et à gauche; dents de la mâchoire infé-

rieure en nombre pair, triangulaires et distinctement dentelées sur les bords, s'inclinant des deux côtés à partir de la ligne médiane.

Il nous reste encore à parler de deux autres espèces inédites appartenant à ce même groupe de poissons, mais que nous n'avons pu faire rentrer dans aucun des genres admis. Elles semblent par leurs caractères établir la transition entre les genres *Centrophorus* et *Scymnus*, et lier les deux tribus *Acanthiana* et *Scymnina*.

Nous avons cru suivre le bon chemin en créant pour elles deux genres nouveaux, que nous proposons d'appeler *Centroscymnus* et *Scymnodon*.

Voici maintenant le résumé des caractères génériques et spécifiques de nos deux poissons.

#### Genre CENTROSCYMNUS.

CHAR. GEN.—*Dentes maxillæ superioris dentibus Scymnorum valde similes. Dentes maxillæ inferioris Centrophorum dentibus non discrepantes. Pinnæ dorsales angustæ, breves, spinis fere inconspicuis instructæ.*

CENTROSCYMNUS CÆLOLEPIS, nob. (Fig. 4.)

*C. castaneo-brunneus; corpore subtriangulari; capite brevissimo; rostro brevi, parum depresso, marginibus cingulatis; squamis pedunculatis, horizontalibus, imbricatis, antice fortiter excavatis.*

La forme particulière des écailles de ce poisson suffit pour le bien caractériser: par la forme des dents et la disposition du système dentaire il est intermédiaire aux genres *Centrophorus* et *Scymnus*.

Sans être fort commun, ce poisson ne nous paraît pas rare. Nos pêcheurs l'appellent "Pailona."

#### Genre SCYMNODON.

CHAR. GEN.—*Dentes maxillæ superioris ut in genere Scymno; maxilla inferiore dens medianus impar, post eum dentes primum erecti, deinde versus angulum oris magis ac magis decumbentes. Pinnæ dorsales angustæ, breves, spinis minutis.*

SCYMNODON RINGENS, nob. (Fig. 5.)

*S. rufo-fuscus, corpore subcylindrico elongato; capite a trunco distincto, semiprismatico; ore amplo, hiante, rictu fere horizontali; pinnis pectoralibus angustis, rotundatis.*

La coloration de ce poisson rappelle tout-à-fait celle du *Centrophorus crepidater*; et par son écaillage il ressemble tellement au *Centrophorus squamosus*, que nos pêcheurs les confondent sous le même nom de "Arreganhada."

3. NOTICE SUR UN BATRACHIEN NOUVEAU DU PORTUGAL (CHIOGLOSSA LUSITANICA, NOB.). PAR J. V. BARBOZA DU BOCAGE, DIRECTEUR DU MUSÉUM D'HISTOIRE NATURELLE DE LISBONNE, MEMBRE ÉTRANGER DE LA SOC. ZOOL. DE LONDRES, ETC.

(Plate XXI.)

CHIOGLOSSA LUSITANICA, sp. nov. (Pl. XXI.)

*Caractères génériques* :—Langue grande, oblongue, attachée antérieurement à la mâchoire inférieure, libre des deux côtés et en arrière, soutenue par un long pédicule qui vient se fixer au milieu de sa face inférieure. Deux rangées longitudinales de dents palatines, très-convergentes en avant, où elles arrivent presque à se toucher, très-divergentes en arrière, parallèles au milieu. Membres antérieurs tétradactyles, postérieurs pentadactyles; pollex antérieur et postérieur très-courts. Pas de parotides apparentes. Peau très-finement chagrinée, presque lisse. Pas d'arcade osseuse temporo-frontale.

*Caractères spécifiques* :—Corps allongé, arrondi, étroit; queue très-longue, mesurant un peu plus des  $\frac{2}{3}$  de la longueur totale, arrondie à la base, un peu comprimée dans sa dernière moitié. Tête courte; museau très-court et arrondi; yeux gros et proéminents. Narines placées près du bout du museau, presque en dessus et assez écartées. Membres courts et grêles, les postérieurs plus longs; les doigts, ainsi que les orteils, un peu déprimés et légèrement bordés, à face palmaire lisse, mais avec les articulations des phalanges nettement accusées en dessus et en dessous par de fortes dépressions de la peau; le second doigt plus grand que le quatrième, le troisième le plus grand de tous; le troisième et le quatrième orteils égaux et les plus longs, le cinquième après le pollex le plus court.

*Coloration*.—En dessus, sur un fond noir-foncé ponctué de blanc, deux larges raies dorsales d'un beau rouge de cuivre doré se prolongent sur la queue en une seule raie, et vers la tête avancent en divergeant jusqu'aux yeux. Flancs, région du ventre et le dessous de la queue de la même couleur noire du dos, sur laquelle de nombreux points blancs, inégalement repartis et plus confluent par places, dessinent de tâches irrégulières laiteuses peu apparentes. La face inférieure de la tête et le cou, jusqu'à l'insertion des membres antérieurs, d'un brun clair uniforme. La face dorsale des membres de la couleur des flancs; la face inférieure brunâtre.

J'ai dit que les raies dorsales et caudales sont d'un beau rouge de cuivre doré; mais j'ai besoin d'ajouter qu'elles semblent peintes avec du cuivre en poussière fine mélangée avec un peu de poudre d'or. La nuance dorée est d'autant plus prononcée que les individus sont plus adultes. L'alcool a la fâcheuse propriété d'attaquer promptement cette couleur, et de la faire disparaître au bout de peu de temps.

Dimensions prises sur un individu adulte :— millimètres.

Longueur totale . . . . .	142
——— de la tête . . . . .	11
——— de la queue . . . . .	95
——— du membre antérieur . . . . .	11
——— du membre postérieur . . . . .	13



Fig. 1



Fig. 3

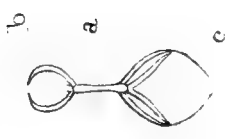


Fig. 4

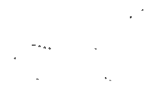


Fig. 5

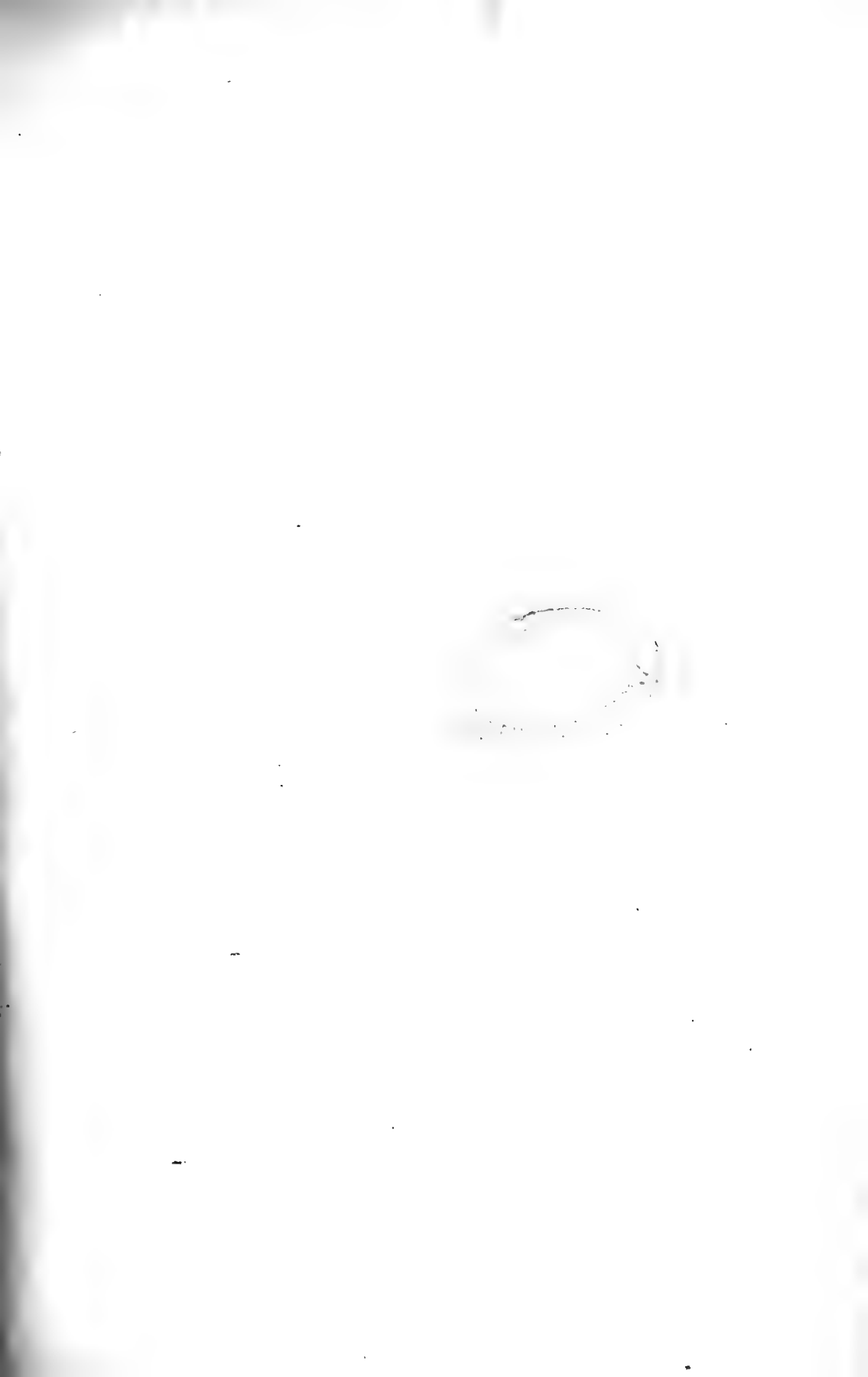


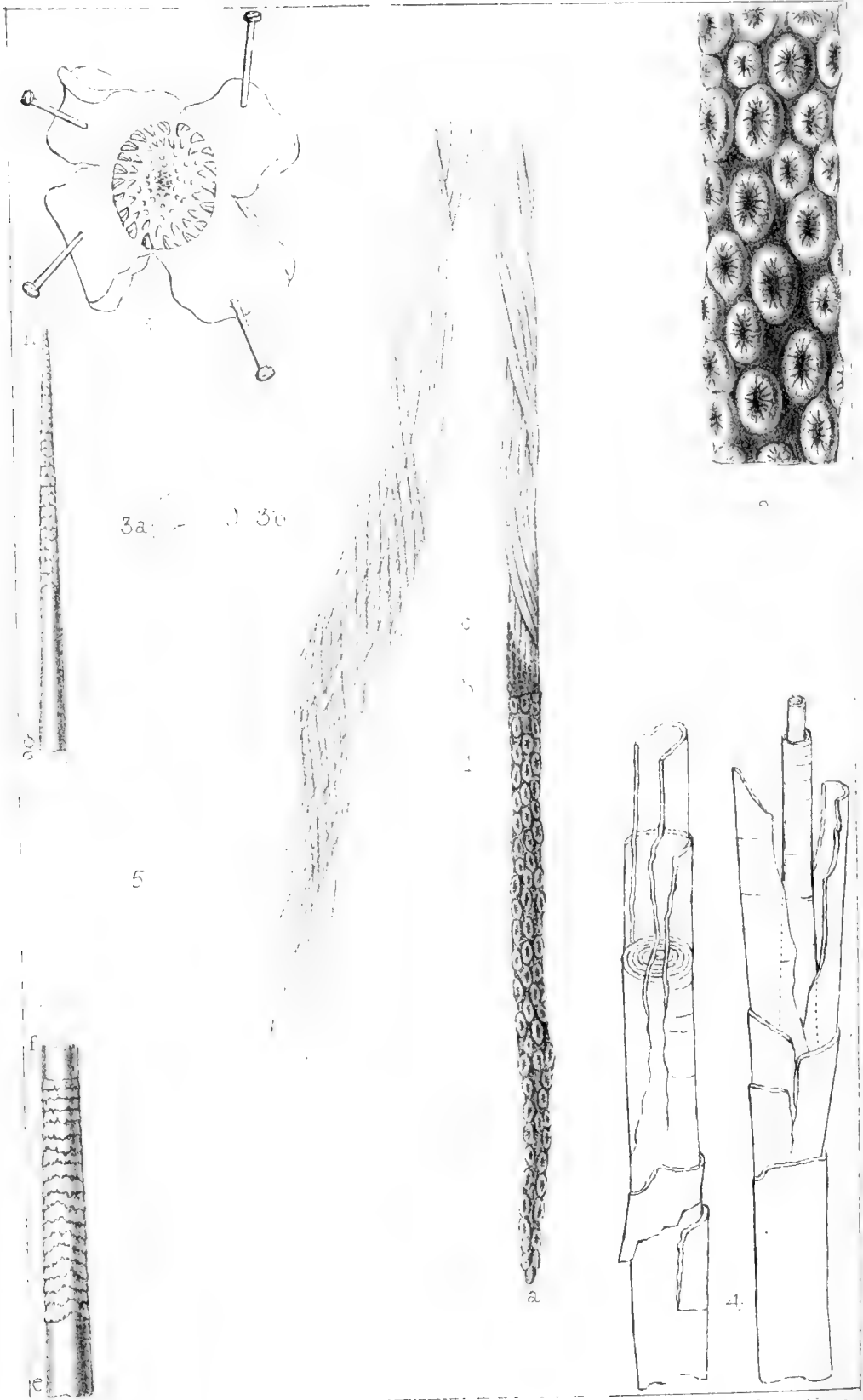
Fig. 2

CHIOGLOSSA LUSITANICA.









George West lith.

M. & N. Hanhart imp.

HYALONEMA LUCITANICUM.

*Habitat.*—Les premiers individus que j'aie vu de cette curieuse espèce m'ont été adressés de Coimbra en Mai de 1863, par mon ami M. Rosa. Ils ont été rencontrés aux environs de cette ville, dans le voisinage d'un bois de pins, et non loin d'une rivière; ils étaient cachés sous un amas de bruyères sèches. J'ai reçu cette année, en Janvier, un nouvel envoi de ces animaux; mais ceux-ci ont été pris sur la montagne de Bussaco, à cinq lieues de Coimbra: ils sont arrivés pour la plupart vivants, mais au bout de quelques jours ils étaient tous morts.

La singulière conformation de la langue de cet animal me semble un caractère générique assez important. Le pédicule osseux qui le supporte est assez long, il a bien 4 millimètres, et sur les côtés de son extrémité antérieure s'articulent deux branches cartilagineuses destinées à soutenir la portion libre de la langue. Chacune de ses branches, après avoir atteint, en se courbant en dehors et en arrière, le bord latéral de cette partie de la langue, suit exactement la direction de ce bord, et va finir sur le bord postérieur en le contournant. La langue n'est retenue le long de la ligne médiane, entre son attache antérieure et son pédicule central, que par du tissu cellulaire (v. figs. 3 & 4).

Par cette disposition de la langue, le genre *Chioglossa* me semble se rapprocher beaucoup des genres *Bolitoglossa*, *Heredia*, *Geotriton*; sa place dans un catalogue méthodique de l'erpétologie européenne doit être dans le voisinage des genres *Triton*, *Euproctus* et *Geotriton*, peut-être entre les deux derniers.

#### EXPLICATION DE LA PLANCHE XXI.

- Fig. 1. *Chioglossa lusitanica*; grandeur naturelle.  
 2. La tête, grossie deux fois.  
 3. La tête avec la bouche ouverte, pour laisser voir la langue avec ses attaches et le long pédoncle qui la soutient.  
 4. Os hyoïde. *a*, pédoncle de la langue; *b*, branches cartilagineuses qui s'articulent sur les côtés de l'extrémité du pédoncle, d'où elles se dirigent vers l'extrémité libre de la langue en contournant les bords; *c*, cornes postérieurs de l'hyoïde. Deux fois de la grandeur naturelle.  
 5. Disposition des dents palatines.

4. NOTE SUR LA DÉCOUVERTE D'UN ZOOPHYTE DE LA FAMILLE HYALOCHÆTIDES SUR LA CÔTE DU PORTUGAL. PAR J. V. BARBOZA DU BOCAGE, DIRECTEUR DU MUSÉUM D'HISTOIRE NATURELLE DE LISBONNE, MEMBRE ÉTRANGER DE LA SOCIÉTÉ ZOOLOGIQUE DE LONDRES, ETC.

(Plate XXII.)

Les curieux zoophytes que M. le docteur Gray a fait connaître sous les noms *Hyalonema mirabile* et *H. sieboldii*, et dont M. Brandt a, plus récemment, formé la famille *Hyalochætides*, paraissent appartenir exclusivement à la faune maritime du Japon; car c'est de ce pays lointain qu'ont été rapportés tous les individus qui se trou-

vent, à ma connaissance, dans quelques musées d'Europe. La découverte dans nos mers d'un individu de cette famille me semble donc un fait de quelque importance, digne d'être porté à la connaissance de ceux qui s'intéressent aux progrès de la zoologie géographique.

L'individu qui fait le sujet de cette note m'a été adressé, en Juin de l'année dernière, de Setubal, ville maritime du Portugal, située à l'embouchure de la rivière Sado. Des pêcheurs qui se livrent à la pêche de quelques espèces de *Squalidæ*, fort abondantes dans ces parages, l'ont retiré d'une considérable profondeur, à quelques milles de la côte; et, fort heureusement, au lieu de le rejeter à la mer, comme ils pratiquent d'ordinaire pour tous les objets dont ils ne peuvent comprendre l'utilité, ils l'ont apporté à un amateur de mes amis, M. Gamito, employé à la douane de cette ville, qui me l'a fait parvenir quelques jours après.

Au moment où je l'ai reçu, cet spécimen conservait encore une odeur forte de poisson, et quoique un peu desséché, il présentait tous les indices de sa récente capture. Du reste, même en l'absence de ces preuves, la parfaite honorabilité de la personne qui me l'a si généreusement cédé ne me permettrait pas le moindre doute quant à l'authenticité de ses renseignements.

Ce n'est pas faute d'avoir compris tout l'intérêt scientifique de cette découverte que j'ai tant tardé à la rendre publique. Ce retard a son excuse dans la nécessité où je me trouvais de consulter l'ouvrage de M. Brandt, 'Symbolæ ad Polypos *Hyalochætides* spectantes,' ouvrage que je ne possédais pas à cette époque-là, et qu'il m'a fallu faire venir de Paris.

Pour ne pas donner trop d'étendue à cette note, j'ai dû me restreindre à la description concise de mon spécimen, de manière à rendre possible la confrontation de ses principaux caractères avec ceux des trois espèces du Japon décrites par M. Brandt (*op. cit.*). La planche qui accompagne mon travail, dans laquelle le zoophyte et ses principaux détails sont assez exactement rendus, pourra suppléer à l'insuffisance du texte.

Comme tous les *Hyalochætides* connus, le spécimen du Portugal (Pl. XXII. fig. 1) est composé d'un axis formé de longs fils hyalins, semblables à des fils de verre, et d'un *corium polypigerum* qui recouvre l'axis en partie. Sa longueur totale est de 63 centimètres: il dépasse donc de quelques centimètres les plus grands individus du Japon observés par M. Brandt.

La couche polypigère (*corium polypigerum*) s'étend depuis l'une de ses extrémités, qu'elle recouvre entièrement, jusqu'aux  $\frac{2}{5}$  de sa longueur totale. Elle occupe à peu près un espace long de 16 centimètres, et son diamètre ne va pas au-delà de 11 à 12 millimètres. Elle ne présente aucune solution de continuité (sauf à sa partie terminale, comme je le dirai plus tard) *ni aucune vestige d'éponge* ou *d'autre production parasitique.*

Les polypes, un peu alongés ou elliptiques, au lieu d'être irrégulièrement placés sur le *corium* et de garder entre eux des distances souvent considérables, comme c'est le cas de tous les *Hyalochætides*

décrits et figurés par M. Brandt, se trouvent au contraire agglomérés partout, juxtaposés, et formant des séries longitudinales et spirales très-régulières (*vide* Pl. XXII. fig. 1 et fig. 2). À l'exception de ceux placés à l'extrémité de la tige (fig. 1 *a*), lesquels sont plus petits et quelques-uns même rudimentaires, ces polypes varient peu en dimensions; ils ont en général 6 millimètres de longueur et 4 millimètres de largeur. Quant à leur élévation au-dessus de la couche qui les soutient, elle me semble peu considérable, ne dépassant pas 2 à 3 millimètres.

La couche polypigère et les polypes sont d'une couleur brunâtre foncée, et d'un aspect granuleux. Chaque polype présente, à partir de son orifice central, un certain nombre de plis ou de sillons radiaux peu prononcés; mais je ne leur ai pas trouvé l'apparence framboisée, qui, d'après M. Brandt, est très-nettement accusée chez les individus du Japon.

Après avoir fait ramollir quelques polypes dans une solution aqueuse d'acide acétique, il m'a été facile d'examiner au microscope leurs tentacules, rentrés dans la cavité du corps. Le résultat de mon examen est loin de s'accorder avec les observations de M. Brandt sur les individus du Japon. J'ai, comme M. Brandt, vu très-distinctement une couronne de 20 tentacules, disposés en cercle à une certaine distance de l'orifice de la bouche; mais j'ai découvert en dedans de ceux-ci un deuxième cercle de tentacules bien développés, en nombre égal, et placés dans les intervalles des premiers; et dans l'espace compris entre ce second rang de tentacules et la bouche j'ai encore remarqué un grand nombre de petites élévations coniques qu'on serait tenté de prendre pour des tentacules rudimentaires (Pl. XXII. fig. 3).

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.

L'axis est à découvert dans les  $\frac{2}{5}$  de sa longueur. Cependant je remarque sur mon spécimen à l'endroit où l'axis commence à se montrer à découvert, une perte de substance du *corium polypigerum* dans une étendue de 15 à 16 millimètres (*v.* Pl. XXII. fig. 1, l'espace compris entre les deux lignes *b* et *c*). Cette perte de substance, qui me semble dater du moment où le zoophyte a été retiré du fond de la mer, doit-on la regarder simplement comme le résultat de la maladresse des pêcheurs qui l'ont pris, ou doit-on y voir plutôt la preuve de ce que l'animal était attaché, médiatement ou immédiatement, par cet endroit à quelque corps sous-marin?

En l'absence de données positives, je n'ose pas me prononcer sur cette question.

Les filaments transparents qui constituent l'axis varient beaucoup en longueur et en épaisseur: leur disposition en spirale varie également. Ils sont formés de plusieurs couches concentriques (Pl. XXII. fig. 4). Leur surface, lisse chez la plupart, présente quelquefois une striation transversale qui leur donne l'aspect de fibres articulées. En les observant au microscope, sous un grossissement convenable, on

reconnaît qu'ils ont une espèce d'enveloppe formée par l'assemblage d'anneaux étroits, emboîtés les uns dans les autres, de la base à la pointe, et dont les bords, qui restent à découvert, sont un peu déchiquetés. Le frottement prolongé fait tomber cet involucre, et rend les fibres lisses (Pl. XXII. fig. 5).

Ces fibres se composent presque exclusivement de silice.

D'après la description que je viens de présenter de mon spécimen, personne n'hésitera à admettre qu'il s'agit d'un individu de la famille *Hyalochætides*, Brandt. Il reste maintenant à décider si on doit le regarder comme une espèce nouvelle, ou le rapporter, malgré son habitat, à quelqu'une de celles décrites par M. Brandt sous les noms de *Hyalonema sieboldii*, *Hyalonema affine*, et *Hyalochæta passieti*.

J'avouerai d'abord que je partage la répugnance de M. Gray à admettre les deux genres créés par M. Brandt. Quant aux trois espèces admises par cet auteur, je ne vois pas de distinction possible entre le *H. sieboldii* et le *H. affine*; mais sa troisième espèce me semble devoir prendre rang à côté de la première dans le même genre *Hyalonema*.

Cependant, quoiqu'il en soit, je pense que le zoophyte du Portugal n'est pas identique à aucun des *types* du Japon.

Je n'appuyerais pas cette distinction spécifique sur la différence très-remarquable dans le nombre des tentacules (40 chez le premier, 20 chez les autres), car j'ai la conviction que cette différence ne doit pas exister en réalité, et qu'elle est le résultat du mauvais état, et surtout de la mauvaise préparation des exemplaires que M. Brandt à examinés. D'autres caractères, sur lesquels j'ai déjà insisté dans le cours de ma description, me semblent suffisants pour séparer spécifiquement le zoophyte du Portugal de tous les *Hyalochætides* connus; ce sont la forme et les dimensions des polypes, leur mode d'aggrégation ou plutôt leur juxtaposition intime, enfin leur arrangement en séries régulières longitudinales et spirales.

Dans le cas où ces raisons seraient admises par des zoologistes plus compétents que moi, je proposerais de l'appeler *Hyalonema lusitanica*, dont la caractéristique différentielle pourrait se résumer ainsi :

*Hyal. polypario elongato, fibris setaceis, hyalinis, spiraliter tortis, corio polypigero ab apice usque ad  $\frac{2}{3}$  longitudinis totæ involutis; polypis dilatatis, ellipticis, valde aggregatis, parum elevatis, per series longitudinales ac spirales regulariter digestis.*

#### EXPLICATION DE LA PLANCHE XXII.

- Fig. 1. *Hyalonema lusitanica*, un quart de grandeur naturelle. *a*, extrémité entièrement recouverte par le *corium polypigerum*; *b* à *c*, espace couvert primitivement par le *corium*, mais qui a été mis à nu probablement au moment où le zoophyte a été retiré de la mer.
2. Portion du *corium polypigerum* grossie quatre fois pour bien laisser voir la forme, l'aggrégation et la disposition régulière des polypes.
  3. Un polype ouvert et grossi. On y voit les deux rangs de tentacules, composé chacun de 20. Les tentacules du second rang occupent les intervalles de ceux du premier. 3 *a*, tentacule du premier rang, vu de côté; 3 *b*, le même vu de face, et montrant son bord externe convexe et arrondi.

4. Portion d'une fibre, cassée en deux, laissant voir les diverses couches concentriques dont elle est formée.
5. Extrémité d'une fibre. On y voit les anneaux emboîtés de son involucre, qui la font paraître articulée. De cet emboîtement la superposition a lieu de la pointe vers la base, et non de la base vers la pointe, comme, par erreur, le fait croire les figs. 14 et 15 de la Pl. II. de l'ouvrage de M. Brandt (*Symbolæ ad Polypos, &c.*).

5. FURTHER CONTRIBUTIONS TO THE ANATOMY OF THE GIRAFFE AND THE NYLGHAU. BY EDWARDS CRISP, M.D., F.Z.S., ETC.

It will be remembered that, in a paper on the visceral anatomy of the Giraffe and on the anatomy of the Eland (*Oreas canna*), lately read (*Proc. Zool. Soc.*, 1864, p. 63), I stated that I had found a remarkable appearance in the rectum of the young Giraffe, that I had mislaid the parts, and that I spoke only from recollection. The death of the young male Giraffe at the Gardens, that occurred in April last, has, however, enabled me to place the rectum and intestinal glands of this animal before the Society. I have taken sketches and wax casts of all the parts, so that the appearances will readily be understood. The animal in question, aged seven months, for some time after birth was strong and healthy; but of late it has showed signs of indisposition, and died very suddenly—its tongue, as the keeper informs me, “being at the time of death curled round in its mouth,” so that it probably died from some cerebral lesion, as I failed to discover any disease in the thoracic and abdominal viscera: and it is satisfactory to know that in these parts there was no evidence of a tuberculous taint.

The animal weighed about 3 cwt. The intestinal canal measured 123 feet 6 inches in length, including the large intestines (33 feet); that of the one before described, which was two months old, 107 feet 11 inches; so that we may form some notion of the rate of growth of this tube. The tracheal rings in this specimen amounted to one hundred; but in the old Giraffe I stated that they numbered more than two hundred; it is possible, however, that I may have made a mistake in my notes. The examination of an old animal, however, will clear up this doubt, as it will the interesting point in relation to the size of the intestinal glands.

I need not again describe the viscera that are now so well known; but I will mention a fact in relation to the heart that has not before been noticed. As mentioned in my former paper, the apex is more pointed than in any of the Antelopes. In this young specimen the heart weighed 1 lb. 14 ozs.; the columnæ carneæ were very indistinct; the chordæ tendinæ amounted to thirteen; the parietes of the left ventricle, at their thickest part, measured  $1\frac{1}{4}$  inch, those of the right ventricle only  $\frac{1}{4}$  inch, the septum ventriculorum 1 inch. The length, from the root, of the aorta 7 inches; greatest width 5 inches. The most remarkable circumstance was the absence of the heart-bone; and it will be curious hereafter to trace the development of this bone in

such animals as possess it. In the old Giraffe its length was nearly an inch.

I inspected carefully the whole length of the intestinal tube. The glandular crypts at the origin of the duodenum, first described by MM. Joly and Lavocat, as mentioned in my last paper, were well marked; they consist of about thirty small sacculated crypts, their mouths varying in diameter from  $\frac{1}{2}$  line to  $1\frac{1}{2}$  line. They partake much of the character of those found near to the cæcal valve; and I think the term "crypt," used by MM. Jolly and Lavocat in 1846, is more applicable than that of "sacculated pouch," employed by Dr. Cobbold. In the small intestines I found three agminated patches; it will be remembered that in the Giraffe two months old there was only one, and that of very small size. The longest of the patches in the present specimen was about  $2\frac{1}{2}$  inches, and  $\frac{1}{2}$  an inch in width; it consists of eight divisions, formed by the mucous membrane, and these are subdivided into smaller folds; they are all, however, superficial: the other patches are  $1\frac{3}{4}$  inch and 1 inch in length, and present the same character. The glandular patch (so called) near to the cæcum consists of about twenty-one crypts, of a larger size and deeper than those in the duodenum; but none of them project externally when the intestine is distended with air. These occupy a space of about 2 square inches; but in Dr. Cobbold's specimen from a Giraffe as shown in the drawing (article "Ruminantia," Todd's Cyclopædia, and in the New Philosophical Journal of Edinburgh, 1856), the surface of the patch is about 5 square inches, and the crypts of a much larger size. So I infer that in the old animal they will be found of larger dimensions; but this future investigation must determine.

The rectum of this animal presents a very remarkable appearance. The lower part of the gut, to the extent of about 8 inches, is in large, elevated, irregular-shaped quadrangular folds; above these, to the extent of 18 inches, the lining membrane is folded longitudinally in a regular manner, the elevations amounting to about fifteen in number. I have examined the intestines of a great many ruminants during the last eighteen months since my attention was first directed to this matter, and I have not seen any similar appearance. As regards the agminated patch near to the cæcum, I have recently met with one in the same situation in the Nylghau (*Antelope picta*), that covers a much larger surface, as seen in the drawing. This patch of agminated crypts occupies a surface of about 4 square inches; the crypts are small, and number from three to four hundred. This was seen in the old male Nylghau that recently broke its neck at the Gardens when butting at the fence. The intestinal tube of this Antelope measured 140 feet 9 inches; that of an old female that I examined some years since, 148 feet 18 inches. In the male the valves in the left renal vein (as shown in the drawing) amounted to ten, a larger number than I have yet seen.

In conclusion I may state that I purpose placing the histology of these glands in the Giraffe and Nylghau before the Society on a future occasion. In the Eland, as I stated in my paper on the anatomy of



this animal lately read, I did not find them. In the *Leucoryx* that recently died at the Gardens after parturition\* they were not present, but there was a small agminated gland in the cæcum (as seen in the drawing). In the Sondaic Ox (*Bos sondaicus*) I found no glands of this description; but, strange to say, in the cæcum of the Jaguar (*Felis onca*) I have recently discovered a great number of agminated crypts that occupy as large a space as those described in the young Giraffe, and bear a greater resemblance to the glands named in this animal than in any I have yet seen. The subject of intestinal glands in the lower animals is one at present but little understood, and affords a wide and interesting field of inquiry for future investigators.

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June 28, 1864.

Dr. J. E. Gray, F.R.S., in the Chair.

Dr. P. L. Sclater called the attention of the Meeting to the two young Bennett's Cassowaries recently hatched in the Society's Gardens. In some notes on the method of incubation amongst the Struthious birds, read before the Society last year †, Dr. Sclater had already recorded the facts relative to the breeding of this bird in former years. In this year copulation commenced in the beginning of March, and continued almost daily until the 26th of April, the two birds being put together for that purpose every morning by the keeper. Six eggs were laid in all, at intervals of from ten to twelve days, the last being laid two days after the male had commenced to sit. This event took place on the 28th of April. One young bird was hatched on the 20th of June, and another on the 22nd. These may be now seen thriving in company with the male, who has the sole care of them, the female having been removed entirely away from them.

Dr. Sclater also exhibited and made some remarks on the skeleton of the original typical example of Bennett's Cassowary (*Casuaris bennettii*), received by the Society in 1857, which was about to be deposited in the British Museum.

The Secretary read the following note from Mr. R. Swinhoe, F.Z.S., referring to the article upon the Birds of China, published in the Society's 'Proceedings,' 1863, p. 259:—

"I may as well here make two required amendments to my 'Catalogue of the Birds of China,' published in the 'Proceedings of the Zoological Society' for 1863. The first mistake was pointed out to

\* It was lately stated before the Society by Dr. Gray, that wild South-African Antelopes had no fat upon them. The man who skinned this animal obtained 36 lbs. of fat from it; and probably, if the flesh had been boiled, nearly double the quantity might have been procured.

† See P. Z. S. 1863, p. 233 et p. 518.

me by Mr. A. Newton; it consists in my having inserted into the list *Eurinatorhynchus pygmæus* on the authority of the *Limicola pygmæa* of Middendorff. Mr. Newton has rightly pointed out to me that *Limicola pygmæa* is only another name for *Tringa platyrhyncha*, Temm., which has already found place in the same list. There appears consequently to be no evidence of *Eurinatorhynchus pygmæus* having ever been noted in this part of the world. The other mistake has occurred in the difficult family of *Laridæ*, where (no. 405) I have identified wrongly *Larus canus*, var. *major*, Midd., our Eastern, somewhat larger representative of *L. canus*, L., with Pallas's *L. niveus*. The latter is described by Pallas (*Zoographia Rosso-Asiatica*, tom. ii. p. 320) as '*L. totus albus, dorso cano, rostro virescentiflavo immaculato, pedibus fuscis; magnitudo Corvi coracis.*' It would, from this description, appear to be more nearly allied to *L. occidentalis*, Audubon (no. 410 of my list); but this last has a red spot on the bill. We must therefore, I suppose, regard our type of *L. canus* as *L. major*, Middendorff, and insert doubtfully into the list as a separate species *L. niveus*, Pallas, 'procured from Kamtschatka and the Northern Seas.'"

The following papers were read:—

1. ON THE PARROTS OF THE MALAYAN REGION, WITH REMARKS ON THEIR HABITS, DISTRIBUTION, AND AFFINITIES, AND THE DESCRIPTIONS OF TWO NEW SPECIES. BY ALFRED R. WALLACE.

(With a Map of the Malay Archipelago.)

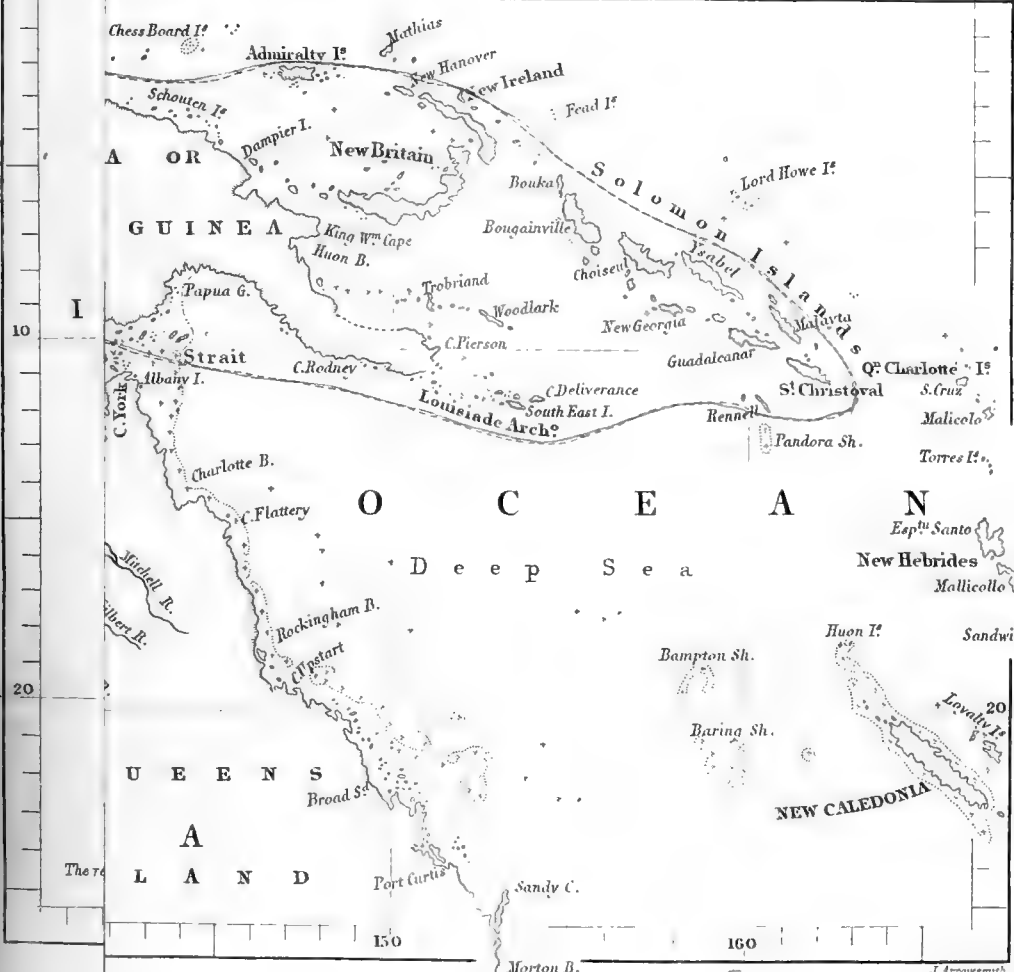
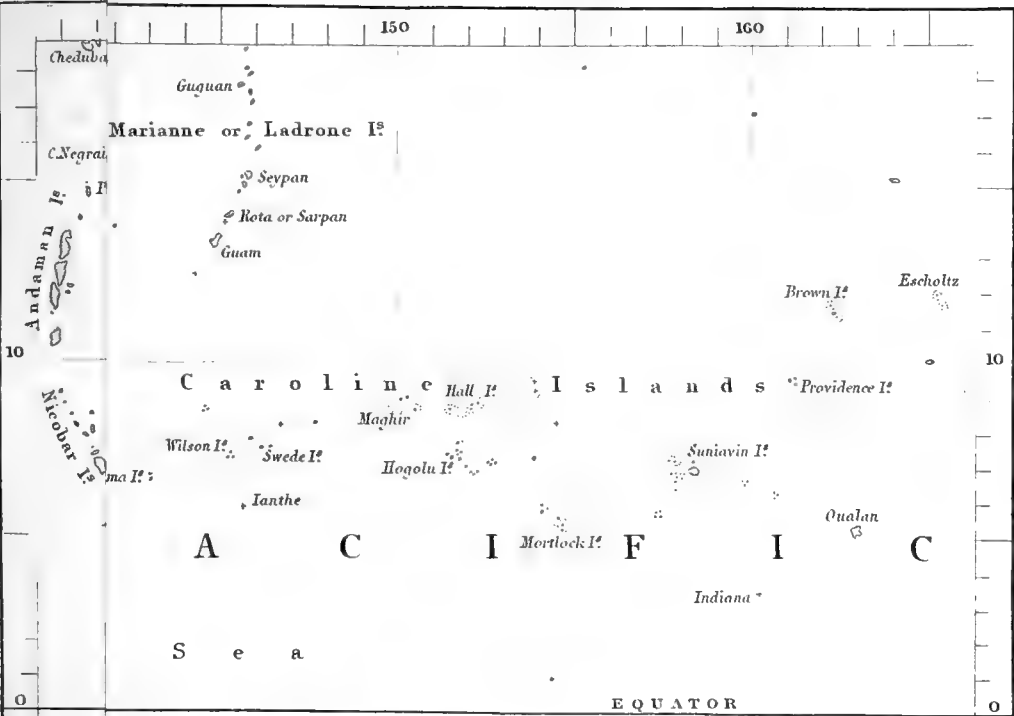
The Psittaci or Parrots are an extensive and very isolated group of birds ranging over the tropics of the whole world, but, with the exception of those lands of anomalies, Australia and New Zealand, rarely found in the temperate and cooler regions. As nearly as I can estimate, the number of species of these birds known at present amounts to 365, grouped in about thirty-six genera and five families. The manner, however, in which these species and group are distributed over the globe is very remarkable. Taking the zoological regions established by Dr. Sclater, we find the following approximate numbers—

Regions.	Species.	Genera.	Families.	
Palæarctic. . . .	0	0	0	} 14 genera, all of one family,
Nearctic . . . .	1	1	1	
Neotropical . .	150	9	1	
Ethiopian . . . .	25	4	1	
Indian . . . . .	25	3	1	} 25 genera of 5 families,—
Australian. . .	165	25	5	

showing a remarkable poverty in the Indian and Ethiopian regions, both in species and groups; abundance of species in the Neotropical (S. American) region, with comparatively few genera; while the Australian region not only contains more species than the American,

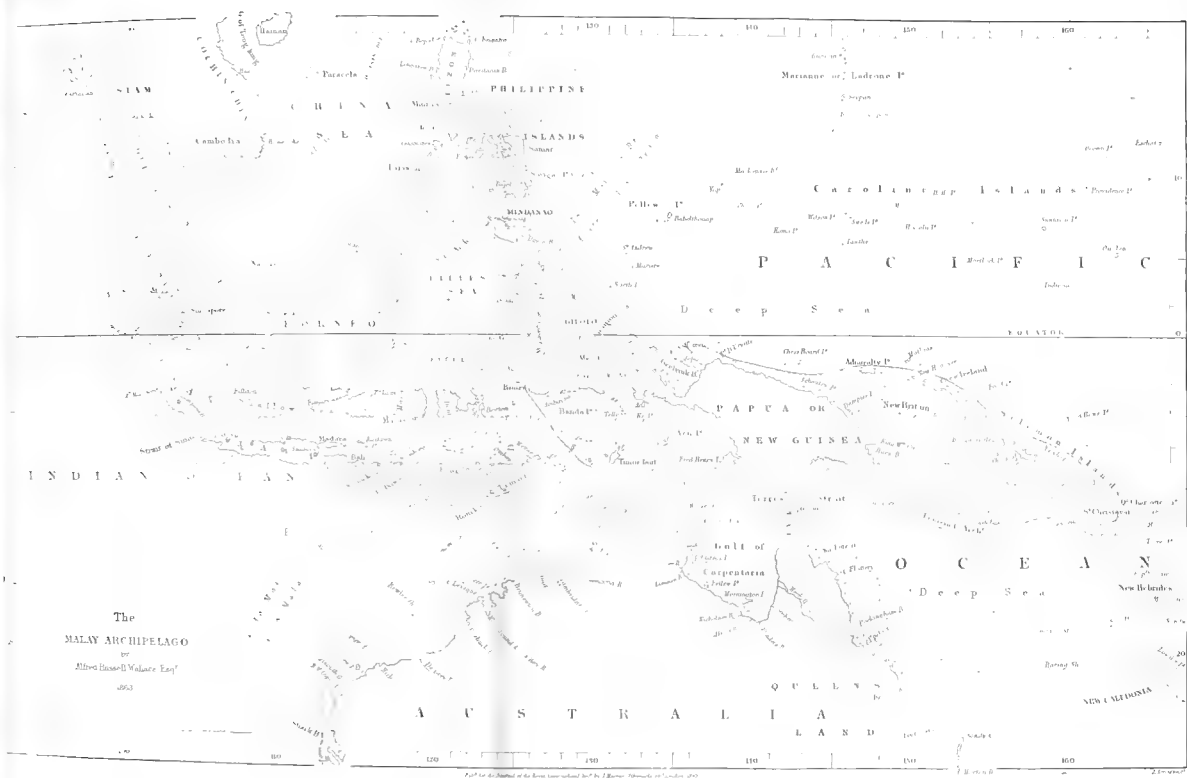
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Part of the material of this book was obtained from the Hydrographic Office, London, 1900.

but possesses nearly three times as many genera, and nearly twice as many as all the other regions combined. More remarkable still, the whole of the Indian, Ethiopian, and American Parrots belong to one great family group, the *Psittacidæ*, indicating a general uniformity of organization; while those of the Australian region mostly belong to three other distinct families—the Brush-tongues or Lories (*Trichoglossidæ*), the Cockatoos (*Ptyctolophidæ*), and the Broad-tails or Ground-Parrots (*Platycercidæ*)—together with a few of the *Psittacidæ*, which last, however, are confined to the Malayan portion of the region.

These facts are of the highest interest in their bearing on the probable origin of the whole Psittacine group; for it is natural to suppose that in that portion of the earth's surface where the species are now most numerous, the forms most varied, where the most singular modifications of structure occur, and where both the highest and the lowest developments of the group are to be found, would be its true metropolis and original birthplace. I believe, therefore, that the Parrot type originated in the Australian region—a region now consisting almost entirely of broken land and scattered islands, but which, there is every reason to think, was once a continental area.

Confining our attention now to the Australian region only, we may divide it into three subregions—Australia, the Pacific Islands, and the Austro-Malayan group—each of which has a distinctive character. The *Platycerci* and the Cockatoos are more particularly the features of Australia and Tasmania, which have also a few *Trichoglossi*, but no *Psittacidæ*. The *Coriphili*, Nestors, and *Strigopidæ* are confined to the Pacific Islands, which have also *Platycerci*, but no Cockatoos. The crimson Lories are entirely restricted to the Malayan district, which has also abundance of Cockatoos, but few *Platycerci*, and several peculiar genera of *Psittacidæ*. Thus four out of the five families into which the order is divided are found in the Austro-Malayan district; they all extend into every part of it, and they are all represented by abundance of species, and three of them by numerous peculiar genera and even subfamilies.

The Australian subregion possesses three of the families only, and has a smaller number both of genera and species; but it has a large proportion of peculiar genera, and is preeminent in its numerous forms of *Platycercidæ* and *Ptyctolophidæ*. Only three families and four genera extend to the Pacific Islands, but three of the genera are quite peculiar to them.

The following table shows these proportionate numbers at one view:—

	Families.	Genera.	Species.
Austro-Malayan Islands . . . .	4	16	86
Australia . . . . .	3	10	60
Pacific Islands . . . . .	3	4	30

We thus see that the preeminence both in species, genera, and families is with the Austro-Malayan region, and we have therefore an *à priori* reason for considering it to be the most ancient, and to

suspect that it may contain within its limits a portion of the country to which the Psittacine order was at one period restricted. Let us therefore examine its productions a little more carefully.

Undoubtedly the most highly organized form of Parrot is the Trichoglossine or Brushtongue family, in which the whole structure is modified to enable these birds to derive a considerable portion of their subsistence from the nectar of flowers. The bill is unusually small, elongated, and compressed, so that it may readily enter the corolla; the tongue is large, long, and very extensible, and can be thrust down to the very bottom of the nectary; and the papillæ of the terminal portion of the upper surface are developed into erectile fibres, forming a double brush, which rapidly gathers up all the honeyed secretions of the blossom. In correlation with this structure the species are mostly of small size, of graceful forms, and have powerfully grasping feet—qualities that enable them to climb actively among the twigs and branches, and to cling in any position to the waving sprays of blossom. They have also elongated wings and a powerful flight, which give them the means to traverse the whole area of their range, and discover at the right moment the flowering trees which are so attractive to them, the period of blossoming in tropical regions being very limited for each species. These extremely interesting birds are spread over the whole Australian region, while not one of them has been found beyond its limits; but it is in the Austro-Malayan district only that they are very abundant and of the most varied forms; for it is here that four out of the six genera are exclusively found. Three of these genera form a natural subdivision of the family, which may be called the *Loriinae*, and comprise all those beautiful birds the ground-colour of whose plumage is vivid crimson, and which are commonly known as Lorries. Of these the genus *Eos* may be considered the most typical, since the species have completely lost the green colouring which is so characteristic of Parrots generally, and by their activity, elegance, and more powerful flight show that they are the most highly developed in the Trichoglossine series. The vivid red colour which is so characteristic of the Lorries here reaches its maximum in such species as *E. rubra* and *E. cardinalis*. This fine group, consisting of three genera and at least eighteen distinct species, has a singularly restricted range, being confined to an elongated tract comprising New Guinea and the islands east and west of it, from the Moluccas to the Solomon Islands. If we look at this area marked out upon a map\*, we must be at once impressed with the idea that we have here roughly indicated the much greater extent at a recent period of the large island of New Guinea, the north-western portion of which seems even now to be undergoing a still further segmentation. This idea receives confirmation from the fact that almost every bird found in this area has its closest allies in New Guinea; and as we approach the central mass, the variety of forms becomes greater. The genera *Monarcha* and *Mimeta* here have their maximum development; and *Tanyssi-*

\* The red line on the accompanying map encloses the area to which the crimson Lorries are restricted.

*ptera*, as abnormal among Kingfishers as Lories are among Parrots, has almost exactly the same limits of distribution as they have. Within these limits are found some of the most curious forms of Parrots, the giant black Cockatoo (*Microglossus*) and the dwarf of the whole order (*Nasiterna*), the bare-headed *Dasyptilus* and the elegant little *Charmosyna*. *Tanygnathus* has the range of *Eos*, but extends north-westwards to Celebes and the Philippines; *Geoffroyus* south-westwards to Timor and Flores; while the remarkable genus *Electus* has exactly the same range as the Lories, whose attire it seems to mimic, for in it alone are found Parrots whose only colours are red with a portion of blue and black. This coincidence of the range of the red *Psittacidæ* with that of the red *Trichoglossidæ* is a very curious fact, and clearly intimates that these gay tints are not mere sports of nature, or designed for the delectation of man, but have a close connexion with the life-history of the creatures which they adorn, and probably subserve an important though hidden object in the economy of these groups.

The whole number of Parrots known to inhabit this Lorian region is fifty-four, belonging to no less than fifteen genera, of which eight genera are altogether peculiar to it. This is very remarkable when we compare it with Australia, which, though many times more extensive and also exceptionally rich in this family, possesses, with a rather larger number of species, about ten genera, of which six or seven only are peculiar to it. But Australia has been comparatively well explored in every part of its great extent, and, though a few more species may be discovered, we cannot expect it to produce any new forms of Parrots. New Guinea, on the other hand, the centre and primary mass to which the surrounding islands are but satellites, is a *terra incognita*. Few persons are aware that every New Guinea bird, beast, or insect we are acquainted with, has been obtained in the northern peninsulas of that country, which, as I before remarked, seem just about to be converted into islands; while the true island itself, a vast tract of forest and mountain, 800 miles long and 500 wide, is absolutely and entirely unknown. The whole of the other islands in this region which have been visited by any naturalist will not make up a tenth of this vast area; and as the mere outskirts of this unexplored land have yielded a number of remarkable genera and hosts of species which do not extend to the surrounding islands, we may be sure that the remarkable concentration of peculiar forms of Parrots which the Lorian region exhibits, even with our present imperfect knowledge of it, is very far below the reality. I believe, therefore, that we have every reason to consider New Guinea as being that still existing portion of what was once the great tropical Pacific continent to which I have alluded; and in the crimson Lories, the black *Microglossum*, the Birds of Paradise, and the great Crowned Pigeons, we have but a remnant and a sample of the strange and beautiful forms of life that once inhabited it, and many of which may still remain to be discovered in the untrodden Papuan forests.

The genus *Trichoglossus* ranges over the whole of Australia and nearly the whole of the Austro-Malayan Islands, the most remark-

able exception being the northern Moluccas (Gilolo, Batchian, and Morty), which do not seem to possess it. The small species in which the sexes differ, and which are best placed with *Charmosyna*, are, however, found in these islands. Celebes, Sumatra, Timor, and Aru have each species of *Trichoglossus* peculiar to them.

The *Platycerci* are but poorly represented in the Austro-Malayan Islands, and seem to be hardly at home in the damp tropical forests. They have the same range as the Lories, but extend also to the Sula Islands; and a species of an Australian form inhabits Timor.

We now come to the Cockatoos, another most characteristic Australian form which ranges over the whole Australian region, except the Pacific Islands, marking out the limits of that region in the Malay archipelago by reaching Celebes and Lombok, and sending one species into the Philippine Islands, which are considered to belong to the Indian region. We must first remark that the genus *Cacatua* has a wider range in the Australian region than any other, occupying every island in the Australian and Austro-Malayan subregions, and always existing in considerable abundance. This indicates a dominant group, which has great capacities for increase and self-preservation and great powers of diffusion. It is therefore not wonderful that one species should be found to have penetrated beyond its true home. That this was due to greater facilities for emigration at a comparatively recent epoch in the existence of the genus, is indicated by the fact that, whereas throughout the rest of the archipelago the species of *Cacatua* are much restricted, each island or small group of islands possessing its peculiar form, in the Philippines one species ranges over the whole of that extensive region.

One of the most interesting genera of Parrots in the archipelago and in the world is undoubtedly *Prioniturus*, which exhibits the only instance in the whole order of a spatulate or racket-shaped tail like that of the Motmot; but in this case the perfectly bare and smooth shaft is produced by a natural process of growth, as in the King Bird of Paradise. The four species of this remarkable genus are equally divided between Celebes and the Philippines, and present a most curious case of the restricted range of a well-marked group. An exactly analogous case among Mammalia is the genus *Cynopithecus*, a form of baboon completely unlike anything else in the East, and confined to the Philippines, Celebes, and the small adjacent island of Batchian, into which it was probably introduced. While these two groups of islands have thus evidently had once a closer connexion than at present, they both possess a striking individuality which separates them from the primary regions to which they respectively belong. The Philippines stand alone in the Indian region by the absence of all large carnivora and pachyderms, as well as of Apes and Monkeys, (in birds) by the absence of *Phasianidæ* (which are preeminently Indian) and by the presence of *Megapodius* (which is as preeminently Australian), by having no Trogons, *Palæornis* or *Eurylæmidæ*, and by possessing *Cacatua*, *Tanygnathus*, and *Cyclopsitta*. Just in a parallel manner is Celebes distinguished by the presence of peculiar forms of Antelope and Baboon, and by species



of *Sciurus*, and, in birds, by having Woodpeckers, Hornbills, and several isolated genera of Passeres, while forms so characteristic of the Austro-Malayan islands as *Monarcha*, *Pachycephala*, *Tropidorhynchus*, and *Eos* are quite absent. Celebes and the Philippines will therefore form together a little intermediate region between those of Australia and India. The real cause of their distinctive peculiarities I believe to lie in their never having been immediately connected with these regions, though they have probably at some time been in closer proximity than at present—and, in the case of Celebes at least, to their representing the remains of some ancient land extending to the westward, at an epoch probably anterior to that at which Borneo and Sumatra were raised above the ocean.

The great islands which form the western half of the archipelago, Borneo, Sumatra, Java, and the Malay peninsula, present a most surprising poverty of Psittacine birds. Only four species are found over this immense region; and these belong to three genera, of which only one is found on both sides of the boundary-line. This fact forms one of the strongest proofs of the division of the archipelago between the Indian and Australian regions; for on the one side we have fifteen genera, of which ten are quite peculiar, on the other three genera, of which one is Indian, one Indo-Australian, and one somewhat isolated species only peculiar. The distribution of the genus *Loriculus*, which is the only one really common to the Indian and Australian regions, is very interesting. The southern island of the Philippines seems to be its metropolis, since no less than four species are found there; one inhabits Celebes, one Sula, and one Gilolo; the rest are found in Flores, Java, Sumatra, and Malacca, Ceylon, India, China, and Manilla. The range of the genus is therefore very extensive; yet one-half of the species will be found concentrated in a limited tract, including Mindanao, N. Celebes, Sula, and Gilolo. This district is upon the confines of the Australian and the Indian regions; and it is very interesting to remark that this, the only genus which is common to the two, is of doubtful affinities, and serves to connect the preeminently Australian *Trichoglossidæ* with the *Psittacidæ* of the rest of the world.

The classification and natural arrangement of the *Psittaci* has been the subject of much difference of opinion. For a long time they were placed as a simple family of Scansores along with Woodpeckers, Toucans, and Cuckoos, birds with which it is difficult to see that they have the remotest affinity, and to which they have no resemblance, except in the one character of the  $\frac{2}{2}$ -toed feet.

The skull of a Parrot is remarkable for its large size, for the nearly complete orbits, for the broad and powerful lower mandible, for the large and complicated lingual and hyoid bones, and for the perfect articulation of the upper mandible to the cranium—peculiarities which, in their combination, separate it most widely from every other form of bird. The sternum has a characteristic form unlike that of any bird; the furcula is small and attached low down on the anterior margin of the keel, and in some genera is liable to be totally wanting

in certain species. When present, however, it is of a semioval form, the two branches being connected in an unbroken curve without angle or projecting processes.

The prehensile feet of Parrots are used in a manner altogether peculiar; for though other birds may secure their food with their foot while eating, no others in the whole class use it systematically as a hand to grasp and convey food to the mouth. We may fairly say that they are the only birds that have hands and use them as such; and this will serve to confirm the superiority which their large brain and highly organized cranium confers upon them. The presence of a crop, their uniformly fruit-eating habits, their wide distribution, their numerous modifications of form, and their utter dissimilarity to all other birds, added to the differences already pointed out in structure and habits, induce me to adopt without any hesitation the views of Bonaparte and Blyth, and to consider the Parrots as one of the primary divisions or orders in the class of birds.

In dividing this order into families I follow generally Bonaparte and Blainville, with a few modifications for simplicity. The great central mass of the order are the *Psittacidæ* or true Parrots, comprising all the American and more than half the Old-World species. These must be divided into several subfamilies, the *Palæornithinæ*, the *Psittacinæ*, and the *Eclectinæ*, containing the Indian and Malayan species. The next family, the *Platycercidæ* (the Broadtails and Ground-Parrots), are somewhat allied to the last group through the *Palæornithinæ*. They have different habits from most other Parrots, being often terrestrial and seed-eaters; their whole structure is weak, their flight slow and Cuckoo-like; the keel of the sternum is lower and more rounded anteriorly than in the other families; the pelvis is short, broad, and flat; the skull is small; the bill short; the lower mandible broad and swollen; the legs rather long and slender; and the plumage lax and abundant.

The *Ptyctolophidæ*, or Cockatoos, are distinguished by their powerful bills, crested heads, heavy forms, and lax powdery plumage. They have a general resemblance to the last family and also to the true *Psittacidæ*. The *Trichoglossidæ* are the best-marked and most specialized group of all. The whole head, as well as the bill, is elongated and compressed; the wings long and powerful; the feet strongly grasping; and the tongue always furnished with brush-like papillæ. They are connected with the *Psittacidæ* by means of *Loriculus*, which agrees with them in general structure, but has the ordinary smooth tongue. In order to bring these families into a natural sequence, I arrange them in the following order:—1. *Ptyctolophidæ*; 2. *Platycercidæ*; 3. *Psittacidæ*; 4. *Trichoglossidæ*. The fifth family, *Strigopidæ*, containing the New Zealand Owl Parrots, seems allied to the *Platycercidæ*, and should follow them in a general arrangement of the order.

I may here remark that the limits which I place to the Malayan subregion, as distinguished from the Pacific Islands—namely, to include the Solomon Islands, while the New Hebrides and New Caledonia begin the Pacific subregion—is well established by the *Psittaci*;

since both the subfamily *Loriinæ* and the family *Plyctolophidæ* reach this point only, as well as the truly Malayan genus *Geoffroyus*.

I have endeavoured to make the following list of the Malayan *Psittaci* as complete and accurate as possible. The localities have been determined from personal observation and inquiry\*, as those usually given are very erroneous, owing to so many of the species being domesticated and carried to every part of the archipelago. Several species, which appear to have been founded on immature birds or accidental variations, are sunk altogether, as well as some which seem to have been described from made-up specimens. A few remarks on the habits of the species observed by myself are also given, and a table showing the geographical range of each species is added.

*List of the Malayan Species of Parrots.*

Fam. I. PLYCTOLOPHIDÆ.

1. CACATUA.

1. CACATUA PHILIPPINARUM.

*Psittacus philippinarum*, Gm. Syst. Nat. i. p. 331; Pl. Enl. 191.  
*Hab.* Philippine Islands.

2. CACATUA MOLUCCENSIS.

*Psittacus moluccensis*, Gm. Syst. Nat. i. p. 331; Pl. Enl. 498.

*Kakadœ rubro-cristatus*, Bourj. Perr. t. 78.

*Plyctolophus rosaceus*, Lear, Parr. pl. 2.

*Hab.* Ceram and Amboyna (*A. R. W.*).

*Remarks.*—This fine species is abundant in Ceram, but much less plentiful in Amboyna, and it is not known to extend beyond these islands. The birds are taken from the nest in holes of trees, and are easily domesticated. In Ceram they attack the young cocoa-nuts, gnawing through the tough outer covering to get at the pulp and water inside.

3. CACATUA CRISTATA.

*Psittacus cristatus*, Linn. Syst. Nat. i. p. 143; Pl. Enl. 263;  
Bourj. Perr. t. 82.

*Hab.* Gilolo, Batchian, and Ternate (*A. R. W.*).

4. CACATUA CRISTATELLA, n. s.

*Simillima C. cristatæ, sed multo minor.*

Exactly like *C. cristata* in colour, but very much smaller in all its dimensions. It inhabits a limited district in the northern peninsula of Gilolo. The true *C. cristata* inhabits the other parts of Gilolo; while the specimens from Batchian and Ternate are smaller, but still seem referable to the old species. The following are the comparative dimensions of four specimens in my collection:—

\* N.B. The initials (*A. R. W.*) after any locality show that the species was observed there by myself.

	Total length.	Wing.	Tail.	Bill.
	in.	in.	in.	in.
<i>C. cristata</i> (Gilolo) . . . . .	18 $\frac{1}{2}$	12 $\frac{1}{4}$	7 $\frac{1}{2}$	17 $\frac{1}{8}$
<i>C. cristata</i> (Batchian) . . . . .	17 $\frac{1}{2}$	10 $\frac{3}{4}$	6 $\frac{3}{4}$	15 $\frac{5}{8}$
<i>C. cristata</i> (Ternate), juv.?. . . . .	17	10 $\frac{3}{4}$	6 $\frac{1}{2}$	11 $\frac{1}{2}$
<i>C. cristatella</i> (Gilolo, Kao) . . . . .	15	10	5 $\frac{1}{2}$	11 $\frac{1}{2}$

The iris is *red* in this species, whereas in *C. cristata* it is dark olive.

*Hab.* Gilolo (Kao) (*A. R. W.*).

#### 5. CACATUA OPHTHALMICA.

*Cacatua ophthalmica*, Sclat. Proc. Zool. Soc. 1864, p. 188.

*C. ducorpsii*, Sclater, P. Z. S. 1862, p. 141, pl. xiv. (err.).

*Hab.* Solomon Islands? (Perhaps some adjacent island.)

#### 6. CACATUA DUCORPSII.

*Cacatua ducorpsii*, H. & J. Voy. au Pôle Sud, Zool. i. p. 108, t. 26. f. 1; Sclater, P. Z. S. 1864, p. 187, Pl. XVII.

*Hab.* Solomon Islands.

*Remark.*—Both these species are now living in the Gardens of the Society.

#### 7. CACATUA TRITON.

*Plyctolophus triton*, Temm. Consp. Gen. Ind. Arch. iii. p. 405.

*Hab.* New Guinea (Goram, introduced) (*A. R. W.*).

*Remarks.*—Numbers of this species are brought from the mainland of New Guinea by the trading inhabitants of the little island of Goram, where escaped birds have bred, and are now very common.

#### 8. CACATUA MACROLOPHA.

*Plyctolophus macrolophus*, Bernst. Cab. Journ. 1861, p. 46.

*Hab.* Aru Islands, Mysol, Waigiou, and Salwatty (*A. R. W.*).

*Remarks.*—This has been confounded with the last, and with Temminck's *C. æquatorialis*. It is intermediate in size between the two.

#### 9. CACATUA ÆQUATORIALIS.

*Plyctolophus æquatorialis*, Temm. Consp. Gen. Ind. Arch. iii. p. 405.

*Hab.* Celebes, Flores, and Lomboek (*A. R. W.*).

*Remarks.*—This is of the same size as *C. sulphurea*, but has a much larger bill.

#### 10. CACATUA SULPHUREA.

*Psittacus sulphureus*, Gm. Syst. Nat. i. p. 330; Pl. Enl. 14; Lear. Parr. pl. 4.

*Hab.* Timor (*A. R. W.*).

#### 11. CACATUA CITRINO-CRISTATA.

*Plyctolophus citrino-cristatus*, Fr. Proc. Zool. Soc. 1844, p. 38.

*Hab.* Timor-laut.

*Remark.*—This bird is often brought alive to Macassar in praus from the Timor-laut and Tenimber islands, to which it seems quite restricted, all the surrounding islands possessing their distinct species.

## 2. MICROGLOSSUM.

### 12. MICROGLOSSUM GOLIATH.

*Psittacus goliath*, Kuhl, Consp. Psitt. pp. 9, 94; Levaill. Perr. t. 12, 13.

*Hab.* New Guinea, Waigiou, and Mysol (*A. R. W.*).

*Remarks.*—This extraordinary bird is of a weak structure and feeble flight, all its muscular power seeming to be concentrated in the head and bill. It is solitary, and frequents the lower parts of the forest, and utters a plaintive whistling note, very different from the harsh scream of the true Cockatoos. The bright red colour of the face, and the long crest, which it suddenly throws up when alarmed or excited, as well as the threatening aspect of the enormous bill, may serve to frighten away birds of prey, to whose attacks its solitary habits and general weakness of structure would seem to render it especially liable. This species has probably the most powerful beak of any bird in the world, and it is the only creature that can break open the extremely hard and solid nuts of the genus *Canarium*, species of which abound in the countries it inhabits.

### 13. MICROGLOSSUM ATERRIMUM.

*Psittacus aterrimus*, Gm.; Kuhl, Consp. Psitt. pp. 12, 91.

*Ara alecto*, Temm. Faun. Jap. p. 17.

*P. griseus*, Bechst.; Less. Perr. t. 11.

*Hab.* Aru Islands (*A. R. W.*); N. Australia (B.M.).

*Remarks.*—The two species of *Microglossum* are hardly distinguishable. The *P. aterrimus* of Gmelin seems to refer to the smaller form which inhabits the Aru Islands and N. Australia, and was therefore probably the earliest known.

## 3. NASITERNA.

### 14. NASITERNA PYGMÆA.

*Psittacus pygmæus*, Q. & G. Voy. de l'Astrol. t. 21. f. 1, 2; Wagl. Mon. p. 631.

*Hab.* New Guinea, Mysol (*A. R. W.*).

*Remarks.*—This curious little bird is most difficult to obtain, owing to its very small size and green colour, rendering it almost invisible among the foliage. According to the observation of my collector, Mr. Allen, it makes a hole in arboreal white ants' nests, in which it lays its eggs, like some of the small *Psittacula* of South America. Its spined tail would indicate some peculiar habits, of which we have as yet no account. It is a very abnormal form, and is placed among the Cockatoos with considerable doubt.

## Fam. II. PLATYCERCIDÆ.

## 4. PLATYCERCUS.

## 15. PLATYCERCUS VULNERATUS.

*Platycercus vulneratus*, Wagl. Mon. Psitt. p. 533.

*Psitt. erythropterus*, Q. & G. Voy. de l'Astrol. t. 27.

*Aprosmictus vulneratus*, Bp.

*Hab.* Timor (*A. R. W.*).

## 16. PLATYCERCUS AMBOINENSIS.

*Psittacus amboinensis*, Bodd.; Briss. Orn. iv. t. 28. f. 2; Linn. Syst. Nat. i. p. 141; Pl. Enl. 240.

*Hab.* Amboina, Ceram, and Bouru (*A. R. W.*).

*Remarks.*—This is a rather scarce bird. It has been confounded with the next species, which inhabits a different area, and is much smaller, as well as differently marked on the bill and tail. Both species eat green plantains, and are of much less sociable and tameable dispositions than most Parrots.

## 17. PLATYCERCUS DORSALIS.

*Psittacus dorsalis*, Q. & G. Voy. de l'Astrol. t. 21. f. 1.

*Hab.* New Guinea, Waigiou (*A. R. W.*), and Sulla Islands (var.) (*Allen*).

## 18. PLATYCERCUS HYPOPHONIUS.

*Platycercus hypophonius*, Müll. & Schleg. Verh. Nat. Gesch. p. 181.

*Hab.* Gilolo (*A. R. W.*).

## Fam. III. PSITTACIDÆ.

## 5. PALÆORNIS.

## 19. PALÆORNIS LONGICAUDUS.

*Psittacus longicaudus*, Bodd. Pl. Enl. 887.

*Psitt. barbatulatus*, Levaill. Perr. t. 72.

*Psitt. malaccensis*, Gm.; Vigors, Bp.

*Hab.* Malacca, Sumatra, and Borneo (*A. R. W.*).

## 20. PALÆORNIS JAVANICUS.

*Psittacus javanicus*, Osb.

*Ps. osbeckii*, Lath.

*Palæornis barbatus*, Lev. Perr. t. 31.

*Hab.* Java and Borneo (? *borneus*, Wagl., immature) (*A. R. W.*).

## 21. PALÆORNIS CANICEPS.

*Palæornis caniceps*, Blyth, Journ. As. Soc. Beng. xv. pp. 23, 51, 368.

*Hab.* Nicobar Islands (? Penang).

*Remarks.*—The specimen obtained by Dr. Cantor in Penang was

probably brought from the Nicobar Islands, which I consider the western limit of the Malayan region

## 6. PSITTINUS.

### 22. PSITTINUS INCERTUS.

*Psittacus incertus*, Shaw, Nat. Miscell. pl. 769.

*P. malaccensis*, Lath. ; Wagl. Mon. p. 630 ; Sw. Zool. Ill. pl. 154.

*Hab.* Malay Peninsula, Singapore, Sumatra, and Borneo (*A. R. W.*).

*Remarks.*—This species is the most abundant of the Parrots of the western Malay countries. The genus has undoubted affinities to *Palæornis*.

## 7. GEOFFROYUS.

### 23. GEOFFROYUS PERSONATUS.

*Psittacus personatus*, Shaw, Gen. Zool. viii. p. 544 ; Lev. Perr. t. 112, 113.

*P. geoffroyanus*, Vieill.

*P. bataviensis*, Wagl.

*P. aruensis*, G. R. Gray, Proc. Zool. Soc. 1858, p. 183 (var.).

*P. jukesii*, G. R. Gray, List of Psitt. in B. M. p. 72 (var.).

*P. capistratus*, G. R. Gray, Proc. Zool. Soc. 1858, p. 183 (♀ var.).

*P. fuscicapillus*, Vieill. N. Dict. d'Hist. Nat. xxv. p. 316 (♀) ; Wagl. Mon.

*P. spadiceocephalus*, Kuhl, Consp. Psitt. p. 84.

*Hab.* Bouru, Ceram, Amboyna, Goram, Ké Islands (*capistratus*), Aru Islands (*aruensis*), Timor (*jukesii*), and Flores (*jukesii*) (*A. R. W.*).

*Remarks.*—This species varies in size, and I can find no permanent differences by which any of the above forms can be separated.

### 24. GEOFFROYUS CYANICOLLIS.

*Psittacus cyanicollis*, Müll. & Schleg. Verh. Nat. Gesch. Ethn. pp. 108, 182.

*Hab.* Gilolo and Batchian (*A. R. W.*).

*Remarks.*—A very distinct and beautiful bird. The species of this genus are seldom domesticated. I do not remember ever having seen one in confinement.

### 25. GEOFFROYUS PUCHERANI.

*Geoffroyus pucherani*, Bp. ; Souancé, Rev. et Mag. de Zool. 1856, p. 218.

*Pionus fuscicapillus* (Wagl.), Homb. et Jacq. Voy. au Pôle Sud, t. 25. f. 3.

*Hab.* New Guinea, Waigiou, and Mysol (*A. R. W.*).

### 26. GEOFFROYUS HETEROCLITUS.

*Pionus heteroclitus*, H. & J. Voy. au Pôle Sud, Zool. iii. p. 103. t. 25\*. f. 1.

*P. cyaniceps*, Puch. Voy. au Pôle Sud, t. 25\*. f. 2.

*Hab.* Solomon Islands.

## 8. PRIONITURUS.

## 27. PRIONITURUS FLAVICANS.

*Prioniturus flavicans*, Cassin, Proc. Ac. Phil. vi. p. 373 (♀); Sclat. Proc. Zool. Soc. 1860, p. 223 (♂).

*Hab.* North Celebes (Tondano) (*A. R. W.*).

*Remarks.*—Eats plantains about the villages; flies after dark.

## 28. PRIONITURUS SETARIUS.

*Psittacus setarius*, Temm. Pl. Col. 15.

*Prioniturus platurus*, Wagl. Mon. p. 523.

*Psitt. spatuliger*, mas, Bourj. Perr. t. 53.

*Hab.* Celebes (Menado and Macassar) (*A. R. W.*).

*Remarks.*—Rather abundant near the town of Macassar in October. In both species the females have the spatulate tail as much developed as that of the males.

## 29. PRIONITURUS DISCURUS.

*Prioniturus discurus*, Vieill. Gal. des Ois. i. p. 7, pl. 36; Wagl. Mon. p. 524.

*Psittacus spatuliger* (♀), Bourj. Perr. t. 53 a.

*Hab.* Philippine Islands (Mindanao).

## 30. PRIONITURUS —.

*Prioniturus spatuliger* (Bourj.), G. R. G. List of Parrots in B. M. p. 18; Sclater, Proc. Zool. Soc. 1860, p. 224.

*Hab.* Philippine Islands. (Probably Mindanao, the island nearest Celebes.)

## 9. CYCLOPSITTA.

## 31. CYCLOPSITTA DIOPHTHALMA.

*Cyclopsitta diophthalma*, H. & J. Voy. au Pôle Sud, t. 25 bis, f. 4, 5.

*Hab.* Aru Islands and Mysol (var.) (*A. R. W.*).

*Remarks.*—This beautiful little bird was shot while feeding on the fruit of a *figus*, close to the trading-town of Dobbo. The specimens from Mysol have the blue spot before the eye larger, and that on the cheeks rather brighter, but less extended. What is probably an immature bird has the cheeks of the female, with the forehead of the male. More examples are wanted to determine whether this is a distinct species.

## 32. CYCLOPSITTA DESMARESTI.

*Psittacula desmaresti*, Garn. Voy. de la Coquille, Zool. t. 35; Bourj. Perr. t. 85.

*Hab.* New Guinea (Dorey Harbour) (*A. R. W.*).

## 33. CYCLOPSITTA BLYTHII, n. s.

*Similis C. desmaresti, sed capite colloque aurantiacis sine macula suboculuri cærulea.*



Green; head above deep orange, more intense on the forehead; cheeks and throat pale orange; breast with a band of blue, succeeded by one of brownish orange, as in *C. desmaresti*; sides of the breast blue; under wing-coverts blue-green; belly yellowish green; bill black; feet greenish olive.

Total length 8 inches; wings  $4\frac{1}{4}$ .

*Hab.* Mysol (*A. R. W.*).

*Remarks.*—I have named this bird after Mr. Edward Blyth, who first called my attention to its distinctness from the allied species. In the British Museum Collection there is a specimen from Salwatty which I had overlooked, but which possesses a small blue cheek-spot, although in other respects it resembles this bird. Six specimens from Mysol were all exactly alike; and more than twenty specimens of *P. desmaresti*, of both sexes, collected by myself in New Guinea were equally constant. The Salwatty specimen is therefore very interesting, as showing one of the links by which these now very distinct species have been formerly connected together.

#### 34. CYCLOPSITTA LOXIA.

*Psittacus loxia*, Cuv.

*Psittacula loxia*, Bourj. Perr. t. 94.

*Hab.* Philippine Islands.

#### 35. CYCLOPSITTA LUNULATA.

*Psittacus lunulatus*, Scop. Sonn. Voy. t. 39.

*P. torquata*, Gm.; Wagl. Mon. p. 630; Lear, Parr. pl. 39.

*Hab.* Philippine Islands (Manilla).

#### 36. CYCLOPSITTA LEUCOPHTHALMA.

*Psittacus leucophthalmus*, Scop. Sonn. Voy. t. 38.

*P. simplex*, Kuhl, Consp. pp. 9, 66.

*Hab.* Philippines (Luzon).

*Remarks.*—The genus *Cyclopsitta* is curiously divided between New Guinea and the Philippines, and seems to have its nearest external allies in the *Agapornis* of Africa.

### 10. TANYGNATHUS.

#### 37. TANYGNATHUS LUCIONENSIS.

*Psittacus lucionensis*, Linn.; Briss. Orn. iv. t. 22. f. 2.

*P. marginatus*, Gm.; Wagl. Mon. p. 678.

*Hab.* Philippine Islands (Manilla).

#### 38. TANYGNATHUS MEGALORHYNCHUS.

*Psittacus megalorhynchus*, Bodd. P. Enl. 713.

*P. macrorhynchus*, Gm.; Wagl. p. 677.

*P. nasutus*, Lath. Ind. Orn. p. 118.

*Hab.* Batchian, Makian, Gilolo, Mysol, Waigiou, Sanguir Islands, and New Guinea (*A. R. W.*).

## 39. TANYGNATHUS AFFINIS.

*Tanygnathus affinis*, Wallace, Proc. Zool. Soc. 1863, p. 20.

*Hab.* Bouru, Amboyna, and Ceram (*A. R. W.*).

## 40. TANYGNATHUS MÜLLERI.

*Psittacus mülleri*, Müll. & Schleg. Verh. Nat. Gesch. Ethn. pp. 108, 182.

*Hab.* Celebes (Macassar and Menado) (*A. R. W.*).

## 41. TANYGNATHUS ALBIROSTRIS.

*Psittacus sumatranus*, Raffl. Linn. Trans. xiii. 281 ; Wagl. Mon. p. 576.

*Tanygnathus albirostris*, Wall. Proc. Zool. Soc. 1862, p. 336.

*Hab.* Celebes and Sulla Islands (*A. R. W.*).

## 11. ECLECTUS.

## 42. ECLECTUS LINNÆI.

*Eclectus linnæi*, Wagl. Mon. p. 571, t. 22.

*Hab.* New Guinea, Mysol, Waigiou, and Aru Islands (*A. R. W.*).

## 43. ECLECTUS GRANDIS.

*Psittacus grandis*, Gm. S. N. i. p. 319 ; Pl. Enl. 683 ; Wagl. Mon. p. 572.

*P. ceylonensis*, Bodd.

*Hab.* Gilolo and Batchian (*A. R. W.*).

## 44. ECLECTUS CARDINALIS.

*Psittacus cardinalis*, Bodd. Pl. Enl. 518.

*P. puniceus*, Gm. S. N. i. p. 335 ; Wagl. Mon. p. 569 ; Wall. P. Z. S. 1863, p. 19.

*Hab.* Bouru, Amboyna, and Ceram (*A. R. W.*).

*Remark.*—Buffon's figure is bad ; but his description combined with it is recognizable, and evidently applies to this species. He gives Amboyna as its locality.

## 45. ECLECTUS CORNELIA.

*Eclectus cornelia*, Bp. Proc. Zool. Soc. 1849, pl. 11.

*Hab.* Unknown. (Probably either Ceram-laut or Jobie Islands.)

## 46. ECLECTUS STAVORINI.

*Psittacus stavorini*, Less. Voy. Coq. Zool. p. 628.

*Hab.* Unknown. (Perhaps Jobie Islands or N. Guinea.)

## 47. ECLECTUS POLYCHLOROS.

*Psittacus polychloros*, Scop.

*P. magnus*, Gm. ; Wagl. Mon. p. 575 ; Pl. Enl. 514.

*Hab.* New Guinea, Mysol, Waigiou, Aru Islands (var.), Gilolo, and Batchian (*A. R. W.*).

## 48. ECLECTUS INTERMEDIUS.

*Psittacodis intermedius*, Bp. Consp. Gen. Av. p. 4.

*Hab.* Ceram, Amboyna, and Bouru (*A. R. W.*).

*Remarks.*—This is only a smaller and rather less brightly coloured form of the last species.

## 49. ELECTUS WESTERMANNI.

*Psittacodis westermanni*, Bp. Consp. Gen. Av. p. 4; Proc. Zool. Soc. 1857, p. 226, pl. 127.

*Hab.* Unknown. (Probably New Guinea or Jobie Islands.)

*Note.*—The red and the green-coloured species of this genus are so alike in structure and habits that it is useless to separate them by adopting the genus *Psittacodis* for the latter. They are dull and heavy birds, frequenting low trees and the neighbourhood of villages, devouring plantains and papaw-fruits, and even descending to feed upon the red peppers, which they sometimes gorge so that they may be taken by hand.

## 12. DASYPTILUS.

## 50. DASYPTILUS PEQUETII.

*Psittacus pequetii*, Less. Bull. Univers. 1831, p. 241.

*Hab.* New Guinea and Salwatty.

*Remarks.*—A living specimen of this rare and curious bird was seen at Salwatty by my assistant, Mr. Allen, in the possession of a Bugis trader, who would not part with it. The natives knew it, but said it was very rare. Its affinities are doubtful, and it may perhaps belong to the next family.

## 13. LORICULUS.

## 51. LORICULUS GALGULUS.

*Psittacus galgulus*, Linn.; Wagl. Mon. p. 626; Pl. Enl. 190.

*Hab.* Malacca, Sumatra, and Borneo (*A. R. W.*).

*Remarks.*—At certain seasons this exquisite little bird is very plentiful, and is captured by the natives, soon becoming tame. It sleeps with its head downwards, suspended by one leg.

## 52. LORICULUS STIGMATUS.

*Psittacus stigmatus*, Müll. & Schleg. Verh. Nat. Gesh. Ethn. p. 182.

*Hab.* Celebes (Macassar and Menado) (*A. R. W.*).

## 53. LORICULUS SCLATERI.

*Loriculus sclateri*, Wall. Proc. Zool. Soc. 1862, p. 336, pl. 38.

*Hab.* Sulla Islands (*A. R. W.*).

*Remarks.*—This, one of the finest species of the genus, is only known from some small islands on the east side of Celebes.

## 54. LORICULUS AMABILIS.

*Loriculus amabilis*, Wall. Ibis, 1862, p. 349.

*Hab.* Gilolo (*A. R. W.*).

## 55. LORICULUS PUSILLUS.

*Loriculus pusillus*, G. R. Gray, Brit. Mus. Cat. Psitt. p. 54.

*Psittacus vernalis*, Kuhl; Sw. Zool. Ill. 2nd ser. pl. 1.

*Hab.* Java (*A. R. W.*).

*Remarks.*—I found this bird myself in Java. Its simple colouring has led to its being taken for other species in an immature state. The sexes are alike.

## 56. LORICULUS FLOSCULUS.

*Loriculus flosculus*, Wall. Proc. Zool. Soc. 1863, p. 488.

*Hab.* Flores (*A. R. W.*).

## 57. LORICULUS MELANOPTERUS.

*Psittacus melanopterus*, Scop. Sonn. Voy. t. 40.

*P. minor*, Gm.

*Hab.* Philippines (Mindanao).

## 58. LORICULUS APICALIS.

*Loriculus apicalis*, Souancé, Rev. et Mag. de Zool. 1856, p. 221.

*Hab.* Philippines (Mindanao).

## 59. LORICULUS BONAPARTEI.

*Loriculus bonapartei*, Souancé, Rev. de Zool. 1856, p. 222.

*Psittacus minor*, Wagl. Mon. p. 628 (nec Gmel.).

*Hab.* Sooloo Islands.

## 60. LORICULUS CULACISSI.

*Psittacus culacissi*, Vieill. Enc. Méth. p. 1405; Wagl. Mon. p. 627.

*P. rubrifrons*, Vig.; Lear, Parr. pl. 41.

*P. philippensis*, Steph. Gen. Zool. xiv. p. 144.

*Hab.* Philippine Islands.

## 61. LORICULUS REGULUS.

*Loriculus regulus*, Souancé, Rev. et Mag. de Zool. 1856, p. 222.

*Hab.* Philippines (Mindanao).

## Fam. IV. TRICHOGLOSSIDÆ.

## 14. LORIUS.

## 62. LORIUS DOMICELLA.

*Psittacus domicella*, Linn.; Pl. Enl. 119; Wagl. Mon. p. 567.

*Hab.* Ceram and Amboyna (*A. R. W.*).

*Remarks.*—The *Psittacus raja* of Shaw, Vieillot, &c., is probably a domesticated variation of this species, induced by peculiar food.

## 63. LORIUS LORY.

*Psittacus lory*, Linn.; Pl. Enl. 168.

*Domicella lory*, Wagl. Mon. p. 568.

*Lorius tricolor*, Steph.

*Hab.* New Guinea, Waigiou, and Mysol (*A. R. W.*).

## 64. LORIUS CYANAUCHEN.

*Lorius cyanauchen*, Müll. & Schleg. Verh. Nat. Gesch. Ethn. p. 107.

*L. superbus*, Fraser, Proc. Zool. Soc. 1845, p. 16.

*Hab.* Myfor and Jobie islands (New Guinea).

*Remarks.*—While I was staying at Dorey Harbour a native vessel arrived from Myfor Island, bringing a few of these fine birds; and I was assured they were also found in Jobie.

## 65. LORIUS GARRULUS.

*Psittacus garrulus*, Linn.

*Domicella garrula*, Wagl. Mon. p. 570; Pl. Enl. 216.

*Hab.* Gilolo and Batchian (*A. R. W.*).

*Remarks.*—The yellow dorsal patch varies much in most Gilolo birds, being very small; while in Batchian specimens it is always very large and conspicuous.

## 66. LORIUS CHLOROCERCUS.

*Lorius chlorocercus*, Gould, Proc. Zool. Soc. 1856, p. 137.

*Hab.* Solomon Islands.

## 67. LORIUS HYPÆNOCHROUS.

*Lorius hypœnochrous*, G. R. Gray, List of Psittacidæ in Brit. Mus. p. 49.

*Hab.* Louisiade archipelago.

*Note.*—*Lorius cœruleatus* and *L. cyanurus* are probably artificial birds.

## 15. CHALCOPSITTA.

## 68. CHALCOPSITTA ATRA.

*Psittacus ater*, Scop.

*P. novæ-guineæ*, Gm.; Wagl. Mon. p. 534; Lev. Perr. t. 49.

*Chalcopsitta bernsteini*, Rosenb. Cab. Jour. 1858, p. 46.

*Hab.* New Guinea and Mysol (*A. R. W.*).

## 69. CHALCOPSITTA SCINTILLATA.

*Psittacus scintillatus*, Temm. Pl. Col. 569 (juv.); Bourj. Perr. t. 51.

*Chalcopsitta rubrifrons*, G. R. Gray, Proc. Zool. Soc. 1858, p. 182, pl. 135.

*Hab.* New Guinea (*Temm.*) and Aru Islands (*A. R. W.*).

*Remarks.*—This beautiful bird is very rare. Both this and the preceding species are easily domesticated, and are universal favourites from their good temper and docility.

## 70. CHALCOPSITTA RUBIGINOSA.

*Chalcopsitta rubiginosa*, Bp. Consp. Av. p. 3; Proc. Zool. Soc. 1850, pl. 16.

*Hab.* Unknown.

## 16. Eos.

## 71. EOS INDICA.

*Psittacus indicus*, Gm.; Pl. Enl. 143; Lev. Perr. t. 53.

*P. coccineus*, Lath.

*Hab.* Siau and Sanguir.

*Remarks.*—This beautiful bird is brought by native traders to Menado and Ternate from these islands, which are its only known habitat; it must therefore be considered as belonging to the Moluccas, although its habitat is situated between Celebes and the Philippines. *Psittacus variegatus*, Gm., is probably a made-up bird.

## 72. EOS CYANOGENIA.

*Eos cyanogenia*, Bp. Consp. Av. p. 4; Proc. Zool. Soc. 1850, pl. 14.

*Hab.* Myfor and Jobie islands (N. of New Guinea).

*Remarks.*—Living specimens of this bird were brought to Dorey along with *Lorius cyanauchen*.

## 73. EOS CYANOSTRIATA.

*Eos cyanostriata*, G. R. Gray, Gen. of Birds, ii. pl. 103.

*Lorius borneus*, Less.

*Hab.* Tenimber Islands and Timor-laut.

*Remarks.*—This species is often brought alive to Macassar in the Bugis praus, which go to the Tenimber Islands for the tripang fishery.

## 74. EOS RUBRA.

*Psittacus ruber*, Gm. (*P. borneus*, L.); Pl. Enl. 519; Lev. Perr. t. 44.

*P. moluccensis*, Lath.

*P. caeruleatus*, Shaw; Lev. Perr. t. 93.

*Hab.* Ceram, Goram, Amboyna, and Bouru (*A. R. W.*).

## 75. EOS SEMILARVATA.

*Eos semilarvata*, Bp. Consp. Av. p. 4; Proc. Zool. Soc. 1850, pl. 15.

*Hab.* Unknown. (Not Ceram, probably Timor-laut.)

## 76. EOS SQUAMATA.

? *Psittacus squamatus*, Bodd. Pl. Enl. 684.

? *P. guebiensis*, Scop.

*Hab.* Waigiou (*A. R. W.*).

*Remarks.*—This seems distinct from the next, having constantly much narrower bands on nape and less purple beneath. Its identification as above is doubtful.

## 77. EOS RICINIATA.

*Psittacus riciniatus*, Bechst.; Lev. Perr. t. 54.

*P. cochinsinensis*, Lath.; ? Wagl. Mon. p. 560.

*Hab.* Batchian and Gilolo (*A. R. W.*).

78. *EOS FUSCATA.*

*Eos fuscata*, Blyth, J. A. S. Bengal, 1858, p. 279.

*Eos torrida*, G. R. Gray, List of Psittacidae in B. M. p. 102.

*Hab.* New Guinea (Dorey) (*A. R. W.*).

*Remarks.*—The yellow variety of this bird is well described by Mr. Blyth, and his dimension ("wing 6 in.") is correct. The two sexes of both red and yellow varieties were obtained from one flock, which visited Dorey for a few days only during my residence there.

79. *EOS UNICOLOR.*

*Psittacus unicolor*, Shaw; Lev. Perr. t. 125.

*Lorius cardinalis*, H. & J. Voy. au Pôle Sud, Zool. iii. p. 103, t. 24\*. f. 2.

*Hab.* Solomon Islands.

17. *TRICHOGLOSSUS.*80. *TRICHOGLOSSUS HÆMATODUS.*

*Psittacus hæmatodus*, Linn.; Lev. Perr. t. 47; Wagl. Mon. p. 550.

*P. capistratus*, Bechst.; Kuhl, Consp. Psitt.

*Hab.* Timor (*A. R. W.*).

81. *TRICHOGLOSSUS FORSTENI.*

*Trichoglossus forsteni*, Bp. Consp. Av. p. 8.

*Hab.* Sumbawa (*Bonaparte*).

82. *TRICHOGLOSSUS CYANOGRAMMUS.*

*Trichoglossus cyanogrammus*, Wagl. Mon. Psitt. p. 554.

*Psittacus hæmatodus*, Gm. S. N. i. p. 316; Pl. Enl. 61.

*T. nigrogularis*, G. R. Gray, Proc. Zool. Soc. 1858, p. 183.

*Hab.* New Guinea, Waigiou, Mysol, Matabello Islands, Goram, Ceram, Amboyna, Bouru, and Aru Islands (*A. R. W.*).

*Remarks.*—This, like most species of wide ranges, varies irregularly, and I can find no character distinguishing the specimens from Aru.

83. *TRICHOGLOSSUS COCCINEIFRONS.*

*Trichoglossus coccineifrons*, G. R. Gray, P. Z. S. 1858, p. 183.

?*Trichoglossus immarginatus*, Blyth, J. A. S. Bengal, 1858, p. 279.

*Hab.* Aru Islands (*A. R. W.*).

*Remarks.*—Mr. Blyth's bird is probably the same as this, but immature, as he does not mention the red on the head. In other details of colouring it seems to agree, especially in the red colour of the under surface of the wings.

84. *TRICHOGLOSSUS ORNATUS.*

*Psittacus ornatus*, Linn.

*Eos ornata*, Wagl. Mon. p. 562.

*Lorius ornatus*, Steph.

*Australasia malaisiæ*, Less. Tr. d'Orn. p. 210.

*Hab.* Celebes (*A. R. W.*).

*Remarks.*—This beautiful species abounds all over Celebes, to which island it seems restricted.

85. TRICHOGLOSSUS FLAVOVIDIDIS.

*Trichoglossus flavoviridis*, Wallace, Proc. Zool. Soc. 1862, p. 337.

*Hab.* Sulla Islands and ? Celebes (Menado) (*A. R. W.*).

*Remarks.*—I obtained a single specimen at Menado, which was unfortunately eaten by rats, but seemed to be the same as this species.

86. TRICHOGLOSSUS EUTELES.

*Psittacus euteles*, Temm. Pl. Col. 568.

*Trichoglossus ochrocephalus*, Blyth, J. A. S. Bengal, 1858, p. 279.

*Hab.* Timor and Flores (*A. R. W.*).

*Remarks.*—This bird was very abundant in Timor, frequenting the blossoms of the *Eucalypti*. I see no reason for separating it generically from the other species as has been done by Bonaparte, who calls it *Psitteuteles euteles*.

87. TRICHOGLOSSUS IRIS.

*Psittacus iris*, Temm. Pl. Col. 567.

*Hab.* Timor (*A. R. W.*).

88. TRICHOGLOSSUS MASSENA.

*Trichoglossus massena*, Bp. Rev. et Mag. de Zool. 1854, p. 157.

*Hab.* Solomon Islands.

18. CHARMOSYNA.

89. CHARMOSYNA PAPUENSIS.

*Psittacus papuensis*, Gm. (*japonicus*, L.).

*P. bontii*, Lath.

*Lorius papuensis*, Less. Tr. d'Orn. p. 195 ; Lev. Perr. t. 77.

*Hab.* New Guinea (*A. R. W.*).

*Remarks.*—I saw tail-feathers at Dorey which had been obtained on the spot by the natives.

90. CHARMOSYNA PULCHELLA.

*Charmosyna pulchella*, G. R. Gray, List of Psitt. in B. M. p. 102.

*Hab.* New Guinea (Dorey) (*A. R. W.*).

91. CHARMOSYNA PLACENTIS.

*Psittacus placentis*, Temm. Pl. Col. 553.

*Hab.* Batchian and Gilolo (*A. R. W.*).

Var. *a.* With less red on throat.

*Hab.* Ceram (*A. R. W.*).

Var. *b.* With scarcely any red on throat.

*Hab.* Aru Islands (*A. R. W.*).







	Malacca.	Sumatra.	Borneo.	Java.	Philippines.	Celebes.	Sulla Islands.	Lomboek.	Sumbawa.	Flores.	Timor.	Bouru.	Ceram.	Goram.	Timor-laut.	Batchian.	Gilolo.	Sanguir Islands.	Aru Islands.	Mysol.	Waigiu.	Jobie and Myfor.	Salwatty.	New Guinea.	Solomon Islands, and those east of New Guinea.	
<b>TRICHOGLOSSIDÆ (cont.).</b>																										
<b>Eos</b>																										
<i>indica, Gm.</i> .....																		1								
<i>cyanogenia, Bp.</i> .....																						1				
<i>cyanostriata, G. R. G.</i> .....															1											
<i>rubra, Gm.</i> .....											1	1	1													
<i>semilarvata, Bp.</i> .....																										
<i>squamata, Bodd.</i> .....																						1				
<i>riciniata, Bechst.</i> .....																1	1									
<i>fuscata, Bl.</i> .....																								1		
<i>unicolor, Shaw</i> .....																									1	
<b>Trichoglossus</b>																										
<i>hæmatodus, L.</i> .....											1															
<i>forsteni, Bp.</i> .....									1																	
<i>cyanogrammus, Wagl.</i> .....												1	1	1					1	1	1			1		
<i>coccineifrons, G. R. G.</i> .....																			1							
<i>ornatus, L.</i> .....						1																				
<i>flavoviridis, Wall.</i> .....						1	1																			
<i>euteles, Temm.</i> .....									1	1																
<i>iris, Temm.</i> .....											1															
<i>massena, Bp.</i> .....																										1
<b>Charmosyna</b>																										
<i>papuensis, Gm.</i> .....																										1
<i>pulchella, G. R. G.</i> .....																										1
<i>placentis, Temm.</i> .....													1			1	1		1							
<i>rubronotata, Wall.</i> .....																							1			
Species in each island . . . .	3	3	4	2	12	8	4	2	2	4	6	7	10	4	2	8	11	2	10	12	11	2	6	18	6	
Sp. peculiar to each island	0	0	0	1	..	5	1	0	1	1	4	0	2	0	2	0	3	1	2	0	1	2	1	4		
Genera in each island . . . .	3	3	3	2	5	5	4	2	2	4	4	6	9	..	..	..	9	..	..	10	..	..	..	14		
		Mal., Sum., Bor., & Java.			Phil.	Celebes.				Timor group.																
Sp. in groups of islands ..		5			12	10				9																
Peculiar species .....		5			12	8				7																
Genera .....		3			5	6				4																
Peculiar genera .....		1			0	0				0																
					1 genus.																					
		One genus quite peculiar.			10 genera peculiar to the Austro-Malayan region !																					
18 genera in the Archipelago (13 peculiar).																										

2. NOTICE OF A NEW VARIETY OF RHODONA PUNCTATA FROM THE SWAN RIVER. BY DR. J. E. GRAY, F.R.S., ETC.

Mr. Edward Gerrard has brought to me a Lizard from the Swan River, which differs considerably from the common form of *Rhodona punctata*\*, indeed so much so that I was at first inclined to regard it as a new species of that interesting genus; but on reconsideration, as it only differs in the distribution of the colours, I think that it is better to regard it as a variety. It may be named after its discoverer, *Rhodona punctata*, var. *gerrardii*. The body white, with three broad black streaks, which are continued from the head to rather beyond the base of the tail; each of the streaks is as wide as, or rather wider than, two-thirds of two series of scales. The two outer streaks commence on the side of the nose, and are continued across and along the eye and down the side of the body; the central vertebral streak commences at the back of the head. The three streaks are continued on the tail; but they become wider, and are broken up into spots, which have some more or less distinct white streaks across them. The upper surface of the hind thighs are black-spotted, the spots forming a kind of streak; the chin, belly, and under part of the tail are white.

*Hab.* Swan River.

3. NOTE ON STERNOTHÆRUS ADANSONII FROM WEST AFRICA. BY DR. J. E. GRAY, F.R.S., ETC.

(Plate XXIII.)

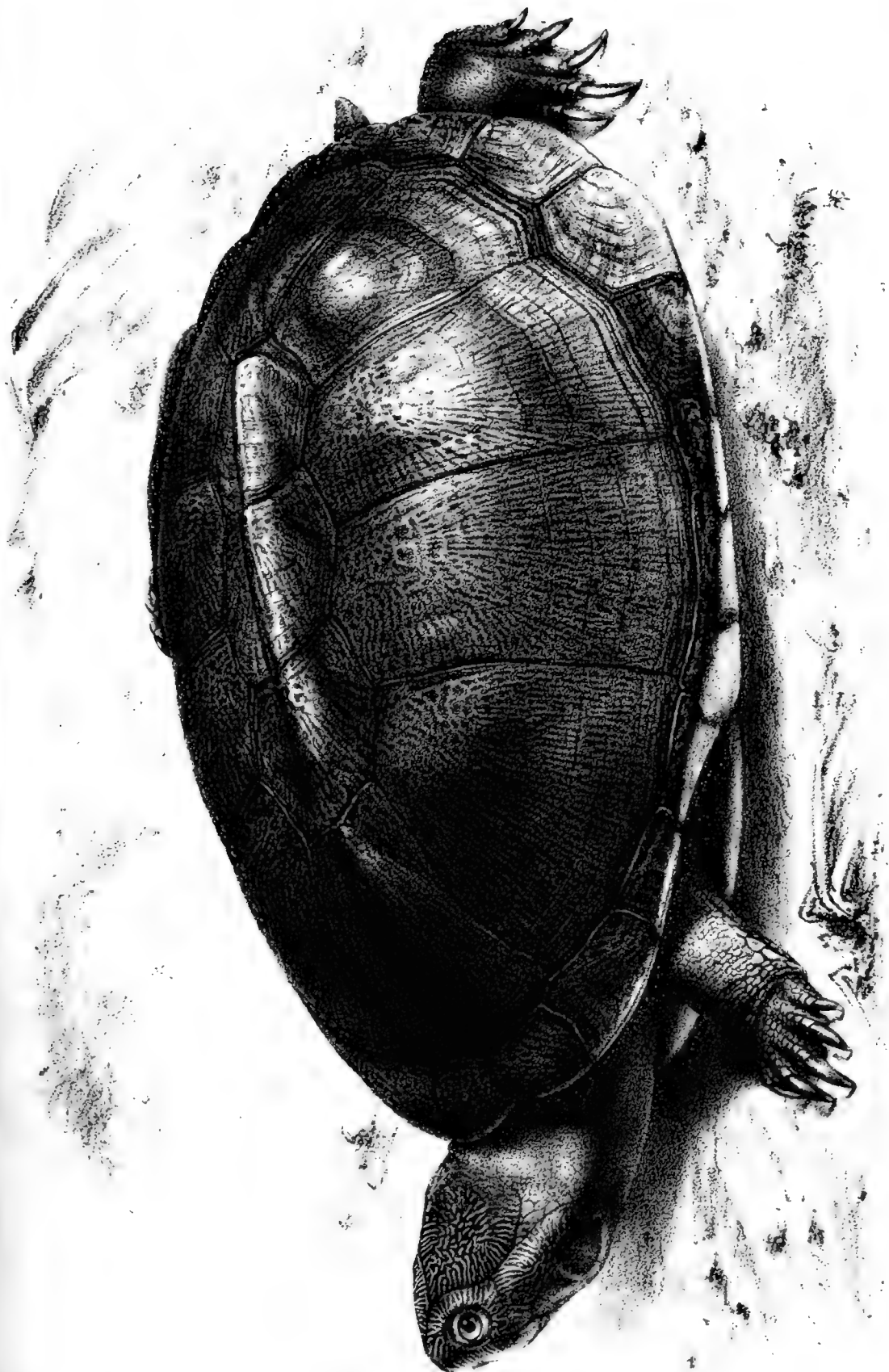
On the 26th of May last year I read a paper before this Society on the species of *Sternothæri* then in the British Museum, and I divided them into sections or subgenera. In that paper I took no notice of *Sternothærus adansonii*, as that species was only described from a shell in the Paris Museum, said to have come from the Cape de Verd Islands, which had been noticed by Schweiger under the name of *Emys adansonii*.

We have just received, through Mr. Dalton, two specimens of a species of the genus from the west coast of Africa, which is very distinct from any of the others, and, I have little doubt, is identical with the shell in the Paris Museum. As it is in a perfect state and well preserved, I think it well to give a new description of it.

It belongs to the subgenus *Notoa*, the head being short, and the temples covered with a large triangular space of small polygonal shields.

The hinder part of the sternum of the animal is narrower, and more like that of the genus *Pelomedusa* than any of the other species of the genus *Sternothærus*; but the front lobe is distinctly moveable, and united by a straight suture.

\* Cat. of Lizards in B. M. (1845), p. 89.









J. Wolf del. et. lith.

M. & N. Hanhart. Imp.

CONURUS RHODOGASTER



## STERNOTHÆRUS ADANSONII.

Shell oblong ovate, depressed, rather wider behind than in front; dark olive, with very close, regular, uniform radiating black lines, sometimes broken up into small dark spots; sternum and undersides of the margin yellow; the areola of the sternal plate square, blackish.

The head depressed, with very close, nearly uniform, unequal black lines; the frontal plate very large, with a triangular patch of small scales on the temple, reaching to over the front edge of the ears; the lips white; the throat pale; the feet olive above, pale beneath; claws 5/5, olive, with a yellow streak in the middle of the upper surface.

The first vertebral plate much longer than wide, narrow behind, with a blunt keel ending in a rounded tubercle behind. The second, third, and fourth vertebræ about as wide as long, with a sharp keel, ending in an acute tubercle near the hinder edge of each shield; the fifth vertebra like the first, but only very slightly keeled. The front marginal plate wide, those over the hinder legs rather wider, and those on the sides of the shell very narrow. The gular plate small, triangular; the intergular one lozenge-shaped, narrowed in front; the pectoral plates narrowed and truncated at the inner edges.

*Hab.* West coast of Africa (*Dalton*).

The species of this genus seem to have a confined range. Thus, there are two species of the first subgenus (*Tanoa*)—one from S. Africa and Natal, and the other from Western Africa; in the same manner there are two species of the second subgenus (*Notoa*)—one from Madagascar and the other from the West African coast. Thus

1. *Tanoa*.2. *Notoa*.

<i>S. sinuatus</i> . . . . .	S. and E. Africa . . . . .	<i>S. subniger</i> .
<i>S. jerbianus</i> . . . . .	West Africa . . . . .	<i>S. adansonii</i> .

4. CHARACTERS OF THREE NEW AMERICAN PARROTS. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XXIV.)

Mr. Otto Finsch, the lately appointed Curator of the Zoological Museum of Bremen, who has recently visited this country in order to obtain materials for the preparation of his work on the *Psittacidæ*, has furnished me with notes on three new American species of this interesting group of birds. Two of these are discoveries made many years ago by the late Johann Natterer in Brazil, although they have not yet been published, and I shall describe them under Natterer's MS. names. To the third species I propose to attach the name of Mr. Finsch, whose monograph of the Parrots, to which he has devoted much time and toil, will shortly be published.

1. *CONURUS RHODOGASTER*, Natt. MS. (Pl. XXIV.)

*Dorso, humeris et alarum tectricibus viridibus; primariis intense cæruleis; secundariis, crisso et tectricibus caudæ superioribus cum fronte et macula cervicali utrinque virescenti-cæruleis: capite et collo sordide brunneis, plumis ad margines pallidis; gutture et cervice antica dilutioribus; facie ad basin rostri inferioris utrinque viridi: ventre coccineo: cauda nigricante, supra cupreo tincto: rostro et pedibus sordide fuscis, oculorum ambitu late nudo.*

Long. tota 8, alæ 5, caudæ 4 poll. Angl.

*Hab.* In vicin. urbis Borba in imp. Brasiliensi.

*Obs.* Affinis *C. lepido*, sed ab hac et aliis sp. ventre coccineo facile dignoscendus.

Mr. Finsch informs me that he first became acquainted with this fine species in Prince Max. of Wied's collection. Subsequently he received information that several examples were in the Vienna Museum, collected by the late J. Natterer in the vicinity of Borba. Through the obliging kindness of Herr August von Pelzeln I have obtained in exchange one of these specimens (which I now exhibit) for my own collection.

2. *BROTOGERYS CHRYSOSEMA*, Natt. MS.

*Aff. B. notato, Bodd., sed colore viridi clariore et flavidiore: primariorum tectricibus aureis nec aurantiacis, fronte flavescente, margine ad rostrum aurantiaco: macula gulari majore et pileo summo cærulescentiore differt.*

Long. tota 6·75, alæ 4·7, caudæ 2·5.

*Hab.* In Brasilia (Natt.).

This species is also one of Natterer's discoveries, and was communicated to Mr. Finsch by Herr von Pelzeln. I have to thank the latter gentleman for the typical specimen which I exhibit.

3. *CHRYSOTIS FINSCI*, sp. nov.

*Similis C. viridigenali, sed paulo major; plumis corporis inferioris nigro distinctius marginatis: fronte angusta, purpurascens-rubra: pilei plumis elongatiusculis, viridibus, cæruleo marginatis: rostro albo.*

*Hab.* In Mexico.

*Mus.* Brit.

The British Museum contains a single example of this fine species of *Chrysotis*, purchased from a dealer, and stated to be from Mexico. It was marked by Mr. Finsch, during his recent visit to this country, as being distinct from *C. viridigenalis* (to which it is nearly allied), and such is evidently the case. I therefore propose to call it by Mr. Finsch's name.

I have recently obtained examples of the true *C. viridigenalis* (*C. coccineifrons*, Souancé) from the Isthmus of Panama.

5. NOTE ON THE GEOGRAPHICAL DISTRIBUTION OF THE DUCKS OF THE GENUS DENDROCYGNA. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

The presence in the Society's collection of a fine series of living representatives of the genus *Dendrocygna* has necessitated some investigation into the history of these birds, with the view of ascertaining their correct specific names. In doing this I have drawn up some notes upon their geographical distribution, concerning which I have several new facts to record.

I am acquainted, from personal observation of specimens, with eight distinct species of this group, only five being enumerated in Eyton's 'Monograph of the *Anatidæ*.' These are—

1. DENDROCYGNA AUTUMNALIS.

*Anas autumnalis*, Linn.

*Dendrocygna autumnalis*, Eyt. Anat. p. 109; Schomb. Reis. iii. p. 762; Baird, B. N. Am. p. 770.

*Hab.* Brit. Guiana (*Schomb.*); Para (received living from); Lake of Yojoa, Honduras (*Taylor*); Guatemala, lagoons on Pacific coast, tolerably abundant (*Salvin*); Valley of Rio Grande, Texas (*Baird*).

*Mus.* Brit.

We have specimens of this well-known bird received alive from Para, whence it seems to be distributed northwards through Guiana and up the Central-American isthmus to Texas. Lately we have received four Mexican examples of this species from Paris. These differ from the South-American examples, in having the breast grey instead of brown like the belly, but not sufficiently to merit separation.

2. DENDROCYGNA VIDUATA.

*Anas viduata*, Linn. S. N. i. 205; Licht. Doubl. p. 84; Max. Beitr. iv. 921.

*Dendrocygna viduata*, Tsch. F. P. Orn. p. 54; Schomb. Reise, iii. 762; D'Orb. Voy. p. 448; Hartl. Orn. W. Afr. p. 248; Eyton, Anat. p. 109.

*Hab.* British Guiana (*Schomburgk*); Brazil, generally distributed over the inland waters (*Burmeister*); Paraguay (*Azara*); West Africa, Senegambia and Guinea (*Hartl.*); Sennaar and Abyssinia, Mengia (*Speke*); Mozambique (*Peters*); Natal (*Gurney*).

*Mus.* Brit.

"Repeatedly compared, by Hartlaub, Cabanis, and others, with South-American examples, and no constant difference discovered" (*Hartl. Orn. W. Afr. p. 248*).

The only suggestion I can make, with regard to the singular fact of this species being found in Africa and South America alike, is that it may have been an introduction into America of the early slavers, these birds being very tame and domestic, and often carried about on board ship.

3. DENDROCYGNA ARBOREA.

*Anas arborea*, Linn.

*Dendrocygna arborea*, Eyton, Anat. p. 110; Gosse, B. Jam. p. 395; Newton, Ibis, 1859, p. 366.

*Hab.* Jamaica (*Gosse*); Ste. Croix (*Newton*).

*Mus.* Brit.

We have lately received living specimens of this fine species from the West Indies.

4. DENDROCYGNA GUTTULATA.

"*Dendrocygna guttulata*, Müll." MS.

*Hab.* Celebes (Menado), Bouru, and Gilolo (*Wallace*).

*Mus.* Brit. et dom. Wallace.

I have not been able to find any reference to Müller's description of this very distinct species.

5. DENDROCYGNA ARCUATA.

*Anas arcuata et javanica*, Horsf. Zool. Res. et Trans. Linn. Soc. xiii. p. 199.

*Mareca awsuree*, Sykes.

*Hab.* Java (*Horsf.*); Sumatra (*Wallace*); India, common (*Blyth*); Nepal (*Hodgs.*); Int. of Africa (*Brit. Mus. ex Denham and Clapperton*); Kordofan (*Heuglin*).

This species is readily known from the two following (which are nearly allied to it) by its ferruginous upper tail-coverts.

6. DENDROCYGNA MAJOR.

*Dendrocygna major*, Jerdon, Ill. Ind. Orn. pl. 22.

"*Dendrocygna arcuata*," Newton, Ibis, 1863, pp. 175, 460.

*Hab.* Peninsula of India (*Jerdon*); Madagascar (*Roch*).

The occurrence of this species in Madagascar is very curious. I should have expected rather to have found the *D. arcuata*; and it is possible both species may occur; but the specimens of Dr. Roch which I have examined (now in the Museum of the Royal Institution at Woolwich) are certainly *Dendrocygna major*.

7. DENDROCYGNA VAGANS.

"*Dendrocygna vagans*, Eyton, MS.;" Cat. of Gallinæ, &c., p. 131 (no description).

*Dendrocygna arcuata*, Gould, B. Austr. vii. pl. 14.

*D. gouldi*, Bp. Compt. Rend. xliii. p. 649.

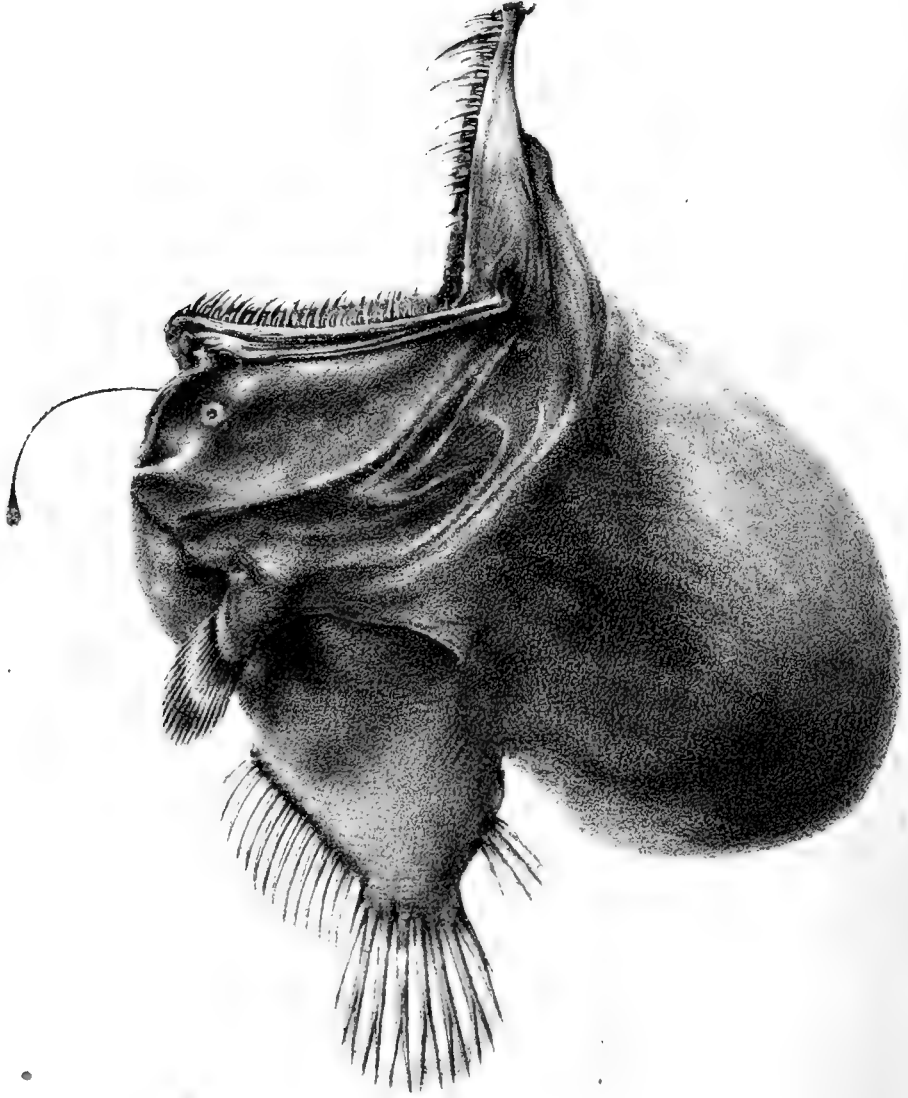
*Anas badia*, Müll. et Schl. Verh. Ethn. p. 159 (no description).

*Hab.* Philippines, Manilla (*Cuming*); Celebes, Macassar (*Wallace*); E. Timor (*Wallace*); N. Australia (*Gould*).

*Mus.* Brit. et dom. Wallace.

This species is figured by Mr. Gould as *D. arcuata* in his 'Birds of Australia.' It has received names from Mr. Eyton and Messrs. Müller and Schlegel, but, as far as I know, has never been described.





The Philippine-Islands examples are smaller and more spotted on the breast than the Australian; but the Celebes and Timor specimens are intermediate in these points.

#### 8. DENDROCYGNA EYTONI.

*Leptotarsis eytoni*, Gould, B. Austr. vii. pl. 15; Eyton, Mon. Anat. p. 111.

*Dendrocygna eytoni*, Gray, Cat. Gallinæ, &c., p. 131.

*Hab.* Northern Australia.

*Mus.* Brit.

Besides these species of *Dendrocygna*, of which I have seen and examined specimens, there appear to be two others which I have not yet met with, namely—

#### (1.) DENDROCYGNA FULVA.

*Anas fulva*, Gm. S. N. i. p. 530.

*Dendrocygna fulva*, Baird, B. N. Am. p. 771, pl. 63.

*Hab.* Mexico (*Gm.*); Fort Tejon, California (*Baird*).

This is perhaps not different from the next species.

#### (2.) DENDROCYGNA VIRGATA.

*Anas virgata*, Max. Reise, i. 322.

*Anas fulva*, Max. Beitr. iv. 918; Burm. Syst. Ueb. iii. p. 435.

*Hab.* Middle Brazil; Rio Belmonte (*Burm.*).

### 6. ON A NEW GENUS OF PEDICULATE FISH FROM THE SEA OF MADEIRA. BY DR. ALBERT GÜNTHER, F.Z.S.

(Plate XXV.)

Mr. J. Y. Johnson discovered during his last sojourn in Madeira, on the 24th December 1863, a fish which proves to be the type of a new genus, not only on account of its extraordinary form, but also on account of the absence of ventral fins. In the latter respect it agrees with *Ceratias* from the coast of Greenland, from which, however, it differs in its dentition.

It must be extremely rare, as the specimen entrusted to me by Mr. Johnson for description, and presented by him to the British Museum, is the only one which has ever come to the knowledge of naturalists. Neither the Rev. R. T. Lowe nor Mr. Johnson had heard of its existence, nor did the fishermen recognize it. It is evidently a deep-sea fish, inhabiting the same horizontal marine zone as *Saccopharynx* and *Alepidosaurus*. When brought to Mr. Johnson, the belly was much distended, and contained, rolled up spirally into a ball, a Scopeline fish, which measured  $7\frac{1}{2}$  inches in length, and 1 inch in depth. Nevertheless it was tempted to take a bait.

## MELANOCETUS.

Head and body compressed, head very large, body small, abdominal cavity forming a sac suspended from the trunk. Cleft of the mouth exceedingly wide, vertical. Teeth of the jaws and palate long, pointed, unequal in size. Skin smooth. The spinous dorsal is reduced to a single filament placed on the head. The soft dorsal and anal short. Ventrals none. Slit of the gill-openings of moderate width, below the pectoral.

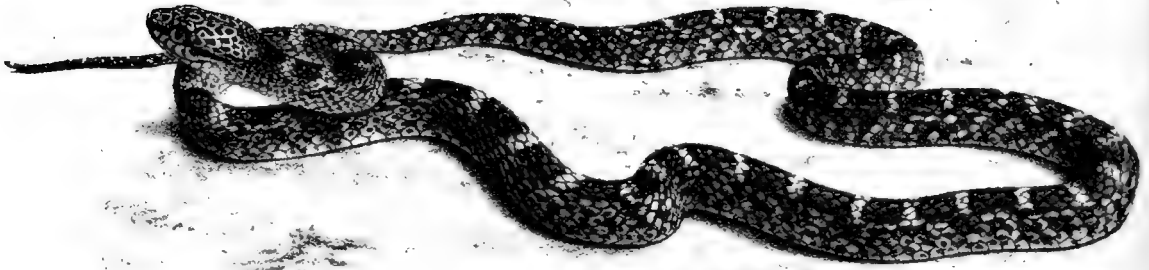
## MELANOCETUS JOHNSONII. (Pl. XXV.)

D. 1|14. C. 8. A. 4. P. 18.

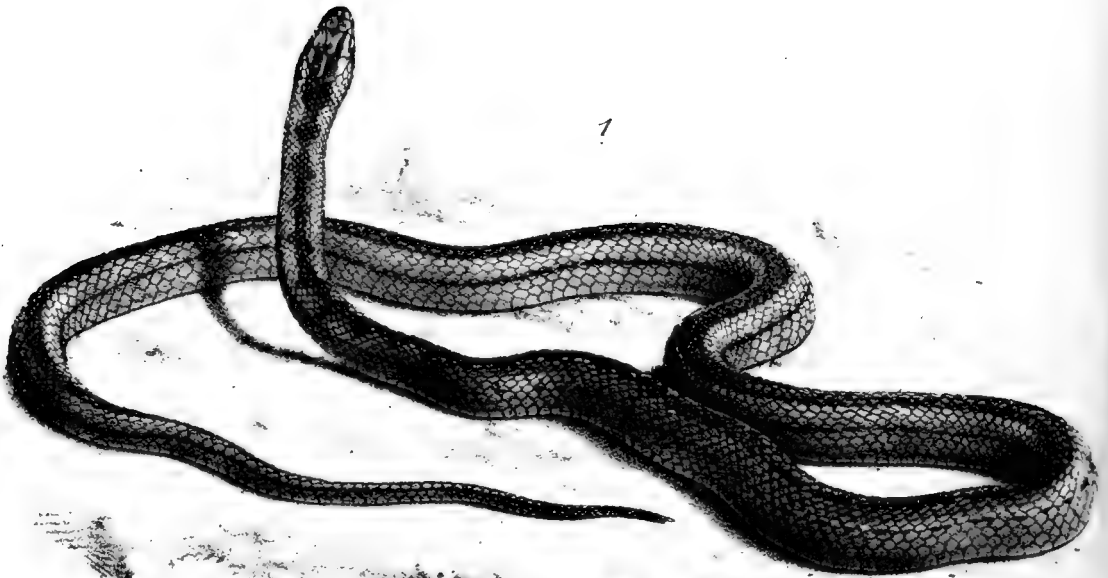
This singular fish is distinguished by a greater disproportion of the various parts of its body than is found in the other genera of the family to which it belongs. The head is of a tetrahedral form, and is the most extensive part of the whole animal. The gape is enormous, and, although the lower jaw is vertical when the mouth is closed, it can be moved downwards at more than a right angle. The lateral extensibility of the mouth is not less than the vertical; so that the prey which can be received within the cavity of the mouth actually may exceed the size of the fish itself. This enormous head is followed by a very small trunk and tail, the length of both being less than the depth of the head. As the trunk would not offer sufficient room for an abdominal cavity corresponding in size to the prey swallowed, this cavity is suspended as a large sac from the lower part of the body, and floats in the water. The upper and lower jaws are armed with a series of teeth, which are very unequal in length, some being very long, others small; all are very slender, and can be depressed towards the inside of the mouth: this peculiarity of the teeth may be observed in the *Lophius*, in the Pike, and numerous other rapacious fish with long slender teeth. The vomer is armed with a transverse series of single teeth, and extends across the whole width of the roof of the mouth; the palatine and pterygoid teeth are situated at some distance behind the vomer, and form two bundles irregular in form. The pharynx and œsophagus are, as might be expected, very wide. The eye is situated high up on the side of the head; it is very small, covered by, but appearing through, the skin. There are no nasal openings. The opercular pieces are reduced to styliform rudiments; there are five branchiostegals. Only the three inner branchial arches bear short branchial lamellæ, which are disposed in a double series on the two middle ones, and in a single one on the innermost arch. The gill-opening itself is a slit of moderate width, below and behind the pectoral fin. The upper surface of the head is concave, and in the middle of its anterior portion there is situated the single filament to which the anterior dorsal fin is reduced; this filament is more than half as high as the head, and dilated into a small lamella at its extremity. The second dorsal fin occupies the back of the tail, and is composed of fourteen simple rays, none of which are as high as the fin is long. The caudal fin is quite free from the dorsal and anal, and composed of eight very







2



1





Hyperolius.

1. *H. flavomaculatus*. 2. *H. citrinus*. 3. *H. microps*.

soft rays, which are bifid at the end, and form a convex posterior margin. Anal fin very short, composed of four rays only, which are opposed to the posterior dorsal rays. The base of the pectoral fin is fleshy and enveloped in skin, as in other *Pediculati*. It is composed of eighteen simple and feeble rays. Ventral fins none. Vent situated immediately behind the abdominal sac. The whole fish, even the inside of the mouth, of the abdominal sac, and of the stomach, is of a uniform deep black.

Total length (mouth closed)  $3\frac{8}{10}$  inches; length of intermaxillary and of mandible  $1\frac{4}{10}$  inch.

7. REPORT ON A COLLECTION OF REPTILES AND FISHES MADE BY DR. KIRK IN THE ZAMBESI AND NYASSA REGIONS. BY ALBERT GÜNTHER, M.A., M.D., PH.D., F.Z.S.

(Plates XXVI., XXVII.)

A most valuable collection of Reptiles and Fishes made by Dr. Kirk, the scientific companion of Dr. Livingstone on his last expedition to Eastern Africa, having been presented by him to the British Museum, I beg leave to lay before the Society a full account of its contents, with descriptions of those species which appear to me to be new to science. The Tortoises and a part of the Saurians have already been noticed by Dr. J. E. Gray in the 'Proceedings' of this Society, 1864, p. 58, where also figures of two new Lizards have been given. In the determination of several of the species, I have been aided by a less complete series of duplicate specimens which had been sent home by Mr. C. Livingstone, and were presented by Earl Russell to the British Museum.

For almost all we know of the fauna of this part of Tropical Africa we are indebted to Professor Peters, who spent several years in the exploration of its zoological and botanical productions, and who reaped so rich a harvest. However, Dr. Kirk entered a country previously unexplored, the topographical features of which are given in the following notes, with which I have been favoured by Dr. Kirk:—

“The present collection is chiefly from the regions bordering the Zambesi, including those of the Nyassa Lake.

“Some of the fish were gathered in the Rovuma, which was explored for 115 miles in direct distance, at which point it becomes encumbered by rocks, and cannot be ascended further. This river, gathering the waters of the eastern slopes of the coast mountain-range which overhangs the Nyassa, opens to the Indian Ocean north of Cape Delgado.

“Above the Victoria Falls of the Zambesi and the Murchison Rapids of the Shire a marked difference in the fish fauna is met with. During the short time spent in the former region, many fishes with which I was not familiar in the lower part were observed; and the natives who accompanied us remarked of others met with near Tete,

and still more met with in the Nyassa Lake, that to them they were unknown. Without claiming for the negro any exalted place, still it cannot be denied that in such points as come under his daily observation, particularly as concerns his food, he is very accurate and discriminating.

“The knowledge possessed of wild game by the hunters of the desert is well known; and the different tribes depending on the produce of the waters are equally well acquainted with their inhabitants.

“By the Murchison Rapids, which break the River Shire in its upper third, the water of Lake Nyassa descends from its own level (1522 feet) nearly to that of the sea. The rapids are between forty and fifty miles in length, the greater part of the descent being effected at six or seven points, between which are minor rapids and smooth reaches crossed by canoes.

“The fishes of the lake are almost all of species peculiar; and a full collection of dried skins of those observed was made, excepting of the Siluroids, which, being large, incompressible, and oily, are peculiarly objectionable where portage is limited.

“Having passed the navigable part of the Shire above the Murchison Rapids and entered the Nyassa Lake in south lat.  $14^{\circ} 25'$ , an inland sea opened to us, lying nearly north and south, overhung by mountains on either side, which, as we sailed north, closed, and at last formed steep cliffs, against which the heavy swell dashed as on the sea-shore. The western side, which was the one followed, presented a variety of rocky headlands jutting out, sandy coves, and long flat beaches. Many good anchorages and sheltered harbours exist, which one day may be turned to account. At various parts the sounding-line was cast; but only at the southern end, where the Shire flows off, or very near shore was bottom found, the remainder being of the pale milky blue of tropical seas. In such parts, with 35 fathoms no soundings were obtained; and near the north, where, at a mile off shore, 115 fathoms were given out, a like negative result followed. The distance due north explored by us amounted to 200 nautical miles; there it became necessary to turn, leaving the end unknown. Yet we have reasons for considering that we were not many days from reaching the furthest end, which may be expected to be in the tenth degree of south latitude, and distant from the known part of the Tanganyika Lake 400 miles.

“The width of the Nyassa is not commensurate with its length, but varies from fifteen to sixty miles. At the narrow points it is crossed by native canoes; but at one of these the voyage is broken, and the night spent, on the large inhabited island of Chisomoro. Fed by the streams coming from neighbouring mountains, the level of the Nyassa rises during the floods 3 feet. No streams of any size were seen entering on the west, while the narrowness of the mountain chain on the east does not admit of any large supply from that side; so that should a river enter from the north, there will still be no more entering than may be accounted for by evaporation and the exit of the Shire.

“The native tribes on the shores are numerous, and in no other part was so dense a population seen; they are engaged in the slave-

trade, and, being in contact with those passing to the coast, are cowardly and treacherous; thieves on all occasions, they are never to be trusted; their civility and goodwill extend only to those who have the power to punish if otherwise treated. These people depend on the lake for much of their food, and from its waters draw abundant support with the minimum of labour. They display great ingenuity in their many contrivances for capturing fish, and, except fly-fishing, employ all the methods in use among more civilized races. The net in all its forms is in use, from the seine to the cast-net; yet, curiously, the manufacture is different, and the common reef-knot employed instead of our more secure method of netting. Fish-weirs are thrown across narrow entrances to lagoons; and fish-baskets, cleverly made of reeds or split bamboo, placed in likely spots, commonly near rushes and *papyrus* frequented by mud-fish. The fish-hook with bait is a common amusement with the children. In other parts the spear is dexterously thrown, and fish-poison used in favourable localities.

“Of the Zambesi fishes, many are peculiar to the brackish tidal creeks; others, such as the spotted electric fish, to the higher parts of the delta, and are unknown above; while some marine fish, as the Saw-fish, ascend far up, being common at Lupata, and far from rare at Tete, 260 miles from the coast.

“Above the rapids of Kebra-bassa many fine fishes were seen, which, if they exist elsewhere, are rare.

“That part of the Rovuma explored yielded a small number of fishes, many of which were unknown to me previously; but I was assured by the crew of the boat that they were to be found also in the Zambesi. The natives who then accompanied us had not the intimate knowledge of fish possessed by the people from the interior; but as the kinds referred to were remarkable and at once easily to be distinguished, it would appear that, if not the same, at least allied forms were familiar to them, which they confirmed by showing a knowledge of the habits, which proved accurate.

“The Rovuma is during the dry season a mere streamlet, winding from side to side along a sandy bed; but during the rains, swollen by mountain torrents, it becomes a large river, and opens to one of the finest bays on the East-African coast. As a trade entrance to the interior it is of no service; its banks are infested by the Tsetse fly, named there ‘Chipanga.’ The natives are notorious robbers, to whom honour is unknown, and by whom fair dealing is looked on as weakness; yet, like all such cowards, they fear those better armed than themselves.

“With my limited means of transport at command, from the most interesting places it was possible to bring off only the dried skins of many fishes, which, being dried and placed along with plants between paper, were easily preserved. Fish-poison, where it can be applied, forms one of the best means for obtaining a tolerably full series of the species of a certain locality. Few savage tribes are ignorant of some such agent: in the interior of Africa a *Gardenia* bush yields

it; in other parts the common sort is from a *Tephrosia*, while the muddy creeks of the coast are poisoned by the climbing stems of *Derris uliginosa* (Benth.). Fish-poisons do not act equally on all species; and occasionally some of the smaller will continue active and unaffected, long after many much larger ones have become insensible and either forced themselves on shore or floated on the surface. In the case of the poison from the *Derris*, this was noticed to be the case with the *Tetrodon*, which remained with a few others, not one of which came up, while the other inhabitants of the creek were dead.

“A table is here added, showing the mean temperature, during the year, of the African rivers: that of the lake, from the few observations made, seemed to differ but little from those of the rivers. The temperature of the rivers varies during the day from 2° to 3°, according to the amount of sunshine and the mass of water acted upon. This has reference to the water in the deep channel: where the river becomes much expanded, as over shallow banks, the temperature is much raised; but in the deep parts no temperature higher than 90° has been observed.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
82°·5	84°·6	83°·5	78°·5	75°·5	72°·0	70°·3	71°·8	76°·0	80°·9	82°·0	84°·6

“Of Snakes there are many kinds, in size varying from that of the Python to the small grass-snakes. A few species are extremely venomous, and cases are well authenticated of the same individual killing several large animals in succession. Yet the danger to the traveller is almost none: during five years spent in company with natives, exposed while passing through every sort of vegetation, no snake ever offered to bite me, and I have never seen another person bitten. Yet our party often numbered thirty, and often slept on the open ground exposed at night. Accidents do occur, but are extremely rare.

“Finally, I must add that this collection has been formed in a desultory manner, under circumstances not always the most favourable, and that it contains many imperfect specimens, which may prove difficult of determination.”

#### List of the Species.

Those marked with an asterisk (\*) are new. Descriptions of those which have not been described elsewhere will form the last part of the paper.

#### TORTOISES.

*Sternotherus subniger*, Lacép.



## SAURIANS.

- Crocodylus vulgaris*, Cuv. Tette.  
*Monitor niloticus*, Cuv.  
 \**Teira ornata*, Gray, Proc. Zool. Soc. 1864, p. 58.  
*Gerrhosaurus robustus*, Peters. Tette.  
 \**Euprepes kirkii*, Gray, Proc. Zool. Soc. 1864, p. 62.  
 \**Euprepes grantii*, Gray, l. c. p. 62.  
*E. punctatissimus*, Smith.  
 \**Mochlus punctulatus*, Gthr.  
 \**Homodactylus turneri*, Gray, Proc. Zool. Soc. 1864, p. 59.  
*Phelsuma cepedianum*, Cuv. Quellimane.  
 \**Lygodactylus strigatus*, Gray, Proc. Zool. Soc. 1864, p. 59.  
*Hemidactylus platycephalus*, Peters.  
*Agama occipitalis*, Gray.  
 ? *Agama mossambica*, Peters. Quellimane.  
*Chamæleo dilepis*, Leach.

## SNAKES.

- Onychocephalus mucroso*, Peters.  
*Coronella olivacea*, Peters. Quellimane.  
 \**Coronella nototænia*, Gthr.  
*Dasyeltis scaber*, L.  
*Ahætulla irregularis*, Leach.  
*A. semivariiegata*, Smith. Shire valley. Ventral shields 190-193.  
*Bucephalus capensis*, Smith.  
*Psammophis sibilans*, L.  
*Leptodira rufescens*, Schleg.  
 \**Chamætortus aulicus*, Gthr.  
*Boodon lineatus*, D. & B.  
*Naja mossambica*, Peters.  
 \**Dendraspis polylepis*, Gthr.  
*Clotho arietans*, Merr.

## BATRACHIANS.

- Cassina senegalensis*, D. & B.  
*Bufo guineensis*, Schleg.  
*Hyperolius fornasinii*, Bianconi.  
*H. tæniatus*, Peters.  
*H. salinæ*, Bianconi.  
*H. argus*, Peters.  
*H. modestus*, Gthr. Quellimane.  
 \**H. flavomaculatus*, Gthr. Rovuma Bay.  
 \**H. citrinus*, Gthr.  
 \**H. microps*, Gthr. Rovuma Bay.  
*Brachymerus bifasciatus*, Smith.

## FISHES.

- Ambassis commersonii*, C. & V.  
*Therapon servus*, Bl. Mouth of Zambesi.  
 \**Pristipoma*, sp. n. (young specimen).

- Sillago acuta*, C. & V.  
*Psettus argenteus*, L.  
*Equula fasciata*, Lacép.  
*Mugil*, sp. (young). Mouth of Zambesi.  
 \**Chromis squamipinnis*, Gthr. Lake Nyassa.  
*C. mossambicus*, Peters. Lake Nyassa.  
 \**C. lateristriga*, Gthr. Lake Nyassa.  
 \**Hemichromis intermedius*, Gthr. Lake Nyassa.  
 \**H. robustus*, Gthr. Lake Nyassa.  
 \**H. longiceps*, Gthr. Lake Nyassa.  
 \**H. dimidiatus*, Gthr. Lake Nyassa.  
*Eutropius*, sp. incerta (young specimens).  
*Synodontis schal*, Bl. Schn. Rovuma.  
 \**Arius kirkii*, Günth. Fish. v. p. 163. Zambesi.  
*Brachyalestes acutidens*, Peters.  
 \**Hydrocyon lineatus*, Schleg. River Shiré.  
 \**Distichodus macrolepis*, Günth. Fish. v. p. 362. River Shiré.  
*D. shenga*, Peters. River Shiré.  
*Mormyrus macrolepidotus*, Peters. Rovuma.  
 \**M. catostoma*, Gthr. Fish. vi. p. . . Rovuma.  
*Albula bananus*, Lacép.  
*Hydrargyra*, sp.  
*Labeo congoro*, Peters. River Shiré, below cataract.  
*L. cylindricus*, Peters. Rovuma.  
 \**Pelotrophus microlepis*, Gthr. Lake Nyassa.  
 \**P. microcephalus*, Gthr. Lake Nyassa.  
*Pristis perroteti*, Valenc.

### Descriptions of New Species.

#### LIZARDS.

#### MOCHLUS (g. n. SCINCIDARUM).

Body and tail elongate; limbs feeble; toes 5—5. Snout depressed, wedge-shaped, the rostral shield being much broader than high, with a sharpish anterior edge. A pair of supranasals; nostril in the middle of a separate nasal shield. Scales perfectly smooth. Eyelid scaly; opening of the ear small. Palate toothless.

#### MOCHLUS PUNCTULATUS.

The supranasal shields are in contact with each other; the frontal and vertical form a broad suture together; four supraciliaries; two small anterior and two larger posterior occipitals with a small central shield between. Ear without lobules in front. There are seventy scales in a longitudinal series between mental shield and vent; the middle of the trunk is surrounded by twenty-eight series of scales. Limbs feeble. The length of the anterior equals the distance between the extremity of the snout and the front margin of the ear, and that of the posterior is one-third of the length of the trunk. The fingers are short, clawed: the third scarcely longer than the fourth; the

fourth toe a little longer than the third. There are three pairs of præanal scales, subequal in size; subcaudal scales not enlarged.

The upper parts are brown, many scales having a whitish or blackish dot; the blackish dots are predominant on the sides, where they are arranged in longitudinal series. Lower parts whitish.

	in.	lines.
Length of the snout . . . . .	0	3
— of the cleft of the mouth . . . . .	0	$6\frac{1}{2}$
Distance between snout and ear . . . . .	0	$7\frac{2}{3}$
Distance between snout and axil. . . . .	1	$2\frac{1}{2}$
Length of trunk . . . . .	2	$10\frac{1}{2}$
Circumference of trunk . . . . .	1	11
Length of front limb . . . . .	0	7
— of third finger. . . . .	0	$1\frac{1}{3}$
— of hind limb . . . . .	0	11
— of fourth toe . . . . .	0	$3\frac{1}{5}$

(Tail injured.)

#### SNAKES.

##### CORONELLA NOTOTÆNIA. (Pl. XXVI. fig. 1.)

Vertical shield elongate, nearly twice as long as broad, much longer than the two frontals together, and as long as the occipital, which is rounded behind. Rostral just reaching the upper surface of the head; loreal square; antecular single, large, extending to the upper surface of the head, but not reaching the vertical; two postoculars. Eight upper labials, the fourth and fifth entering the orbits, the last small; temporals scale-like, 1+2+3, the anterior the largest and in contact with both postoculars. Two pairs of chin-shields; the posterior are rather longer than the anterior, and pointed behind; there are four lower labials in contact with the front chin-shields. Scales in seventeen rows, with a single apical groove. Ventrals 177; anal bifid; subcaudals 76. Posterior maxillary tooth grooved.

Greyish brown: a deep brown band commences on the crown of the head, it being darkest and serrated on the anterior part of the body; it becomes fainter posteriorly, and is accompanied by a series of black dots on each side, which disappear on the tail. A brown line runs along the third outer series of scales, from the middle of the length of the body to the extremity of the tail; belly brownish yellow, marbled with brown.

Total length  $14\frac{1}{2}$  inches, the cleft of the mouth measuring 4 lines, and the tail  $3\frac{1}{3}$  inches.

I take this opportunity of substituting the name of *Crypsidomus* for that of *Rhamnophis*, which I had given to a genus of West-African Snakes (Ann. & Mag. Nat. Hist. 1862, p. 129), but which is preoccupied by a genus of East-African Ophidians described by Peters.

## CHAMÆTORTUS (g. n. DIPSADIDARUM).

Body and tail of moderate length, rather compressed; head depressed, broad behind, and distinct from neck, with the snout rather short. Rostral shield of moderate size; nostril between two nasals; loreal united with lower anteorcular, entering the orbit; another anteorcular above. Scales smooth, with a single very small (or without) apical groove, those of the vertebral row not enlarged; subcaudals two-rowed. Posterior maxillary tooth longest, grooved.

## CHAMÆTORTUS AULICUS. (Pl. XXVI. fig. 2.)

Shields on the upper side of the head normal; the vertical is elongate, twice as long as broad, much longer than the frontals together, and nearly as long as the occipital; the latter is rounded behind. The shield which represents the united loreal and lower anteorcular is subtriangular, as high as long; the upper anteorcular reaches just to the upper surface of the head. Eye of moderate size, with vertical pupil. Temporals 1+2+3, the anterior in contact with the postoculars, which are two in number. Eight upper labials, the third, fourth, and fifth entering the orbit. Ten lower labials, the five anterior of which are in contact with the front chin-shields. Two pairs of oblong chin-shields, the anterior being a little longer than the posterior. Ventrals 189, obtusely keeled on the sides; anal entire; subcaudals 86.

The head has a whitish ground-colour, but it is densely and symmetrically spotted with brown; a brown streak commences from the nostril, and passes through the eye to the angle of the mouth. Each labial and each scale on the temples and nape with a brown spot. Upper parts brown, with narrow whitish cross bars, which become less distinct on the hind part of the body, very similar to the markings in *Lycodon aulicus*. The white and brown colours are equally, though irregularly, distributed on the sides. Lower parts uniform white.

Total length 13 inches, the head measuring 5 lines, and the tail 3 inches.

## DENDRASPIS POLYLEPIS.

Scales in 23 series; temporals 2+3, both anterior temporals in contact with the postoculars, the lower situated above the sixth and seventh upper labials. Ventrals 258; subcaudals 120. Dull greenish olive, hind part of the body and tail with small irregular blackish spots; inside of the mouth black.

The single specimen in the collection is 6 feet long.

## FROGS.

## HYPEROLIUS FLAVOMACULATUS. (Pl. XXVII. fig. 1.)

Tympanum scarcely conspicuous; tongue deeply notched behind; snout short, broad; upper parts quite smooth, dark violet, with rounded yellow spots irregularly disposed; one of these spots on

each elbow and heel; the hind margin of the fore arm and of the tarsus yellow. Upper lip yellow, lower parts whitish.

A single adult female specimen from the Rovuma Bay is in the collection.

**HYPEROLIUS CITRINUS.** (Pl. XXVII. fig. 2.)

Tympanum hidden; tongue deeply notched behind; snout rather short; upper parts with small scattered tubercles; the region between eye and axil finely tubercular. Entirely uniform lemon-coloured above and below.

I have examined two male specimens, one from the Senegal, and the other from the Zambesi Expedition.

**HYPEROLIUS MICRIPS.** (Pl. XXVII. fig. 3.)

Tympanum hidden; tongue broad and deeply notched behind; eye comparatively small, shorter than the snout, which has a sharpish canthus rostralis; upper parts smooth; belly finely and equally granulated. Greyish olive above; a whitish line runs along the canthus rostralis, and is continued behind the eye along the anterior half of the length of the body; its rostral portion has a brown inferior margin; upper parts of the head sometimes with a few minute brown dots. Lower parts whitish.

This is one of the smallest species, an adult male being only 10 lines long; it has the gular sac fully developed, and is from Rovuma Bay.

FISHES.

**CHROMIS SQUAMIPINNIS.**

D.  $\frac{15-16}{10-11}$ . A.  $\frac{3}{9}$ . L. lat. 33. L. transv. 4/14.

The height of the body is two-fifths of the total length (without caudal); the length of the head more than one-third. Teeth very small, in about three series in both jaws; there are about forty on each side in the front series of the upper jaw. The naked portion of the præoperculum is a little higher than long, and at the angle as wide as the scaly part of the cheek below the eye. Scales on the cheek in two series. Dorsal spines of moderate strength, not so strong as those of the anal fin; the dorsal rays do not extend to the caudal fin, when laid backwards. Caudal densely covered with minute scales. Pectoral long, sometimes extending beyond the middle of the anal. Silvery, with six black cross bands, the first in the middle of the nape; the second descends from the origin of the dorsal; the fifth from its end; the last on the root of the caudal. A black spot on the extremity of the operculum.

This species is similar to *C. niloticus*; but it may be readily distinguished by its much larger head, densely scaly caudal fin, and black cross bands. Several specimens were collected on Lake Nyassa, the largest being one foot long.

**CHROMIS LATERISTRIGA.**

D.  $\frac{16-18}{9-10}$ . A.  $\frac{8}{9-10}$ . P. 14. L. lat. 38. L. transv. 6/12.

Teeth very small. Scales below the eye in four series; eye rather small. Caudal fin scaly. A black band runs from the nape of the neck, along the upper part of the side, to the base of the caudal fin.

The skins of two examples have been preserved; the largest, 10 inches long, is from Lake Nyassa.

**HEMICHROMIS INTERMEDIUS.**

D.  $\frac{16}{11}$ . A.  $\frac{3}{10}$ . L. lat. 34. L. transv. 4/10.

This species connects *Chromis* and *Hemichromis*, having the general habit of the former genus, and the conical teeth of the latter. The height of the body is contained twice and three-fifths in the total length (without caudal); the length of the head nearly thrice. Head not much longer than high; snout rather elevated, and somewhat shorter than the postorbital portion of the head. Teeth minute, conical, of equal size, in a double series in the upper jaw as well as in the lower. The lower jaw projects a little beyond the upper, and the maxillary terminates somewhat before the vertical from the front margin of the orbit. Præorbital nearly square, and scarcely wider than the orbit. The naked præopercular limb is higher than long, and at the angle narrower than the scaly part of the cheek, the scales being arranged in three series. The dorsal fin commences above the upper end of the gill-opening; the spines are slender, and rapidly increase in length posteriorly, the length of the last being two-fifths of that of the head. The soft rays are long, increasing in length to the sixth and seventh, which extend nearly to the middle of the caudal fin when laid backwards. Anal spines stout; caudal emarginate, densely scaly; pectoral and ventral equal in length, the latter extending to the soft portion of the anal.

Back with some obscure cross bands; interradiat membrane of the soft dorsal with a series of ocelli; anal with large round whitish spots.

A single example, 8 inches long, is in the collection; it is probably from Lake Nyassa.

**HEMICHROMIS ROBUSTUS.**

D.  $\frac{16}{13}$ . A.  $\frac{3}{10}$ . L. lat. 37. L. transv. 6/14.

The length of the head is somewhat more than the height of the body, which is one-third of the total length (without caudal). Snout compressed, long, rather high, somewhat shorter than the postorbital portion of the head. Teeth conical, of moderate strength, rather closely set, and slightly bent at the tip; they form two series in the upper jaw, and one in the lower. The lower jaw projects somewhat beyond the upper, and the maxillary extends nearly to below the centre of the orbit. Præorbital bone much wider than the orbit; the scales on the cheek are small, arranged in about ten series. Dorsal

spines of moderate length and strength ; the dorsal rays extend to the root of the caudal, when laid backwards. Caudal fin with an oblique truncated margin behind, and with scarcely any scales ; ventral rather longer than pectoral, extending to the vent.

Head and upper parts brownish ; operculum with a black spot behind ; a dark band runs from the opercular spot to the root of the caudal ; another band, parallel to the former, and indistinct, runs along the side of the belly. The soft dorsal and caudal fins with small round dark spots.

A specimen 12 inches long, from Lake Nyassa, is in the collection.

#### HEMICHROMIS LONGICEPS.

D.  $\frac{17}{12}$ . A.  $\frac{3}{9}$ . L. lat. 40. L. transv. 3/11.

Head and body elongate, as in *Cheilio* ; the height of the body is one-fourth of the total length (without caudal), the length of the head more than one-third. Snout elongate, longer than the post-orbital portion of the head. Teeth small, rather widely set, in two series in the upper jaw as well as in the lower, those of the outer series being larger than the very small ones of the inner ; the teeth in the upper jaw gradually decrease in length posteriorly. The lower jaw projects a little beyond the upper, and the maxillary terminates midway between the extremity of the snout and the front margin of the orbit. Præorbital bone much wider than the orbit. The naked præopercular limb is as wide as the scaly part of the cheek, the scales being arranged in three series. The lower part of the lateral line extends forwards to below the posterior dorsal spines, or even still further. The dorsal fin commences above the root of the pectoral fin ; its spinous portion is low, formed by feeble spines, the middle being equal in length to the diameter of the eye ; the soft portion is more elevated, but the rays, if laid backwards, do not extend to the caudal fin. The third anal spine is longer and stronger than any of the dorsal spines. Caudal fin slightly emarginate, with the lobes angular, and with the basal portion scaly. Pectoral and ventral rather elongate, the latter extending nearly to the vent.

Upper parts dark green ; sides and belly silvery ; operculum with a deep-black spot behind.

The skins of two specimens from Lake Nyassa have been preserved ; the larger is  $9\frac{1}{2}$  inches long ; the natives called it "Sangwe."

#### HEMICHROMIS DIMIDIATUS.

D.  $\frac{16}{10}$ . A.  $\frac{3}{10}$ . L. lat. 33. L. transv. 4/11.

Similar to *Hemichromis longiceps* ; the height of the body is one-fourth of the total length (without caudal), the length of the head one-third. Snout pointed, elongate, longer than the postorbital portion of the head. Dentition and mouth as in *H. longiceps*. Præorbital bone much wider than the orbit. The naked præopercular limb is much narrower than the scaly part of the cheek, the scales being arranged in four series. Dorsal spines rather feeble, of mode-

rate length, the middle being longer than the diameter of the eye; the soft rays terminate at some distance from the root of the caudal, if laid backwards. The third anal spine is stronger, but not longer, than the posterior dorsal spines. Caudal fin slightly emarginate, with the lobes angular, the upper being somewhat the longer: two-thirds of it are scaly. Ventral longer than the pectoral. A narrow black band runs from the upper part of the gill-opening along the middle of the side to a blackish spot on the root of the caudal, dividing the body into two equal halves.

The skin of a single example, 9 inches long, from Lake Nyassa, has been preserved.

PELOTROPHUS (g. n. CYPRINIDARUM).

Distinguished from *Leuciscus* by the form of the anal fin, the anterior part of which is much elevated; whilst the posterior is very low, both parts being abruptly divided, &c.

PELOTROPHUS MICROLEPIS.

D. 13. A. 19. L. lat. 88. L. transv. 14/6.

The maxillary extends nearly to below the posterior margin of the eye. The last dorsal ray is vertically above the origin of the anal fin. The last six anal rays are short—only half as long as the ray preceding them. Bright silvery.

The skin of a single specimen from Lake Nyassa is 20 inches long.

PELOTROPHUS MICROCEPHALUS.

D. 13. A. 19. L. lat. 47. L. transv. 9/3.

The length of the head is contained five times and a half in the total (without caudal); the maxillary extends somewhat behind the vertical from the centre of the eye. The last dorsal ray is vertically above the anterior anal rays. The last six anal rays very short. Brownish above, silvery on the sides.

The skin of a single specimen from Lake Nyassa is 15 inches long.

8. ON THE ANGWÁNTIBO (*ARCTOCEBUS CALABARENSIS*, GRAY)  
OF OLD CALABAR. BY T. H. HUXLEY, F.R.S., V.P.Z.S.

(Plate XXVIII.)

On the 25th of April 1860, Dr. John Alexander Smith read before the Royal Physical Society of Edinburgh a "Notice of the 'Angwántibo' of Old Calabar, Africa—an animal belonging to the family *Lemurina*, and apparently to the genus *Perodicticus* of Bennett."

The specimen from which this notice was drawn up was sent home by the Rev. Alexander Robb, who, in a letter dated July 28th, 1860, which is quoted by Dr. Smith, says, "Another specimen which I procured I handed to Mr. Thomson, who, I believe, sent it to Mr. Murray."





J. Wolf. del, et, lith.

M & N. Harhart. Imp<sup>t</sup>

ARCTOCEBUS CALABARENSIS.



This specimen my friend Mr. Murray was kind enough to transmit to me for examination, some two years ago; but I have unfortunately been prevented by the pressure of other occupations from undertaking the investigation until now.

The most important passages in Dr. Smith's description of his specimen, which, like mine, is of the male sex, are the following:—

“The Angwántibo is covered with a thick and long wool-like hair, which becomes short and thin on the face and on the extremities, the inner sides of the fore and hind hands being free from hair. The hair is of a dark grey colour at the base, and the upper third, or so, of its length is of a light brown or fawn-colour, the terminal points being of a darker brown; this is the general character of the fur of the upper parts of the body and limbs. The face in front of the eyes is rather darker in colour; but the sides of the head are lighter, and the chin and throat are nearly white. The inner surface of the limbs is also lighter, as well as the whole under surface of the body; the grey hairs having their distal half of a light fawn-colour, and in some places nearly white. The specimen having been for a long time preserved in spirits makes it a little difficult to get at the minute details of colour. There are no stripes or markings on the back, or other parts of the body, to be observed on this animal, as on the *Stenops tardigradus* of the East Indies—its general appearance being more uniform over the surface, although somewhat mottled in character, from the hair varying in colour at base and apex.

“The body of the Angwántibo is slender, and measures  $10\frac{1}{2}$  inches in length from the point of the muzzle to the extremity of the very short tail, which is completely hid in the long fur of the body, and measures only about  $\frac{1}{4}$ th of an inch in length. This animal is a male, the penis, which is supported apparently by a small bone, projecting upwards and forwards from the rounded scrotum.

“The head is oval and rounded, tapering rapidly in front of the eyes: the muzzle protruded, full or blunt, and rather prominent. The breadth of the head in front of the ears is about  $1\frac{1}{2}$  inch; in front of the eyes about  $\frac{3}{4}$ ths of an inch. The length from the mesian line of the nose to the anterior part of the meatus of the ear is  $1\frac{3}{4}$  inch; from point of nose to anterior angle of eye is  $\frac{3}{4}$ ths of an inch; from anterior angle of eye to point of opening of ear  $1\frac{1}{8}$  inch, the total length of head from muzzle to back part being nearly  $2\frac{1}{2}$  inches.

“The eyes are rather full and large, the opening of the lids measuring  $\frac{1}{2}$  an inch in length; the distance between the eyes at their anterior angles is  $\frac{1}{2}$  an inch. They are rather prominent forwards, and very slightly lateral.

“The ears are erect and patulose, rather large and rounded in outline, without emarginations, measuring about  $\frac{3}{4}$ ths of an inch across from before backwards, and also from above downwards; they seem to be naked internally, and slightly covered with short hair externally. In this specimen they are nearly naked, especially on the inner surface. There are two transverse abrupt parallel projecting ridges of cartilage, each measuring  $\frac{4}{12}$ ths of an inch in length, in the free cartilage above the external opening of the meatus.

“The external openings of the nostrils are rather lateral, and are sinuous, curved upwards and inwards towards the median line of the full and rounded snout; and there is a groove between them running down to the front of the upper lip.

“The tongue is long and rounded in front, and rather rough, being covered with small papillæ. Immediately below the tongue is the projecting lamina, covered with a horny cuticle and resembling a smaller bird-like tongue, which springs from the frænum, and projects forwards about  $\frac{3}{8}$ ths of an inch in length, reaching to within  $\frac{1}{4}$ th of an inch of the point of the tongue itself. This horny lamina measures about  $\frac{1}{4}$ th of an inch in breadth across its root or base, and about  $\frac{1}{8}$ th of an inch across its free or front extremity, which is divided into nine sharp terminal points or filaments . . . . . Below the tongue and this supplementary organ the mucous membrane lining the floor of the mouth has a slightly free margin, projecting along the sides of the gums of the lower jaw, in which, apparently, the ducts of the submaxillary glands (Wharton’s ducts) open into the mouth.

“The neck is rather short and slender. There is no appearance on the back of the neck of this specimen of the spinous processes of the five last cervical and first dorsal vertebræ piercing through the horny integument of the back, with a weak horny covering, as described by Van der Hoeven of the *Stenops potto*.

“The limbs are very slender and nearly equal in length, the hinder extremities being a little larger and stronger in their development than the anterior. The fore hands are thinly covered with short hair on the dorsal, and are bare of hair, or naked, on the palmar surface. The thumb is much larger than any of the other fingers, to which it is opposed. There is a large rounded fleshy and horny tubercle, nearly  $\frac{1}{4}$ th of an inch broad at its base, which projects about  $\frac{1}{8}$ th of an inch from the base of the thumb on the inner side (near the centre of the hand). Immediately opposed to it, and of equal size, or a very little larger, is another apparently simple tubercle, rising from the outer side (next the thumb) of the base of the clustered fingers; this, however, is the rudimentary index finger, its free extremity projecting only about  $\frac{1}{8}$ th of an inch. It is supported by a short metacarpal bone, with a full and rounded extremity, to which are attached *two* small, or rudimentary, phalanges; each of the other fingers (not including the thumb) having *three*. This rudimentary index finger has no nail: there is simply a minute marking like a cicatrix, or rather a mere short depressed smooth line, an indication of where a nail should be. The nails of the thumb and of the fingers are all thin, flat, and rounded or ovate, like those of the human hand, and are not extended beyond the points of the fingers. The remaining three fingers are slender and prolonged, and the first phalanges are all conjoined by the integuments, the two distal phalanges of each finger, alone, being free. The index or second finger (considering the thumb as a finger) is, as already described, merely like a tubercle rising at the base of the others. The third finger is the smallest of the three other fingers, and also the shortest; the fourth (or middle

of the developed fingers) is the longest; and the fifth, or last, is longer than the third. The hands are each divided into two opposing portions—the thumb with the tubercle at its base being opposed to the other fingers with the tubercle-like index at their base, the thumb itself being opposed to the fourth, the middle or longest of the fingers.

“The posterior hands, or feet, are rather larger and stronger than the anterior ones, and are each divided into two opposing portions—the one consisting of the thumb, with a large rounded fleshy tubercle projecting from the inner side of its base (as in the fore hand), and the other portion; formed of the remaining four fingers, the first phalanges of which are also conjoined, being covered by the integuments as in the hand. There is a comparatively smaller fleshy tubercle, somewhat like the undeveloped index finger of the fore hand, projecting from the outer side of their base, which is opposed to the tubercle at the base of the thumb. The nails of the thumb and fingers are thin, flat, and rounded or oval in form, like those of the fore hand, with the exception of that of the second finger (counting the thumb as the first), which is narrow, convex, sharp-pointed, and claw-like, and extends nearly to the point of the third finger . . . The whole length of the free extremity of the finger is half an inch, including the claw-like nail, which measures rather less than a quarter of an inch.”

I have quoted Dr. Smith's clear description at length, because it applies, in almost every particular, to my own specimen, though there are some points of difference which I shall now proceed to note.

I find a pale band running down the median line of the face from the brow to the end of the nose, where it divides and sends a short lateral branch along the alæ of the latter; otherwise the characters of the pelage are quite those given by Dr. Smith.

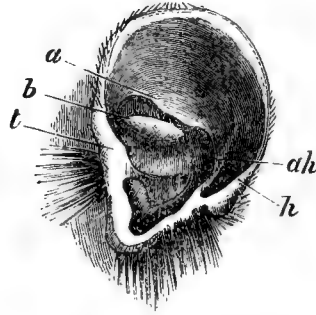
I may remark in addition, however, that there are no vibrissæ nor defined eyebrows. A patch of short dark brown hairs, with interspersed, almost black longer ones, grows upon the inner half of the upper eyelid; and two tufts of hair, 0·3 in. long, project horizontally, one from the point of the tragus, the other from the region of the antitragus, or lower part of the pinna of the ear. The inner surface of the ear is, for the most part, covered with fine short hairs.

The pinna of the ear (fig. 1) is not flattened and directed outwards, but is curved, so that its posterior surface becomes convex, while its outer margin is bent forwards, so as to be placed midway between the front and the hinder boundary of the external ear. Hence the aperture of the external ear is directed forwards as much as outwards. The pinna has no distinct lobule; the tragus (*t*) is very small; the helix (*h*) is represented only by the thin edge of the pinna; the antihelix (*a. h*) is more distinct, and divided in front and above into two branches; at its base, inferiorly, a small antitragus appears. The fossa innominata, which separates the helix and antihelix, is obsolete, except inferiorly, where it forms a deepish pit behind the antihelix.

The two singular transverse ridges (*a, b*), which lie above the

auditory meatus and anterior to the upper end of the antihelix, described and figured by Dr. Smith, are 0·25 inch long and about 0·1 inch high; they are separated at their bases by an interval of about 0·1 inch, but their free edges approach more closely. Fine hairs spring perpendicularly from the opposed margins of these ridges, and interlock with one another.

Fig. 1.



The left ear of the Angwántibo.

The length of the body is only 9·8 inches, instead of 10½ inches. The tail, however, has the same length (0·25); and the other measurements are very similar to those of Dr. Smith's specimen, thus:—

	inches.
The breadth of the head in front of the ear is . . . . .	1·5
The breadth of the head in front of the eyes is . . . . .	0·8
Mesian line of nose to anterior part of meatus auditorius . . . . .	1·75
Point of nose to anterior angle of eye . . . . .	0·75
Anterior angle of eye to ear . . . . .	1·1
Total length of head . . . . .	2·5
Eye-slit . . . . .	0·4
Distance between inner canthi . . . . .	0·45
Ear, antero-posteriorly (when flattened out) . . . . .	0·75
Ear, vertically . . . . .	0·8

The measurements of the limbs also agree very well with those given by Dr. Smith (*l. c.* pp. 184, 185). Thus I find the distance from the

	inches.
Point of shoulder to the elbow to be . . . . .	2·15
Elbow to wrist . . . . .	2·15
Wrist to point of fourth finger . . . . .	1·25 <span style="float: right;">5. 55</span>
Great trochanter to knee . . . . .	2·45
Knee to ankle . . . . .	2·45
Foot from ankle-joint to point of fourth toe . . . . .	1·5 <span style="float: right;">6. 40</span>

Dr. Smith gives:—Arm 2¼ inches; forearm 2¼; hand 1¼; thigh 2½; leg 2½; foot 1½.

The differences obviously lie within the limits of individual variation.

Dr. Smith's description of the nostrils and of the snout fits the present specimen very well; but not so the figure given at page 188 of his paper, in which the snout is far too blunt, and the nostrils have too little curvature. Of the tongue I shall speak fully by and by; in general it agrees with Dr. Smith's description.

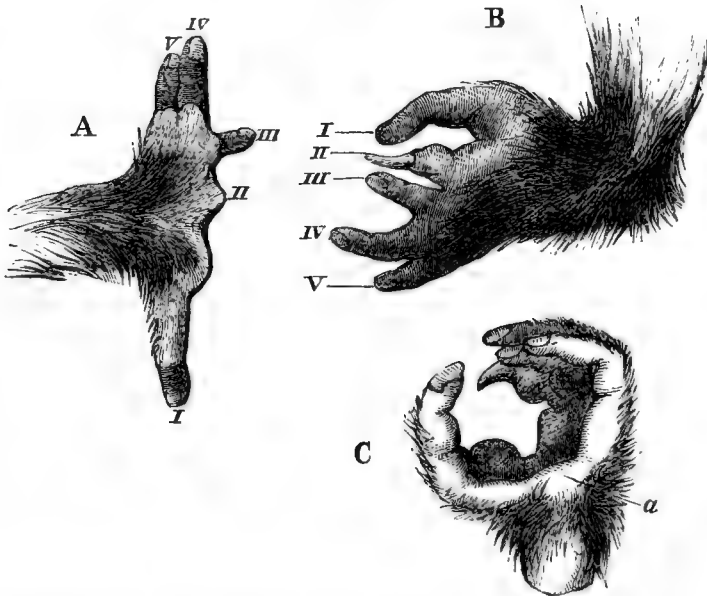
The spinous processes of the cervical vertebræ do not project in the manner described by Van der Hoeven in the Potto, though they can be readily felt through the skin. Dr. T. Strethill Wright's figures of the hand and foot of Dr. Smith's Angwántibo would very well represent those of the present specimen; nor need any modification be made in the description of those parts. I may remark, however, that short hairs are developed upon the dorsal surface of the distal phalanges, as of the rest.

The disposition of the hands and feet and of their digits, however, calls for some special notice.

All the digits were strongly flexed. The exertion of a considerable force was necessary to extend them; and when that force was removed, they at once returned to their flexed attitude. Left to itself, the hand assumes the prone position, with the thumb inwards, the fingers outwards; under like conditions, the dorsum of the foot is turned as much outwards as upwards, and the fibular edge of the metatarsal region downwards (fig. 2, B).

The distal part of the foot can be so rotated that the dorsal region of the metatarsus is turned completely upwards and completely outwards; but, left to itself, it returns to the position just described.

Fig. 2.



A. The left hand: the digits artificially extended as far as they will go.  
 B. The left foot in its natural position, seen from without.  
 C. The same, seen from below.

The sole of the foot is formed behind, as usual, by the tuberosity of the calcaneum, and is bare; in front, where the hallucal and digital divisions of the foot diverge, there is a callous oval projection (fig. 2, C, *a*) supported by a large sesamoid bone. The skin is bare on this projection; but between it and the ball of the heel is a narrow hairy band.

Dr. Smith does not mention the circumstance; but, in the hand of the present specimen, the two distal free phalanges of the third digit are not parallel with those of the fourth and fifth digits, but are directed obliquely inwards (fig. 2, A).

With Dr. Smith, I find only two phalanges in the index finger (the second being very short and slender), and no trace of any nail, the only marking on the exterior of the digit being that produced by the projection of the end of the metacarpal bone.

The proximal phalanx of the index finger is 0.15 inch long; the distal rather less than 0.1 inch.

Thus far the differences between my specimen and that described by Dr. Smith are of no moment; but on passing to the dentition I find, with a complete general correspondence, a solitary discrepancy which I cannot account for.

Dr. Smith says of the upper incisors:—"Two together (in pairs), with intermediate edentulous space; first incisor the smallest; the second nearly twice as large as the first."

In the specimen under description, on the other hand, the upper incisors are strictly equal in size; and the proportions of the two teeth noted by Dr. Smith are the more remarkable, as they do not obtain in any other Lemurs. When, as in *Nycticebus* and *Tarsius*, the upper incisors are unequal, it is the outer which is the smaller.

In the face of the resemblances of size, proportion, pelage, and sex between the two specimens of Angwántibo, it is difficult to admit that this singular difference can have more significance than an individual variation. However this may be, the characters of the teeth of the Angwántibo are so well shown in the present specimen that I shall describe its dentition at some length, and compare it with that of the other Lemurs.

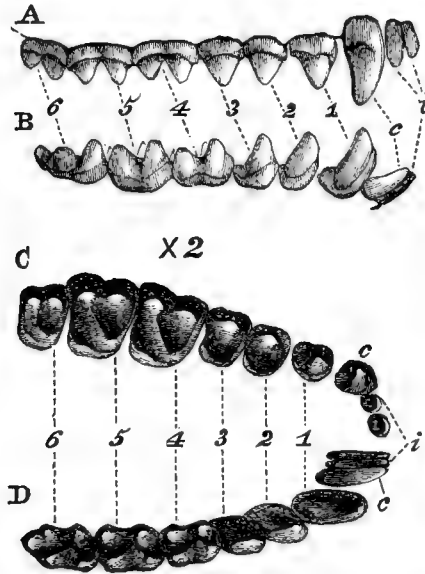
The series of teeth belonging to the adult dentition is complete (except the right outer incisor, which is broken off at the root), and the crowns are not at all worn. The total number of the teeth, as in the majority of the Lemurs, is 36; and the dental formula is—  
 $i. \frac{2-2}{2-2}; c. \frac{1-1}{1-1}; pm. \frac{3-3}{3-3}; m. \frac{3-3}{3-3}$

In the upper jaw (A, C, fig. 3) the incisors (*i*) are set in a nearly straight transverse line, at the outer ends of which are the canines (*c*). The distance from the outer edge of one canine to that of the other is 0.4 in. The inner edges of the grinders (1-6) are also arranged in straight lines; the distance of the right and left series, anteriorly, is 0.3 inch, posteriorly, 0.4; while the length of the series is 0.7 inch. The five hinder grinders are close together; while the first premolar is separated from the second by a slight interval—less, however, than that which separates the first premolar from the canine.



The median incisors are distant from one another about  $\frac{1}{6}$ th of an inch. The outer incisors are separated from them by less than half that space; but are as near the canines as they are to the median incisors. The incisors are not more than  $\frac{1}{20}$ th of an inch in breadth, and are chisel-shaped, with their outer angles rounded off.

Fig. 3.



Right dental series of both jaws of *Arctocebus calabarensis*.  
A and C, upper; B and D, lower jaw.

The inner and outer incisors are as nearly as possible equal in size, and their crowns are not more than  $\frac{1}{10}$ th of an inch long. The pointed and curved canines are between  $\frac{1}{5}$ th and  $\frac{1}{6}$ th of an inch long, and measure 0.1 inch antero-posteriorly. Their front edges are convex, the posterior concave, and both are sharp and cutting.

There is a rudimentary cingulum on the outer side of the base of the canine, both internally and externally, and the inner face of the tooth is produced into a vertical ridge. The base of each of the premolars measures about 0.1 inch antero-posteriorly; viewed from without (fig. 3, A) each looks like a shorter canine, with the cingulum much more marked, and so greatly developed backwards as to give rise to a "talon" (heel, or posterior basal process). From within, or above (fig. 3, C), the cingulum appears still better developed, in accordance with the increased breadth of the base of the tooth. The base of the first premolar (1) is not much thicker than that of the canine (0.083); but in the second (2) it measures 0.1 inch, and in the third (3) 0.13 inch. In this last tooth, therefore, the crown is rather wider than it is long. Opposite the end of the ridge on the inner surface of the principal cusp, which is present in the premolars, as in the canine, rises, within the cingulum, a second, minute or rudimentary

cuspidate; while the cingulum itself is produced internally and behind into a third similar cusp. Thus the second and third premolars are tricuspidate, two cusps being internal and one external; the ridge which runs down the inner face of the latter joins the antero-internal rudimentary cusp.

The two anterior molars (4, 5) are larger than the premolars, measuring 0·15 inch long by 0·18 wide. The hindmost (6), on the other hand, is hardly larger than the last premolar, being 0·1 inch long by 0·13 inch wide.

The two anterior molars are each surrounded by a cingulum, like the premolars, but are quadricuspidate. As in the premolars, the outer cusps are larger than the inner; but the disproportion is far less. The last molar has the postero-internal cusp rudimentary.

If the crowns of the molars and premolars be compared together, it will be found that the former differ from the latter, mainly, in the great relative development of the parts answering to the posterior basal process and the rudimentary cusps of the premolars.

Of the two outer cusps of the molars, the anterior represents the principal cusp of the premolars; the posterior is an additional growth from the outer side of the heel, which has now become as large as the anterior division of the tooth. The two inner cusps are readily identifiable with the rudimentary cusps of the premolars, the only important difference being that the antero-internal cusp is now separated by a groove from the cingulum, instead of rising directly from it. The oblique ridge connecting the antero-internal with the postero-external cusp appears to be a new development, not represented in the premolars. By its appearance, the molars of the *Angwántibo* acquire the pattern which is so obvious in *Man* and in the *Anthropomorpha*, but which is absent in all the *Old-World Apes* and in most of those of the *New World*.

In the lower jaw (B, D, fig. 3) the proclivous, close-set incisors and canines occupy a space of 0·15 inch. The grinding series is 0·7 inch long; and the first premolar is separated from the second by an interval about equal to that which exists between it and the canine.

The incisors are laterally compressed, and, at their bases, longer from before backwards than they are from side to side. Their front faces are convex from above downwards; their posterior faces convex from side to side, but concave from above downwards, and so inclined to the front faces that the upper rounded edges are sharp. The canines are like the incisors, but somewhat broader, thicker, and sharper at the edges. The cingulum of the incisors and canines, unmistakably present, and, in its ordinary place on the backs of the teeth, becomes confounded with their outer edges higher up, so that their front faces might be said to be almost wholly, if not quite, "*subcingular*."

The first premolar has the crown 0·17 inch long, and therefore is a much larger tooth than the canine. It is recurved and pointed, and has a sharp anterior and posterior edge; the cingulum, traceable on both the inner and outer faces, rises much higher in front than behind, and is produced posteriorly into a slight cusp-like

talons. The inner face of the tooth has an obscure rounded longitudinal ridge.

In the other two premolars, which are successively shorter than the first, the form of the tooth is fundamentally similar; but the base becomes broader, the inner ridge more definite and slightly angulated, and the posterior basal process of the tooth more distinct, and obscurely tuberculated, internally and externally.

Each of the three molars has about the same length (0.15 inch); the two anterior ones are 0.1 inch broad and quadricuspidate; the last, a little narrower, is quinquecuspidate; the fifth tubercle being median and posterior.

A well-marked transverse ridge connects the antero-external with the antero-internal, and the postero-external with the postero-internal cusp; and besides these an oblique curved ridge connects the postero-external with the antero-internal cusp. The cingulum is well developed, and there is an anterior basal process, whence a ridge rises to the antero-external cusp.

This ridge and the oblique ridge before-mentioned so connect the other ridges and cusps, that the grinding-face of the tooth exhibits an almost doubly crescentic pattern—a circumstance of no small interest, if one reflects how extensively this doubly crescentic pattern obtains among other Mammalia. And, again, the foregoing analysis of the form of the molars shows that, different as the patterns of the grinding-surfaces of the upper and lower molars appear to be at first sight, they are really arranged upon much the same scheme.

Furthermore the transition from premolar to molar is effected in the same way in the lower as in the upper molars—by the development of cusps which are rudimentary in the premolars, and by the appearance of an oblique ridge.

The dentition of the genera *Loris* (*Stenops*), *Nycticebus*, *Perodicticus*, *Otogale*, *Galago*, and *Otolienus* resembles that of the Angwántibo in all essential particulars, but presents certain very interesting minor deviations.

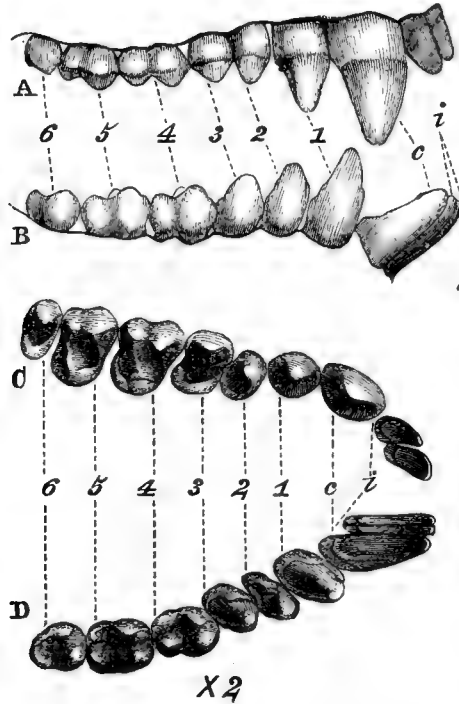
In *Loris* the third premolar differs much from the first molar in both jaws; and the last molar of the upper jaw has its internal posterior cusp well developed, so that it is quadricuspid. The last molar of the lower jaw is quinquecuspid. The oblique ridges of both upper and lower molars are well developed; but, in the lower jaw, they do but just reach the anterior internal cusp.

In *Nycticebus javanicus* the oblique ridges are well marked in the upper molars, sometimes less distinct in the lower ones. Out of four skulls, the inner posterior cusp of the hinder upper molar was obsolete in three, and very small in the fourth. In the lower jaw, the fifth cusp of the last molar was very small or obsolete in three, while in the fourth (the same as that which had the inner posterior cusp of the last upper molar developed) it was distinct.

The dentition of *Perodicticus potto* (fig. 4), it is important to note, differs more from that of the Angwántibo than either of the preceding.

For the posterior upper molar is short and wide, so as to have a transversely elliptical crown, which has only two cusps, the posterior external, as well as the posterior internal cusp having disappeared. In addition to this, the hinder upper molar is set further out than the other molars, and the hinder lower molar has only four cusps.

Fig. 4.



Right dental series of both jaws of *Perodicticus potto*.  
A and C, upper ; B and D, lower jaw.

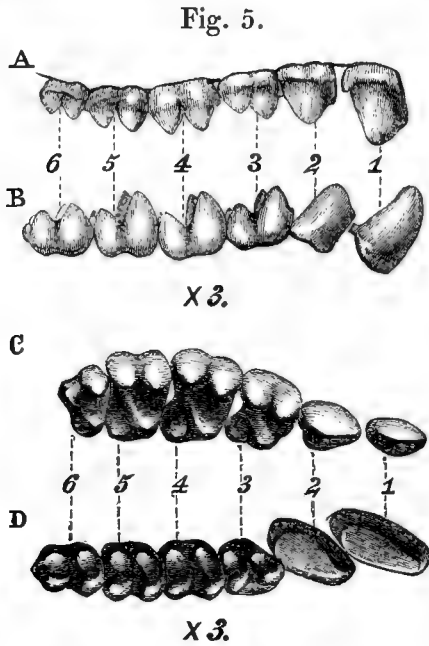
In all the species yet mentioned, as in the Angwántibo, the last premolar has but a short heel, and differs considerably from the first molar. But in *Otogale pallida*, *Galago sennaarensis* (fig. 5), *G. maholi*, *G. allenii*, *Otolicnus garnettii*, and *O. crassicaudatus* the heel of the hinder premolar above and below becomes so large and cuspidate as to assume the form of a quadricuspidate molar. This is particularly well seen in *Galago sennaarensis* (fig. 5) and *G. allenii*. In the latter species, even the second premolar acquires a great heel, so that the transition from canines to molars is quite insensibly graduated.

In *Galago minor*, on the other hand, the third premolar is as different from the first molar as in the Angwántibo.

With regard to the other teeth, the hindermost upper molar of *Otogale pallida* is quadricuspidate, though the inner posterior cusp is low, as in the first and second molars.

In the lower jaw the fifth cusp of the last molar is distinct, and the oblique ridges do not reach the antero-internal cusp.

In *Galago sennaarensis* the inner posterior cusp of the last upper molar is obsolete; but the fifth cusp of the last lower molar is well developed and ridge-like. In this species the lower molars might be said to be Tapiroid, the elevation which answers to the oblique ridge being shorter and less distinct, while the two transverse ridges connecting the outer and inner cusps are more obvious (fig. 5, D).



Right molars and premolars of both jaws of *Galago sennaarensis*.  
A and C, upper; B and D, lower jaw.

*Galago maholi*, also, has the inner posterior cusp of the last upper molar obsolete, and Tapiroid lower molars, the last of which is quinquecuspid.

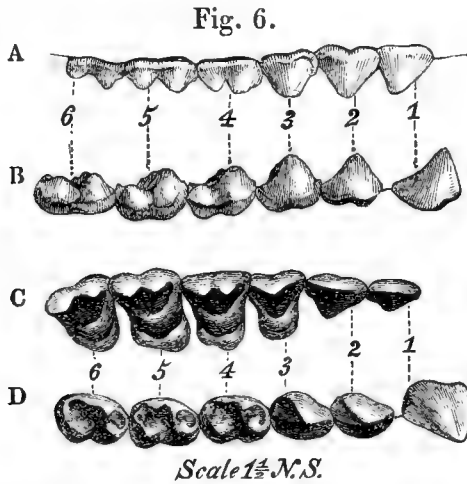
*Galago allenii* has the inner posterior cusp of the third upper molar well developed; the lower molars are provided with an oblique ridge, nearly reaching the inner anterior cusp, while the third has a large fifth cusp.

In *Galago minor* the inner posterior cusp of the third upper molar is obsolete; the oblique ridges of the lower molars are tolerably well marked, and the last has a fifth cusp.

*Otolicnus garnettii* and *O. crassicaudatus* have the inner posterior cusps of the third upper molars rudimentary, the oblique ridges of the lower molars but little developed, and the fifth cusp of the third lower molar rudimentary.

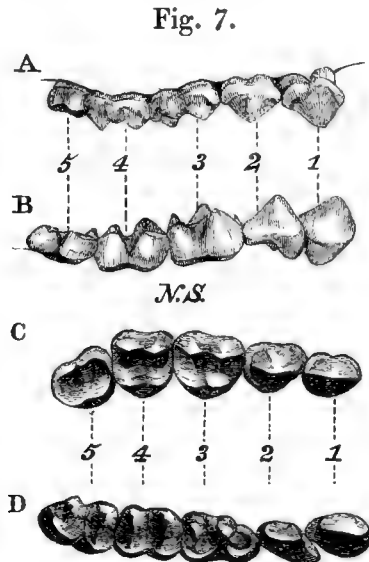
The upper molar teeth of the ordinary Lemurs (*Varecia*, *Lemur*, and *Prosimia*, Gray) have the inner posterior cusp obsolete, or very small; and a very strongly developed cingulum, internally. The oblique ridges are sometimes present, sometimes obsolete.

The lower molars have the oblique ridge and the anterior basal process so developed as to assume, in some cases, a doubly crescentic or Rhinocerotoc character (fig. 6, D).



Right molars and premolars of *Lemur catta*. A and C, upper ; B and D, lower jaw.

In the Indri (fig. 7), lastly, there is a type of dentition which departs still further from that of Angwántibo. Of the upper five grinders, the two anterior are unicuspidate, and like the premolars of



Right molars and premolars of *Lichanotus indri*. A and C, upper ; B and D, lower jaw.

other Lemurs ; the other three are quadricuspidate, the hindermost being the smallest. Each pair of cusps is united by a transverse ridge, and there is no oblique ridge.

In the lower jaw, also, the first and second grinders are unicuspidate and premolar-like. The third has four cusps, connected in pairs by ridges, which are disposed obliquely from within outwards and forwards. The anterior external cusp is continued by a curved ridge on to the margin of the large anterior basal process of the tooth; and the posterior external cusp is connected by an oblique curved ridge with the antero-internal. Thus the tooth acquires a doubly crescentic, Rhinocerotid pattern.

In the next grinder, which is also quadricuspidate, the anterior basal prolongation is reduced, and the ridges connecting the pairs of cusps are transverse to the axis of the jaw. There is no oblique curved ridge.

The last molar is like the preceding; but there is a fifth cusp, and the ridges which connect the pairs of cusps are oblique, sloping from within backwards and outwards, or in the opposite direction to that observed in the antepenultimate tooth.

There is, in both jaws, a much greater difference between the second grinder and the third, than between the third and the fourth, so that, except for the caution suggested by the similarity of the last premolar to the first molar in *Galago sennaarensis*, &c., one might suspect the third tooth to be a true molar, and consider that, in these animals, it is a premolar, and not a molar, which is suppressed.

The roof of the palate of the Angwántibo exhibits altogether nine transverse ridges, each of which is convex forwards and concave backwards. The eight anterior ones extend from a given tooth to the corresponding tooth of the opposite side. The first lies between the outer incisors, and the others between the following six grinding-teeth. There is a faint ridge behind the last molars, beyond which the soft palate continues the roof of the mouth for half an inch. In the interval between the first two ridges, in the middle line, there is a small round aperture which ends cæcally; but in front of this and of the first ridge are two small crescentic apertures, the concavities of which are turned towards one another. Into either of these a style can be passed upwards, outwards, and backwards for a considerable distance. These passages are the so-called ducts of Stenson.

Mr. Murray has noticed a similar structure in the palate of *Galago murinus* as "two small orifices (as large, however, as the root of the superior incisors) situated in the middle space between the two incisors on each side, but a little behind their line. Their position suggests an analogy to Jacobson's vesicles in the Horse; and, on tracing their origin, we find that they lead to the nasal orifice, expanding before they reach it into a sort of sac, which appears to communicate, by a narrow and short canal, with the nasal orifice, in this respect differing from Jacobson's sac, which does not communicate directly with the exterior" ("Supplementary Remarks on the genus *Galago*," Edinburgh New Philosophical Journal, new series, Jan. 1860). Burmeister has observed them in *Tarsius* (Beiträge, p. 103); Van der Hoeven in the Potto (Ontleedkundige Onderzoek van den Potto van Bosman, p. 47); Hoekema Kingma in *Otolienus peli*

(Eenige Vergelijkend-ontleedkundige Aanteekeningen over den Otolicnus Peli, p. 32).

The tongue, long and narrow, is marked by depressions corresponding with the palatine ridges. At its base, as in most Lemurs, are three circumvallate papillæ, arranged in a  $\nabla$ , the apex of which is directed backwards. Under the tongue is the characteristically Lemurine sublingua, a broad, lyre-shaped plate, 0.35 inch long, by 0.2 inch wide at its truncated free end\*. The under surface of this plate presents a median keel, on each side of which is a furrow. The keel ends in a sharp point in the middle of the free edge, the lateral halves of which are also serrated, each exhibiting three or four points.

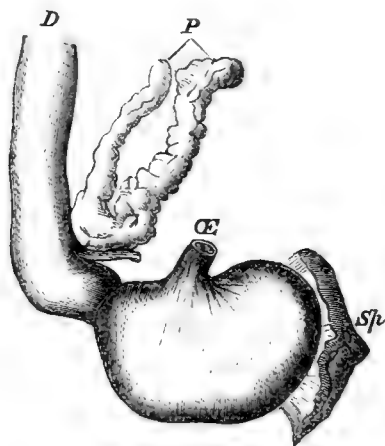
The mucous membrane of the floor of the mouth, between the tongue and the mandibular rami, is raised into two sharp ridges with undulating edges; and these end in front in two pointed free processes, one on each side of the frænum.

In the Potto, Van der Hoeven (*l. c.* p. 48) describes a very similar appendage beneath the sublingua, and states that the ducts of the submaxillary and sublingual glands open on its free edge, whence he has no doubt that it answers to the caruncula linguæ. Burmeister, in *Tarsius* (*l. c.* p. 106), describes what seems to correspond to the sublingua (*miki*) as the "Lytta," and that which appears to answer to the second appendage as "Unterzunge."

There is no uvula. The tonsils are well developed; the epiglottis projecting, and shaped like the broad end of a shoeing-horn.

The distance from the lips to the cardiac orifice of the stomach is, measured in a straight line, 5 inches.

Fig. 8.



The stomach, with the œsophagus ( $\text{Æ}$ ), the duodenum ( $D$ ), the pancreas ( $P$ ), and the spleen ( $Sp$ ) of the Angwántibo. Nat. size.

\* It is therefore somewhat larger in all its dimensions than in Dr. Smith's specimen.



The stomach (fig. 8) is  $1\frac{1}{2}$  inch long and about 1 inch in vertical diameter. The œsophagus opens on the pyloric side of the centre of its lesser curvature; the cardiac division of the stomach is consequently very large, and indeed larger than the pyloric division. At the pylorus there is no complete valve, but merely a constriction, which leaves a wide passage of communication between the stomach and the duodenum. The wall of the pyloric division is rather thicker than that of the cardiac end, in which the mucous membrane is raised into irregular longitudinal folds.

The small intestine remains of nearly the same width (about 0·4 inch) throughout; from the pylorus to its junction with the colon it is 26 inches long.

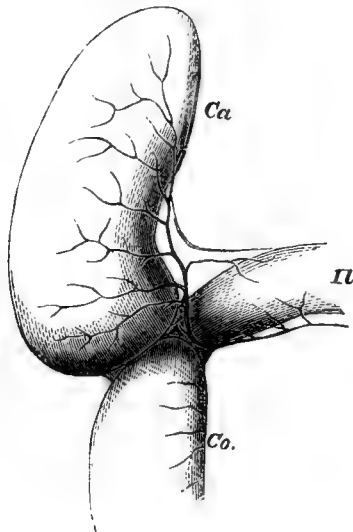
The large intestine, about 0·7 inch wide, is devoid of longitudinal muscular bands or sacculations, nor is it divided definitely into colon and rectum; it is 14 inches long.

As the gullet and oral cavity are 5 inches long, the alimentary canal is altogether  $(5 + 1\frac{1}{2} + 26 + 14) = 46\frac{1}{2}$  inches long; or a little more than four and a half times as long as the body.

In the Potto the proportion is as 6 or 6·5 to 1; in *Stenops javanicus* 3·5 to 1; in *Stenops gracilis* 4 to 1; in *Otolicnus peli* 4·9 to 1. (See Van der Hoeven, 'Potto van Bosman,' p. 52.)

Where the large and small intestines join, the cœcum is given off. This is cylindroidal, somewhat curved, and  $2\frac{1}{2}$  inches long by 0·9 inch in diameter. It has no vermiform appendix (fig. 9).

Fig. 9.

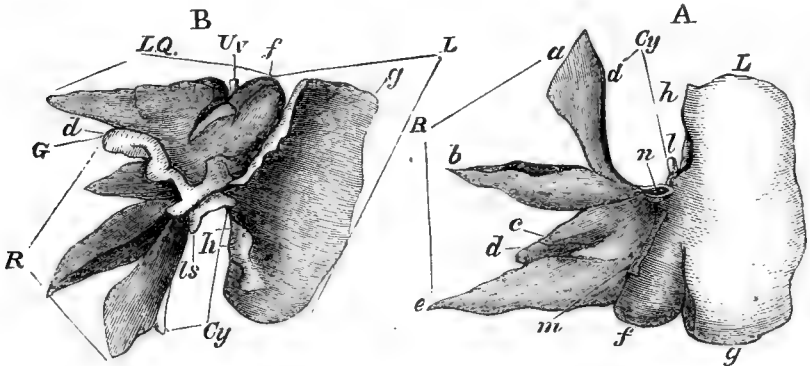


The ileum (*Il*), colon (*Co*), and cœcum (*Ca*) of the Angwántibo. Nat. size.

The liver (fig. 10) is a very irregularly shaped body, which, if spread out on a flat surface, nearly covers an area 2·2 inches wide by 1·85 inch long. It is broken up into numerous lobules by radiating

fissures of greater or less width ; but it may be resolved into the same components as that of Man, by taking into account the attachment of the ligaments, and the position of the vessels, gall-bladder, and ligaments.

Fig. 10.



The liver of the Angwántibo. A, viewed from above; B, from below. *Cy*, coronary ligament; *LQ*, lobulus quadratus; *R*, right; *L*, left lobe; *ls*, lobulus Spigelii; *Uv*, umbilical vein; *n*, hepatic vein.

Thus the upper surface (fig. 10, A) exhibits the attachment of the broad ligament, *m*; the moiety of the liver to the left of this (*f*, *g*, *h*) answers to the left lobe of the Human liver, that to the right (*a*, *b*, *c*, *e*) to the right lobe in Man. But, in the Angwántibo, the left lobe is the larger and more solid, being divided by narrow fissures only into three lobules (*f*, *g*, *h*). The fissure between *f* and *g* is far deeper than the other, extending from the front margin nearly to the portal vessels.

The right half is divided by deep and wide fissures into four lobules (*a*, *b*, *c*, and *e*). The largest of these (*e*) is situated between the ductus venosus and the gall-bladder (*d*); it therefore corresponds to the lobulus quadratus. The other three are subdivisions of the right lobe. Besides these, on the under surface of the liver, behind the portal vessels, is a small lobule, which is transversely elongated and raised into a point at each end. This corresponds with the lobulus Spigelii, and indeed somewhat resembles that part in the Orang.

The coronary ligament is attached to the edge of the hindermost division of the right lobe, and, for a short distance, to the lobule *h* of the left lobe.

The gall-bladder is long and somewhat undulating; in consequence of the great breadth of the lobulus quadratus in front, its end is turned more to the right side than forwards.

The ductus choledochus opens into the duodenum at not more than 0.4 inch from the pylorus. Fixed upon it, as it were, close to its termination, is the pancreas, which consists of two branches, one of which lies behind the stomach and nearly touches the spleen by its free end, while the other is enclosed in the loop of the duodenum (fig. 8).

The spleen (fig. 8) is 1·5 inch long and 0·3 inch wide in the middle ; it is very flat, and tapers to each end. It is attached by the lesser omentum to the cardiac end of the stomach, and does not extend along its great curvature. The alimentary canal thus much resembles that of the Potto (Van der Hoeven, *l. c.* pp. 50, 51). In the latter, however, the stomach forms a small cæcal dilatation beside the pylorus, and the colon is sacculated, though the cæcum is devoid of sacculations. Neither in the Potto, nor in *Otolicnus peli*, nor in *Tarsius*, is there any appendix vermiformis, though Schroeder van der Kolk, and Vrolik find it to be represented in *Nycticebus* (Recherches d'Anat. Comp. sur le genre *Stenops*).

The liver appears to be somewhat more subdivided than in the Potto, but not more than in *Stenops* (Sch. K. & V.). The ductus choledochus opens much nearer the pylorus than in either *Tarsius* or the Potto, in which it ends in the descending part of the duodenum. The pancreas is divided into lobes in *Tarsius*, *Otolicnus*, and *Stenops* (Schroeder van der Kolk and Vrolik). The spleen is confined to the cardiac end of the stomach, not attached along its greater curvature as in *Tarsius*, the Potto, *Nycticebus*, and *Loris*.

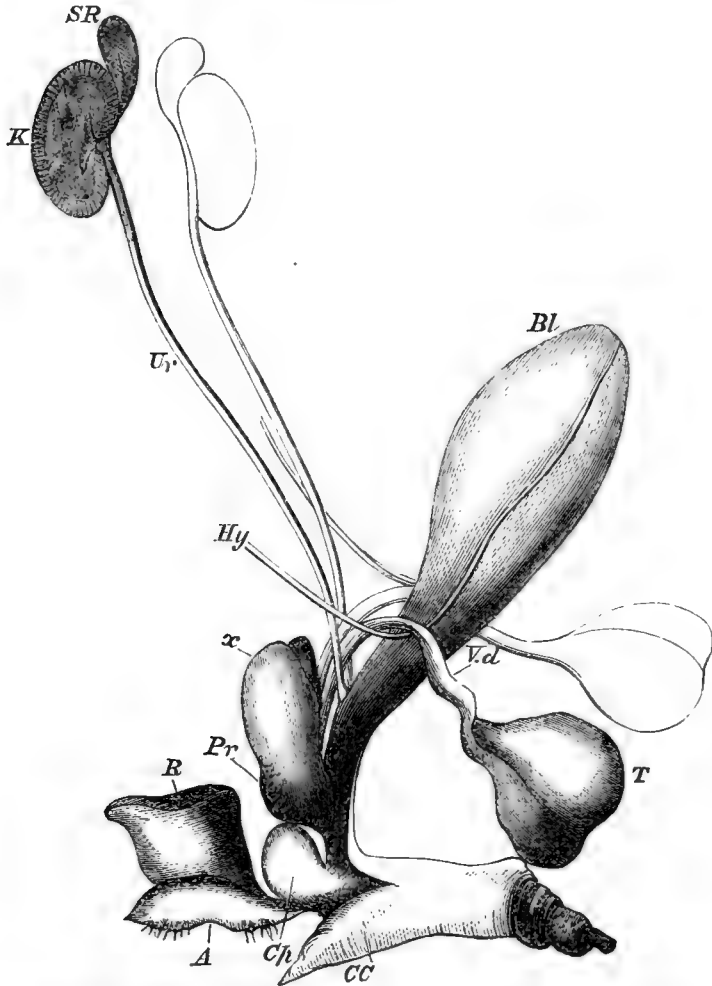
The arterial part of the vascular system of the Angwántibo had been partially injected by Mr. Murray, with the view of determining the existence and the nature of any retia mirabilia which might exist. Mr. Murray was unfortunately prevented, however, from carrying his examination of the specimen, while freshly injected, further than the brachial artery, which, he writes, exhibited "a longitudinally striated appearance. I meant to have dissected these striations fully and delicately out, and expected to find that they were composed of a series of vessels . . . . I reasoned that it would answer the same purpose, whether the artery was broken up into many branches spread all about the arm, or packed in one tube . . . . . When I last looked at it the striations were much less visible than at first. At first they were wondrous distinct."

Unacquainted with these observations, I, at first, nearly failed to make out the existence of any rete mirabile in either the upper or the lower extremities. Occupying the place of the brachial and femoral vessels, I found what had all the appearance of simple trunks, filled evenly, though imperfectly, with the red injection-mass ; and it was only on finding myself unable to pass a fine style into the supposed arteries, that I was led to examine their structure more minutely by the help of transverse sections and the microscope. Each trunk now turned out to be a dense and firm cord of connective tissue, traversed longitudinally by multitudinous trunks, some of which presented the remains of the red injection, while the others were empty. The former and the latter occupied opposite halves of the cord, and were not intermingled. In the femoral cord, the injected trunks were one comparatively large artery,  $\frac{1}{60}$ th of an inch in diameter, with strong walls, and about eighteen smaller ramuscules of between a half and a third the diameter of the large one. The uninjected trunks were of a similar size.

In the brachial cord there was a precisely similar arrangement; but the small branches were rather more numerous.

I am not aware that any rete mirabile has yet been observed having the arrangement just described; and it would be a matter of much interest to work out the details of the angiology of this animal in a specimen better fitted for investigation.

Fig. 11.



The uropoietic and male reproductive organs of the Angwántibo (nat. size). *A*, anus; *R*, rectum; *K*, kidney; *SR*, suprarenal bodies; *Ur*, ureter; *Bl*, bladder; *Hy*, hypogastric artery; *T*, testis; *V. d.*, vas deferens; *Pr*, prostate; *Cp*, Cowper's glands; *CC*, corpora cavernosa.

The kidneys (fig. 11, *K*) are situated in the lumbar region, immediately below the diaphragm, the right being higher than the left by half its length. Each kidney is 0·7 in. long by 0·35 inch wide, and is shaped much like that of Man. In vertical and longitudinal section

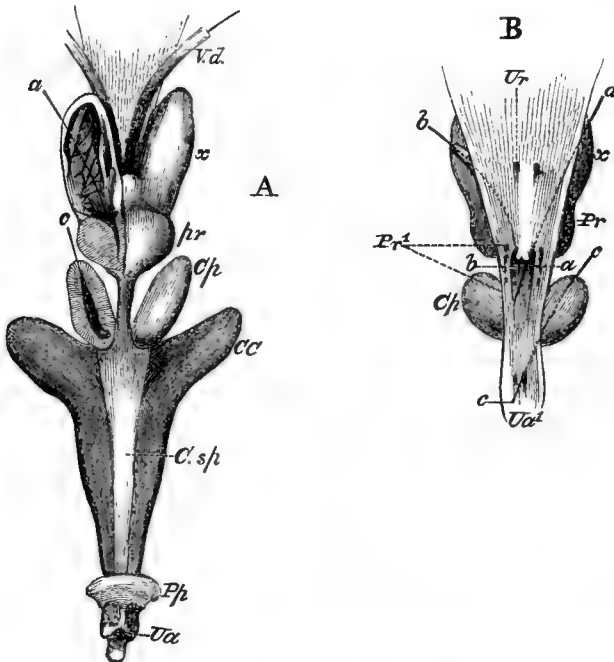
it exhibits but a single papilla. The ureters open into the bladder about half an inch above its urethral aperture, and 2 inches from its summit. The bladder is, thus, in its empty and flaccid condition about 2·5 inches long.

The suprarenal bodies (SR) are oval, 0·4 inch long, and are attached to the front and upper faces of the kidneys.

The testes (fig. 11, T) are large for the size of the animal, each being 0·7 inch long by 0·4 inch wide, without the epididymis, which is proportionately developed. The inguinal canal is open, so that a blowpipe can be passed into it and the peritoneal sac inflated. The thick vasa deferentia pass through it, and then curving over the obliterated hypogastric arteries (which can be traced up to the summit of the bladder), they bend down behind the bladder and become closely connected together. They terminate in the urethra by two apertures placed close together, upon the end and rather the under surface of a papilla-like colliculus seminalis, which is slightly bifid at its extremity (fig. 12, B).

At first, I took the notch which causes this appearance for the mouth of an uterus masculinus, which I imagined might lie on the elevated ridge which extends between the apertures of the vasa defe-

Fig. 12.



The vasa deferentia, accessory generative glands and penis of the Angwántibo, dissected, and drawn of twice the natural size. A, viewed from behind; B, from in front, and slit open; a, b, c, bristles introduced into the oval sac, vasa deferentia, and Cowper's glands, respectively. In A: C. sp, the corpus spongiosum; Pp, the prepuce; Ua, the urethral aperture. In B: Ur, the apertures of the ureters; Pr', of the prostate ducts; Ua', the urethral canal.

rentia and those of the ureters; but careful examination did not reveal the existence of any such structure. Two longitudinal folds of mucous membrane, along which the apertures of the prostatic ducts (*Pr'*, fig. 12, B) are situated, extend from the colliculus and form the lateral boundaries of a wide fossa, which it overhangs. This fossa receives at its upper and back part, by two separate apertures, the ducts of two large oval sacs, which are perfectly distinct from one another, though their inner walls are united for some distance. The walls of these sacs are raised into oblique folds, and they lie at the back of the neck of the bladder behind the vasa deferentia, and occupy the place of the vesiculæ seminales. As they do not communicate directly with the vasa deferentia, however, I am doubtful whether they ought to be considered as representing the vesiculæ seminales, or as a large uterus masculinus.

These sacs are distinguished externally from the prostate (*Pr*) only by a slight constriction; but their ducts pass in front of that gland, which lies altogether at the back of the urethra, so that the front wall of the latter is free and uncovered by the prostate. The prostate is pyriform, broad above, narrow below, and has the ordinary structure.

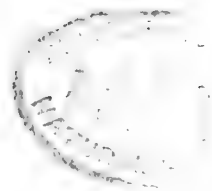
A "membranous portion" of the urethra unites the prostatic part with the slightly dilated bulbous portion and its continuation lodged in the corpus spongiosum. The bulb receives the ducts of the two large oval Cowper's glands (*Cp*, figs. 11, 12), each of which has thick walls and a central cavity continuous with the ducts.

The os penis, 0·75 inch long, is situated between the corpora cavernosa, extending from the apex of the penis backwards in the middle line.

The glans penis consists of a median, curved, subcylindrical portion supported by the extremity of the bone of the penis, and of a sort of hood, bifid below, which surrounds the base of this. The hood has a tuberculated surface; and the urethra opens between the lobes formed by its inferior bifurcation, and therefore at some distance behind the apex of the organ.

According to Van der Hoeven's account (*l. c.* p. 54), the male reproductive organs of the Potto must be very similar to those of the Angwántibo; and Kingma's description and figures demonstrate the like for *Otolicnus peli*. Kingma, in fact, has worked out the anatomy of the parts more thoroughly than Van der Hoeven; for he shows that, as in the Angwántibo, the hollow vesicles connected with the prostate open independently of it and of the vasa deferentia, and does not admit them to be vesiculæ seminales. But it is unsafe to come to a conclusion respecting the nature of these parts without some knowledge of their development.

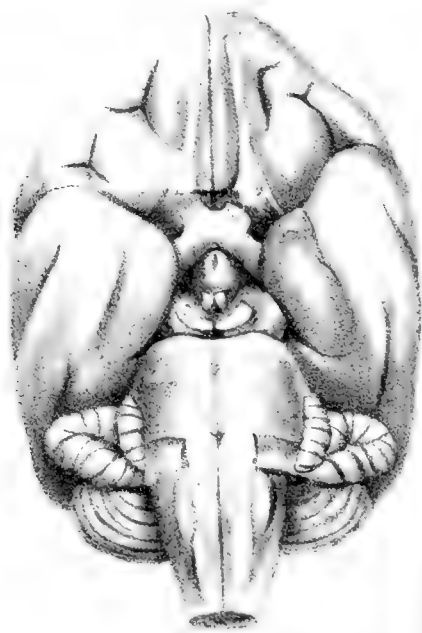
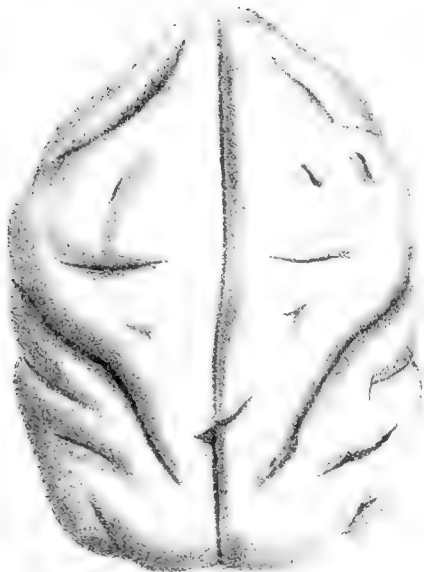
In his recently published "Revision of the Species of Lemuroid Animals" (*Proc. Zool. Soc.* 1863, p. 129), Dr. J. E. Gray has separated the Angwántibo from *Perodicticus*, and has made it the type of a new genus, *Arctocebus*. The genera *Perodicticus* and *Arctocebus* are differentiated as follows (*l. c.* p. 150):—



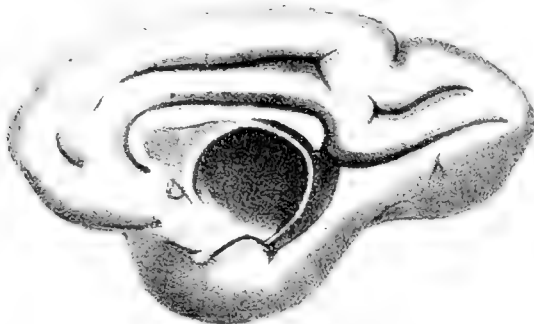
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2



3





“†† *The hand broad; the index finger abortive, clawless; eyes moderate.* Perodicticina.

“15. PERODICTICUS, Bennett.

“Tail shorter than the body. The hands and feet large. Fingers and toes free at the ends; the index finger rudimentary, but distinct. Lower cutting teeth large and prominent, and projecting. The apices of the vertebræ of the back, neck, and withers projecting beyond the skin, like prickles.”

“16. ARCTOCEBUS.

“Tail very short. Hands and feet small, with the lower phalanges (not including the thumb) united in the skin, the two upper joints free; the index finger abortive, reduced to a tubercle. Lower cutting teeth small, hyaline, hidden by the lips.”

Leaving the skeleton (the characters of which I propose to discuss on a future occasion) out of consideration, the facts which I have brought forward in the present communication appear to me to justify, though on grounds different from those stated by Dr. Gray, the establishment of the new genus *Arctocebus* for the Angwántibo. This genus is distinguished from all other *Lemuridæ* by the combination of the following characters:—

The tail rudimentary. The pinna of the ear has two projecting shelf-like lamellæ above the auditory meatus. The index finger is rudimentary and nailless. The dental formula— $i. \frac{2-2}{2-2}$ ;  $c. \frac{1-1}{1-1}$ ;  $pm. \frac{3-3}{3-3}$ ;  $m. \frac{3-3}{3-3}$ . The anterior upper molars have oblique ridges and are quadricuspid, the last is tricuspid. The last lower molar quinqucuspid.

In *Perodicticus*, on the other hand, the tail is distinct, though short. The pinna of the ear has only one complete shelf-like lamella. The index finger is rudimentary and nailless. The dental formula is— $i. \frac{2-2}{2-2}$ ;  $c. \frac{1-1}{1-1}$ ;  $pm. \frac{3-3}{3-3}$ ;  $m. \frac{3-3}{3-3}$ . The anterior upper molars have oblique ridges and are quadricuspid, the last is bicuspid. The last lower molar is without a fifth cusp.

9. ON THE BRAIN OF THE RED HOWLING MONKEY (*MYCETES SENICULUS*, LINN.). BY WILLIAM HENRY FLOWER, F.R.S., ETC., CONSERVATOR OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

(Plate XXIX.)

One of the most important omissions in the great work of Gratiolet “On the Cerebral Convolution of the Primates” is that of a description of the brain of any member of the well-marked genus *Mycetes*. This may easily be accounted for by the extremely rare occurrence of these animals in a living state in Europe, and the difficulty of preserving the brain in the hot climate in which alone they are

found. Through the resources of the Society's Gardens, I am now able to supply the deficiency; and it is interesting to find that this hitherto undescribed brain presents such striking peculiarities of conformation as to render a figure of it well worthy of a place in our 'Proceedings.'

The entire weight of the animal (an old male, which died in the Gardens in October 1863) was 7 lbs.  $9\frac{1}{2}$  ozs. avoirdupois, the body being in an extremely emaciated condition. The encephalon, immediately after removal, weighed 740 grains, or nearly  $\frac{1}{72}$  of the whole weight. The capacity of the cranial cavity was  $4\frac{1}{2}$  cubic inches. The greatest length of the cerebral hemispheres when fresh was 2.4", their greatest breadth 1.7". After having been immersed for some days in spirits, the length had diminished by shrinking of the brain-mass to 2.25"; and upon the brain which had suffered this slight contraction the dimensions given below were taken.

As regards their general form, the cerebral hemispheres, taken together, may be described as depressed, moderately broad, with the upper surface very little arched, the sides flat and parallel, the posterior end rather abruptly truncated, and in front narrowing rapidly to an obtuse point. The frontal lobes are small, flat above, and deeply excavated below for the roof of the orbits; the temporal lobes are full and rounded; the parietal lobes broad and flat; and the occipital lobes short, broad, and shallow, not more than just covering the whole of the cerebellum. The olfactory lobes project 0.2" beyond the cerebral hemispheres in front.

The base of the brain offers few special characters. The corpora albicantia are quite distinct from each other. The tuber cinereum large. The pons varolii 0.4" long and 0.7" broad. The olivary bodies 0.2" long, by nearly 0.1" broad. The limits of the corpora trapezoidea can be readily defined. The anterior pyramids strongly marked, each 0.15" broad.

The cerebellum is of moderate dimensions, and has a very large and prominent flocculus standing out horizontally on each side considerably beyond the hemispheres. The vermiform process, 0.3" broad, projects posteriorly slightly beyond the limits of the hemispheres. The latter have the same form as in the Primates generally. The breadth of the cerebellum across the hemispheres is 1.25", across the flocculi 1.5".

The corpus callosum measures 0.9" in length, or, compared with the entire length of the cerebrum, as 37 to 100. The antero-median portion of the hemisphere (parts in front of the hinder edge of the hippocampus major) measured internally 1.4", the posterior (equivalent to the "posterior lobe," and containing the "posterior cornu," &c.) 0.7", or as 100 to 50.

To return to the surface of the cerebral hemispheres, the sulci are distinct and deep, but not numerous or complex, and with very few secondary grooves. There is a tolerably close general bilateral correspondence, though not extending to all the details.

A. *Sulci upon the outer surface.*—Sylvian fissure. This great fissure, the complete development of which is characteristic of the

brain of the Primates, forms an important landmark upon the surface of the hemispheres, dividing it into two pretty nearly equal portions. It runs obliquely upwards and backwards, and is prolonged to the upper surface of the occipital lobe, extending to within  $\cdot 15''$  of the middle line and  $\cdot 4''$  of the posterior end of the hemisphere. The antero-temporal fissure lies at the distance of  $\cdot 25''$  behind the Sylvian fissure, though approaching nearer at the upper end. It extends upwards only about two-thirds of the length of the Sylvian fissure. Behind the upper part of this, and parallel with it, is a straight sulcus about half an inch long, curving somewhat backwards at its upper end, placed near the limits of the temporal and occipital lobes. This and an indentation on the edge of the hemisphere, at the great longitudinal fissure, three-quarters of an inch from the posterior end, more pronounced on the right than the left side, are the only indications of the external perpendicular fissure. Rather below the middle of the occipital lobe, on its outer side, is a short horizontal shallow sulcus, bifurcated in front on the left side, and represented on the right by a triradiate indentation. This completes the enumeration of the sulci on the outer face of the hemisphere behind the fissure of Sylvius.

The fissure of Rolando is distinct, half an inch long, and quite transverse in direction. A quarter of an inch behind it, is a short transverse groove, and about the same distance in front a longitudinal one. On the frontal region is a strongly arched fissure, a little way above, but parallel to, the supraorbital border, slightly forked at its hinder or external end. The orbital surface of the hemisphere is marked by several irregular sulci.

B. *Sulci on the inner face of the hemisphere.*—The calloso-marginal sulcus is nearly straight; it coincides in length with the corpus callosum, and bifurcates behind, its upper division not reaching the margin of the hemisphere. The calcarine fissure is quite simple, being joined by no other sulcus, and not bifurcating at its posterior extremity. It is slightly curved, with the concavity downwards, and does not extend quite so far as the apex of the hemisphere. It is not so deep or complex internally as in most of the Old World Apes; its internal relief in the ventricle, the hippocampus minor, is consequently small in proportion to the rest of the hemisphere. Above and nearly parallel to the last is a well-marked but shorter sulcus, having a sigmoid curve. The dentate sulcus is continuous with the calcarine. The collateral is deep, short, and simple, curving at its lower part to the outer surface of the temporal lobe. Between its hinder extremity and the calcarine is a slight triradiate indentation.

The brain just described, taken all together, presents certain characters by which it is distinguished from that of all other Apes. The whole organ is small as compared with the size of the animal. The brain has in itself a contracted shrunken look, wanting that roundness and fulness seen in other genera, as *Ateles* and *Cebus*. Then the surface-markings are, considering the size of the brain, comparatively few and simple, and they depart remarkably from the ordinary type seen in the order.

Among the Old-World Apes there is a striking general similarity in the character of the surface-markings of the cerebral hemisphere. Taking *Cercopithecus* as a typical form, we find *Macacus*, *Cynocephalus*, and *Cercocebus* agreeing with it in all essentials—a slight modification in ascensive development in *Semnopithecus* and *Hylobates*, and a further complication overlying the same primitive type in *Trogodytes* and *Simia*, leading up to the brain of Man. Among the New-World Apes, on the other hand, there is much greater diversity. In *Cebus*, but in this genus alone, there is a precise repetition of the Old-World type. In *Ateles* a modification takes place in the ascending direction; but in the other forms, *Pithecia*, *Callithrix*, *Nyctipithecus*, and more especially *Mycetes*, we have modifications of which there is no parallel among the Catarrhine series.

The chief peculiarities of the distribution of the sulci in the hemispheres of *Mycetes* are these:—1. On the outer surface: *a*, the excessive prolongation of the Sylvian fissure; *b*, the absence of the angular sulcus; *c*, the absence of any well-marked external perpendicular fissure. 2. On the inner face of the hemisphere: *a*, the simplicity of the calcarine fissure; *b*, the absence of any well-marked internal perpendicular fissure.

In endeavouring to ascertain the zoological affinities of the genus *Mycetes* through its cerebral organization, we must first observe the absence of signs of serial elevation in the brain-characters (such as large proportionate size, and complexity of convolutions), which ought to be met with if the place usually assigned to it in systems, at the head of the Platyrrhine group, be correct. Next, its great dissimilarity to all, even the lowest, of the Old-World forms, and to those American Monkeys which in their brain-characters most closely resemble the Old-World Apes. Lastly, its affinity in some of its most striking characters (*i. e.* the prolongation of the Sylvian fissure, absence of angular and external perpendicular sulci) to some of the lower forms of Platyrrhine Apes, as generally considered, and especially to the genus *Nyctipithecus*. Whether this similarity is of any real zoological significance I am not prepared to say, as it must be taken in conjunction with numerous other structural characters.

The general relation which is commonly supposed to obtain between brain-structure and mental characteristics is fully borne out in the Howling Monkeys, all original observers of the habits of these animals agreeing in describing their disposition as surly and untamable, and their intelligence as of a very different order from that of their geographical neighbours the Spider Monkeys and *Cebi* of higher cerebral organization.

#### DESCRIPTION OF PLATE XXIX.

Brain of *Mycetes seniculus*, natural size.

Fig. 1. Lateral view.

Fig. 2. Upper surface.

Fig. 3. Under surface.

Fig. 4. Inner face of hemisphere.

10. ON THE STERNAL APPARATUS OF BIRDS AND OTHER VERTEBRATA. BY W. K. PARKER, F.Z.S.

At the last Meeting of this Society it was my good fortune to hear Professor Owen read a paper on the "Osteology of the Great Auk (*Alca impennis*)."

In his description of the sternum, our author turned aside to rebuke those anatomists who applied the terms used in the description of the Tortoise's breastplate to the parts of the Bird's sternum. I was very glad to be reminded of the confusion which exists in the nomenclature of the shoulder- and breast-bones in the Vertebrata generally; and as I have always used Geoffroy's terms, episternal, hyosternal, &c., in my published descriptions of the sternum of birds, I thought it would be well to re-examine the matter.

In my paper on the *Balæniceps* I quoted Professor Owen's views as to the nature of the Chelonian breastplate; and therefore, whilst still using the old familiar terms, I did so with open eyes, choosing them for the bird, although I knew that they were inapplicable to the bones that appear in the same region in the Tortoise. The question is, Is it fair to use the cast-away terms of one class for the *analogous*, but not *homologous*, parts in another? I will quote Professor Owen's own writings to show how these threads of scientific thought came to be ravelled. In the 'Descriptive Catalogue of the Skeletons in the Museum of the College of Surgeons' (vol. i. p. 169, no. 769), Prof. Owen, in describing the skeleton of *Chelone midas*, says, "The plastron consists, in the genus *Chelone*, as in the rest of the Order, of nine pieces—one median and symmetrical, and the rest in pairs. With regard to the homology of these bones, three explanations may be given—one in conformity with the structure of the thoracic-abdominal cage in the Crocodile, the other based upon the analogy of that part in the Bird, and the third agreeably with the phænomena of development. According to the first, the median piece of the plastron, called 'ento-sternal,' answers to the sternum of the Crocodile, or 'sternum proper,' and the four pairs of plastron-pieces to the hæmapophyses forming the so-called sternal and abdominal ribs of the Crocodile. Most comparative anatomists have, however, adopted the views of Geoffroy St.-Hilaire, who was guided in his determination of the pieces of the plastron by the analogy of the skeleton of the Bird, according to which all the parts of the plastron are referred to a complex and greatly developed sternum, and the marginal plates are viewed as sternal ribs (hæmapophyses). The third ground of determination refers the parts of the plastron, like those of the carapace, to a combination of parts of the endo-skeleton with those of the exo-skeleton."

It is evident from this quotation that Geoffroy, in the first instance, took his cue from the sternum of the bird—most likely from the structure of the sternum in the chick; if so, where is the absurdity of retaining his familiar and useful terms for the parts and processes of the ornithic sternum, and of allowing the Tortoise to crawl off in some other direction to get names for his nine-jointed breastplate?

But we were informed by Professor Owen at the last Meeting that there is no entosternal piece in the sternum of the Bird, but that symmetrical bones meet, coalesce, and grow downwards into the still cartilaginous keel. I am sorry that this very eminent anatomist did not give us the genera in which this occurs; for, although I have been peeping and prying into the secrets of this matter ever since I was in my teens, I have only seen this simply symmetrical state of the growing sternum in birds of the Ostrich family, *e.g.* *Struthio*, *Dromæus*, and *Dinornis*. In the Fowl-tribe there are five centres, three in the Cormorant, in the Plovers (*e.g.* *Ædicnemus*) three, and three in the Passerine and singing-birds, *e.g.* *Turdus*, *Alauda*, and their allies, the fastest-growing birds in the class. This matter, however, of the number of centres transitionally existing in the sternum of the Bird is not the main part of the question. My use of the terms is really for *the processes* in that curious piece of a Bird's framework; and very convenient terms they are. For the Bird's sternum agrees neither with that of the Batrachian, nor with that of the Monotreme, nor with that of the ordinary Mammal, but with the same part in the Lizard. In both these groups the sternum is one and undivided; but whilst in the Lizard it either continues cartilaginous or, as it were, degenerates into granular bone, in the Bird it not only ossifies most perfectly, but in a transient manner anticipates the segmentation of its homologue in the mammal.

Now, then, for the phenomena of development in the plastron of *Chelone midas*. There is no *connation* whatever; there is no sternum at any time, and no hæmapophyses—nothing, indeed, but *membrane-bones* formed between the corium and the membrane lining the thoracic abdominal cavity. One bone, the azygous piece, answers to a similarly unsymmetrical piece in the thoracic apparatus of the Aves and of the Lacertilia, and had its counterpart also in the extinct Plesiosaurs and Ichthyosaurs, and also exists in the Monotremes. It has long been taken for granted that the merrythought (“furcula”) of the Bird agrees with the clavicles of the Mammal; in most genera, however, it ossifies from only one centre. In some, *e.g.* the Toucan and the Touraco (*Ramphastos* and *Corythaix*), and the genus *Athene* amongst the Owls, it is double, as in us and our suckling congeners. It is known that the main part of the clavicle of the Mammal is only an ossification of fibrous tissue, and does not belong to the same category as the scapula and coracoid: so it is in Birds, so it is in Lizards, the azygous condition of this part not really altering its morphological signification. But the bone, which in Lizards and Amphibians has been called the “clavicle,” is an ossified *cartilaginous* rod, and is not the homologue of the Mammalian clavicle. Now, whilst suffering both from the Professor's rebuke and from a sense of the pressure of the whole difficulty, it occurred to me that it would be best to touch the thing with the point of my needle, and see what a little patient labour would reveal. My hap was to light upon a guano-mummy of a young Booby, a present (along with some flattened and dried Cormorant-chicks) from my kind friend Mr. T. J. Moore of Liverpool.

In this bird I beheld a furcula with double branches, and saw that the V-shaped membrane-bone had, clamped upon each of its outspread arms, a wedge-like mass of feebly ossified cartilage. The whole matter flashed upon my mind in a moment, and I saw at once that the term "clavicle" had been loosely and incorrectly applied to a part of the thoracic apparatus which is well developed in Frogs and Lizards, but continues rudimentary in Birds.

Professor Huxley has assisted me greatly by putting into my hands a most valuable recent paper by Gegenbaur ("Ueber die episternalen Skelettheile und ihr Vorkommen bei den Säugethieren und beim Menschen," Abdruck a. d. Jen. Zeitschr. f. Medicin, etc. 1864), in which this subject is beautifully worked out in many Mammals, and this additional cartilaginous piece, called by him "episternum," is shown to exist very frequently in this class also.

I am satisfied that these cartilaginous rods are really the homologues of the so-called clavicles of Lizards and Frogs; whilst they have nothing whatever in common with the episternal pieces in the Chelonian, with the so-called episternal bone of the Lizards, nor with the episternal process in Birds. Moreover the episternal piece or pieces in the Batrachia have nothing in common with the so-called "episternals" of Gegenbaur.

I shall close this paper by remarking that I wholly disclaim Professor Owen's nomenclature of the scapular arch in osseous Fishes; for there are only the two and the four well-known cartilaginous pieces in the whole structure, the supposed forearm and wrist; whilst the so-called suprascapula, scapula, coracoid, clavicle, epiclavicle, and the almost infinite joints of the symmetrical fin-rays, all these want names that will suit their nature\*.

It is just possible that the humeri of Cuvier (coracoids of Owen) may be the clavicles, and that they reappear as a single piece in Lizards and most Birds, and then in certain birds get back their separateness, which they retain throughout the Mammalian class. This view of them was taken by Spix, Geoffroy, Meckel, and Agassiz (see Owen's Lectures on Comp. Anat. vol. ii. p. 118). Still there is never such an inordinate growth of *aponeurotic* bone in this region in the air-breathing vertebrata.

\* I do not mention this part of the Fish as if no other region of its body had suffered from being dragged into harmony with that mischievous piece of fancy-work, "the vertebrate archetype." It is high time for us to have ceased from transcendentalism: of what value is it? Our proper work is not that of straining our too feeble faculties at system-building, but humble and patient attention to what Nature herself teaches, comparing actual things with actual.

11. NOTES ON A COLLECTION OF BIRDS FROM THE ISTHMUS OF PANAMA. BY P. L. SCLATER, M.A., PH.D., F.R.S., AND OSBERT SALVIN, M.A., F.Z.S.

(Plate XXX.)

The series of birds which forms the subject of the present paper was collected by Mr. James M'Leannan, the track-master of Lion Hill Station on the Panama Railway. Lion Hill is the second station on leaving Colon or Aspinwall, and is about ten miles from the Atlantic coast of the isthmus. Mr. M'Leannan is well known to science, having supplied Mr. G. N. Lawrence, of New York, with materials for his valuable papers on the avifauna of the isthmus, published in the 'Annals of the Lyceum of Natural History of New York,' in the 'Proceedings of the Academy of Sciences of Philadelphia,' and in the 'Ibis,' where some few of the new species are described. The large series of birds possessed by us from countries immediately contiguous to the Isthmus of Panama, embracing many types of original descriptions, has enabled us to compare the Isthmian series with the birds of New Granada and Western Ecuador in the south, and with those of Guatemala and Southern Mexico in the north, necessitating in several cases an alteration of Mr. Lawrence's nomenclature. This is our reason for retraversing the ground that he has already gone over so recently.

The first indications of the rich avifauna of Panama were obtained by the well-known French collector, Delattre, who spent some time upon the isthmus when he visited New Granada and Bolivia in 1846. M. De Lafresnaye, who has given us an account of M. Delattre's collections made during this expedition\*, in the 'Revue Zoologique' for 1847, mentions the following six species from Panama:—

*Conopophaga nævioides*, Lafr.

*Pipra vitellina*, Gould.

*Aglaia francescæ*, Lafr.

*Arremon aurantirostris*, Lafr.

*Coccyborus cyanoides*, Lafr.

*Malacoptila panamensis*, Lafr.

Little further appears to have been done towards rendering our knowledge of Panama birds more complete until 1861, when Mr. Lawrence commenced the series of papers to which we have already alluded, upon the collections made by Mr. M'Leannan†.

We yet require more perfect knowledge of the immediately adjoin-

\* Rev. Zool. 1847, p. 67.

† "Catalogue of a Collection of Birds made in New Granada by James M'Leannan, Esq., along the route of the Panama Railway," Ann. Lyc. N. H. New York, part 1, vol. vii. p. 288; part 2, p. 315; part 3, p. 461; part 4, vol. viii. p. 1. "Descriptions of Six New Species of Birds from the Isthmus of Panama," Ibis, 1862, p. 10. "Descriptions of Eight New Species of Birds from the Isthmus of Panama," Ibis, 1863, p. 181. "Descriptions of New Species of Birds, &c.," Proc. Acad. N. Sc. Philad. 1864, p. 106.





J. Wolf del. et lith.

M. & N. Hanhart Imp

EUCOMETIS CASSINII



ing country of Costa Rica to be able to ascertain with greater accuracy the limits of the somewhat peculiar fauna which is to be found in Veragua. Our knowledge, as far as it goes at present, indicates that this section of the isthmus is more intimately allied ornithologically to the lowlands of the northern portion of New Granada and Western Ecuador than to the country immediately to the north of it. Yet, as will be seen in the following list, Central American representatives of South American forms are still met with, amongst a larger number of truly South American species. The occurrence of *Turdus grayii*, *Muscivora mexicana*, &c. are cases in point.

[In March and April of last year (1863) I spent three weeks at Panama, partly occupied with Capt. Dow in fishing in the Bay of Panama, enjoying all the time the hospitality of the steamer 'Guatemala.' On Capt. Dow's return to Central America I availed myself of a free passage up and down the line of railway, granted me by Colonel Totten, to visit Mr. M'Leannan's and other stations on the line. The time was too short to do much myself—not more than sufficient to take a passing view of the scenery of the isthmus and to collect a few birds. With pleasure I here acknowledge the great service, kindness, and liberality rendered to me by the Panama Railway Company during the latter part of my stay in Central America, and especially by Capt. Dow, to whom I owed my introduction. Personally a stranger to him, and only known to him as travelling with a scientific object, he, on behalf of the company, not only took especial charge of the boxes I forwarded from time to time, but when I returned to England a free passage was given me to Aspinwall and the hospitality of his ship till she returned on her voyage; and since then, where science has been the object, he has done all in his power to assist. If other companies were thus liberally disposed, how much would the cause of the scientific traveller be aided!

The line of railway passes through a forest region which, on the Atlantic side, is only broken by large swampy tracts. On the higher lands and on the Pacific slope a few clearings have been cut; but, the population being very thin, slight impression has been made upon the natural growth. Lion Hill Station is situated in a district of the densest tropical forest; the ground is undulating, the hollows being swampy in the wet season, and even in the dry the tracks through the forest are confined to the low hills. The difficulties of collecting are greatly enhanced by the dense undergrowth of a species of *Agave*, the barbed leaves of which catch one at every step, and to pass through which a free use of the knife is necessary. Owing to these drawbacks Mr. M'Leannan considered his the worst station on the line for collecting; yet, from what I could judge the few days I spent there, I should say that birds were very numerous both in species and individuals. When bent on a shooting-excursion, we would start at daybreak and ride along the line in a "hand car" worked by two negroes, to some point where a track led into the forest, which we would follow till stopped by an impenetrable swamp. All along these paths birds abounded, and we had no difficulty in securing in a couple of hours enough work to occupy the rest of the day. A car

is provided at each station to enable the track-master to examine the line; they are all kept with great care, and usually named with reference to some taste of the owner. The "Ornithologist" of Lion Hill was an easy-going and fast conveyance, and saved us some long walks in the hot sun.—O. S.]

Our list comprises 272 species, most of which are included in Mr. Lawrence's papers, and to which he adds 117 more, which have not yet come under our notice. We have therefore 389 species at present known to inhabit this section of the isthmus. The discrepancy between this number and the total given by Mr. Lawrence (415) is explained by noticing that his numbers are placed for reference, and not to indicate the total number of species found in the district. Thus when a correction of synonymy is made, the bird is numbered twice over.

#### Fam. TURDIDÆ.

##### 1. *Turdus grayii*, Bp.

"*Turdus casius*, Bp."; Lawrence, Ann. of Lyc. of Nat. Hist. N. Y. vii. p. 326.

Agrees perfectly with Guatemalan and Mexican specimens.

The differences pointed out by Mr. Lawrence between *T. casius* and *T. grayii* do not hold on comparison with a selected series of the Central American species.

Other Thrushes mentioned by Mr. Lawrence are *T. fuscescens*, Stephens, *T. obsoletus*, Lawr., and *T. minimus*, Lafr. (= *T. swainsonii*, Cab. : vide Baird, Rev. Am. Birds, p. 20).

#### Fam. SYLVIIDÆ.

##### 2. *Polioptila superciliaris*, Lawr. Ann. Lyc. Nat. Hist. N. Y. vii. p. 304.

Panama examples agree with specimens from the Pacific coast of Ecuador collected by Fraser, which in Sclater's American Catalogue are referred to *P. bilineata*. The true *P. bilineata* (or at least that which we take for it, Bonaparte's description being too vague for accurate identification) has the whole circle round the eye white, and is purer white below—the *P. superciliaris* being of an ashy-white below, and having the space immediately behind the eye black.

The geographical range of these black-headed *Polioptilæ* in Central America is rather puzzling. The present species extends from Western Ecuador to Costa Rica, and then reappears at Chisec in Central Vera Paz, from which locality Salvin has a single male specimen; while Central Guatemala is occupied by *P. albiloris*, Scl. & Salv., having the lores only white.

#### Fam. TROGLODYTIDÆ.

##### 3. *Heleodytes albo-brunneus*, Lawr. Ibis, 1862, p. 10.

A strict congener of *H. griseus* (Sw.), but very distinct in coloration, and with the bill rather shorter and more curved.

“Seen feeding amongst some low trees near San Pablo Station. It has the restless habits of a *Campylorhynchus*, being constantly on the move amongst the outer branches.”—O. S.

4. RHODINOCICHLA ROSEA, Less.; Lawr. Ann. Lyc. Nat. Hist. N. Y. vii. p. 292.

The true position of this remarkable bird is certainly among the Oscines. It is in fact very closely allied to *Heleodytes*.

5. CYPHORINUS LAWRENCII, Sclater.

*Cyphorinus cantans*, Lawr. Ann. Lyc. Nat. Hist. N. Y. vii. p. 293 (err.).

*C. lawrencii*, Lawr. *ibid.* viii. p. 5.

*C. supra fuscus*; *alis et cauda extus nigro frequenter transfasciatis*: *regione auriculari, mento, gutture et pectore toto castaneis*: *ventre cinereo, lateribus et crisso brunnescentibus*: *rostro corneo*: *pedibus fuscis*.

Long. tota 5.0, alæ 2.5, caudæ 1.55.

*Hab.* In prov. Veraguensi, Panama.

Sexus similes. Sp. aff. *C. phæocephalo* Sclateri, ex rep. Equator.; sed pectore clarius castaneo, et ventre cinereo, nec concolore, distinguenda.

6. MICROCERCULUS LEUCOSTICTUS (Cab.).

*Cyphorhinus leucostictus*, Lawr. *l. c.* vii. p. 320.

It appears that Dr. Cabanis was right in uniting the Mexican and South American specimens of this species, which ranges from Southern Mexico to Ecuador and Guiana; for Panama examples and those from the localities north and south present no distinctions. Sclater's name *prosthaleucus* will therefore sink into a synonym of Dr. Cabanis's older name.

7. THRYOTHORUS RUFALBUS, Lafr.

*T. longirostris*, Lawr. (nec Vieill.) *l. c.* vii. p. 320.

*T. rufalbus*, Lawr. *l. c.* viii. p. 5.

This species ranges from Guatemala to New Granada, Venezuela, and Trinidad, specimens from all these localities being, in our opinion, undistinguishable.

8. THRYOTHORUS ALBIPECTUS, Cab.

*T. galbraithii*, Lawr. *l. c.* vii. p. 320.

Specimens of this bird from Santa Martha, Cayenne, and Ecuador are in our opinion undistinguishable from these examples. It may, however, be mentioned that the Ecuador bird so noted by Sclater (P. Z. S. 1860, p. 273) is rather paler in general coloration. On the other hand, a slight variation in this respect is noticeable in the present specimens.

9. *THRYOTHORUS MODESTUS*, Cab.

*T. leucotis*, Lawr. (nec Lafr.) *l. c.* vii. p. 320.

*T. modestus*, Lawr. *l. c.* viii. p. 5.

Except that the general colour is decidedly paler, a specimen from Panama agrees with a typical example of this bird received from Dr. Cabanis. The Wren collected by Mr. Fraser at Escuintla, catalogued (Sclater, *Am. B.* p. 20) as *T. albipectus*, really belongs here; and Salvin has also many examples from Guatemala.

10. *THRYOTHORUS CASTANEUS*, Lawr.

*T. nigricapillus?*, Lawr. (nec Scl.) *l. c.* vii. p. 293.

*T. castaneus*, Lawr. *l. c.* vii. p. 321.

Closely allied to *T. nigricapillus*, Sclater, from Ecuador, but distinguishable by the chestnut colouring below, where the adult becomes almost immaculate, the black bars wearing off.

11. *THRYOTHORUS FASCIATO-VENTRIS*, Lafr. *R. Z.* 1845, p. 337.

*Cyphorhinus fasciato-ventris*, Lawr. *l. c.* vii. p. 320.

*C. albigularis*, Sclater, *P. Z. S.* 1855, p. 76, pl. LXXXVIII., & 1857, p. 4.

This species is clearly a *Thryothorus*, allied to the preceding species, and of the *Pheugopedius* group.

12. *TROGLODYTES HYPÆDON?*, Scl.

We are somewhat at a loss what to call the Panama House-Wren, as it agrees more closely with the true *aëdon* of North America than with the Guatemalan and Mexican representative. The colouring of the under plumage is much paler than in *T. hypædon*, and the bars on the sides are clearly shown, while in the latter species they are hardly visible, although not absolutely wanting as Sclater's description would indicate. In all the so-called species this characteristic is subject to considerable variation, as is also the marking on the back. The bill of the Panama bird is the longest, and in this respect resembles rather *T. aëdon*. We still require further materials to separate or unite the several birds which have been described under the names of *T. aëdon*, Vieill., *T. hypædon*, Scl., and *T. intermedius*, Cab.

Mr. Lawrence also mentions the following species of this group:—*Thryothorus rutilus*, Vieill., a Trinidad species, and *Cyphorhinus philomela*, Salv., of Central America.

## Fam. MOTACILLIDÆ.

Mr. Lawrence mentions *Anthus rufus*, Wils. *l. c.* vii. p. 322.

## Fam. MNIOTILTIDÆ.

13. *HENICOCICHLA NOVEBORACENSIS*, Gm.

*Seiurus noveboracensis*, Lawr. *l. c.* vii. p. 322.

14. *MNIOTILTA VARIA*, Linn.; Lawr. *l. c.* vii. p. 322.  
 15. *OPORORNIS FORMOSA*, Wils.; Lawr. *l. c.* vii. p. 14.  
 16. *HELMINTHOPHAGA CHRYSOPTERA*, Linn.; Lawr. *l. c.* vii. p. 293.  
 17. *HELMINTHOPHAGA PEREGRINA*, Wils.; Lawr. *l. c.* vii. p. 322.  
 18. *DENDRÆCA VIRENS*, Gm.  
 19. *DENDRÆCA CORONATA*, Linn.  
 20. *DENDRÆCA CASTANEA*, Wils.  
 21. *DENDRÆCA PENNSYLVANICA*, Linn.  
 22. *DENDRÆCA CÆRULEA*, Wils.  
 23. *DENDRÆCA ÆSTIVA*, Gm.  
 24. *DENDRÆCA MACULOSA*, Gm.  
 25. *MYIODIOCTES MITRATUS*, Gm.  
 All these are also included by Mr. Lawrence.

26. *BASILEUTERUS UROPYGIALIS*, Sclater, P. Z. S. 1861, p. 128.  
*B. semicervinus?*, Lawr. (nec Sel.) *l. c.* vii. p. 322.

Agrees with Sclater's type specimen of this species, the locality for which, taken from MM. Verreaux's label, is, no doubt, erroneous.

27. *SETOPHAGA RUTICILLA*, Linn.; Lawr. *l. c.* vii. p. 322.

Mr. Lawrence also refers to *Geothlypis philadelphia* (Wils.), *Dendræca canadensis* (L.), *D. blackburniæ* (Gm.), and *Basileuterus delatryi*, Bp., which we have not yet seen from Panama.

#### Fam. HIRUNDINIDÆ.

28. *HIRUNDO HORREORUM*, Barton; Lawr. *l. c.* vii. p. 317.  
 29. *NEOCHELIDON TIBIALIS* (Cassin).  
*Petrochelidon tibialis*, Cass. Pr. Acad. Phil. vi. p. 370.  
*Microchelidon tibialis*, ScL. Cat. Am. Birds, p. 39.  
*Neochelidon*, ScL. *ibid.* p. xvi.

Agrees with Sclater's specimen, of which the locality (Brazil) is no doubt erroneous. Dr. Hartlaub has lately obtained a skin of this species for the Bremen collection, from "New Granada."

30. *PETROCHELIDON ALBILINEA*, Lawr, *l. c.* viii. p. 2.

*Petrochelidon littorea*, Salv. P. Z. S. 1863, p. 189.

This is a common species, frequenting the rivers and sea-coasts of all the low land as far north as Guatemala.

31. *COTYLE UROPYGIALIS*, Lawrence, Ibis, 1863, p. 181.

*C. flavigastra*, Lawr. (nec Vieill.) *l. c.* 1861, p. 317.

Agrees with Fraser's Ecuadorian specimens, which Sclater refers (P. Z. S. 1860, p. 292) to the eastern *C. ruficollis* (Vieill.). The two species are in fact barely separable, the grey uropygium being the only noticeable difference. Cassin, in his List of Lieut. Michler's collection from Darien (Pr. Ac. Nat. Sc. of Philadelphia, p. 133), refers specimens, doubtless of the same bird, to *C. flavigastra*, Vieill. (= *C. ruficollis*).

*Hirundo lunifrons* and *Progne chalybea* also occur (*vide* Lawr. *l. c.*). As *Progne dominicensis* occurs in Costa Rica and Ecuador (Sclater, P. Z. S. 1860, p. 292), it is probable that this is the bird referred to as *P. chalybea*, both by Lawrence (*l. c.*) and by Cassin (Pr. Ac. Nat. Sc. Phil. 1860, p. 133).

## Fam. VIREONIDÆ.

32. *VIREOSYLVA ALTILOQUA* (Vieill.).

The occurrence of this Antillean species on the continent is rather remarkable; but there seems no doubt about the identity of the skin transmitted by Mr. McLeannan with Jamaican examples in Sclater's collection.

33. *HYLOPHILUS VIRIDIFLAVUS*, Lawr. *l. c.* vii. p. 324.

A distinct species, with the bill rather short and stout.

34. *HYLOPHILUS CINEREICEPS*, Scl.

*H. pusillus*, Lawr. *l. c.* vii. p. 323.

We are unable to confirm Mr. Lawrence's *H. pusillus* as distinct from the Mexican and Guatemalan bird which we suppose Mr. Lawrence to mean by "*H. plumbiceps*, Sclater." All the distinctions pointed out between birds from either locality can be shown to exist in northern specimens, as well in size as in coloration.

Mr. Lawrence includes in his lists, *l. c.*, *Vireo flavifrons*, Vieill., *Vireosylva flavoviridis*, Cass., *V. bogotensis*, Bryant?, *Hylophilus aurantiifrons*, Lawr., and *Vireolanius pulchellus*, Scl.

## Fam. CÆREBIDÆ.

35. *DACNIS ULTRAMARINA*, Lawr. Pr. Ac. Nat. Sc. Phil. 1864, p. 106.

*Dacnis cærebicolor*, Lawr. Ann. L. N. H. N. Y. vii. p. 291.

If referred to either of the allied species, this bird must go to *D. cayana*; but the more purple colouring of the blue parts render it easily distinguishable from this bird.

36. *DACNIS VENUSTA*, Lawr. *l. c.* 1862, p. 10; Sclater, Ibis, 1863, p. 311, pl. 7.



37. CHLOROPHANES GUATEMALENSIS, ScL. P. Z. S. 1861, p. 129.

*C. atricapilla* (Vieill.), Lawr. *l. c.* 1861, p. 319.

There appear to be four points by which the Central American *Chlorophanes* can be distinguished from the New Granadian, viz. by size (the northern bird being the larger), by the greater length of the bill, by the greater extent of the black crown, and by the greener cast of the plumage. Specimens from Panama have the general coloration and long bill of the northern bird, but the smaller size and less extensive black crown of the southern. It is, in fact, in its characters of so-called specific value, exactly intermediate between the two; but for the present we prefer to leave the question open as to the propriety of maintaining the two, or perhaps three forms as distinct, or of uniting all under one variable species—at the same time noticing that specimens from the same locality present remarkable uniformity of size and coloration.

38. CÆREBA CARNEIPES, ScL. ; Lawr. *l. c.* 1861, p. 291.

39. CÆREBA LUCIDA, ScL. & Salv. ; Lawr. *l. c.* 1861, p. 291.

40. CERTHIOLA MEXICANA, Sclater.

*C. luteola*, Cab. ; Lawr. *l. c.* 1861, p. 291.

Panama specimens are quite identical with Guatemalan and Mexican examples, and are hardly separable from the New Granadian *C. luteola*. The whole genus requires a careful revision.

#### Fam. TANAGRIDÆ.

41. EUPHONIA CRASSIROSTRIS, Sclater.

Agrees with New Granadian and Ecuador specimens. It differs from the Mexican and Guatemalan *E. hirundinacea* in the more extended yellow crown, and in having the white internal web of the outer rectrix not continuous to the end of the feather. Moreover the female is yellow instead of ashy beneath.

42. EUPHONIA FULVICRISSA, Sclater, P. Z. S. 1856, p. 276 ; Cat. Am. B. p. 58 ; Cassin, Proc. Acad. Phil. 1860, p. 143.

Sclater's original description only relates to the male of this very distinct *Euphonia*, of which the present collection contains two pairs. The species must be removed into the vicinity of *E. gouldi*, and may be shortly characterized as follows:—

♂. *Supra nitenti-cæruleo-nigra, fronte anguste flava: subtus flava, gutture ad medium pectus dorso concolore: ventre medio crissoque fulvo-rufis, hoc saturatiore: rectrice una utrinque externa in pogonio interno alba.*

♀. *Supra olivacea, æneo tincta: fronte anguste rufa: subtus olivaceo-flava, medialiter flavidior, crisso fulvescenti-flavo.*

The species ranges from Santa Martha up to Panama. Lieut.

Michler obtained it on the Truando, a confluent of the Atrato, as recorded by Cassin (*l. c.*).

43. *CALLISTE GYROLOIDES* (Lafr.); Lawr. *l. c.* vii. p. 332.

Not different from New Granadian specimens.

44. *CALLISTE FRANCESCÆ* (Lafr.); Salvin, P. Z. S. 1863, p. 169; Lawr. *l. c.* vii. p. 298.

Hardly distinguishable from *C. larvata*, as pointed out by Salvin, *l. c.*

45. *CALLISTE INORNATA*, Gould; Sclater, Mon. Call. pl. 45; Lawr. *l. c.* vii. p. 298.

Clearly not the young of the preceding, of which the collection also contains specimens, and doubtless a very good and distinct species.

46. *TANAGRA DIACONUS*, Less.

*T. cana*, Lawr. *l. c.* vii. p. 297.

47. *TANAGRA MELANOPTERA*, Hartlaub.

*T. palmarum*, Lawr. *l. c.* vii. p. 297.

Agrees with New Granadian specimens.

48. *RAMPHOCÆLUS DIMIDIATUS*, Lafr.; Lawr. *l. c.* vii. p. 331.

Agrees with New Granadian specimens.

49. *RAMPHOCÆLUS ICTERONOTUS*, Bp.; Lawr. *l. c.* vii. p. 297.

Agrees with New Granadian specimens.

50. *PYRANGA RUBRA* (Linn.); Lawr. *l. c.* vii. p. 331.

51. *PYRANGA ÆSTIVA* (Gm.); Lawr. *l. c.* vii. p. 297.

52. *PHÆNICOTHAUPIS FUSCICAUDA*, Cab. Journ. f. Orn. 1861, p. 86.

*P. erythrolæma*, Bp. MS.; Sclater, Cat. Am. B. p. 83.

*P. rubicoides*, Lawr. *l. c.* vii. p. 297.

*P. fuscicauda*, Lawr. *l. c.* viii. p. 9.

The Panama examples of this bird are not distinguishable from the New Granadian (lowland) form, which Sclater has called in his catalogue by Bonaparte's MS. name. We agree with Mr. Lawrence in adopting for this local but constant form Cabanis's first-published name.

53. *EUCOMETIS CRISTATA* (Du Bus); Lawr. *l. c.* vii. p. 298.

Agrees with the New Granadian form, not with the more northern *E. spodocephala*, Bp., which replaces it in Costa Rica, and ranges as far north as Guatemala.

54. *EUCOMETIS CASSINII*. (Pl. XXX.)

*Tachyphonus cassinii*, Lawr. *l. c.* vii. p. 297.

This well-marked Tanager clearly belongs to the *Eucometis* group. The sexes are alike; in *Tachyphonus* and *Lanio* they are always differently coloured. We have great pleasure in being able to give a figure of this fine species.

55. *TACHYPHONUS MELALEUCUS* (Sparm.); Lawr. *l. c.* vii. p. 331.56. *TACHYPHONUS LUCTUOSUS* (Lafr. & D'Orb.); Lawr. *l. c.* vii. p. 331.57. *TACHYPHONUS DELATTRII* (Lafr.); Lawr. *l. c.* vii. p. 331.

Two males of this species in the series agree with a New Granadian skin (Bogota make) in Sclater's collection, except in the triflingly darker shade of the crest. Lafresnaye's type was from Santa Buenaventura, on the west coast of New Granada; and the species was also obtained by the Darien expedition on the Truando. (See Cassin, *l. c.* p. 149.)

58. *TACHYPHONUS XANTHOPYGIUS*, Sclater, P. Z. S. 1854, p. 158, et 1855, p. 83, pl. 90; Lawr. *l. c.* vii. p. 331.

A female of this beautiful species, which occurs also on the Truando. (*Vide* Cassin, *l. c.* p. 142.)

59. *ARREMON AURANTHIROSTRIS*, Lafr. Rev. Zool. 1847, p. 72; Lawr. *l. c.* vii. p. 298.

Originally described by Lafresnaye from Panama, but ranges up the isthmus to the lowlands of Eastern Guatemala, where it is common, and thence northwards into Southern Mexico. More northern specimens have, however, a broader pectoral band and stronger bill, and are perhaps specifically distinct.

60. *SALTATOR ATRICEPS*, Less.; Lawr. *l. c.* vii. p. 297.61. *SALTATOR MAGNOIDES*, Lafr.

Both these *Saltators* are Mexican species which have here, as far as we know, attained their southernmost limits. Mr. Lawrence has described a *Saltator* belonging to this group from Panama (Pr. Ac. Nat. Sc. Phil. 1864, p. 106) under the title of *S. intermedius*. We are unable to recognize any tangible differences between our Panama and Central American specimens. A series of specimens from either locality would seem to include all the points of distinction by which Mr. Lawrence has separated the Panama bird; hence we are unwilling to adopt *S. intermedius* as a distinct form.

62. *SALTATOR ISTHMICUS*, Sclater.

*S. striatipectus*, Lawr. *l. c.* vii. p. 331.

A species founded by Sclater upon Panama skins. It requires to be carefully compared with the allied *S. maculipectus*, *S. striati-*

*pectus*, and *S. albicollis*, for which we have not at present sufficient materials. It is very possible that Mr. Lawrence may be right in referring it to Lafresnaye's *S. striatipectus*, the type of that species having been obtained by Delattre at Cali, near the head of the valley of the Cauca, New Granada.

63. PITYLUS GROSSUS (Linn.); Lawr. *l. c.* vii. p. 298.

Panama skins agree best with Sclater's Esmeraldas specimens (ex Fraser), but are barely separable from the eastern bird.

64. PITYLUS POLIOGASTER, DuBus.

Agrees with Mexican specimens. Other Tanagers recorded from Panama by Mr. Lawrence are *Euphonia hirundinacea* (perhaps *E. crassirostris*, nobis), *E. gouldi*, *E. minuta*, and *Ramphocelus luciani*. The latter is perhaps what we consider to be *R. dimidiatus*.

#### Fam. FRINGILLIDÆ.

65. GUIRACA CYANOIDES, Lafr.

*Cyanoloxia cyanoïdes*, Lawr. *l. c.* vii. p. 297.

Established by Lafresnaye upon Panama specimens which are not separable from the Cayenne bird, as distinguished from the small-billed *G. cyanea* of Brazil.

66. SPERMOPHILA SEMICOLLARIS, Lawr. *l. c.* viii. p. 10.

*S. aurita*?, Lawr. *l. c.* vii. p. 333.

A species somewhat allied to *S. ophthalmica*, Sclater, but quite distinct (*gula nigra*, &c.).

67. SPERMOPHILA MINUTA (Linn.); Lawr. *l. c.* vii. p. 333.

Agrees with Cayenne and Bogota skins.

68. SPERMOPHILA GUTTURALIS (Licht.).

*Phonipara gutturalis*, Lawr. *l. c.* vii. p. 298.

Agrees with Fraser's Ecuadorian skins in Sclater's collection, except in its rather stouter bill, which is not of much moment in a Finch.

69. VOLATINIA JACARINA (Linn.); Lawr. *l. c.* vii. p. 332.

70. EMBERNAGRA STRIATICEPS, Lafr. Rev. Zool. 1853, p. 61.

Lafresnaye's name was bestowed upon the Panama bird, which seems well distinguished from the allied *E. conirostris*, Bp., of New Granada on the one side, and *E. chloronota*, Salvin, of Guatemala on the other. From *E. conirostris* it differs in its olive-green back and brighter-yellowish outer margins of wings; from *E. chloronota* in its clearer-green back and paler under surface. It is larger in size than either of its affines.

71. PHONIPARA PUSILLA (Sw.), Lawr. *l. c.* vii. p. 298.

The only continental species of this form.

72. *EUSPIZA AMERICANA* (Gm.); Lawr. *l. c.* vii. p. 298.

73. *CHRYSOMITRIS MEXICANA* (Sw.); Lawr. *l. c.* vii. p. 332.

Mr. Lawrence has also received specimens of *Hedymeles ludovicianus*, Linn., *Spermophila lineata* (Gm.), *S. schistacea*, Lawr., and *Oryzoborus æthiops*, ScL.

Fam. ICTERIDÆ.

74. *OCYALUS WAGLERI* (Gray & Mitch.); Lawr. *l. c.* vii. p. 297.  
Agrees with Guatemalan skins.

75. *OSTINOPS MONTEZUMA* (Less.); Lawr. *l. c.* vii. p. 297.

The occurrence of this bird at Panama is curious, as on the Isthmus of Darien and in the valley of the Magdalena the allied *O. guatimozinus* takes its place. (See Cassin, Proc. Acad. Phil. 1860, p. 138.)

76. *CASSICULUS MICRORHYNCHUS*, sp. nov.

*Cassiculus uropygialis*, Lawr. (nec Lafr.) *l. c.* vii. p. 297.

♂. *Niger: uropygio coccineo: rostri mesorhinio angusto, neque ad basin incrassato, culmine parum incurvo.*

Long. tota 8·5, alæ 5·1, caudæ 3·6, tarsi 1, rostri a rictu 1·15.

♀. *Mari similis, sed minor.*

There are only two described species of red-rumped *Cassici*—*C. hæmorrhous* and *C. uropygialis*. Our new species is easily distinguished from the former by its much smaller size, from the latter by its smaller and differently formed bill, the mesorhinium in *C. uropygialis* being much widened at the base, and the whole bill considerably larger.

77. *CASICUS PERSICUS* (Linn.).

*Cassiculus icteronotus?*, Lawr. *l. c.* vii. p. 297.

Mr. Lawrence's *Cacicus vitellinus* (Proc. Acad. Phil. 1864, p. 107) is probably this species, which we cannot distinguish from the true *C. persicus*.

78. *CASSICULUS PREVOSTI* (Less.); Lawr. *l. c.* vii. p. 297.

Ranges from New Granada into Mexico.

79. *ICTERUS BALTIMORE* (Linn.); Lawr. *l. c.* vii. p. 331.

The most southern locality recorded for this bird.

80. *ICTERUS SPURIUS* (Linn.); Lawr. *l. c.* vii. p. 331.

Hardly smaller in size than a North American specimen in Sclater's collection; so that Prof. Baird's views as to *I. affinis* being not different (B. N. A. p. 547) seem quite correct.

81. *ICTERUS GIRAUDI*, Cassin.

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82. *ICTERUS MESOMELAS* (Wagl.); Lawr. *l. c.* vii. p. 297.

83. *CASSIDIX ORYZIVORA* (Gm.).

A bird of wide distribution in Tropical America.

Mr. Lawrence also includes in his list *Ostinops cristatus*, Gm., *Cassidix baritus*, Sw., and *C. crassirostris*, Sw.

#### Fam. CORVIDÆ.

84. *CYANOCORAX AFFINIS*, Von Pelz. Sitz. Acad. Wien.

*Uroleuca pileata*, Lawr. *l. c.* vii. p. 296.

Our Panama skins agree with Sclater's Bogota examples of this Crow, which is a northern form of *C. pileatus*.

#### Fam. DENDROCOLAPTIDÆ.

85. *SCLERURUS GUATEMALENSIS* (Hartl.).

*Tinactor guatemalensis*, Hartl. Rev. Zool. 1844, p. 370.

*Sclerurus caudacutus*, Lawr. *l. c.* vii. p. 320.

The Panama bird agrees with Salvin's specimen from Choctum (see Ibis, 1861, p. 352), which we consider to be Hartlaub's *T. guatemalensis*, although the characters given by the describer are somewhat meagre. The species is readily known from its three allies (see Sclater's Cat. A. B. p. 149) by its throat-feathers being strongly edged with black. It wants the rufous uropygium of *S. mexicanus* and *S. caudacutus*, and in this respect resembles *S. brunneus*.

86. *SYNALLAXIS PUDICA*, Sclater.

*S. brunneicaudalis*, Lawr. (nec Scl.) *l. c.* vii. p. 319.

Panama skins agree with New Granadian specimens in Sclater's collection.

87. *AUTOMOLUS PALLIDIGULARIS*, Lawrence.

*Anabates ochrolæmus*?, Lawr. *l. c.* vii. p. 319.

*Automolus pallidigularis*, Lawr. *l. c.* vii. p. 465.

Allied to *A. cervinigularis*, Sclater, and *A. melanopezus*, Sclater; in form and size of bill rather closer to the latter.

88. *XENOPS MEXICANUS*, Sclater; Lawr. *l. c.* vii. p. 320.

Agrees with the Mexican bird. *X. littoralis* of Ecuador is scarcely different.

89. *GLYPHORHYNCHUS PECTORALIS*, Sclat. & Salv. P. Z. S. 1860, p. 299.

*G. cuneatus*, Lawr. *l. c.* vii. p. 320.

*G. major*, Sclater, Cat. Am. Birds, p. 161, & P. Z. S. 1862, p. 369.

Agrees with Guatemalan specimens.

## 90. DENDROMANES ATRIROSTRIS, Lafr.

*Dendrocincla olivacea*, Lawr. Ann. L. N. Y. vii. p. 466.

*D. fumigata?*, Lawr. *l. c.* vii. p. 320.

The Panama bird quite agrees with Sclater's Ecuadorian specimens, which we believe are referable to this species; but the bird should be removed into the genus *Dendromanes*, the true *Dendrocinclæ* having a broader, flatter bill.

91. DENDROCOLAPTES SANCTI-THOMÆ (Lafr.); Lawr. *l. c.* vii. p. 320.

Agrees with Sclater's specimen of this bird from Honduras.

92. DENDRORNIS LACRYMOSA, Lawr. *l. c.* vii. p. 467.

A fine, well-marked species.

## 93. DENDRORNIS ERYTHROPYGIA, Sclater.

Agrees with Mexican specimens; represented in New Granada by *D. triangularis* (Lafr.).

## 94. DENDRORNIS NANA, Lawrence, Ibis, 1863, p. 181.

Allied to *D. multiguttata*, at least to the species so named in Sclater's collection, but with the bill more curved and rather deeper, also rather paler in its colouring beneath. Mr. Lawrence has also received *Anabates cervinigularis*, Scl., *Dendromanes homochrous*, Scl., *Dendroornis pardalotus*, Vieill., and *D. tenuirostris* (Licht.).

## Fam. FORMICARIIDÆ.

95. CYMBILANIUS LINEATUS (Vieill.); Lawr. *l. c.* vii. p. 293.

Agrees with southern specimens.

96. THAMNOPHILUS TRANSANDEANUS, Sclater; Lawr. *l. c.* vii. p. 293.

The crissum is rather more black than in Ecuadorian specimens; but the birds do not otherwise differ, the wing-markings being alike.

## 97. THAMNOPHILUS AFFINIS, Cab. &amp; Hein.

*T. doliatus*, Lawr. *l. c.* vii. p. 293.

A single male specimen seems referable to this northern form of *T. doliatus*.

## 98. THAMNOPHILUS RADIATUS, Vieill.

A male and two female specimens agree with the Santa Martha birds which Sclater refers to this species.

## 99. THAMNOPHILUS NÆVIUS (Gm.).

*T. amazonicus*, Lawr. *l. c.* vii. p. 325 (?).

Panama examples agree well with southern specimens of *T. nævius* from Cayenne, except in being rather darker on the back.

100. MYRMOTHERULA FULVIVENTRIS, Lawr. *l. c.* vii. p. 468.

*M. gularis*, Sclater, P. Z. S. 1860, p. 294 (part.).

This species is a close ally of *M. gularis* of Brazil, but is easily distinguishable by the fulvous belly, the male never attaining the grey belly of the latter species. The female *Myrmotherula* obtained by Mr. Fraser at Esmeraldas, and doubtfully referred by Sclater, *l. c.*, to *M. gularis*, belongs strictly to this species.

101. MYRMOTHERULA SURINAMENSIS (Gm.); Lawr. *l. c.* vii. p. 293.

Agrees with Sclater's specimens from Cayenne and Ecuador.

102. MYRMOTHERULA MELÆNA, Sclater.

*Formicivora melæna*, Lawr. *l. c.* viii. p. 6.

The Panama birds seem to agree best with this Bogota form of *M. axillaris*.

103. FORMICIVORA BOUCARDI, Sclater; Lawr. *l. c.* vii. p. 469.

*F. quixensis*, Lawr. *l. c.* vii. p. 325.

The Panama specimens agree with the northern form *F. boucardi*, the Ecuadorian bird (*F. consobrina*) being slightly different.

104. RHAMPHOCÆNUS RUFIVENTRIS, Bp.; Lawr. *l. c.* viii. p. 6.

Agrees with Vera Paz specimens.

105. CERCOMACRA TYRANNINA, Sclater, Cat. p. 186.

A single specimen from Panama seems rather smaller than either Vera Paz or New Granadian specimens, but is not otherwise different. The northern specimens of this species are rather darker; and in this respect the Panama bird agrees best with southern specimens.

106. PYRIGLENA MACULICAUDIS, Sclater, Cat. p. 185; Lawr. *l. c.* vii. p. 325.

Agrees with Sclater's examples of this bird. The female is much paler below than that of *P. serva*.

107. GYMNOCICHLA NUDICEPS (Cassin); Sclater, P. Z. S. 1858, p. 274.

*Pithys rufigularis*, Lawr. (♀) *l. c.* vii. p. 293.

*Myrmeciza ferruginea*, Lawr. *ibid.* p. 470.

The collection contains specimens of both sexes of this curious bird, which is certainly closely allied to *Pyriglena*. The female is much like the females of the smaller section of that group. It may be characterized—

♀. *Rufescenti-fusca, alarum tectricum marginibus et corpore subtus ferrugineo-rufis: macula dorsali celata alba.*

The male is described in Sclater's 'Synopsis of Ant-Thrushes,'



pt. 3 (P. Z. S. 1858, p. 274). Mr. Lawrence has evidently mistaken the female for another species.

108. *MYRMECIZA LONGIPES* (Vieill.); Sclater, Cat. p. 186; Lawr. *l. c.* vii. p. 325.

A single female of this species.

109. *MYRMECIZA IMMACULATA*, sp. nov.

*Myrmeciza exul*, Lawr. *l. c.* vii. p. 325 (nec Sclater).

♂. *Obscure badia; capite toto et corpore subtus ad medium ventrem nigricanti-plumbeis, gutture et pileo saturatoribus: campterii margine albo: alis immaculatis, dorso concoloribus: rostro et pedibus nigris.*

Long. tota 5·5, alæ 2·6, caudæ 1·7, tarsi 1·15.

♀. *Mari similis, sed pileo obscuro, badio tincto; gula solum plumbea; abdomine dorso concolore.*

*Hab.* In isthmo Panama.

Several specimens of both sexes of this species are in the collection. Mr. Lawrence appears to have referred it to Sclater's *M. exul*; but that species has wing-coverts distinctly spotted with white, and is smaller in size.

110. *HYPOCNEMIS NÆVIROIDES*, Lafr.; Lawr. *l. c.* vii. p. 326.

A single example of this species, originally described by Lafresnaye from this locality.

111. *PITHYS BICOLOR*, Lawr. *l. c.* viii. p. 6.

*P. leucaspis*, Lawr. (nec Scl.) vii. p. 326.

Several specimens of this fine species, which is nearly allied to the sub-Andean *P. leucaspis*.

112. *PHLOGOPSIS M'LEANNANI*, Lawr. *l. c.* vii. p. 285.

One male example of this fine species.

113. *FORMICARIUS HOFFMANNI*, Cab. Journ. f. Orn. 1861, p. 95.

Several examples of this species, which is well described by Cabanis, *l. c.*, are in the collection. According to Mr. Lawrence, *F. analis* appears also to occur; this species is more like *F. moniliger*, except in the red crissum.

114. *PITTISOMA MICHLERI*, Cassin; Lawr. *l. c.* vii. pp. 294 & 326.

Several examples of this fine Ant-thrush are in the series. The form hardly differs from that of the larger *Grallariæ*, except in the broader and rather flatter bill.

115. *GRALLARIA PERSPICILLATA*, Lawr. *l. c.* vii. pp. 303 & 326.

This species is allied to *G. fulviventris* and *G. brevicauda*.

Mr. Lawrence records as from Panama also *Myrmotherula pygmæa*,

*M.* — ?, *Formicivora virgata*, *Rhamphocœnus semitorquatus*, Lawr., *Hypocnemis schistacea*, *H.* — sp. ?, *Myrmelastes corvinus*, Lawr., and *Formicarius analis*.

Fam. TYRANNIDÆ.

116. *ATTILA SCLATERI*, Lawr. *l. c.* vii. p. 470.

*Attila spadiceus*, Lawr. *l. c.* vii. p. 327.

117. *COPURUS LEUCONOTUS*, Lafr. ; Lawr. *l. c.* vii. p. 327.

Agrees with southern specimens.

118. *TODIROSTRUM CINEREUM* (Linn.) ; Lawr. *l. c.* vii. p. 295.

This widely distributed species is not absent from Panama, occurring also as far north as Mexico.

119. *TODIROSTRUM NIGRICEPS*, Sclater ; Lawr. *l. c.* vii. p. 330.

Agrees with a Santa Martha specimen—Sclater's type.

120. *TODIROSTRUM SCHISTACEICEPS*, Scl. ; Lawr. *l. c.* vii. p. 300.

Agrees with Sclater's type specimen from Oaxaca.

121. *ONCOSTOMA OLIVACEUM* (Lawrence).

*Todirostrum olivaceum*, Lawr., *Ibis*, 1862, p. 12.

*Oncostoma olivaceum*, Lawr. *Ann. L. N. Y.* vii. p. 473.

A strict congener of *O. cinereigulare*. See Sclater's note in 'Ibis,' *l. c.*

122. *MIONECTES STRIATICOLLIS* (Lafr. et D'Orb.), Lawr. *l. c.* vii. p. 328.

Rather larger than southern specimens.

123. *MIONECTES OLEAGINEUS* (Licht.).

*M. assimilis* ?, Lawr. (nec Scl.) *l. c.* vii. p. 328.

Agrees best with the southern form ; but the northern *M. assimilis* is hardly separable.

124. *LEPTOPOGON AMAUROCEPHALUS*, Cab. ; Lawr. *l. c.* vii. p. 328.

Agrees with Brazilian specimens.

125. *CAMPTOSTOMA FLAVIVENTRE*, sp. nov.

*C. imberbe*, Lawr. (nec Scl.) *l. c.* viii. p. 19.

*Olivaceum* : pileo, alis et cauda fuscis : alis albido late bivittatis, secund. marg. externis item albidis : subtus clare limonaceo-flavum, gutture dilutiore : rostro corneo : pedibus plumbeo-nigris.

Long. tota 3·5, alæ 1·9, caudæ 1·5, tarsi ·55.

This species seems distinct from *C. imberbe*, though similar in form. It may be recognized by its clear-yellow belly and more di-

distinct brownish cap. Sclater's collection contains a specimen of the same bird from Zamora in Ecuador, collected by Fraser.

126. *TYRANNULUS BRUNNEICAPILLUS*, Lawrence, Ibis, 1862, p. 12.

A near ally of *T. semiflavus*, but not so brightly yellow underneath, and with the cap brownish and less distinct.

127. *TYRANNISCUS PARVUS*, Lawr. Ibis, 1862, p. 12, and Ann. L. N. Y. vii. p. 473.

128. *ELAINEA PLACENS*, Sclater; Lawr. *l. c.* vii. p. 328.

Agrees with Mexican specimens.

129. *ELAINEA CANICEPS*, Sw.?

Agrees with Bogota skins in Sclater's collection, but has the crest rather more yellow than in the Cayenne bird.

130. *ELAINEA SUBPAGANA*, Sclater; Lawr. *l. c.* vii. p. 328.

Agrees with Mexican and Guatemalan specimens.

131. *LEGATUS ALBICOLLIS*, Vieill.

*L. variegatus?*, Lawr. (nec Scl.) *l. c.* vii. p. 328.

*L. albicollis*, Lawr. *ibid.* p. 472.

Smaller than the Mexican *L. variegatus*, and not different from the southern species.

132. *MYIOZETETES COLUMBIANUS*, Cab. & Heine; Lawr. *l. c.* vii. p. 328.

133. *MYIOZETETES GRANADENSIS*, Lawr. Ibis, 1862, p. 11, and Ann. L. N. Y. vii. p. 473.

Agrees with a Bogota specimen named by Sclater from comparison with Mr. Lawrence's type.

134. *RHYNCHOCYCLUS ÆQUINOCTIALIS*, Sclater.

*Cyclorhynchus brevirostris*, Lawr. (nec Cab.) *l. c.* vii. p. 329.

*C. æquinoctialis*, Lawr. *l. c.* vii. p. 473.

Agrees with Sclater's type.

135. *RHYNCHOCYCLUS FLAVO-OLIVACEUS*, Lawr. *l. c.* viii. p. 8.

Perhaps the same as *R. sulphurescens*, Spix.

136. *RHYNCHOCYCLUS CINEREICEPS*, Sclater.

The northern and southern species seem both to be found here.

137. *PITANGUS LICTOR*, Licht.; Lawr. *l. c.* vii. p. 327.

Smaller than Sclater's bird from Para, but not otherwise distinct.

138. *MYIODYNASTES NOBILIS*, Scl. ; Lawr. *l. c.* vii. p. 295.

Sclater's specimens of this species are from Santa Martha and Ecuador. Panama skins are not different.

139. *MEGARHYNCHUS MEXICANUS* (Lafr.).

*Scaphorhynchus mexicanus*, Lawr. *l. c.* vii. p. 295.

Intermediate between *M. mexicanus* and *M. chrysogaster* of Ecuador, showing that these two forms pass into one another.

140. *MUSCIVORA MEXICANA*, Sclater ; Lawr. *l. c.* vii. pp. 295, 329.

Agrees with the Mexican bird, and easily distinguishable from the Ecuadorian *M. occidentalis* by its dark back.

141. *MYIOBIUS ATRICAUDUS*, Lawr. Ibis, 1863, p. 183.

*M. barbatus*, Lawr. Ann. L. N. Y. vii. p. 328.

Not very different from Sclater's Ecuadorian specimens, which he calls *M. barbatus*.

142. *EMPIDONAX ALBIGULARIS*, Sclat. & Salv.

One example, agreeing with the Guatemalan type.

143. *EMPIDONAX FLAVIVENTRIS* (Baird).

144. *EMPIDONAX*, sp. ?

145. *CONTOPUS RICHARDSONI*, Sw.

146. *CONTOPUS VIRENS* (Linn.).

147. *CONTOPUS BRACHYTARSUS*, Sclater ; Lawr. *l. c.* vii. p. 327.

Specimens of these three northern species are in the collection.

148. *MYIOCHANES*, sp. ?

"*Cyclorhynchus subbrunneus*, Scl. ;" Lawr. *l. c.* vii. p. 473.

A single example of a species very like *M. subbrunneus*, Sclater, of Ecuador, but decidedly smaller. We wait for more specimens before describing this species.

149. *MYIARCHUS PANAMENSIS*, Lawr. *l. c.* vii. p. 295.

Closely allied to *M. ferox*, and probably not really different ; but as it is rather greyer above, and is without any trace of a cap, we leave it for the present under Mr. Lawrence's name.

150. *MYIARCHUS NIGRICEPS*, Sclater ; Lawr. *l. c.* vii. p. 327.

Head not quite so dark as in Fraser's typical examples of this species.

151. *TYRANNUS SATRAPA* (Cab. & Hein.) ; Sclater, Cat. p. 235.

*T. melancholicus*, Lawr. *l. c.* vii. p. 295.

152. *TYRANNUS ROSTRATUS*, Sclater, Ibis, 1864, p. 87.

A single specimen apparently referable to this species is in the collection. It is, however, a younger bird, and the bill is rather smaller than in Sclater's type.

153. *MILVULUS TYRANNUS* (Linn.).

*M. monachus*, Hartl. ; Lawr. *l. c.* vii. p. 295.

Other *Tyrannidæ* mentioned by Mr. Lawrence in his several papers are—

*Attila citreopygius*, Bp.

*Todirostrum megacephalum*, Sw.

*Leptopogon flavovirens*, Lawr.

*Myiozetetes cayennensis*, Linn.

*M. marginatus*, Lawr.

*Platyrhynchus superciliaris*, Lawr.

*Myiobius erythrurus*, Cab.

*Empidonax griseigularis*, Lawr.

*E. traillii*, Aud.

*Myiarchus crinitus*, Linn.

*Tyrannus intrepidus*, Vieill.

#### Fam. COTINGIDÆ.

154. *TITYRA PERSONATA*, Jard. & Selb. ; Lawr. *l. c.* vii. p. 295.

Rather smaller than the Mexican form of this species, and in this respect agreeing rather with the southern race.

155. *PACHYRHAMPHUS CINEREUS* (Bodd.), Lawr. *l. c.* vii. p. 330.

Agrees with Sclater's specimens from Santa Martha.

156. *PACHYRHAMPHUS CINEREIVENTRIS*, Sclater.

Agrees with Sclater's type from Santa Martha.

157. *LIPAUGUS UNIRUFUS*, Sclater ; Lawr. *l. c.* vii. p. 330.

158. *LIPAUGUS HOLERYTHRUS*, Scl. & Salv. ; Lawr. *l. c.* vii. p. 330.

Both these species agree with Guatemalan specimens.

159. *LIPAUGUS RUFESCENS*, Sclater, P. Z. S. 1857, p. 296, and 1861, p. 211 ; Lawr. *l. c.* vii. p. 330.

One example of this bird. It is probable that this species has been wrongly said to have been obtained at Coban. In none of the large collections from that district that have come under our notice is it included, though they contain members of both the allied species, and it is the only species said to have been procured by M. Delattre in Vera Paz that we have not met with.

Coban has been assigned as a locality to all that traveller's specimens from Guatemala—incorrectly so, as is clearly shown in the case

of *Momotus castaneiceps*, which frequents the Motagua Valley, quite a distinct district in every respect. As M. Delattre also collected at Panama, it is quite possible that an error may have been made.

160. *PIPRA MENTALIS*, Sclater; Lawr. *l. c.* vii. p. 296.

Head rather deeper red, and throat rather less yellow, than in Vera Paz specimens.

161. *PIPRA CYANEOCAPILLA*, Hahn; Lawr. *l. c.* vii. p. 296.

Plumage blacker, and head of a rather brighter blue, than in specimens from the Peruvian Amazon.

162. *CHIROXIPHIA LANCEOLATA* (Wagl.); Sclater, Cat. p. 251.

*C. caudata*, Lawr. (nec Shaw) *l. c.* vii. p. 296.

Agrees with New Granadian specimens. A little further this species is replaced by the very distinct *C. linearis* of Costa Rica, Nicaragua, and the Pacific coast of Guatemala.

163. *CHIROMACHÆRIS VITELLINA* (Gould); Lawr. *l. c.* 1861, p. 296.

164. *QUERULA CRUENTA* (Bodd.); Sclater's Cat. p. 257; Lawr. *l. c.* vii. p. 296.

Agrees with southern examples. Other species of this family recorded as from Panama by Mr. Lawrence are—

*Tityra albitorques.*

*Pachyrhamphus cinnamomeus.*

— *homochrous*, Lawr.

*Lipaugus albogriseus*, Lawr.

*Heteropelma veræ-pacis*, Scl. & Salv.

*Cotinga amabilis*, Gould.

## Ordo FISSIROSTRES.

### Fam. MOMOTIDÆ.

165. *MOMOTUS LESSONI*, Lesson.

All the Motmots of this form require a careful examination, which will probably lead to the union of several obscure forms which are barely recognizable. This is eminently the case with the so-called species *M. lessoni*, *M. psalurus*, *M. microstephanus*, and *M. sub-rufescens*.

166. *PRIONIRHYNCHUS PLATYRHYNCHUS*, Leadb.; Scl. P. Z. S. 1857, p. 256.

*Crypticus platyrhynchus*, Cassin, Proc. Acad. Phil. 1860, p. 136; Lawr. *l. c.* vii. p. 290.

We have had no opportunity of comparing this bird with specimens from the Amazon valley, where it also seems to occur.

167. *MOMOTUS SEMIRUFUS*, Sclater, Rev. Zool. 1853, p. 489, & P. Z. S. 1857, p. 254.

*M. martii*, Cass. Proc. Acad. Phil. 1860, p. 136; Lawr. *l. c.* vii. p. 290.

Dr. Schlegel has pointed out (Musée des Pays-Bas, Aves, *Momotus*, p. 8) the slight distinctions which separate this race from the *Momotus martii* of the Amazon valley. The present bird occurs near Santa Martha (*Verreaux*), on the Nercua River, on the eastern side of the Andes of New Granada (*Cassin*), and as far north as Panama.

Fam. ALCEDINIDÆ.

168. *CERYLE TORQUATA*, Linn.

169. *CERYLE AMAZONIA*, Lath.

170. *CERYLE INDA*, Linn.

171. *CERYLE SUPERCILIOSA*, Linn.; Lawr. *l. c.* vii. p. 290.

Mr. Lawrence also gives *C. americana*, Gm., and *C. alcyon*, Linn.

Fam. GALBULIDÆ.

172. *JACAMEROPS GRANDIS*, Gm.; Lawr. *l. c.* vii. p. 291.

Fam. BUCCONIDÆ.

173. *BUCCO DYSONI*, G. R. Gray; Sclater, Cat. p. 269; Lawr. *l. c.* vii. p. 318.

Panama birds do not differ from the Guatemalan *B. dysoni*; and *B. leucocrissus*, Sclater, of Ecuador is hardly separable.

174. *BUCCO PECTORALIS*, G. R. Gray; Lawr. *l. c.* vii. p. 10.

175. *BUCCO SUBTECTUS*, Sclater, Cat. p. 270.

*B. tectus*, Lawr. (nec Bodd.) *l. c.* vii. p. 318.

Agrees with Sclater's types, except that the breast-band is rather wider in our Panama specimen.

176. *MALACOPTILA PANAMENSIS* (Lafr.).

177. *MALACOPTILA INORNATA* (Du Bus).

It is very probable that these so-called species may be sexual forms of the same bird; but we are not yet in a position to explain the matter fully.

In Mr. M'Leannan's series the cinnamon-coloured birds are labelled males, and those with pale plumage females. Wherever one so-called species is found, the corresponding one also occurs. In Vera Paz we find *M. veræ-pacis* and *M. inornata* in the same localities.

## Fam. TROGONIDÆ.

178. TROGON VIRIDIS, Linn. ; Lawr. *l. c.* vii. p. 290.

179. TROGON ATRICOLLIS, Vieill.

It is probably this species which Mr. Lawrence calls *T. aurantii-ventris* (*l. c.* vii. p. 290), and afterwards (viii. p. 3), following Cabanis, *T. tenellus*. We doubt its real distinctness.

180. TROGON CALIGATUS, Gould ; Lawr. *l. c.* vii. p. 290.

Mr. Lawrence's description of his *T. concinnus* (*l. c.* vii. p. 463) is evidently taken from a young bird, the rounded tail-feathers and the double character of the markings of the wing-coverts being characteristic of a young male. The differences, then, between *T. concinnus* and *T. caligatus*, as pointed out by Mr. Lawrence, are reduced to the more general "bronzy-green" colour of the former, as compared with the "greenish blue" of the latter. A specimen in the collection agrees well with Mr. Lawrence's description ; but, comparing it with our series of *T. caligatus*, we prefer to attribute the slight difference of shade of colour to age of feathers rather than to specific distinctness.

181. TROGON MACRURUS, Gould ; Lawr. *l. c.* vii. p. 290.

182. TROGON MASSENA, Gould ; Lawr. *l. c.* vii. p. 290.

## Fam. CAPRIMULGIDÆ.

183. CHORDEILES VIRGINIANUS, Briss.

Agrees with North-American specimens.

184. NYCTIDROMUS GUIANENSIS, Gm. ; Sclater's Cat. p. 281.

*N. americanus*, Lawr. (nec Linn.) (*vide* Sci. P. Z. S. 1861, p. 77) *l. c.* vii. p. 290.

*N. guianensis*, Lawr. *l. c.* vii. p. 290.

There seems to be but one species of *Nyctidromus* inhabiting Central America and the northern portion of the southern continent. A large series in Salvin's collection from Guatemala well illustrates the variations of plumage and size to which this bird is liable.

*Nyctibius grandis* is included in Mr. Lawrence's list.

## Fam. TROCHILIDÆ.

185. GLAUCIS AFFINIS, Lawr.

*G. hirsutus*, Lawr. *l. c.* vii. p. 319.

Mr. Gould says this species is from the *highlands* of New Granada ; but these examples are from the hot district, not much above the sea-level. It is doubtful whether *Glaucis* ever ranges high up in altitude.

186. GLAUCIS RUCKERI, Bourc. ; Lawr. *l. c.* vii. p. 319.

187. PHAËTHORNIS LONGIROSTRIS, Delattre ; Lawr. *l. c.* vii. p. 319.



188. PHAËTHORNIS ADOLPHI, Bourc. ; Lawr. *l. c.* vii. p. 291.

189. PHÆOCHROA CUVIERI, Delatt. et Bourc.  
*Campylopterus cuvieri*, Lawr. *l. c.* vii. p. 319.

190. LAMPORNIS MANGO (Linn.) ; Lawr. *l. c.* vii. p. 319.

191. CHALYBURA BUFFONI (Less.).  
*Hypuroptila buffoni*, Lawr. *l. c.* vii. p. 319.

192. THALURANIA VENUSTA, Gould, Mon. Troch. ii. pl. 105 ;  
Lawr. *l. c.* vii. p. 292.

A great diversity exists in the extent of the blue on the back in a series of specimens of this bird, those possessing the greater amount being, as is usual, the oldest individuals. In addition to a considerable number of specimens from Panama, we have examined several from Costa Rica, the locality whence *T. venusta* was originally obtained. All agree in every respect ; hence, if *T. venusta* be of specific value as distinct from *T. columbica*, the Panama bird must be united to the Costa-Rican form.

193. FLORISUGA MELLIVORA (Linn.) ; Lawr. *l. c.* vii. p. 292.

194. LOPHORNIS DELATRII (Less.) ; Lawr. *l. c.* vii. p. 465.

195. HELIOTHRIX BARROTI, Bourc. ; Lawr. *l. c.* vii. p. 291.

196. HELIOMASTER STUARTÆ, Lawr. *l. c.* vii. p. 291.

197. AMAZILIA RIEFFERI (Bourc.) ; Lawr. *l. c.* vii. p. 292.

198. SAUCEROTTIA EDVARDI, Delattr. et Bourc.

*Erythronota edwardi*, Lawr. *l. c.* vii. p. 292.

199. SAUCEROTTIA NIVEIVENTRIS (Gould).

200. DAMOPHILA JULIÆ (Bourc.).

*Juliamyia typica*, Lawr. *l. c.* vii. p. 292.

201. DAMOPHILA AMABILIS (Gould) ; Lawr. *l. c.* vii. p. 292.

202. SAPPHIRONIA CÆRULEIGULARIS, Gould ; Lawr. *l. c.* vii.  
p. 319.

203. CHLOROLAMPIS ASSIMILIS, Lawr. *l. c.* vii. p. 292.

204. CHLOROLAMPIS — ?

A second species of *Chlorolampis* in the collection cannot at present be determined. Mr. Lawrence also includes in his lists

*Phaëthornis eurynomus*.

*Gouldia conversi*.

*Heliothrix aurita*.

*Heliomaster sclateri*.

*Chrysuronia elicæ*.

## Fam. CUCULIDÆ.

205. CROTOPHAGA ANI, Linn.; Lawr. *l. c.* vii. p. 301.

206. COCCYZUS AMERICANUS (Linn.); Sclater, Cat. p. 322, and P. Z. S. 1864, p. 120.

207. PIAYA GRACILIS, Heine, Journ. f. Orn. 1863, p. 356.

*P. rutila*, Lawr. *l. c.* vii. p. 300.

Separated by F. Heine, perhaps not without reason, from the eastern *P. minuta*. Panama examples agree with the Ecuadorian specimens, upon which the species was founded.

208. PIAYA NIGRICRISSA, Sclater, Cat. p. 322; Lawr. *l. c.* vii. p. 300.

Agrees with Ecuadorian specimens.

209. DIPLOPTERUS NÆVIUS (Linn.).

*Diplopterus excellens*, Lawr. (nec Scl.) *l. c.* vii. p. 300.

Agrees with southern specimens. This form ranges into Costa Rica. Mr. Lawrence mentions also the following *Cuculidæ*:—

*Crotophaga sulcirostris*, Sw.

*Dromococcyx mexicanus*, Bp.

*Coccyzus erythrophthalmus*, Wils.

## Fam. RAMPHASTIDÆ.

210. RAMPHASTOS TOCARD, Vieill.; Lawr. *l. c.* vii. p. 299.

211. RAMPHASTOS CARINATUS, Sw.; Lawr. *l. c.* vii. p. 299.

*Selenidera spectabilis*, Cass., we have not yet seen, though it does occur on the isthmus.

212. PTEROGLOSSUS TORQUATUS, Wagl.; Lawr. *l. c.* vii. p. 299.

These specimens possess the brown nape, and are indistinguishable from the Mexican bird, although we should have expected to find Mr. Gould's *P. erythropygius* (without the brown nape) here.

## Fam. CAPITONIDÆ.

213. CAPITO MACULICORONATUS, Lawr. *l. c.* vii. p. 300; Sclater, Ibis, 1862, p. 1, pl. 1.

## Fam. PICIDÆ.

214. CAMPEPHILUS MALHERBII, Gray & Mitch.; Lawr. *l. c.* vii. p. 299.

215. DRYOCOPUS FUSCIPENNIS, Sclater, P. Z. S. 1860, pp. 286, 287.

These examples are in some respects more like the Brazilian *D.*

*lineatus* than Sclater's *D. fuscipennis* of Ecuador; and the latter species will probably have to be reunited with the former.

216. CENTURUS PUCHERANII (Malh.); Lawr. *l. c.* vii. p. 299.  
Ranges from South Mexico into Western Ecuador.

217. CENTURUS TRICOLOR (Wagl.); Sclater, Cat. p. 343; Cab. Journ. p. 327.

*C. rubriventris*, Lawr. *l. c.* vii. p. 299 (?).

Agrees with Venezuelan examples and New Granadian-coast specimens.

218. CELEUS MENTALIS, Cassin.

*Celeus mentalis*, Cassin, Pr. Ac. Nat. Sc. Phil. 1860, p. 137, et Trans. Acad. Phil. v. p. 461, pl. 52, figs. 2, 3.

*C. fraseri*, Sclater, Cat. Am. B. p. 335.

*Celeopicus fraseri*, Malh. Mon. Pic. ii. p. 16, pl. 43 *bis*, fig. 4.

*C. squamatus*, Lawr. Ibis, 1862, p. 184, and Ann. L. N. Y. viii. p. 11.

A single female specimen in the collection appears undistinguishable from the type of *Celeus fraseri* in Sclater's collection. There is little doubt that Cassin's description refers to the same species. He describes the male as having the entire chin and throat bright scarlet. Mr. Lawrence's bird, as well as the present and the type of *C. fraseri*, are all females.

*Picumnus granadensis*, Lafr., *Dryocopus scapularis*, Vig., and *Chloronerpes collopterus*, Lawr., are included in Mr. Lawrence's lists.

#### Fam. PSITTACIDÆ.

219. ARA ARACANGA, Linn.

Appears to be distributed southwards from Mexico.

220. ARA CHLOROPTERA, G. R. Gray.

221. BROTOGERYS TOVI (Gm.).

*Psittovius tovi*, Lawr. *l. c.* vii. p. 299.

A common species throughout the Pacific slope of Central America. We cannot help thinking Mr. Lawrence's *P. subcæruleus* (*l. c.* vii. p. 475) is only a variety of this bird, in which opinion Mr. McLean concurs. He says, he shot the single specimen sent to Mr. Lawrence in company with the common species.

222. CONURUS OCULARIS, sp. nov.

*Conurus pertinax*, Lawr. *l. c.* vii. p. 333.

*Conurus chrysogenys*, Lawr. *l. c.* viii. p. 11.

♂. *Viridis, subtus dilutior, ventre flavescente; capitis lateribus infra oculos, gula et pectore antico brunnescente indutis: macula suboculari exigua aurantiaca: subalaribus viridibus, rec-*

*tricibus infra flavicantibus; primariis intus cærulescentibus, apicibus in margine interiore anguste nigricantibus: rostro fusco, apice albicante; pedibus sordidis.*

Long. tota 8·5, alæ 5·0, caudæ 4·0.

♀. *Mari similis, sed paulo minor.*

*Obs.* Affinis *C. pertinaci* et *C. chrysogeni*, sed pileo toto viridi, et macula parva suboculari differt.

This *Conurus*, which Sclater has hitherto identified with *C. chrysogenys*, may, we think, be well distinguished from that species and the allied *C. chrysogenys* by the small subocular spot. *C. chrysophrys*, Sw. (figured in Souancé's 'Icon. des Perr.' pl. 11), has a similar suborbital spot; but has the head bluish, and the belly bright yellow.

Mr. M'Leannan has sent a pair of this species, apparently adult.

223. *CHRYNOTIS VIRIDIGENALIS*, Cassin; Souancé, Icon. pl. 31.

Our specimens agree with the top figure of Souancé's plate, having quite a narrow red front, and the whole head-feathers edged with blue. We suspect it may ultimately be found to belong to a distinct species from the true *C. viridigenalis* (which has a broad red front and green head), and perhaps entitled to the MS. name *glauciceps* of Hartlaub, given in Gray's 'List of Psittacidae,' p. 82.

224. *PIONUS MENSTRUUS*, Linn.; Lawr. *l. c.* vii. p. 299.

225. *CAÏCA HÆMATOTIS*, Scl. & Salv.

*Pionus coccinickollaris*, Lawr. *l. c.* vii. p. 475.

A specimen in the collection has an irregular red collar, as indicated by Mr. Lawrence, which is wanting in eight specimens of the Guatemalan bird. But, in the absence of all other points of distinction, we are unwilling to separate the two forms solely on such slight grounds as the development of a few red feathers (often seen abnormally in a Parrot). The other basis of distinction, viz. the dark red edging to the feathers of the crown, does not hold, as the Panama bird has them, while several of the Guatemalan birds have not.

Mr. Lawrence includes *Ara militaris*, *A. severa*, Linn., *A. macao*, Linn., and *Psittacus pulverulentus*, Gm.

Fam. FALCONIDÆ.

226. *IBYCTER AMERICANUS* (Bodd.); Lawr. *l. c.* vii. p. 288.

227. *THRASAËTUS HARPYIA*, Linn.; Lawr. *l. c.* viii. p. 7.

The Harpy Eagle is by no means an uncommon bird in the forests of the isthmus. Mr. M'Leannan said that scarcely a week passed but he saw one or more. The day I left America, one crossed the line of railway. For a Hawk, its flight is slow and heavy.

228. *SPIZAËTUS TYRANNUS* (Max.); Lawr. *l. c.* vii. p. 316.

All three of the *Spizaëti* of Central America occur on the isthmus, and range into Guatemala; they are all to be found in the *tierra*

*caliente* of either coast, and seldom extend their range to a greater elevation than 3000 feet.

229. *SPIZAËTUS ORNATUS*, Daud.

Equally abundant with the preceding, and occupying the same range.

230. *SPIZAËTUS MELANOLEUCUS* (Vieill.).

Decidedly a scarce bird throughout Central America, its range being usually confined to the hottest region of the immediate sea-coast. It occurs in Panama, Costa Rica, and Guatemala.

231. *BUTEO PENNSYLVANICUS*, Wils.; Lawr. *l. c.* vii. p. 288.

232. *BUTEO BOREALIS*, Gm.

An immature bird.

233. *ASTURINA NITIDA*, Lath.; Lawr. *l. c.* vii. p. 316.

A common Central American coast species.

234. *URUBITINGA ANTHRACINA*, Nitzsch; Lawr. *l. c.* vii. p. 316.

Occurs in Costa Rica and throughout Central America.

235. *HARPAGUS BIDENTATUS*, Lath.; Lawr. *l. c.* vii. p. 317.

An immature bird.

236. *CYMINDIS UNCINATUS*, (Temm.) Pl. Col. 103, 104 & 115.

A specimen in immature plumage.

237. *CIRCUS HUDSONICUS*, Linn.; Lawr. *l. c.* vii. p. 317.

A number of other Accipitres occur on the isthmus. Mr. Lawrence gives

*Sarcorhamphus papa*, Linn.

*Cathartes aura*, Linn.

— *atratus*, Bartram.

*Pandion carolinensis*, Gm.

*Herpetotheres cachinnans*, Linn.

*Buteo ghiesbreghti*, Du Bus.

*Asturina magnirostris*, Gm.

*Urubitinga zonura*, Shaw.

*Hypotriorchis ruficularis*, Daud.

*Leucopternis semiplumbeus*, Lawr.

*Accipiter pileatus*, Max.

— *collaris*, Scl.

*Micrastur gilvicollis*, Vieill.

— *poliogaster*, Temm.

*Geranospiza cærulescens*, Vieill.

*Elanoides furcatus*, Linn.

*Ictinia plumbea*, Gm.

*Cymindis cayennensis*, Gm.

Fam. STRIGIDÆ.

238. SYRNIUM PERSPICILLATUM, Lath. ; Lawr. *l. c.* vii. p. 289.

239. SYRNIUM VIRGATUM, Cass. ; Lawr. *l. c.* vii. p. 317.

Other Owls mentioned by Mr. Lawrence are

*Syrnium lineatum*, Lawr.

*Scops choliba*, Vieill.

Fam. COLUMBIDÆ.

240. COLUMBA NIGRIROSTRIS, Scl. P. Z. S. 1860, p. 390.

*Chlorœnas vinacea*, Lawr. *l. c.* vii. p. 333.

Specimens from Panama, as well as from Guatemala, before doubtfully referred to *C. vinacea*, Temm., all agree with a typical example of *C. nigrirostris*, Sclater, received from M. Sallé. This is a very common Pigeon throughout the forest-region of Eastern Central America, and its peculiar note something like what the words "Tres pesos son" would sound if any one attempted to whistle them. It will recall to those who have visited that country the recollection of all that is hot and tropical.

241. COLUMBA RUFINA, Temm. ; Lawr. *l. c.* vii. p. 333.

Ranges as far north as Central Vera Paz, where, however, it is by no means of frequent occurrence.

242. PERISTERA CINEREA, Temm. ; Lawr. *l. c.* vii. p. 301.

A species of very wide range.

243. LEPTOPTILA ALBIFRONS, Bp. Consp. ii. p. 74.

Abundant in Guatemala. Panama birds are quite the same.

244. LEPTOPTILA — ?

*L. verreauxi*, Lawr. *l. c.* vii. p. 333 (?).

Distinct from the Guatemalan bird which was doubtfully referred to *Columba erythrothorax*, Temm., being cinereous and not dull cinnamon on the chest, besides different in other minor points.

245. CHAMÆPELIA AMAZILIA, Bp. Consp. ii. p. 88.

*C. granatina*, Lawr. *l. c.* vii. p. 333 (?).

246. CHAMÆPELIA RUFIPENNIS, Bp. ; Lawr. *l. c.* vii. p. 301.

Much paler than Guatemalan specimens, but not otherwise distinct.

247. GEOTRYGON — ?

*Geotrygon violacea*, Temm. ? ; Lawr. *l. c.* viii. p. 23.

A female which we are unable to determine.

*Columba speciosa*, Gm., is also included in Mr. Lawrence's list.

Fam. TINAMIDÆ.

248. TINAMUS ROBUSTUS, Scl. ; Lawr. *l. c.* viii. p. 23.

Agrees with Guatemalan specimens.

249. TINAMUS MESERYTHRUS, Scl.

*T. pileatus*, Lawr. ? *l. c.* vii. p. 334.

Agrees with northern specimens.

Fam. CRACIDÆ.

250. CRAX ———, Linn.

A female, apparently different from *C. globicera*. *Crax globicera* and *Penelope purpurascens* also occur, according to Mr. Lawrence.

251. ORTALIDA POLIOCEPHALA, Wagl. ; Lawr. *l. c.* vii. p. 333.

Easily distinguishable from either of the northern *Ortalidæ* by its rufous primaries.

Fam. TETRAONIDÆ.

252. ODONTOPHORUS MARMORATUS, Gould, Mon. Odont. Intr.

*O. guianensis*, Lawr. *l. c.* vii. p. 301.

Mr. Gould identifies the Panama bird with his *O. marmoratus*.

Fam. ARDEIDÆ.

253. GARZETTA CANDIDISSIMA, Gm.

254. HERODIAS EGRETTEA, Linn.

255. FLORIDA CÆRULEA, Linn.

Adult and young.

256. DEMIEGRETTA LUDOVICIANA, Wils.

A single immature specimen, agreeing with Central American specimens.

Other Herons occurring at Panama (*vide* Mr. Lawrence's lists) are

*Pilherodias pileata*, Lath.

*Butorides virescens*, Linn.

*Tigrisoma brasiliense*, Linn.

—— *tigrinum*, Gm.

*Botaurus lentiginosus*, Steph.

*Ardetta exilis*, Gm.

*Cancroma cochlearia*, Linn.

*Eurypyga major*, Hartl.

## Fam. TANTALIDÆ.

257. HARPIPRION CAYENNENSIS, Gm. ; Lawr. *l. c.* viii. p. 25.  
Mr. Lawrence also gives *Tantalus loculator*.

## Fam. SCOLOPACIDÆ.

258. GALLINAGO WILSONII.  
259. ACTODROMAS MACULATA.  
260. TRINGOIDES MACULARIUS.  
261. RHYACOPHILUS SOLITARIUS.  
262. ACTITURUS BARTRAMIUS.

These are all included by Mr. Lawrence, *l. c.*, as well as the following, which we have not yet seen :—

- Himantopus nigricollis*.  
*Macrorhamphus griseus*.  
*Tringa wilsoni*.  
*Gambetta flavipes*.  
— *melanoleuca*.

## Fam. CHARADRIIDÆ.

Mr. Lawrence gives *Ægialitis azaræ*, Temm., and *Æ. vocifera*, Linn.

## Fam. RALLIDÆ.

263. PARRA MELANOPYGIA, Scl. P. Z. S. 1856, p. 282 ; Lawr. *l. c.* vii. p. 301.

The geographical distribution of this genus is remarkable. Three species are given by Sclater (P. Z. S. 1856, p. 282) as occurring at Santa Martha : of these, *P. gymnostoma*, Wagl., ranges into Central America ; *P. hypomelæna*, Gray, is found at Chiriqui and Panama.

264. PORZANA CAROLINA, Linn. ; Lawr. *l. c.* viii. p. 25.

An immature specimen of this widely distributed species is in the collection.

265. CORETHRURA ALBIGULARIS, Lawr. *l. c.* vii. p. 302.

Occurs also in Costa Rica ; but further north *C. rubra* (quite a distinct species, without barred abdomen and flanks) takes its place.

266. PORPHYRIO MARTINICUS, Linn. ; Lawr. *l. c.* vii. p. 302.

## Fam. ANATIDÆ.

267. DENDROCYGNA AUTUMNALIS (Linn.).

Of this species of Tree-duck, Mr. M'Leannan had two tame birds at the time of Salvin's visit ; and very tame they were, entering the house at all hours, and walking round the table on the look-out for



any pieces that might be thrown to them. They commence calling just before daybreak; the cry is rather like the crow of a Cock, only whistled, not crowed.

268. *CAIRINA MOSCHATA*, Linn.

Common in the swamps of the low forests. *Anas boschas*, Linn., and *Dafila acuta*, Linn., are also given by Mr. Lawrence.

Fam. LARIDÆ.

269. *HYDROCHELIDON PLUMBEA*, Wils.

Common on the coast of British Honduras.

Fam. PELECANIDÆ.

270. *PELECANUS FUSCUS*, Linn.

Fam. COLYMBIDÆ.

271. *PODICEPS DOMINICUS*, Linn.; Lawr. *l. c.* vii. p. 334.

Fam. HELIORNITHIDÆ.

272. *HELIORNIS FULICA*, Bodd.; Lawr. *l. c.* vii. p. 302.

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November 8, 1864.

Prof. Huxley, F.R.S., V.P., in the Chair.

The Secretary reported the safe return from India, on the 25th of July, of Mr. James Thompson, the Society's head keeper, with the following fine series of animals, which had been brought together for the Society at Calcutta by the exertions of their Corresponding Members the Baboo Rajendra Mullick of Calcutta, Mr. A. Grote of Alipore, Dr. John Squire and Mr. Wm. Dunn of Akyab.

*From Calcutta.*

- 2 Rhinoceroses (*Rhinoceros indicus*).
- 2 Black Cuckoos (*Eudynamys orientalis*).
- 2 Rose-coloured Pastors (*Pastor roseus*).
- 1 Rhinoceros Hornbill (*Buceros rhinoceros*).
- 2 Concave Hornbills (*Buceros cavatus*).
- 3 Green-necked Pea-fowl (*Pavo spicifer*).
- 3 Lineated Pheasants (*Euplocamus lineatus*).
- 2 Rufous-tailed Pheasants (*Euplocamus erythrophthalmus*).
- 1 Peacock Pheasant (*Polyplectron chinquis*).
- 2 Indian Tantali (*Tantalus leucocephalus*).

- 2 Indian Jabirus (*Mycteria australis*).
- 2 Saras Cranes (*Grus antigone*).
- 2 Land-Tortoises (*Testudo indica*).

*From Capetown.*

- 1 Black Kite (*Milvus niger*).
- 1 Crested Spizaëtus (*Spizaëtus occipitalis*).
- 3 Madagascar Francolins (*Francolinus madagascariensis*).

Mr. Thompson had experienced very few losses on the voyage home, the only noticeable occurrence under this head being the Polyplectrons. Of these birds a large number had been shipped at Calcutta, but nearly all of them died before reaching Madras.

Dr. Sclater also called the attention of the Meeting to several recent interesting additions to the Society's Menagerie, amongst which were—

1. A Brown Bear from Hakodadi, in the northern island of Japan, probably referable to *Ursus arctos*, var. *beringensis*, of Middendorf (Sib. Reise, ii. p. 4 *et seq.*). Dr. Sclater remarked that the Society now possessed living examples of the two distinct species of Bears from Japan referred to in the Fauna Japonica, Mamm. p. 29, as *Ursus ferox* and *Ursus tibetanus*. Of the latter, correctly named *Ursus japonicus*, a figure had already been given in the 'Proceedings,' 1862, pl. xxxii. p. 261. The former, on the authority of Von Schrenck (Amur-reise, i. p. 16), must be *Ursus arctos*, var. *beringensis*.

2. Pairs of the Sömmering's Pheasant of Japan (*Phasianus sømmeringii*). Fourteen birds of this fine species had been successfully imported into this country in June last by Mr. Reginald Russell, Corr. Memb., of which two pairs had been secured for the collection.

3. A young male Abyssinian Ass (*Equus tæniopus*, Heuglin), and a young female of the true Zebra (*Equus zebra*). These two acceptable additions rendered the series of the genus *Equus* in the Society's collection complete, it now embracing examples of all the six known species.

- (1.) *Equus hemionus* from Tibet, one female.
- (2.) — *onager* from India, Persia, and Syria, three females.
- (3.) — *tæniopus* from Abyssinia, one male.
- (4.) — *zebra* from South Africa, one female.
- (5.) — *burchelli* from South Africa, male and female.
- (6.) — *quagga* from South Africa, one female.

4. A second specimen of the Apteryx, or Kiwi, of New Zealand (*Apteryx mantelli*), presented to the collection by Major E. Ruck Keane, of Swyncombe, Henley-upon-Thames, on the 29th of September last. This bird (which appeared to be immature, and had been obtained by Major Keane in Auckland, in September 1863, from a Maori, who had caught it in a swamp in that neighbourhood) had been placed in the Collection, along with the female of the same

species, received in 1851. After a few days they agreed perfectly together; so that hopes were entertained that they would prove to be a pair, and that the eggs laid next season by the old female would prove to be fertile.

5. A fine living specimen of the rare Parrot of the Feejees (*Pyrrhulopsis splendens*, referred to, *anteà*, p. 158), which had been purchased from a dealer on the 27th of June last.

The Secretary laid before the Society a series of specimens of birds' eggs, collected in the vicinity of Barrackpore, and presented to the Society by Lieut. R. C. Beavan, of the Bengal Revenue Survey Department. The following is Lieut. Beavan's list of the species, with his notes on their nesting-habits. The nomenclature is that used in Dr. Jerdon's recently published work on the 'Birds of India,' where a description of the eggs will be found.

1. *ATHENE RADIATA*, Tickell; Jerdon, *Birds of India*, i. p. 143.

Two eggs from a hole in a tree. Maubhoon, April 1864.

2. *CYPSELUS AFFINIS*, Gray; Jerdon, *Birds of India*, i. p. 177.

Eggs from a nest under the roof of an out-house. Barrackpore, May.

3. *CAPRIMULGUS ALBONOTATUS*, Tickell; Jerdon, *l. c.* i. p. 194.

Two eggs laid on the bare ground. Maubhoon, April.

4. *CAPRIMULGUS ASIATICUS*, Lath.; Jerdon, *l. c.* i. p. 197.

Two eggs placed similarly to the last. Maubhoon, April.

5. *CAPRIMULGUS MONTICOLUS*, Franklin; Jerdon, *l. c.* i. p. 198.

Two eggs found on the bare ground. Maubhoon, March.

6. *MEROPS VIRIDIS*, Linn.; Jerdon, *l. c.* i. p. 205.

One egg taken from a female bird. Maubhoon, April.

7. *ARACHNECHTHRA ASIATICA*, Lath.; Jerdon, *l. c.* i. p. 370.

The nest of this species is domed like that of the European Wren (*Troglodytes vulgaris*). It is hung from the bough of a tree, to which it is attached by cobweb, the nest itself being chiefly composed of the same material. The bird is very common. Maubhoon, April 15th.

8. *DICRURUS MACROCERCUS*, Vieill.; Jerdon, *l. c.* i. p. 427.

The nest is made of loose twigs placed in a tree. Barrackpore, May.

9. *MALACOCERCUS TERRICOLOR*, Hodg.; Jerdon, *l. c.* ii. p. 59.

Builds in bushes. The nest resembles the English Blackbird's. Maubhoon, April.

10. *PYCNONOTUS PYGÆUS*, Hodg. ; Jerdon, *l. c.* ii. p. 93.  
Builds a very neatly made nest in a tree. Maubhoon and Barrackpore.
11. *COPSYCHUS SAULARIS*, Linn. ; Jerdon, *l. c.* ii. p. 115.  
Builds in bushes. Barrackpore, May.
12. *THAMNOBIA CAMBAYENSIS*, Lath. ; Jerdon, *l. c.* ii. p. 122.  
The nest of this species is roughly made of grass, bents, horse-hair, fragments of cast snake-skins, and fibres. The tree usually chosen for its situation is the Sal or Sakooa (*Shorea robusta*). Maubhoon, April 20th.
13. *CORVUS CULMINATUS*, Sykes ; Jerdon, *l. c.* ii. p. 295.  
Builds in trees. Maubhoon, April.
14. *CORVUS SPLENDENS*, Vieill. ; Jerdon, *l. c.* ii. p. 298.  
Builds a nest of rough twigs in trees. Barrackpore.
15. *DENDROCITTA RUFa*, Scopoli ; Jerdon, *l. c.* ii. p. 314.  
Builds like the Crows, in trees. Barrackpore.
16. *STURNOPASTOR CONTRA*, Linn. ; Jerdon, *l. c.* ii. p. 322.  
This species of Starling builds a nest composed of a large mass of material. The structure is domed, has a hole at one side, and is always placed in a tree. Barrackpore, May.
17. *ACRIDOTHERES TRISTIS*, Linn. ; Jerdon, *l. c.* ii. p. 325.  
Builds in holes in houses and verandahs. Barrackpore, May.
18. *PASSER INDICUS*, Jard. & Selb. ; Jerdon, *l. c.* ii. p. 362.  
Builds in holes in houses. Barrackpore, May.
19. *CROCOPUS PHÆNICOPTERUS*, Lath. ; Jerdon, *l. c.* ii. p. 447.  
The nest of this species is composed of twigs, and placed in trees. Maubhoon, April.
20. *TURTUR RISORIUS*, Linn. ; Jerdon, *l. c.* ii. p. 481.  
Builds like the preceding. Maubhoon, April.
21. *TURTUR CAMBAYENSIS*, Gm. ; Jerdon, *l. c.* ii. p. 478.  
Builds a nest similar to the two preceding Pigeons. Maubhoon, April.
22. *LOBIVANELLUS GOËNSIS*, Gm. ; Jerdon, *l. c.* ii. p. 648.  
Builds no nest, but lays its eggs on the bare ground. Maubhoon, April.
23. *ÆGIALITIS PHILIPPENSIS*, Scopoli ; Jerdon, *l. c.* ii. p. 640.  
This Plover scrapes a hole in the sandy bed of a river, in which it lays its eggs, making no regular nest. Maubhoon, March.

24. *ŒDICNEMUS CREPITANS*, Temm.; Jerdon, *l. c.* ii. p. 654.

The Stone Curlew, like the last, lays in a hole scraped in the ground. Maubhoon, April.

Mr. Gould exhibited a specimen of the *Emberiza pusilla* of Pallas, which had been lately captured in a clap-net near Brighton, being the first instance of its occurrence in the British islands. Also a specimen of the *Anthus campestris* of the Continent, caught in the same locality.

The Rev. H. B. Tristram, Corr. Memb., exhibited a pair of Sanderlings (*Calidris arenaria*) from Grimsey Island, Iceland, and three eggs, supposed to be those of that bird, received at the same time.

Mr. Fraser exhibited a mounted specimen of the Siamese Pheasant (*Euplocamus praelatus*), and a second pair of Horns of that exceedingly rare Bovine animal the *Budorcas taxicolor*, from his own collection.

The Secretary read the following extract from a letter received from Dr. W. Peters, For. Memb., dated Berlin, July 14, 1864:—

“Looking through Part I. of the ‘Proceedings’ for this year, I find the following passage in a paper of Dr. Gray’s (p. 58):—‘*Gerrhosaurus robustus*, Peters, Monatsb. 1854, p. 618. Dr. Peters gives the word *Caaiia* as the name of this Lizard; but, Dr. Kirk informs me, that word simply means “I do not know,” which was probably what the native said when he asked him what they called it.’

“As from this it might appear that I had collected the very important indigenous names of animals which I met with in Mozambique in a thoughtless and unwarrantable manner, you will allow me the following remarks:—

“1. The native name of the *Gerrhosaurus robustus* at Tette is not *Caaiia*, but *Calua* (English-pronounced, ca-ou-a), the former being a misprint, as has been remarked on the last page (p. 726) of the ‘Monatsbericht’ of the Berlin Academy for 1854.

“2. I never took down a name from a person whom I did not understand; and all native names which I have published have been carefully compared and corroborated by several persons.

“3. I resided in Tette from the 9th of December 1844 until the beginning of September 1845, where, of course, I knew every person, and where every one was anxious to oblige and assist me in my scientific pursuits.

“I am particularly indebted to Senhor Pascoal, Senhor Candido Jose da Costi Cardozo, Senhor Nunez, and Senhor Botelho for their assistance in pronouncing and writing the native names. All four were natives (not negroes), spoke very fluently the Portuguese language, and knew the productions of this country. In doubtful cases about the native names of zoological objects, they called their negroes, and the names were discovered.

“4. I got only two specimens of the *Gerrhosaurus robustus* (one

on the 25th of January, and the other on the 2nd of April, 1845), although I tried very much to get more specimens of this interesting and gigantic species. After having left Tette, my friend Pascoal wrote to me that his negroes had caught a 'Caáua' for me, which he sent to Quillimane, where I then resided. But this specimen died before the person to whom he confided it arrived in Quillimane, and was thrown away, to my great regret.

"5. If Dr. Kirk would look into my vocabularies (partly published by Dr. Black), 'The Language of Mozambique,' p. 290 (1856, London, printed by Harrison and Sons, St. Martin's Lane), he might find that 'pēnu' (pronounced pai-noo) is the word which signifies, not only at Tette, but also at Jena and Quillimane, 'I do not know.'

"I cannot believe that the language of Tette can have changed so much since my time, that a word *which only exists in a misprint at Berlin* should have been introduced instead of a word which was used every day, and at the same time, in three different dialects.

"6. Neither did I hear that the *Gerrhosaurus* 'enters the fowl-houses and kills the fowls,' which is rather astonishing, as the *Gerrhosaurus* does neither climb nor fly, and the fowl-houses, at least at Tette, are provided with perches, on account of the rats. Dr. Kirk will, perhaps, be able to tell us whether the same native who gave him such valuable information about the *customs* and *common* appearance of the *Gerrhosaurus* was his teacher in the language of Tette."

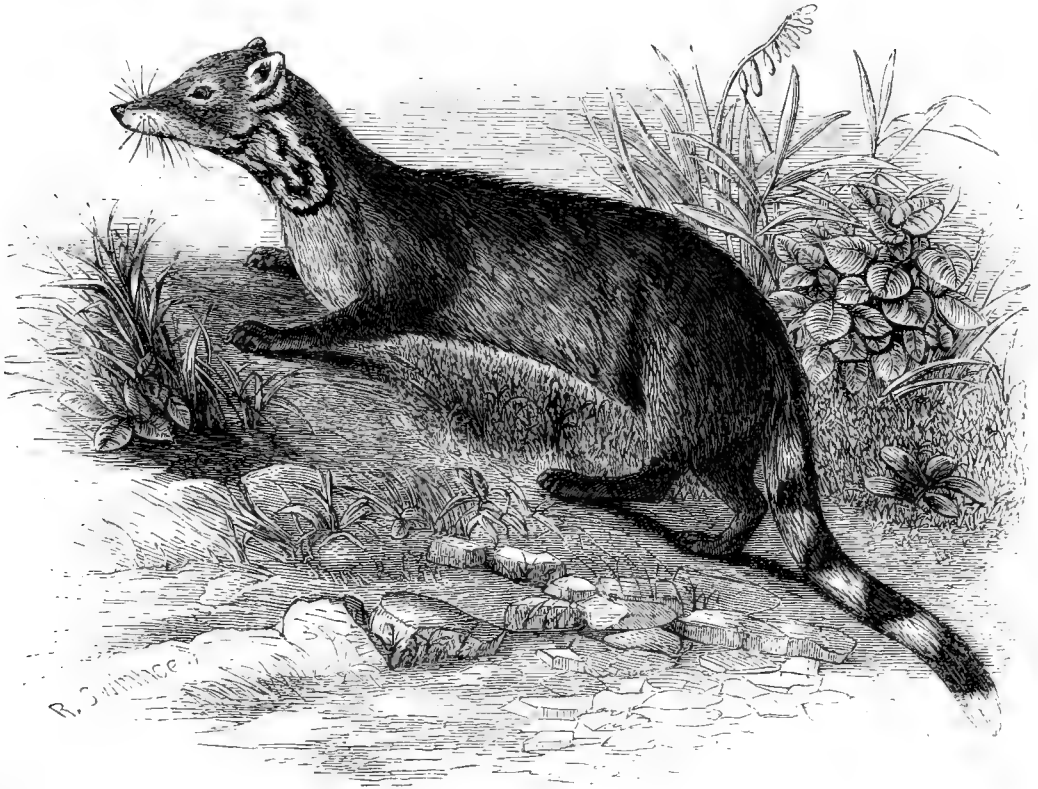
The Secretary read the following extracts from letters recently addressed by Mr. R. Swinhoe, H. B. M. Consul in Formosa, to Dr. J. E. Gray:—

"Foochow, 27th July, 1864.

"Having been cruising about the Formosan Channel for the last month, I have arrived at last at Foochow; and being detained at this port a few days, I have managed to find leisure to make a few notes in zoology. The only strange mammal that has yet occurred here is a Porcupine (*Hystrix*, sp.?). It was killed before I got here, and unfortunately not preserved; I regret, therefore, that I have no remarks to offer as to its appearance. The people who shot it are positive that it was wild, though I strongly suspect it was brought up from Singapore in a junk. At Amoy I heard of some Hedgehogs (*Erinaceus*) having been offered for sale, but of what species I could not ascertain. They were said to have been taken in the vicinity. A gentleman here has two magnificent skins from Newchwang, the northernmost part of China. One is that of a Tiger, the Chinese race, pale, with few stripes; and the other that of a Leopard, evidently your *Leopardus japonensis*. I strongly suspect that the animal you procured with a Japanese stamp was a skin procured by the Japanese in their trading-stations. No Leopard is said by the Japanese to inhabit the islands of Japan.

"I am about to remove from Tamsuy to Takow, S. W. Formosa, very shortly. I am closing up and sending home all my collections, and will send you a memoir on the new mammals added to the For-

mosan list; but this must wait till my return to that wild and solitary isle.



“*Viverra ashtoni*, n. sp. Shot at Suykaou, up the River Min, Foochow, by Mr. T. K. Ashton, and kindly lent by that gentleman to me for description. The skin is preserved flat, and the claws have been, unfortunately, cut away. It is the largest of the genus I have seen, and is quite a beautiful animal. Total length 4 feet; tail 16 inches, heavy, bushy, and handsome, slightly tapering. Its ground-colour may be described as a light ochreous white, finely mottled with black; blacker on the occiput, hind neck, fore shoulders, fore thighs, and along the back. The mottling effect is produced by some of the hairs having black tips, some being entirely black in the deeper parts. The downy fur or pile at the roots of the hair is brownish ash-grey. The paws are blackish brown, spotted with a deeper hue, the spots being carried up towards the thighs. Muzzle with a white patch on each side; bars moderate, with a black spot on their outward bases. A united bar occurs behind the ears, and runs in a line down the side of the neck, curving downwards before reaching the shoulder, and nearly meeting on the under neck; another crosses the lower throat, and another disconnected one twists about on either side of the neck below the first line. The neck is more decidedly white, edged with ochreous. From the nuchal bar

a black list begins to show, which takes a more certain form between the shoulders and runs down the back into the third dark bar of the tail. The hairs of this list are so thickly set, and so much longer than the rest of the fur, that they look as if added on by art. The tail has a pale indistinct bar at its roots, and four others along its length, the latter increasing in breadth and blackness as they approach the tip; they are stretched lozenge-shaped across the tail, being broader at their middles than at their sides. The rest of the tail is white, forming with the tip five bars. Before the eyes to the nose brown; moustache-bristles long and white, a few of the upper ones being brown.

“The animal does not appear to be well known in this neighbourhood, the present being the only instance of its having been observed and preserved by Europeans. I have taken its specific name from its discoverer, Mr. Ashton.”

“Tamsuy, 10th August, 1864.

“As I am now closing my collecting-operations in North Formosa, it would be as well to send you a few remarks on the more recent experience I have been able to acquire. The Monkey (*Macacus cyclopiis*) is distributed throughout the hilly country. We saw a large party of them the other day at Lungkeou.

“The Formosan Bear, I feel sure, is an undescribed animal. I have not been able to procure a perfect skin, but I procured some paws lately at Sawo Bay, and the cap of a savage covered with a patch of its skin. It is intermediate in size between the Bears of Japan and Thibet. It is about four feet and a half from muzzle to tail, and is clothed with rigid, somewhat short, black hair, and carries in the adult a crescent-shaped white mark on its breast between the fore legs. In the young this patch would appear to be brown; at least the Indian's cap above referred to had the mark on it of that colour. Of the paws, the fore paw measures, from the carpal joint to the end of the middle claw, 5 inches; its greatest breadth above is 3 inches: claws well hooked, and cultrated underneath: palm-pad nearly triangular, the apex towards the carpus, inclining outwardly; length  $2\frac{1}{2}$  inches, greatest breadth  $2\frac{8}{10}$ : each of the toes has bare oval pads underneath. Hind foot 6 inches in length measured underneath, greatest breadth above  $2\frac{8}{10}$ ; sole-pad an irregular triangle,  $3\frac{8}{10}$  long,  $2\frac{1}{2}$  greatest breadth; the pad of the outer and inner toes joining with the sole-pad, the rest of the toe-pads, as those of the fore foot, having cushions of hair between. Toe-pads of hind foot smaller than those of fore foot; claws not so long as in fore foot, and more covered with hair, being nearly hidden by it. For the Formosan Bear may I take the liberty of proposing the name *Ursus formosanus*? I have heard objections made to Formosa being formed into an adjective by the termination *anus*; but is not this liberty sanctioned by classical Latin in such a word as Augustani being applied to the people of the cities bearing the name Augusta?

“A few words now on *Leopardus brachyurus*. I have not seen this animal alive. At Sawo I procured two skins of adult animals



of this species, and at Lungkeaou (S. W. Formosa) one of an apparently younger specimen. They all show smaller heads than in Wolf's figure (P. Z. S. 1862, p. 347). All these skins have short tails, that of the Lungkeaou specimen not being ripped open; so that there can be no doubt of the distinctness of the species in that character from the *L. macrocelis*. This Lungkeaou specimen is lighter than those from Sawo in the tawny hue of its upper parts, and its pale under parts are nearly white; the streaks on its back are not so broad, and do not so frequently coalesce; its face is more narrowly and distinctly streaked, and its tail is more narrowly and numerously banded. The ears of all are black behind, with a light spot low down. Their moustache-bristles are some black and some white. The Lungkeaou skin is the only one that has legs. The feet appear to have been small, and the spots on the sides of the legs small and distinct.

Sawo skin . . . . .	Length 2 ft. 9 in., tail $22\frac{1}{4}$ in.	} including $\frac{3}{4}$ in. apical hair.
Sawo skin, No. 2..	Length 3 ft. 0 in., tail 25 in.	
Lungkeaou skin ..	Length 2 ft. 9 in., tail $30\frac{3}{4}$ in.	

“*Paguma larvata*.—I have received further specimens. The ears were in all small and round, as I described them; but the tail varies in length, and in the greater and less amount of black along its length.

“*Vespertilionidæ*.—Most of the Bats that fly about of an evening are small, and, I think, of the same species as those procured at Taiwanfoo. I have, however, a couple of specimens of a small Leaf-nose, taken in the cave at Kelung, which will be interesting. The other day I observed a species (of *Pteropus*?) of a bright colour, about 8 inches long, hanging by the heels on a large leaf. I, unfortunately, had no gun with me, and, trying to knock him down with my stick, missed him. The Chinese are very unsuccessful collectors of Bats, and very rarely bring me examples.

“*Porcula taiwana*.—I have not managed to procure or get a sight of an adult. The largest I have seen was perhaps half-grown, in which the stripes and spots still remained. The natives insist that the animal is so marked all its life. I have purchased several young ones, with the view of sending them to the Society, but have not succeeded in inducing them to live. One lived with me for over a month. I took it to Foochow with the hope of getting it off all safe, but it died the day after my arrival at that place. A half-grown Pig of this species was bought by a friend here. It was very wild, and always jumped furiously at any person that came near its pen. It was covered with rather long bristles, longest down the back, and had a white tail. I despair, for the present, of getting a specimen in this vicinity; but I may meet with it again in the south. I will now enumerate the additions that I have made to my first list of eighteen species of Mammals of Formosa (P. Z. S. 1862, p. 347).

“19. *Lutra nair*, with white sides to its neck. An indifferent skin seen at Sawo, in the hands of Chinese there; doubtless killed on the island.

“20. *Manis brachyurus*? When I was in Takow, in 1861, I

heard from the natives of the existence of this beast in the island; and in Dutch books on Formosa I saw it spoken of as the 'Taewan Devil,' the old Hollanders, like the Chinese, not being able to divine to what class of the animal kingdom it belonged. I have succeeded in procuring a specimen, and am sending it home. It is almost sure to be the South China species, *Manis brachyurus*; but, not having specimens to compare with it, I cannot set this down as a certainty.

"21. *Sorex myosurus* (the Musk-Rat of China). Not uncommon about Chinese houses in Tamsuy.

"22. *Sorex* —, sp.? I found a nest of this under a decayed patch of buffalo-dung, and secured two small Shrews; they are small and immature, and closely affine to the foregoing, but destitute of the musk-odour, and, I think, of a different species. I am sending them home for determination.

—"23. *Mus decumanus*. Very common, and rather variable in colour.

—"24. *Mus musculus* (the House-Mouse). I have seen, in houses here, little creatures which I have taken to be of this species.

"25. *Mus coninga*, Swinhoe, P. Z. S. 1864, p. 185. This species does not affect trees, like the *M. flavescens* of China.

"26. *Mus* —? About one-third the size of the common Rat, and of rather similar colour, with softer fur and small feet. From the interior. I was intending to give a full description of this apparently new species, but I find my specimens have been already packed and forwarded to M. Verreaux.

"27. *Mus* —? With reddish-brown back, interspersed with black hairs, whitish under parts, large head, and rounded ears. I picked up a mutilated specimen on a hill not far off. It is almost twice as big as a common Mouse, with longer tail. It appears to be a field species, and is probably undescribed. I have, unfortunately, not been able to procure good specimens.

"This is all I have at present to offer on the Mammals.

"I have been of late rather assiduous in collecting land shells. From this neighbourhood I have got nearly thirty species, from South Formosa four, and from Foochow two. The South Formosan, comprising three *Helices* and one *Bulimus*, are all distinct from those we meet with here. But both the Foochow species have close allies in Kelung, differing only enough perhaps to note them as varieties. But my knowledge of shells is so limited that I must refrain from talking too wildly of species and varieties, and leave those nice distinctions to the deeper learning of Mr. Cuming and Dr. Pfeiffer.

"I trust these notes will interest you. They may be worth communicating to the Zoological Society. You will probably not hear from me again until I have made some progress in Takow (South Formosa)."

"Formosa, Sept. 5th, 1864.

"With regard to my report on the Formosan Mammalia, it is necessary to make some corrections with regard to the supposed *Porcula*. Hitherto I had only received very young specimens, and,

relying on the reports of the natives as to its carrying its stripes at a mature age, I was led to suppose the animal a second species of Hodgson's genus *Porcula*. I have, however, lately had four live wild Pigs brought to me, which, judging from their appearance, I should take to be from five to six months old; and in this estimate I am borne out by the fact that it is during March and the commencement of April that sucklings are brought to us by the country-people. Two of the four pigs sulked and died; a third battered himself to death; and the fourth was very unmanageable, and eventually showed an inclination to droop, so that I was obliged to have him killed. In their grunts, squeaks, and other noises emitted, they were entirely *porcine*. The largest is about  $2\frac{1}{2}$  feet from snout to rump, and about  $1\frac{1}{2}$  foot high at the shoulder; tail  $2\frac{3}{4}$  inches long, with a further  $\frac{3}{4}$  inch length of hair at tip. The undeveloped state of their teeth and skulls generally proclaim their juvenility, so that the mature animal would be probably twice as large at least. The distinct bands have disappeared, and their incisors project in the usual manner of typical pigs. They are therefore wrongly referred to *Porcula*, but more properly belong to true *Sus*. I have three skins and three skulls. The general colour of the upper parts is yellowish brown, thickly mixed with black hairs, which give the fur a mottled appearance. A patch just before the shoulder, and another on the forehead before the eyes, are paler and more free from black hairs. The black hairs are longest on the back of the neck and on the rump. The under parts and tail are white, more or less mixed with black hairs. The chin is dark fuscous. A triangular line of white runs away from the angle of the mouth, bounded on each side by a line of black hairs. This last character calls to my mind the peculiar characteristic of the Japanese Wild Pig (*Sus leucomystax*); and indeed they may be of that species, which is probably also the Wild Pig of South China, if it be true that the Domestic Chinese Hog is descended from that wild stock. The appearance of these animals would doubtless have altered with advancing age; but they may be sufficiently stamped to indicate the species. I have no copy of the 'Fauna Japonica' with me to refer to. I am sending the specimens home, and will leave you to settle the question of their identity or otherwise with the Wild Japanese Pig. I may eventually succeed in getting a full-grown animal, and may perhaps manage to get live specimens home for the Gardens. I have no pigs' skulls to compare with those of our species. There is, however, a drawing of those of *Sus scrofa ferus* and *Sus pliciceps* illustrating a paper by you in the 'Proceedings.' The skull of *Sus taivanus* is at once distinguishable from either of these by its well-rounded forehead, and by the sides of the parietal and temporal bones being well convex instead of concave. But it is not, of course, with *Sus scrofa* that this has to be compared, as, from the external appearance of the skins, there is not the least chance of our pig being referable to that species."

The following papers were read:—

I. NOTES ON THE SKELETONS OF WHALES IN THE PRINCIPAL MUSEUMS OF HOLLAND AND BELGIUM, WITH DESCRIPTIONS OF TWO SPECIES APPARENTLY NEW TO SCIENCE. BY WILLIAM HENRY FLOWER, F.R.S., F.R.C.S., CONSERVATOR OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

Having had an opportunity during the autumn of examining personally the extensive collections of skeletons of Cetacea contained in several public and private museums in the Netherlands, I have put together some notes, chiefly with reference to the *Balænoidea* or Whalebone Whales. I trust that they may be of interest to students of this branch of zoology, as affording an indication of the localities in which the different specimens are to be found, and also as a contribution towards elucidating the difficult subject of the specific and generic characters of these animals, more especially of the subfamily *Balænopterinae*, or Fin-Whales.

Before proceeding further I am glad to avail myself of this opportunity of expressing my thanks to the directors of the various museums which I visited, and especially to Professor Schlegel of Leyden, Professor Van Beneden of Louvain, and M. le Vicomte Du Bus of Brussels, not only for their liberality in giving me unrestricted access to the treasures under their care, but also for numerous personal acts of kindness during my stay in their respective cities.

Certain general observations that have occurred to me during the examination of the osseous remains of Cetacean animals will form a necessary prefix to the special notes, in order to give an idea of the means employed in arriving at conclusions in reference to the specific distinction or identity of different individuals. These will be followed by some remarks upon the classification and nomenclature employed in speaking of the various species of Whales.

The alterations which take place in the bones at different periods of life render it an object of primary importance in investigating the skeletons of Cetacea, to ascertain as near as may be the relative age of the individual under examination. Unless this is carefully recorded, the description cannot be considered as complete. For this purpose the condition of the osseous tissue generally, the development of the various apophyses, especially those of the vertebræ, the state of the sutures of the cranium, and of the epiphyses of the vertebral column and of the bones of the pectoral limb afford the best indications.

In the early periods of life the bones have a peculiarly fibrous or spongy texture, and the apophyses, especially the spines and transverse processes of the vertebræ, are obviously unfinished, being abruptly and roughly truncated. Even to a comparatively late period portions of the cartilaginous skeleton, as the ends of the transverse processes of the cervical vertebræ, the olecranon, and the upper border of the scapula, remain unossified; and the peculiar appearance presented by the surface of the bone in this condition is such that it cannot be mistaken by the careful observer. This applies of course to macerated skeletons; for, as Eschricht has demonstrated, the form of each bone of the adult skeleton is defined at a very early stage of

foetal life in cartilage; and the peculiar characteristics of the mature animal can be obtained far more accurately from the examination of such a specimen, than from that of the bony portion only of the partially ossified skeleton of a half-grown individual.

In young skeletons all the bodies of the vertebræ have readily detached disk-like epiphyses at each end. These commence to unite to the main portion of the bone at the two extremities of the series, the union in the case of the central vertebræ not taking place until most other signs of immaturity in the skeleton have disappeared. I have observed also that in the individual vertebræ it is usually the epiphysis furthest removed from the middle of the column, *i. e.* the anterior one in the cervical region and the posterior one in the caudal region, which first join the body of the bone. It is stated by Professor Owen that "this embryonic condition is not obliterated at any age in these gigantic aquatic mammals, which, being sustained in a medium of nearly their own specific gravity, have more need of flexibility than firmness in the vertebral column"\*.

Certainly in the large majority of museum specimens the vertebral epiphyses, at least in the dorsal and lumbar regions, are still unattached; but their union with the bodies of the vertebræ, and the complete obliteration of all trace of their original autogeny, throughout the vertebral column in the adult animal is well seen in the large skeletons of Common Fin-Whales (*Physalus antiquorum*) in the British Museum, Alexandra Park, Rosherville Gardens, and Antwerp Zoological Gardens.

The humerus has two epiphyses, upper and lower; the radius and ulna also two each. The order in which these unite to the diaphysis is as follows:—That of the lower end of the humerus and upper end of the ulna and radius about the same time, then that of the upper end of the humerus; these are all united before the epiphyses of the bodies of the dorsal and lumbar vertebræ. Lastly, and only at a comparatively late period of life, when the vertebral column is completed, do the peculiar small rough nodules of bone developed in the mass of cartilage which forms the lower end of the radius and ulna become united to the shaft.

The obliteration of the sutures of the cranium affords some indications as to age: for instance, the distinctness of the basisphenoid from the presphenoid and basioccipital bones, and of the exoccipitals from the supraoccipital, indicates a very early condition; but after the union of these, very little change takes place, except the soldering of the supraoccipitals with the parietals and frontals, the majority of the bones remaining, as far as I have yet had an opportunity of observing, distinct and separable throughout life.

We are able from these indications to divide, for practical purposes, all the skeletons that may be met with into three stages of growth. I. In the first, all the epiphyses of the vertebral column, and of both ends of the humerus, radius, and ulna, are still separate, and the processes of the vertebræ are very incomplete. The animal remains in this condition until it has attained to more than half the length of

\* Descrip. Cat. Osteol. Series, Mus. Roy. Coll. Surgeons, 1853, vol. ii. p. 440.

the adult (e. g. *Balænoptera rostrata*, Mus. Roy. Coll. Surg., 17' long; *Physalus antiquorum*, The Hague, 40' long; *Megaptera longimana*, Leyden, 28½' long; ditto, Louvain, 33' long). This stage of growth may be designated as "young"; towards its close the majority of the bones lose the spongy character of the "very young" animal, and acquire the firm structure characteristic of succeeding ages.—II. In the next stage, both epiphyses of the humerus, those of the upper end of the radius and ulna, and those of the bodies of the anterior cervical and the posterior caudal vertebræ are united, while those of the greater part of the column are still free. The ossification of the transverse processes of the cervical vertebræ, although often still incomplete at the ends, has gone on so far as to give them in great measure the characteristic form seen in the adult. This is a condition in which skeletons are frequently seen in museums. The animal while in this stage, which may be called "adolescent," has attained nearly its full size (*Balænoptera rostrata*, Mus. Roy. Coll. Surg., 25' long; *Balæna mysticetus*, *ibid.*, 47'; ditto, Brussels, 50'; *Megaptera longimana*, *ibid.*, 46'); the reproductive functions have also come into action (*Balæna mysticetus*, ♀, Mus. Roy. Coll. Surg., pregnant).—III. The last stage, or the perfectly "adult," in which all the vertebral epiphyses are ankylosed, I have met with among the Balænoidea only in the large Fin-Whales of the common species mentioned before. Adult Hyperoodons and other Delphinoids are not uncommon in collections.

It is possible that variations may occur in different species or different individuals in the order of completion of the several parts of the skeleton. The foregoing observations are founded upon a careful examination of upwards of twenty skeletons of Whalebone Whales of different species. If not complete, they at least indicate a line of inquiry important to the exhaustive study of the anatomy and zoology of the Cetacea.

The next point to which I would draw attention is the amount of variation found among different individuals of the same species—a point which will assist greatly in determining what differences in similar specimens may be considered as specific; and yet it is one which cannot absolutely be settled until the limits of the species themselves are definitely fixed. Some years ago, when many species which we now know to be very different were thrown together into one, the individuals of a supposed species were found to vary extremely among themselves. It is possible that the same error may be made at present, and species still confounded which more critical examination will show to be distinct. We must feel our way cautiously, and I shall therefore under this heading only take for illustration some of the best-known and most generally accepted species, and see what can be derived from an examination of some of their best-marked characteristics.

First, as to variations in size. It will help much in determining specific identity of new or little-known species, if we can show, among those that are well known, what is the usual amount, and what the limit, of variation in this direction; for we may assume that it is at

least probable that the same laws govern the different members of a group so well-defined as the Whales. No species of Balænoïd Cetacean is so well determined as the Northern Right Whale (*Balæna mysticetus*), and of none are we able to adduce so many instances of the size that various individuals of the species have attained. A skeleton in a late stage of the adolescent period in the Museum at Brussels measures a little over 50' in length; and Scoresby, as is well known, states that out of 322 examples examined by him no one exceeded 60' in length; indeed the largest measured was 58', being one of the longest, to appearance, that he ever saw. The adult animals must then have a tolerably limited range of variation, within a few feet of either side of 55'. Again, the common and well-marked species *Balænoptera rostrata*, the dwarf of the family, is still in the adolescent stage at 25' long, and there is no instance recorded in which it exceeded 31'. The adult Hump-backed Whale (*Megaptera longimana*) appears to range within 45' and 50' in length. In the Common Fin-Whale (*Physalus antiquorum*) we have evidence of variation at an adult age and in the same (male) sex, of from 60' (Rosherville Gardens) to nearly 70' (Alexandra Park and Antwerp Zoological Gardens). It is possible that this species may sometimes attain a few feet longer, but all the cases in which this is stated require fresh investigation. The alleged length of a Whale in the flesh is rarely to be depended on, and even the given measurements of skeletons are often inaccurate, as much depends upon the method of articulation. Size being in the popular mind a point of vital importance in a Whale, the tendency to exaggerate this quality is a constant obstacle to exact investigation. We may conclude, then, that all the evidence at present available tends to prove that the idea which some naturalists entertain, that Whales have no definite limit to their growth, is incorrect, and that, as in other mammals, there is an average size to which each species attains, subject to individual differences within a moderate range.

The number of vertebræ and number of ribs have been supposed to be subject to considerable individual variation, partly in consequence of several distinct species having been confounded, and partly from the loose way in which these bones have been counted from defective or badly articulated skeletons; but in fact, subject to the exceptional circumstances about to be mentioned, they are quite as constant among the Cetacea as among other Mammalia, and are therefore characters of the highest importance in determining species. Every example of *Balænoptera rostrata* that I have examined in museums, or found recorded, has eleven pairs of ribs, and a total number of vertebræ amounting to 48 or 50. In like manner skeletons of *Physalus antiquorum*, when complete, appear always to have 15 pairs of ribs and 61 or 62 vertebræ. *Megaptera longimana* has 14 pairs of ribs and 53 vertebræ; *Balæna mysticetus* 12-13 pairs of ribs and 54 vertebræ. It frequently happens that the last pair of ribs only attain a rudimentary condition, and, their heads not articulating with the vertebræ, they are lost in preparing the skeleton. This condition of the last (15th) pair of ribs is well seen in the ske-

leton of *Physalus antiquorum* in the Alexandra Park, prepared by Mr. Gerrard, jun. ; they measure, the one  $19\frac{1}{2}$ " in length, the other 27", and taper to a point at their upper extremity, being suspended in the position they originally occupied, far removed from the vertebral column. A small rudimentary additional rib, or pair of ribs, attached to the first lumbar vertebræ is sometimes developed ; but a fully formed pair of ribs above the normal number is, I believe, never met with.

As to the number of vertebræ, a small amount of latitude may usually be allowed on account of the difficulties connected with the terminal bones of the tail. Very often in specimens in museums several of these are wanting, owing to carelessness in preparing the skeleton ; and by a less excusable carelessness the circumstance may not be noted in published accounts of the number of vertebræ possessed by the specimen. But even if all are present, slight discrepancies in enumeration readily occur. In early periods of life, the last vertebra, although certainly formed in cartilage, is not ossified, and the penultimate has so much the appearance afterwards assumed by the last, as frequently to be taken for it ; or, again, later in life two or even three of the terminal vertebral elements grow together so as to form a single osseous mass, which is counted as one or several bones according to the discretion of the observer. Therefore, even in well-described skeletons, a discrepancy of one or two in the given number of caudal vertebræ is of no great consequence ; but there is no evidence to prove the occurrence of any greater variation in any given species.

It would be interesting to collect an account of the numerous and various differences in detail found in the osteological structure of several individuals of each well-determined species ; but to do this with advantage would cause me greatly to exceed the limits originally proposed to this paper. I shall have occasion to mention some of them hereafter, and will next proceed to give such a sketch of the arrangement of the genera of the Whalebone Whales as may explain the names assigned to the different specimens mentioned in the following notes. The materials at our disposal are still so scanty, that I do not suppose that the classification now offered may not hereafter require modification ; but it has not been attempted without a personal examination and a very careful consideration, at all events, of all the more important osteological characters of several individuals of each genus.

I perfectly concur with those naturalists who divide the Cetacea into two primary sections, which merit, it appears to me, the rank of suborders. The BALÆNOIDEA or MYSTICETE, or Whalebone Whales, and the DELPHINOIDEA or ODONTOCETE form two natural and equivalent groups, separated from each other by the following (among many others of less importance) trenchant distinctions :—

I. BALÆNOIDEA. Teeth never functionally developed, but always disappearing before the close of intra-uterine life. Upper jaw provided with plates of baleen. Sternum composed of a single piece, generally broader than long, and connected only with the first rib.



No costo-sternal bones. All the ribs at their upper extremity articulating only with the transverse processes of the vertebræ; their capitular processes, when developed, rudimentary, and not forming true articulations with the bodies of the vertebræ. Rami of mandible curved, their anterior ends meeting at an angle, and connected by fibrous tissue, without any true symphysis. Skull symmetrical. Maxilla produced in front of, but not over, the orbital process of the frontal. Nasal bones well developed, symmetrical. Lachrymal bones distinct from the jugal\*.

II. DELPHINOIDEA. Teeth always developed after birth, and generally numerous, sometimes few and early deciduous. No balcen. Sternum elongated, composed of several pieces placed one behind the other, to which are attached the ossified cartilages of several pairs of ribs. The anterior ribs with capitular processes developed, and articulating with the bodies of the vertebræ, as in other Mammalia. The posterior ribs without head, and only articulating with the transverse processes. Rami of mandible straight, the two coming in contact in front by a surface of variable length, but always constituting a true symphysis. Upper surface of the skull generally, if not always, unsymmetrical. Upper end of the maxilla expanded, and produced over the orbital process of the frontal bone. Nasal bones rudimentary and unsymmetrical. Lachrymal bone confluent with the jugal.

In conforming with all the above characters, the Sperm Whales are true Delphinoids; but into the further divisions of this group I do not at present propose to enter.

The *Balænoidea* fall naturally into two families, the *Balænidæ* or *Leiobalæna* (Eschricht), Smooth Whales or Right Whales, and the *Balænopteridæ* or *Ogmobalæna* (Eschricht), Furrowed Whales or Rorquals.

1. The *Balænidæ* have a very large head (exceeding one-fourth of the total length of the body); no dorsal fin; the under surface of the throat and chest smooth. The bones of the cranium greatly arched, so as to leave a wide interval between the upper and lower jaws. The rostrum narrow and compressed at the base. The orbital processes of the frontals very much prolonged, and extremely narrow and rounded on their upper surface. Tympanic bones broad, rhomboid. The coronoid process of the lower jaw scarcely perceptible. Baleen-plates long and narrow. All, or the greater number of the cervical vertebræ ankylosed together. Hand broad and pentadactylous.

The members of this family are not sufficiently distinguished from

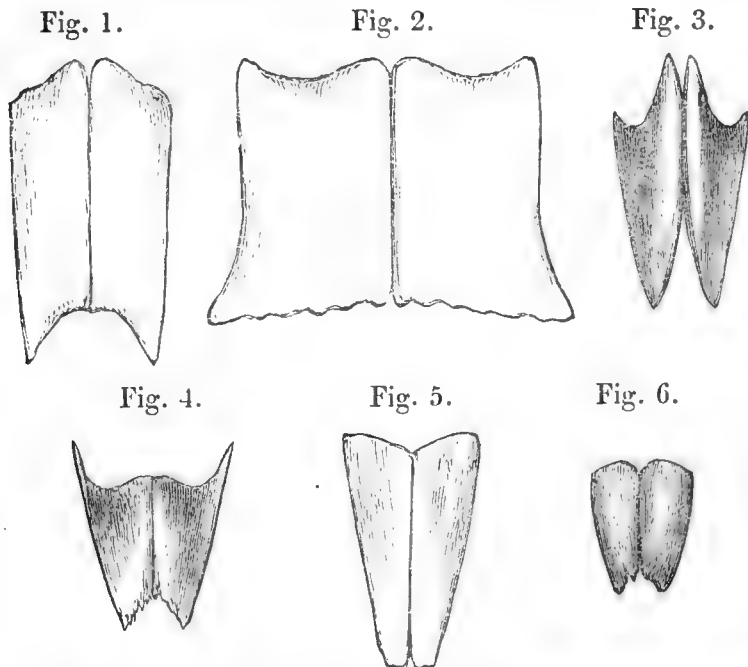
\* The statements, in works of comparative anatomy and zoology, regarding the lachrymal bone of the *Balænoidea*, afford a curious example of the difficulty of eradicating a mistake when once it has become incorporated in scientific literature. The defective condition of most of the skulls preserved in museums was undoubtedly the original source of error; but, notwithstanding Cuvier's distinct description, in the skull of the Rorqual, of the bone "qui ne peut être que l'analogue du lacrymal" (Oss. Foss., edit. 1836, t. viii. p. 275), the absence of the lachrymal is repeated as a character of the section in many of our most valued treatises.

each other to warrant their division into subfamilies; but they constitute two tolerably well-marked genera (*Balæna*, Linn., *pars*, and *Eubalæna*, Gray), which present the following among other less-marked distinctive characters:—

(1.) *Balæna*. Total number of vertebræ 54. Pairs of ribs 13. Head more than one-third of the total length of the body. Nasal bones long and narrow (fig. 1). Orbital processes of frontals much elongated, sloping backwards, and very little dilated at their extremity. Cervical vertebræ all ankylosed. Baleen-plates very long, and narrow at the base.

Type species *B. mysticetus*, Linn., at present the only one known. The most specialized in structure of all the Whales.

(2.) *Eubalæna*\*. Total number of vertebræ 57–58. Pairs of ribs 15. Head less than one-third of the total length of the body.



Upper surface of nasal bones of Whales of different genera,  $\frac{1}{10}$ th nat. size.

- Fig. 1. *Balæna mysticetus*. Mus. Roy. Coll. Surg.
2. *Eubalæna australis*?. Mus. Leyden.
3. *Megaptera longimana*. Mus. Brussels.
4. *Physeter antiquorum*. Mus. Roy. Coll. Surg.
5. *Sibbaldius schlegelii*. Mus. Leyden.
6. *Balænoptera rostrata*. Mus. Roy. Coll. Surg.

\* The very few skeletons of members of this genus in Europe present considerable discrepancies, which have never been satisfactorily investigated. As the Leyden specimens are the only ones I have seen, the above characters are taken from them; but I have now reason to believe that they do not belong to *E. australis* (Desm.). Dr. Gray, in a recent paper (*Ann. and Mag. Nat. Hist. Nov.* 1864), makes three genera of the Southern Whales—*Eubalæna*, *Hunterus*, and *Caperea*.

Nasal bones short and broad (fig. 2). Orbital processes of frontals moderately long, and widening considerably at their outer extremity, directed nearly horizontally outwards. First five cervical vertebræ only ankylosed (?). Baleen-plates moderately long, and broad at the base.

Type species, *E. australis* (Desm.). Probably several other species, including *Balæna biscayensis*, Eschr.; but these are not yet well determined\*.

2. *Balenopteridæ*. The head less than one-fourth of the total length of the body. A dorsal fin. Skin of the under surface of the throat and chest provided with numerous parallel longitudinal furrows. The bones of the cranium very slightly arched. The rostrum broad at the base, gradually tapering, depressed. The orbital processes of the frontal moderately prolonged, broad, and flat on the upper surface. Tympanic bones elongated, ovoid. The coronoid process of the lower jaw more or less developed. Baleen-plates short. Cervical vertebræ usually all free. Hand narrow and tetradactylous.

This family may be divided into two minor groups or subfamilies, the *Megapterinæ* (genus *Kyphobalæna*, Eschricht), or Humpbacked Whales, and the *Balenopterinæ* (genus *Pterobalæna*, Eschricht), or Fin-Whales.

(1.) *Megapterinæ*. Dorsal fin low, obtuse. Orbital process of frontal much narrowed externally. Scapula high and narrow; acromion and coracoid process absent or rudimentary. Metacarpus and phalanges greatly elongated.

This division contains, as far as is known at present, but one genus—*Megaptera*, Gray, characterized, in addition to the above, by a total number of vertebræ amounting to 53, and 14 pairs of ribs. Coronoid process of lower jaw low, obtuse. Nasal bones narrow, pointed at both ends, rising to a sharp ridge in the middle line, and deeply hollowed at the sides (fig. 3).

Type species, *M. longimana* (Rudolphi).

(2.) *Balenopterinæ*. Dorsal fin falcate. Orbital process of frontal nearly as broad at the outer extremity as the base, or somewhat narrowed. Scapula low, broad, with a long acromion and coracoid process. Metacarpus and phalanges of moderate dimensions.

Van Beneden ("Faune Littorale de Belgique," Acad. Roy. Belg. vol. xxxii. 1860) has recognized the distinctive characters of three species belonging to this group, which he calls *Pterobalæna communis*, *P. gigas*, and *P. minor*. Dr. Gray (Proc. Zool. Soc., May 24th, 1864) constitutes these three species as the types of distinct genera, which he has named *Physalus*, *Sibbaldius*†, and *Balenoptera*; he also

\* In a valuable monograph ('Om Nordhvalen,' Copenhagen, 1861), lately published in the Danish language, by Eschricht and Reinhardt, and about to be translated into English under the auspices of the Ray Society, it is conclusively proved that the habitat of the *Balæna mysticetus* is, and always has been, exclusively confined to the Polar Seas, and that it has therefore no claim to a place in the European fauna. The Right Whales of the North Atlantic, formerly chased by the Basque whalers, belonged to this section of the family.

† I hope my kind friend Dr. Gray will excuse me, if I venture thus to modify the generic name "*Sibbaldus*," originally proposed by him.

makes a fourth genus, *Benedenia*. Although I am as little disposed as any one to multiply generic names (a tendency of modern times of which we are all apt to complain), I cannot help admitting that, if the genera of Whales are to be at all equivalent in value to those now generally received in other groups of mammals, the first three of these are perfectly valid. Of the genus *Benedenia* I speak with more hesitation, as it is constituted only upon the examination of a very young individual, which I confess I am unable to distinguish from a *Physalus*. As the diagnostic characters given by Dr. Gray are brief, and limited to certain parts of the organization, I may be permitted perhaps to give more detailed characters taken from the skeleton generally, which will, I think, fully confirm his views as far as these genera are concerned. Into those characters, taken from the external form, position of dorsal fin, or from the visceral anatomy, it is not my purpose to enter at present.

A. *Physalus*, Gray. Total number of vertebræ 61-64. Ribs 15 pairs\*. Orbital process of frontal bone considerably narrowed at its outer end. Nasal bones short, broad, deeply hollowed on their superior surface and anterior border (fig. 4). Rami of the lower jaw massive, with a very considerable curve, and a high, pointed, curved coronoid process. Neural arches of the cervical vertebræ low; spinous processes very slightly developed. Transverse process of the atlas arising from the upper half of the side of the body, long, tapering, conical, pointed directly outwards. Upper and lower transverse processes, from the second to the sixth vertebræ, well developed, broad, flat (and united at the ends in the adult, forming complete rings?). Head of the first rib simple, articulating with the transverse process of the first dorsal vertebra. Second, third, and sometimes the fourth ribs with capitular processes, reaching nearly to the bodies of the vertebræ. Sternum broader than long, in the form of a short broad cross, of which the posterior arm is very narrow; it might perhaps be compared to the heraldic trefoil (fig. 7); it is subject, however, to considerable individual modifications.

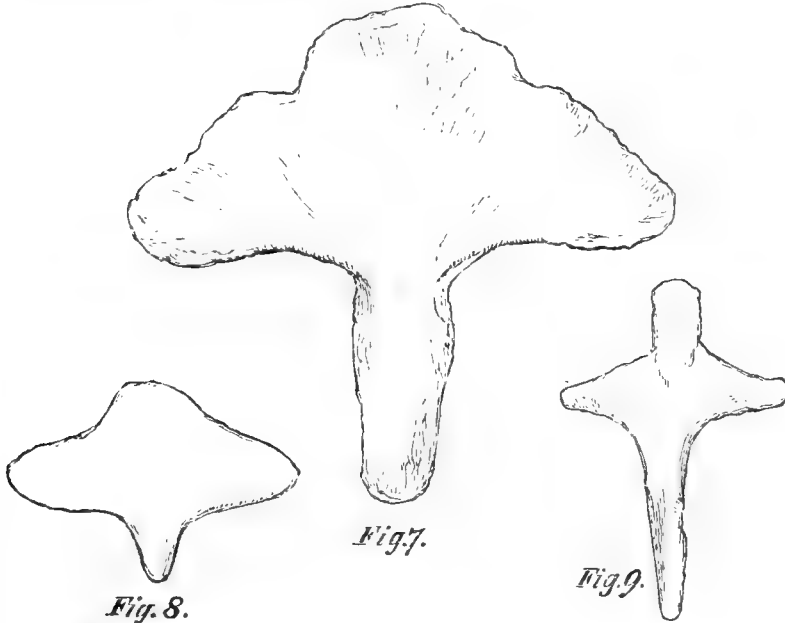
Type species, *P. antiquorum*, Gray.

B. *Sibbaldius*, Gray. Total number of vertebræ 56-58. Ribs 14 pairs. Orbital process of frontal bone nearly as broad at outer end as at the base. Nasal bones elongate, narrow, flat, or very slightly hollowed on the sides of the upper surface, obliquely truncated at the anterior end (fig. 5). Lachrymal bones thickened and rounded at the outer end. Lower jaw with a comparatively slight curve, and a low, obtusely triangular coronoid process. Neural arches of the cervical vertebræ high, and their spines well developed. Transverse process of atlas arising from upper two-thirds of side of the body, short, and deep from above downwards (figs. 10, 11). On the hinder border of the under surface a median pointed triangular process, directed backwards and articulating with the axis. Upper

\* A specimen (*Physalus sibbaldii*, Gray) in the museum of the Hull Philosophical Society is said to have sixteen pairs of ribs—the highest number recorded in any Whale. If constant to the species, a modification of the above generic character will be required.

and lower transverse processes of the second to the sixth vertebræ inclusive well developed, broad, and flat (united at their ends in the adult, except the sixth?). Lower process of the sixth short, broad, and much twisted on itself. Head of the first rib bifurcated into an anterior and posterior division, articulating with the extremities of the transverse processes of the seventh cervical and first dorsal vertebræ respectively. Second, third, and fourth ribs with short capitular processes. Sternum very small, short, and broad, somewhat lozenge-shaped (fig. 8). Stylohyals very broad and flat (fig. 17).

Type species, *S. laticeps*, Gray\*.



Sternal bones of Fin-Whales of different genera.  $\frac{1}{10}$ th nat. size.

Fig. 7. *Physalus antiquorum*. Alexandra Park.

8. *Sibbaldius schlegelii*. Mus. Leyden.

9. *Balænoptera rostrata*. Mus. Roy. Coll. Surg.

*C. Balænoptera*, Lacépède, *pars*. Total number of vertebræ 48-50. Ribs 11 pairs. Orbital process of frontal almost as broad at the outer end as the base. Nasal bones rather narrow and elongate, truncated at their anterior ends, convex on the upper surface in both directions (fig. 6). Rami of lower jaw much curved, and with a high, pointed coronoid process. Cervical vertebræ usually separate; but this family character not unfrequently departed from

\* Dr. Gray, with good reason, refers the Whale stranded at Charmouth, in 1840 (Sweeting, Proc. Zool. Soc. 1840), to this genus. There is not, as far as I am aware, a skeleton or skull of a *Sibbaldius* preserved in any of the museums in this country; we possess, however, at the College of Surgeons a lower jaw, pair of first ribs, pair of scapulæ, atlas, and some other vertebræ. Their origin is unknown.

by the union of the second and third, or the third and fourth, by their arches. Neural arches high; spines moderately developed. Transverse process of atlas arising from the middle of the body, elongated, tapering, directed outwards, and slightly upwards. Upper and lower transverse processes of axis and succeeding vertebræ, to the sixth inclusive, well developed. Those of the axis broad, flat, and in the adult united at their extremity; those of the other vertebræ slender, and never united at their extremity, except occasionally in the sixth and more rarely in the fifth vertebra. Head of the first rib simple; capitular processes scarcely developed upon any of the ribs. Sternum longer than broad, having the form of an elongated cross (fig. 9).

Type species, *B. rostrata* (Fabricius).

All the Fin-Whales which I have had an opportunity of examining fall under one or the other of these groups. There may possibly be others, which will need either a new genus to be formed for their reception, or a modification of some of the differential characters given above. The number of species in the genera *Physalus* and *Sibbaldius* is at present very uncertain. In *Balænoptera*, as far as is known, there is but one—*B. rostrata*, Fab.=*Pterobalæna minor*, Eschricht and Van Beneden\*.

It may perhaps be useful to place the arrangement of the *Balænoidea* in a tabular form, so as to show the relation of the different divisions to one another (see opposite page). The table also exhibits at a glance the progressive steps in the classification of the group made since the time of Linnæus, by Lacépède, Eschricht, and Gray respectively.

I will next proceed to notice in systematic order the specimens of skeletons and skulls of Whalebone Whales contained in the Royal Museum at Leyden.

*Balæna mysticetus* (the Greenland Right Whale).—This species is represented only by the skull of a very young individual in rather an imperfect condition. It is 5' 2" in length, and 2' 10½" in greatest breadth across the squamosals. The elements of the occipital bone are distinct; but the parietal is already ankylosed with the supra-occipital along the upper margin of the temporal fossa. The basi-sphenoid is distinct from both the presphenoid and basioccipital, though the union with the latter is the more advanced of the two. At this stage the skull differs much from that of the adult animal. Besides the proportionately greater size of the cranial cavity, the orbital processes of the frontals are shorter, and broader at their extremity, the maxillaries are less arched, and the skull generally much more depressed.

The Southern Right Whale (*Eubalæna australis*?).—Of this species, or perhaps I should say of one of the species confounded together under this name, the collection contains a very fine skull of an

\* Barkow (Das Leben der Walle, &c., Breslau, 1841) has described another species under the name of *Pterobalæna pentadactyla*; but much uncertainty hangs over the origin and composition of the single skeleton in the Museum at Breslau, on which it is founded. If genuine, it would necessitate a considerable modification of both the family and generic characters.

Order.	Suborder.	Families.	Subfamilies.	Genera.	Type species.
CETACEA.	BALENOIDEA seu MYSTICETE. Gen. <i>Balena</i> , Linn. Whalebone Whales.	BALENIDÆ. Gen. <i>Leuobalena</i> , Esch. Smooth Whales, or Right Whales.	BALENINÆ.	{ <i>Balena</i> , Linn., pars. }	{ <i>B. mysticetus</i> , Linn. Greenland Right Whale. }
		MEGAPTERINÆ.	Gen. <i>Kyphobalena</i> (Esch.). Humpbacked Whales.	{ <i>Megaptera</i> , Gray. }	{ <i>M. longimana</i> (Rud.). Northern Long-finned or Humpbacked Whale. }
		BALENOPTERINÆ.	Gen. <i>Pterobalena</i> (Esch.). Fin-Whales.	{ <i>Sibbaldius</i> , Gray. }	{ <i>P. laticeps</i> , Gray. Rudolph's Fin-Whale. }

adult and a nearly complete skeleton of a young individual, both obtained from the Cape of Good Hope by Dr. Horstok. These are briefly described by Schlegel in his 'Abhandlungen aus dem Gebiete der Zoologie, &c.' (Leiden, 1841), part 1, p. 37.

The skull is 13' 5" in extreme length. To any one accustomed to the appearance of the skull of the adult *B. mysticetus*, the differential characters exhibited by this specimen are very striking. The size is much inferior, both absolutely and as compared with that of the body of the animal. Its general contour is less regularly arched, as it rises abruptly in the occipital region to a very prominent and rounded eminence at the junction of the supraoccipital, frontal, and nasal bones, and then slopes gradually down to the apex of the beak. The articular processes of the squamosals are broader and less elongated. The supraorbital processes of the frontal are, as noticed by Schlegel, directed more horizontally outwards, shorter, and very much stouter, especially at the extremity. The orbital processes of the maxillary are also stouter. One of the most marked differences from *B. mysticetus*, and one which I have not before seen noticed, is the great breadth and comparative shortness of the nasal bones (fig. 2), and consequent great width of the posterior margin of the nasal aperture. The part of the upper surface of the two nasal bones uncovered by the frontal is 13½" broad and 11" long; in a skull of *B. mysticetus*, 17' in length, they are but 7" broad and 11" long. The malar, lachrymal, and tympanic bones are absent from this skull.

The skeleton is that of a young animal; the epiphyses of all the vertebræ and of both ends of the humerus, radius, and ulna are not united. It wants the lachrymals, malars, sternum, hyoid and pelvic bones. The entire length is 31' 4", of which the head occupies 7'. The total number of the vertebræ is fifty-six; and one, or perhaps two, may be wanting from the end of the tail. The first five of the cervical vertebræ are united together; the bodies of the other two are greatly compressed and close together, but not ankylosed. There are fifteen pairs of ribs. The first, as described by Schlegel, is of very singular shape, being divided at the upper end for a distance of 6" into two broad flat heads, anterior and posterior, and widening exceedingly at the lower end, in the middle of the border of which is a deep notch. It is 34" in length, measured in a straight line, 4" in breadth at the middle, and 12¾" at the lower end. The two divisions of the upper end are attached to the transverse processes of the first and second dorsal vertebræ, which disposition induced Schlegel to assign sixteen dorsal vertebræ to this specimen; but this is probably an error of the articulator, as in the Fin-Whales with double heads to the first rib, these are connected with the seventh cervical and first dorsal vertebræ; and in *B. mysticetus* the head of the first rib is placed altogether in front of the transverse process of the first dorsal vertebra, being intimately connected with the seventh cervical.

The second rib is very thick and broad at the lower end. The last rib is much shorter and more slender than the others. There are nine chevron bones present. The scapula is 26" broad and 24"



high, with very short acromial and coracoid processes. The humerus 15'' long. The radius 16½'' long, and 10'' broad at its distal end. The ulna 8'' broad at the same part. The thumb is absent; the digits differ but slightly from each other in length. The second, third, and fifth have, besides the metacarpal bones, each four phalanges; the fourth has five; but, as they are artificially articulated, these numbers are not entirely to be depended on.

*Megaptera longimana*.—A nearly complete skeleton of a young animal, obtained from Greenland through Eschricht. It is 28' 7'' long, of which the skull is 7' 7''. There are but thirteen ribs present.

Genus *Physalus*.—A skull of a young specimen, agreeing in all its characters with *P. antiquorum*, Gray; marked "*Balænoptera physalus*, Mer Sept." Its length, from the condyles to the tip of the beak in a straight line, is 10' 6''.

Genus *Sibbaldius*.—A skeleton marked "*Balænoptera physalus*, Vinisch, Zuider Zee." This is no. 17 of Eschricht's list (*Untersuchungen über die Nordischen Wallthiere*, Leipzig, 1849), according to which it was taken in the Zuider Zee, near Monnikendam, Aug. 29th, 1811, its length being 32' Rheinland. The skeleton is perfect, with the exception of the hyoid and pelvic bones. The malars, lachrymals, and tympanics are present. The entire length (including the skull, which is 6' 7'') is 29' 7''; but the bodies of the vertebræ are placed close together, so that 2 or 3 feet should be added for the intervertebral spaces. The animal was young; the epiphyses of all the vertebræ, including that of the hinder surface of the axis, are separate from the bodies, as well as those of both ends of the humerus, radius, and ulna. The vertebral formula is C. 7, D. 13 or 14, L. 16 or 15, C. 19=55; but the last caudal is elongated, and really consists of two bodies ankylosed, with even a minute rudimentary third. The cervical vertebræ exhibit all the characters peculiar to the genus; but their lateral processes are, as the surface of the bone shows, incomplete at the ends. The atlas has a deep, compressed-from-before-backwards, short transverse process, and a backward-directed, median triangular projection on the under surface of its body for articulation with the axis. The five following vertebræ have each an upper and lower transverse process, but not united together at their ends in any of them—not quite, even in the second. The processes are of tolerably equal length throughout, except the lower one of the sixth vertebra, which is shorter and broad, and twisted on itself so that its flat surface is horizontal at the end. The upper processes are slenderer than the lower, and become more so posteriorly. The spaces between the upper and lower processes, in vertical height, are in the second 2''·2, in the third 4''·2, in the fourth 4''·2, in the fifth 4''·1, in the sixth 4''·7. The spines are comparatively well developed, especially that of the axis.

There are thirteen pairs of ribs present; but it is probable that the posterior pair are wanting. The first has a bifid articular head, the cleft extending to the depth of 5 inches. It articulates by this with the transverse processes of the seventh cervical and first dorsal. Its extreme length in a straight line is 21''; its breadth at the middle

$2\frac{3}{4}$ " at the lower end  $4\frac{1}{4}$ ". The second, third, and fourth have short capitular processes, not reaching halfway to the bodies of the vertebræ. These processes are absent in all the others. The longest rib (the fifth) is 41" in a straight line, the twelfth is 31", and the thirteenth 30". There are ten chevron bones present. The sternum is remarkably small for the size of the animal, a transversely elongated lozenge in shape, 4" in antero-posterior and 8" in transverse diameter.

The scapula is, as usual in the family, much elongated transversely, and has a long acromion process. Its length is 14", its breadth 25". The humerus is 10" long; the radius  $18\frac{1}{2}$ ", and proportionately slender. The hand, artificially articulated, is 18" long; the second digit has, besides the metacarpal, three bones, the third three bones, the fourth six bones, the fifth three bones. These numbers are probably not correct, as they do not correspond with a natural skeleton of the hand of the same species at Brussels.

The upper surface of the orbital plate of the frontal is almost of a rhomboid form. The malars are very thin; the outer end of the lachrymals forms a thick, projecting, rounded knob. The nasal bones are almost straight across their anterior ends, slightly longer at the middle, and sloping away at the sides; their upper surface tolerably flat, but raised to a low ridge in the middle towards the anterior end, and slightly hollowed on each side of this. The dimensions of the cranium are given in the table at p. 402, compared with those of other specimens of the genus. The inferior maxillaries have low, obtusely triangular coronoid processes. They are articulated too close to the head, and their upper edge rotated too much inwards. This position greatly diminishes their curve as seen from above, and causes their extremity to bend downwards. I was much interested in observing this, as it explains away a great peculiarity in the figure of the Whale in the Berlin Museum by Rudolphi (*Abhandlungen Acad. Berlin*, 1822), in which the same mode of articulating has caused some misconception as to the character and relation of these bones, the more important to be rectified, as this is the only figure extant of the skull of any member of this genus.

The question now naturally arises, to what species is this skeleton to be referred, and what should it be named? There can be little doubt that it is identical with the above-mentioned specimen described by Rudolphi; at least a careful perusal of his description and figure (for I have not seen the skeleton) leaves this impression on my mind. In habitat, age, size, number of vertebræ and ribs, and all other important osteological characters they agree. There are certainly slight differences in the proportions of the parts of the cranium, but not greater than are found among different individuals of undoubtedly the same species; and it is possible that even these may arise from inaccuracies on the part of the artist. Some of the evidence also is wanting to make the comparison complete; for instance, the sternum from the Berlin specimen, and the hyoids from the one at Leyden. In assigning only five vertebræ to the cervical region, Rudolphi is obviously in error, being probably misled by the mode in which the skeleton was articulated. He states that the transverse

processes of the cervical vertebræ have all (that is, the first five) very large holes. If this is strictly correct (that is, if the holes are completely surrounded by bone), it indicates a more advanced state of ossification than in the Leyden specimen—a circumstance, of which the peculiarity is somewhat diminished by the fact that the skeleton of a Whale of the same species, and of almost exactly the same size, in the Brussels Museum is in a condition intermediate between the two, the processes of the second and third vertebræ being completely united, but not those of the fourth and fifth. In calling his specimen *Balæna rostrata*, Rudolphi was acting upon the idea, then prevalent, of the specific unity of many of the northern Fin-Whales now known to be distinct. Dr. Gray seems to have been the first to point out that it differed from all Whales which had been previously described with anything like definite accuracy, and gave it the name of “Rudolphi’s Finner Whale,” *Balænoptera laticeps* (Zoology of the Erebus and Terror, 1846); this name therefore has the right of priority for the species. Unfortunately it is anything but expressive of the character of the species, the head not being broader than in other Fin-Whales, as the following table, compiled chiefly from my own measurements, will show.

In the first three columns are given the actual length of the cranium, greatest breadth (at the squamosals behind the orbit), and breadth across the middle of the beak, in inches; and in the last two, the proportionate breadth of the skull and beak to the total length, the latter being reckoned at 100.

	Length of cranium.	Breadth of cranium.	Breadth of beak.	Proportion to length.	
				Breadth of skull.	Breadth of beak.
<i>Physalus antiquorum.</i>					
Adult. Antwerp.....	184	96	33	52	18
Adult. Louvain.....	179	78	32	41	18
Adult. Alexandra Park.....	186	86	36	46	19
Adult. Rosherville Gardens.....	168	75	34½	45	20
Young. Leyden.....	126	60	26	48	21
Young. Mus. R. Coll. Surg. ....	111	56	22½	50	20
<i>P. —?</i>					
Utrecht. (Mus. Lidth. de Jeude) ..	118	60	32	51	27
<i>Sibbaldius.</i>					
Adult. Ostend. (Approximation } from Dubar’s measurements).. }	256	118	..	46	..
Adolescent. From Java, in Ley- } den Mus. .... }	116	57	22	49	19
Young. Leyden.....	79	40	16	51	20
Young. Brussels.....	80	38	15	48	19
Young. Berlin. (Approximation } from Rudolphi’s figure)..... }	78	36	18	46	22
<i>Balænoptera rostrata.</i>					
Adolescent. Brussels.....	63	34	13	54	21
Adolescent. Mus. R. Coll. Surg. ..	65	35	15	54	23
Young. Mus. R. Coll. Surg. ....	48	24	9½	50	20

It is seen by this that the individual differences among specimens of *Physalus* and *Sibbaldius* are considerable, the proportionate breadth of skull ranging in the first case between 44 and 52, and of the beak between 18 and 21, and in the second genus between 46 and 51, and 19 and 22; and these differences do not seem at all to be regulated by age. A slight allowance must certainly be made for errors arising from the difficulty of measuring straight lines with exactness, especially single handed, upon these large irregular objects. On the whole, however, the specimens of *Sibbaldius* have no advantage on the score of breadth. The examples of *Balenoptera rostrata* are slightly broader than the others in proportion to their length.

Van Beneden is of opinion that this specimen, as well as that at Berlin, is referable to the same species as the very large female Whale taken near Ostend in 1827, the skeleton of which was exhibited some years ago at Charing Cross; and as this animal was 87 feet in length (larger than the ordinary size attained by the Common Fin-Whale), he has given it the specific name of *gigas*. Unfortunately this skeleton is no longer available for examination\*; and the only descriptions and drawings we have of it are not made with the scientific accuracy necessary to settle the question. It certainly agrees in many important points—the number of vertebræ (54, a few wanting from the end of the tail) and of ribs (14), the double head of the first rib, and the small broad sternum. Its generic identity is therefore undoubted.

One difficulty which arises in my mind is about the size. The 32'-long examples of *Sibbaldius* at Leyden and Brussels are, as I have said, in the *young* stage; but still the general condition of the bones shows them to be by no means in the earliest period of youth. A Common Fin-Whale (*Physalus antiquorum*) that I examined at the Hague, 40' long, had the bones much softer, more spongy, and incomplete at the ends of the processes than in either of these; whereupon I should *à priori* have said that the latter belonged to a species which, when adult, was smaller than the common one. As far as we know at present, the young of Fin-Whales are from one-fourth to one-third of the length of the mother at the time of birth, which would give a very early age to our specimens if derived from such a parent as the Ostend Whale. As these speculations upon the size and growth of Whales are, however, based upon very slight foundation, I must still admit the possibility of the specific relationship of the Ostend Whale with the representatives of *Sibbaldius laticeps* in the Museum of Berlin, Leyden, and Brussels.

During the present year the Leyden Museum has received the skeleton of a Fin-Whale taken on the north-west coast of the island of Java, and of which I am, with Professor Schlegel's permission, enabled to give the following description. According to the statement received with the specimen, Whales are of rare occurrence upon that coast, the present one having been an object of great curiosity to the natives.

\* It was shipped for the United States; perhaps some naturalist in that country may be able to discover whether it is still in existence.

The hands, from the carpus downwards, the pelvic bones, and some of the terminal caudal vertebræ are wanting, also the lachrymals and malars from the skull; in other respects the skeleton is complete. Not being yet articulated, the separate bones could be examined with great facility. Both epiphyses are ankylosed to the bodies of the three first cervical vertebræ; the anterior epiphyses only are united on the fourth and fifth. From this as far as the ninth caudal, inclusive, they are detached; on the tenth caudal the hinder, and on the succeeding ones both epiphyses are firmly united. On the humerus the upper epiphysis is partly, and the lower one completely united to the shaft, all traces of the original separation of the latter having disappeared. The upper epiphyses of the radius and ulna are in the same condition; but those at the lower end are separate. The transverse processes of the cervical vertebræ show, from the condition of their terminal surfaces, that they are not quite complete. The upper edge of the scapula appears completely ossified in the middle, but must have been cartilaginous towards the two extremities. These conditions taken together show that the animal was in the adolescent stage, and had probably attained very nearly its full size.

The skull is 9' 8" long in a straight line; the vertebræ, placed close together and without their epiphyses, measured 30'; so that, allowing for the epiphyses, intervertebral spaces, and the end of the tail, the animal could not have been less than 45 feet long.

The number of vertebræ present is 54; and 3, or probably 4 of the caudal are wanting, raising the total number to 57 or 58. Of these, 7 are cervical, 14 dorsal, and about 13 or 14 lumbar; but, the articular surfaces for the anterior chevron bones not being well marked, I could not be certain where the tail should be considered to begin. There are 14 pairs of ribs.

The skull presents the general characters of the genus *Sibbaldius*. The only important difference that I could find between it and the specimen last described is in the form of the orbital process of the frontal bone, which is narrower at its outer end, approaching more to the form characteristic of *Physalus*, although by no means so narrow as in this. The nasals (fig. 5) are long and narrow, nearly flat on their upper surface, and slightly shelving downwards from the middle line. Their anterior border is rather less produced near the middle line than at the sides—the reverse in this respect to the Zuyder Zee specimen. The tympanic bones are 4''·6 long, 3''·5 in greatest breadth, and 2''·5 thick: their form is seen in the annexed woodcut (fig. 16). The lower jaw has a very slight curve and a low coronoid process, the highest part of which is 20'' from the hinder end of the bone. It is triangular in form, rounded at the apex, with a base about 4'' in breadth, and rising about 2½'' in height. The principal dimensions of the skull, in inches, are given in the following table, compared with those of the skulls of the two other specimens of the genus mentioned in this notice.

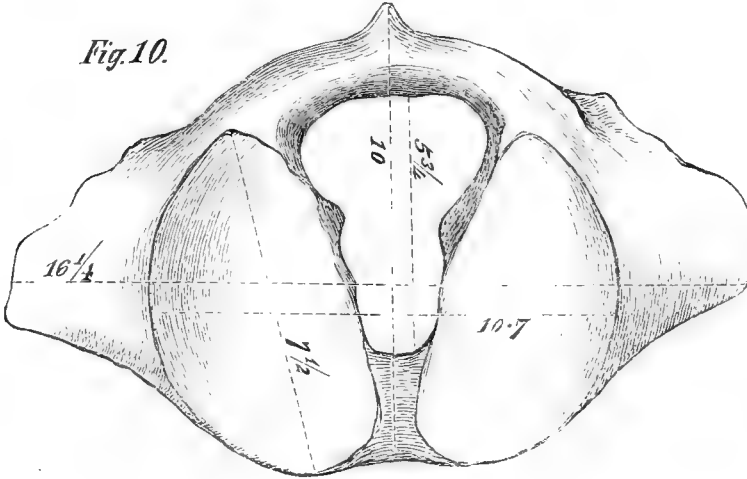
	Java : Leyden Museum.	Zuyder Zee : Leyden Museum.	North Cape : Brussels Museum.
Length of skull in straight line.....	116	79	80
Breadth of condyles .....	10 $\frac{1}{2}$	10	9
Breadth of exoccipitals .....	41	26	27
Breadth of squamosals (greatest breadth of skull) .....	57	40	38
Length of supraoccipital .....	29 $\frac{1}{2}$	21 $\frac{1}{2}$	21
Length of articular process of squamosal .....	22	15	16
Orbital process of frontal, length .....	22	13	13
Orbital process of frontal, breadth at base .....	24 $\frac{1}{2}$	16	15
Orbital process of frontal, breadth at outer end.....	15	12	11
Nasals, length .....	10 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{4}$
Nasals, breadth of the two, at posterior end .....	2	2 $\frac{1}{2}$	3
Nasals, breadth of the two, at anterior end .....	6	4	4
Length of beak, from middle of curved border of maxillary to the tip of premaxillary .....	82	53	50
Length of maxillary .....	90	57	55
Projection of premaxillary beyond maxillary .....	6	5	3
Greatest width of nasal aperture .....	10	6 $\frac{1}{2}$	
Breadth of maxillaries at posterior end .....	11	9	8
Breadth of maxillaries across orbital processes (following the curve) .....	63	43	43
Breadth of beak at base (following the curve) .....	42	30	30
Breadth of beak at middle (following the curve) .....	22 $\frac{1}{4}$	16	15
Breadth of maxillary at same point .....	6	4	4
Breadth of premaxillary at same point .....	4	3	2 $\frac{1}{2}$
Length of lower jaw in a straight line .....	117	78 $\frac{1}{2}$	76
Height at coronoid process .....	14	9	9
Height at middle .....	9 $\frac{1}{2}$	7 $\frac{1}{4}$	
Amount of curve* .....	8 $\frac{1}{2}$	6	6

The atlas presents the characteristic features of this bone in other members of the genus in a very marked degree. The transverse process is particularly deep from above downwards, and much twisted. The spinal canal is contracted in the middle; the articular surfaces for the axis are not confluent at their lower margins, but between them is a distinct, oval, transversely elongated facet, and another smaller round one is situated on the upper surface of a pointed triangular projection from the hinder border of the inferior surface of the bone, which runs under the body of the axis. There are thus four distinct articular surfaces in connexion with the second vertebra. The extreme width of the bone is 16 $\frac{1}{4}$ " ; the length of the inferior surface of the body 4"·4 including the triangular process, which is 1"·5. The other dimensions are shown in the sketches (figs. 10 and 11).

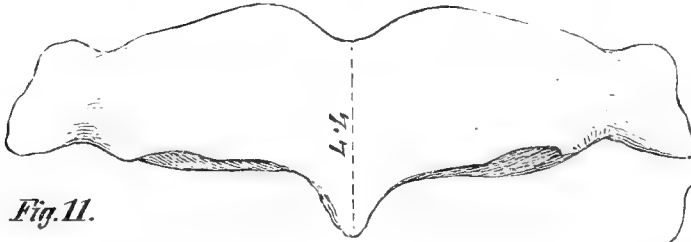
The axis (fig. 12) has the usual form of this bone in the Fin-Whales. The odontoid process is represented by a slight rounded elevation, with a depression in the centre; and besides the two large lateral articular surfaces for the atlas, there are two small median facets, one on the lower part of the anterior and one on the inferior

\* Greatest distance of the inner surface of the jaw from a straight line drawn between the extremities.

*Fig. 10.*



*Fig. 11.*



*Fig. 12.*

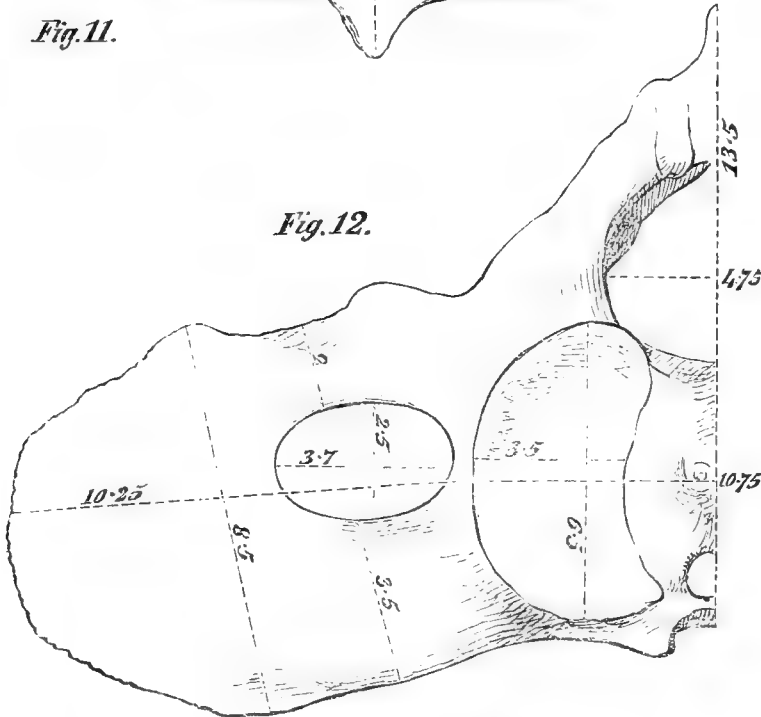


Fig. 10. Atlas; anterior surface.  
 11. Atlas; under surface.  
 12. Axis; anterior surface.

surface, corresponding to those above described in the first vertebra. The neural arch is high and massive, and the spine well developed. The lateral processes are large wing-like plates, directed somewhat backwards, with a regularly oval perforation rather above the middle of their base. The dimensions are given in the figure, which is drawn to scale, regardless of perspective.

The third, fourth, and fifth vertebræ much resemble each other; they have rounded oblong bodies, high triangular neural canals, spines gradually increasing in length, and well-developed upper and lower transverse processes completely united together at the ends, leaving large oval spaces between them. In the sixth the transverse processes do not meet by the space of 3 inches; and I doubt if they ever would meet in the process of growth, on account of the different planes of their ends. The upper one is long, with its flat surface almost vertical; the lower one, short and broad, with a stout conical tuberosity projecting forwards and downwards from its base, turns so completely on itself that its broad terminal end is directed horizontally; it is, moreover, very nearly complete. The peculiar form of this process is highly characteristic of all the specimens I have examined of the genus *Sibbaldius*, though it is best marked in the one under consideration, being the most mature. It should be mentioned that, when the series is placed together, a gradual approach to its form is seen in the lower processes of the antecedent vertebræ. The seventh cervical vertebra has no trace of an inferior transverse process. The thicknesses of the under surface of the bodies of the five last cervical vertebræ, and of the two first dorsal (without the epiphyses), are respectively 1.5, 1.3, 1.4, 1.5, 2, 2.25, and 2.5 inches. The width of the first dorsal vertebra across the transverse processes is exactly the same as that of the last cervical, 23"; the second is 3" less. The transverse processes of the posterior dorsal and of the lumbar vertebræ are very broad in the antero-posterior direction, and the spines are high. In the second lumbar vertebra, which is the largest, the extreme width is 40", and the height 29".

The ribs generally are slender, the first much shorter, broader, and flatter than any of the others. The vertebral end of this is split to the depth of about 6" into two flat broad plates, of which the anterior is slightly the longest; this brings their articular surfaces, when the rib is placed in its natural position (*i. e.* somewhat sloping backwards), exactly on a level, and proves that they must have articulated with the equal transverse processes of the seventh cervical and first dorsal vertebræ, and not with those of the latter and the second dorsal vertebra, which is  $1\frac{1}{2}$  inch shorter. This rib is  $32\frac{1}{2}$ " in length in a straight line,  $4\frac{1}{2}$ " wide at the middle, and 8" at the lower end; in thickness at the middle it is  $1''\cdot 2$ . Its general form closely resembles the figure given by Dr. Gray (P. Z. S. 1864, p. 224) from a specimen in the Museum of the Royal College of Surgeons, but it is rather broader in proportion to the length. The second, third, and fourth ribs have large articular heads and only slightly produced capitular processes. The second rib is 45" in length, the third 60", the fourth 61", the fifth  $62\frac{1}{2}$ ", the sixth  $61\frac{1}{2}$ ", the seventh  $61\frac{1}{4}$ ", the ninth 57", the twelfth 51", the thirteenth



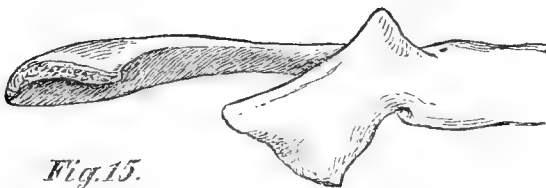
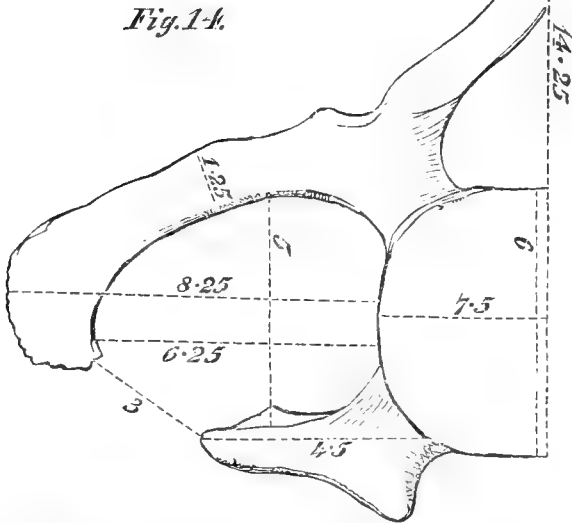
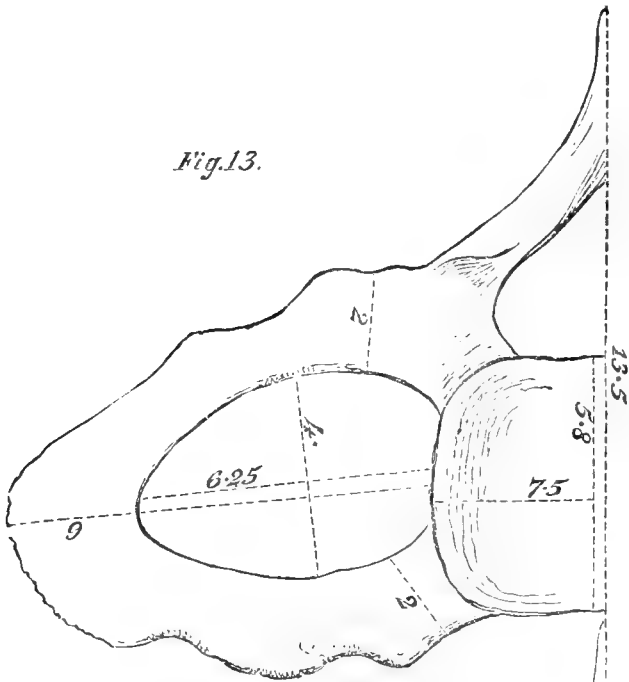


Fig. 13. Fifth cervical vertebra; anterior surface.  
14. Sixth cervical vertebra; anterior surface.  
15. The same; inferior surface.

49", and the fourteenth 48". They gradually decrease in breadth from the first. The last is considerably twisted on itself; it has a small, flat articular head, but there is no corresponding surface on the fourteenth dorsal vertebra, which is only slightly thicker at the extremity than the succeeding ones. On the thirteenth vertebra there is a distinct articular surface.

The sternum (fig. 8) is small, in the form of an irregular transversely elongated lozenge, the posterior angle being narrower and more produced, and the anterior more rounded, than in the Zuyder Zee specimen; so that it approaches more the form seen in the genus *Physalus*. Its length is  $8\frac{3}{4}$ ", and its breadth  $12\frac{3}{4}$ ".

The scapula is low and broad, with a long acromium and well-developed coracoid process. Its breadth is 40", its height  $22\frac{3}{4}$ "; the acromium 10" long, and 3" in depth; the coracoid 4"; the glenoid fossa  $8\frac{1}{2}$ " by  $5\frac{1}{2}$ ". The humerus is 15" long, by 6" in diameter in the middle of its shaft and  $7\frac{1}{2}$ " at the lower end. The radius is  $24\frac{1}{2}$ " long in a straight line, 4"·6 broad above, 3"·7 at the middle, and 5"·3 at the lower end. The ulna, which is 25" long, including the olecranon projection, is 7"·5 broad above, 2"·7 at the middle, and 4"·5 at the lower end. The thickness of the radius at the middle is 2"·2; that of the ulna 1"·8.

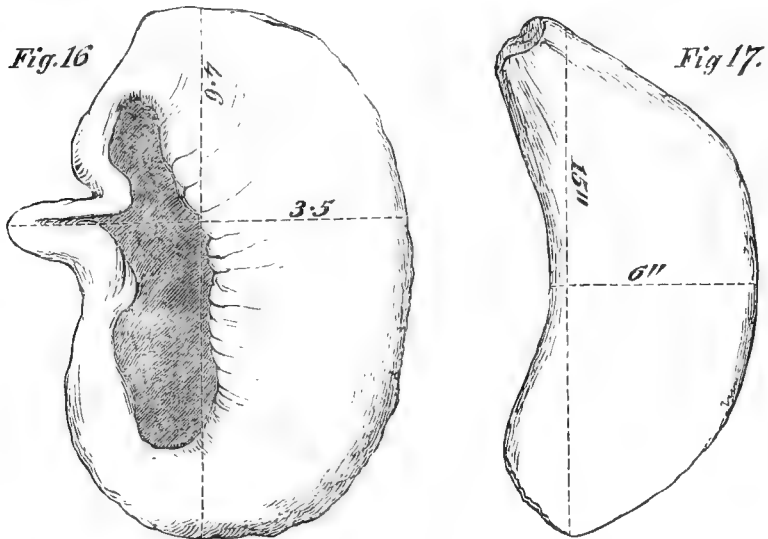


Fig. 16. Tympanic bone; half nat. size.  
17. One of the stylo-hyals.

The hyoid bone, formed of the completely united basi- and thyrohyals, is flatter and deeper from before backwards, and the lateral processes are smaller and more tapering, than in *Physalus*; but otherwise its general form is not dissimilar. Its extreme width in a straight line is 25"; its antero-posterior length  $10\frac{1}{2}$ ". The stylo-hyals (fig. 17) present a remarkable modification in form. Instead of the usual subcylindrical shape seen in *Physalus* and *Balaenoptera*, they are very broad and flat, and much curved, having a convex rounded

border and a concave thin edge, their flat surface having somewhat the form of a crescent with truncated ends, 15" long by 6" broad. Their greatest thickness at the convex border is about  $1\frac{1}{2}$ ". The ends are not alike, one being narrower and thicker, the other broader and flatter. The two bones are precisely similar.

Of the generic affinity of this Whale with the previously described specimen in the Leyden Museum from the Zuyder Zee, with Rudolphi's specimen at Berlin, and with the great Ostend Whale there can be no doubt. But is it specifically related to all or any of these? If this can be proved, the fact must have an important bearing on the distribution of the Fin-Whales, the coasts of European Holland and of its colony in the Indian Archipelago being as remote geographically and physically as almost any two spots upon the surface of the globe. Of course, to prove the absolute specific identity of two animals from the skeletons alone would be impossible. With only so much to found an opinion upon, all we can say, after having compared them bone by bone and found them agreeing in every particular, is that there is no proof of their being of different species, and that therefore, in the absence of other evidence, we are obliged to consider them as zoologically identical.

In the present case I have carefully compared the skeletons (that from Java and those from the European coast) together. I have even had the advantage of placing many of the bones of the two in the Leyden Museum side by side; and I confess that, allowing for difference of age, it is difficult to fix upon any characters in which they decidedly differ. The stylo-hyoids in the first, it may be said, are broader than in the Berlin or Brussels specimens, the sternum larger and of more definite cross-like form than in the Leyden skeleton, the transverse processes of the vertebræ are more developed and united at their ends than in either of these; but such characters are of no value for specific distinction. One, however, does appear to me of some importance; and that is the form of the orbital plate of the frontal, so decidedly narrower at the outer end in the Javan cranium than in the three specimens from Europe; but it is possible that even here age may cause the difference. Eschricht has laid great stress upon the little dependence that can be placed upon the proportions of the bones of the head in making out the specific characters of Whales. It is rather curious that the tympanic bones, though agreeing in general form, are actually smaller in the Java than in the Zuyder Zee skeleton, being less in length by  $0''\cdot3$ , and in breadth by nearly the same amount.

As I have said before, I cannot but regard this skeleton as having nearly attained its adult dimensions. Besides the special age-characteristics before pointed out, the general character of the vertebral column, especially the great development of the processes compared with the body of the bones, all indicate a condition approaching maturity. Whatever may be said, therefore, of the preceding specimen, I cannot identify the present one with the Ostend Whale: the difference of size alone appears to preclude it. Moreover, although a comparison of osteological details of the immature bones of the other specimens with those of the adult Ostend example was not

likely to throw much light upon the subject, here the case is different; and, as far as can be made out from the descriptions and drawings given by Dubar of that skeleton, there are notable differences, as in the form of the atlas, of the first rib, of the stylo-hyoid, in the statement that the second and three following ribs have heads reaching the bodies of the vertebræ, and in the statement that the transverse processes of the third, fourth, and fifth cervical vertebræ do not unite to form a complete hole as in the second, which last, however, would be of greater importance, if the figure did not throw some doubt upon its accuracy.

On the whole I have no hesitation in rejecting the name of *gigas* for this Java specimen, and, on account chiefly of its peculiar habitat, have some difficulty in placing it with *laticeps*. The question can only be definitely solved when far more is known of the habits and wanderings of the Cetacea than at present. The tendency of modern naturalists is decidedly to the idea that the geographical range of each species is much more strictly limited than was formerly supposed. Even Eschricht, who at one time strongly held the opposite opinion, and maintained that some species were cosmopolitan, was, as Prof. Van Beneden informs me, decidedly changing his views before his lamented death. We have, however, here an important alternative: either a species of Whale found in the North Sea, between the North Cape and the south coast of England, is found also on the coast of Java, without being known (at present at least) in any intermediate locality, or, on the other hand, in the specimen which I now bring before the notice of this Society we have a species new to science. As I know that the latter opinion will be adopted by many cetologists, I propose to call this specimen provisionally by the name of *schlegelii*, in honour of my distinguished friend, by whose influence the specimen has been made accessible to European naturalists, and who has himself made valuable contributions to this department of zoology\*.

The next specimen to be noted in the Leyden Museum is a skull of a very young Whale, of great interest as having also been brought from Java, by the late Dr. Reinwardt. It is labelled "*Balænoptera longimana*," and has in consequence been quoted in some of our most esteemed catalogues as evidence of the extensive geographical range of that species (Van Beneden, 'Faune Littorale de Belgique,' p. 38, and, after him, Gray, Proc. Zool. Soc. 1864, p. 208). The cranium is now in an extremely imperfect condition, the maxillaries, premaxillaries, and nasals being absent. There is, however, enough to show that it is not a *Megaptera*, but belongs to the subfamily *Balænopterinæ*, and probably, on account of the great width of the external part of the orbital process of the frontal bone, to the genus *Sibbaldius*. The lower jaw is 52" long, which would indicate an animal of about 18 feet, perhaps a young individual of the species last described.

\* Mr. Blyth (Journal of the Asiatic Society of Bengal, xxviii.) has noticed a Whale, said to have been 84 feet long, cast ashore on Juggu or Amherst Islet (lat. 19° N.) in 1851, and of which some bones are preserved in the museum at Calcutta, under the name of *Balænoptera indica*. The description of the coronoid process of the lower jaw indicates that it did not belong to the genus *Sibbaldius*, but was probably a *Physalus*.

Of *Balænoptera rostrata* there are two specimens, but neither of them yet articulated. The first is young and not very perfect; it formed part of the old anatomical collection of the University. The second and third cervical vertebræ are ankylosed by their arches; all the rest are free; the transverse processes are not fully developed.

The second is a fine perfect skeleton of an adolescent individual obtained more recently from the Norway coast. The cervical vertebræ are all free from each other; the upper and lower transverse processes fully developed; those of the axis and the sixth vertebra united together on both sides; the others all separate. A small tubercle represents the inferior transverse process on both sides of the body of the seventh vertebra.

The wealth of the collection of Cetacea in the Leyden Museum may be judged of when I mention that, in addition to the above, there are mounted skeletons of a very fine adult Hyperoodon, 23 feet long, a Grampus (*Orca gladiator*), two *Globiocephali*, a Beluga, two Narwhals, male and female, three examples of *Delphinus tursio*, eleven skeletons of smaller species of Dolphins, and a considerable series of skulls of members of this family.

In December 1841 a male Fin-Whale about 40 feet long was stranded at Katwijk-aan-Zee, six miles from Leyden. Dr. Schlegel gave a figure and description of its external characters, with some notes on its anatomy, in the second part of his 'Abhandlungen.' The skeleton passed into the hands of a person at Scheveningen, at which place it was for some time exhibited. As the rare opportunity here offered, of being able to connect a detailed and truthful account of the external appearance with the osteology of the same individual, I was highly desirous of making an examination of this specimen. It had been moved from Scheveningen; and it was not until after considerable trouble that I discovered the skeleton packed away in boxes in a store-room in the roof of a house at the Hague. I was enabled, however, to make some notes, though circumstances did not permit a very careful examination. This is less to be regretted, as I trust that by this time it has been transferred to a more appropriate resting-place in the Leyden Museum.

The skeleton was evidently that of a very young individual of the genus *Physalus*, agreeing in every particular, as far as I could ascertain, with *P. antiquorum*. The bones were spongy, and the epiphyses on the limb-bones and vertebræ all non-united, even that on the hinder surface of the axis. The skull was about 9 feet long; the nasals were deeply excavated; the orbital process of the frontals narrowed at the extremity. The lower jaw had a considerable curve, and a long coronoid process. As mentioned by Schlegel, the vertebral formula was C. 7, D. 15, L. 14, C. 24=60. The form of the atlas and of the bodies of the cervical vertebræ were as in *Physalus* generally; the transverse processes were not developed, being in fact mere stumps. The upper and lower processes were not united even in the axis. The lower process of the fifth very short. Ribs, 15 pairs; the first with a simple head. Sternum small, undeveloped, with two broad lateral lobes at the anterior part, and a deep notch between

them on the front border; prolonged posteriorly into a handle-like process; its entire length was 9", its breadth 10". Scapula 20" in height, and 32" in breadth. Humerus 14" long. Radius 22" long.

In the magnificent private collection at Utrecht, formed by the late Professor Lidth de Jeude, is a fine skeleton of a Fin-Whale, of which, through the kindness of the Professor's widow, I had an opportunity of making a detailed examination. I could not learn either the time or place of its capture, except that it was obtained on the coast of Holland. It was from a young animal. The epiphyses were detached from both ends of the bodies of all the vertebræ between the axis and the last two or three of the tail; also from both ends of the humerus and bones of the forearm. The exoccipital, parietal, and squamosal bones were non-united; and moreover the processes of the vertebræ were imperfectly ossified, as shown by the condition of their ends, and their shortness compared with the large size of the bodies of the bones. It was more advanced, however, than the specimen examined at the Hague.

The length of the cranium is 9' 10"; of the vertebral column, the bones being placed close together, without the epiphyses, 31' 2"; to this must be added at least 5 feet for the thickness of the epiphyses and the intervertebral spaces; so that the whole animal could not have been much short of 50 feet in length. The number of vertebræ is C. 7, D. 15, remainder (of which 15 or 16 are lumbar) 42=64. The column is quite complete, and ends, not in an elongated bone composed of two or three centrums ankylosed, but in a small flat circular disk-like bone half an inch in diameter. The penultimate vertebra is simple, short, rounded at the edges, and about an inch in diameter. The one before this is much larger in every direction, increasing rapidly at its anterior end.

The cranium presents many of the characters before attributed to the genus *Physalus*, but with some peculiarities that I have not met with in any other specimen. The most remarkable of these is the great width of the rostrum, which, instead of gradually and steadily contracting from the base to the apex, as in *P. antiquorum* and the members of the genera *Sibbaldius* and *Balænoptera*, continues as far as the middle with very little diminution of width, so that the outer border is much more strongly convex in the anterior half. This is occasioned by the width of the maxillary bone, which more resembles that of *Megaptera longimana*. The great difference of the proportional breadth of the beak to the length of the cranium in this specimen, as compared with other Fin-Whales, is seen in the table at p. 399, and in the table of dimensions below. I may mention also that the breadth of the palatine surface of the maxillary, measured in a straight line, at the middle of the beak, is 16", whereas in the cranium of a Common Fin-Whale (*P. antiquorum*) in the Museum of the Royal College of Surgeons, of almost the same length (viz. 9' 3"), it is but 11½". The nasal bones are very broad and short, raised to a ridge in the middle line, and hollowed on each side on the upper surface and anterior border, though to a less extent than in the common species. The orbital plate of the frontal resembles

in its general form that of *Physalus antiquorum*, but is rather less narrowed externally. The lower jaw is massive, has a high, pointed coronoid process, and a considerable but not excessive curve.

*Dimensions (in inches) of Skulls of different examples of Physalus antiquorum and of the specimen at Utrecht.*

	Utrecht.	Antwerp Zoological Gardens.	Alexandra Park.	Louvain.	Young: Leyden.	Young: R. Coll. Surgeons.
Length of skull in straight line . . . . .	118	184	186	179	126	111
Breadth of condyles . . . . .	15	12	14	12	14 $\frac{1}{4}$	11 $\frac{1}{2}$
Breadth of exoccipitals . . . . .	36	56	55	54	39	38
Breadth of squamosals (greatest breadth of skull) . . . . .	60	96	86	78	60	56
Length of supraoccipital . . . . .	27	41	37 $\frac{1}{2}$	38	26	26
Length of articular process of squamosal . . . . .	28	36	34	35	25	24
Orbital process of frontal, length . . . . .	19 $\frac{1}{2}$	32	30	29	..	19
Orbital process of frontal, breadth at base* . . . . .	22	34	32	35	25	21
Orbital process of frontal, breadth at upper surface of outer end . . . . .	13	18	17	18	12 $\frac{1}{2}$	12 $\frac{1}{2}$
Nasals, length . . . . .	6 $\frac{1}{2}$	8 $\frac{1}{2}$	7	8 $\frac{1}{2}$	8 $\frac{1}{2}$	7
Nasals, breadth of the two, at posterior end . . . . .	5 $\frac{1}{4}$	6	4 $\frac{1}{2}$	3	4	3
Nasals, breadth of the two, at anterior end . . . . .	6	9 $\frac{1}{4}$	7 $\frac{1}{2}$	9	6 $\frac{1}{2}$	6
Length of beak † . . . . .	73	133	132	119	79	75
Length of maxillary . . . . .	86	145	142 $\frac{1}{2}$	137	86	87
Projection of maxillary beyond premaxil- lary . . . . .	5	9	10 $\frac{1}{2}$	8	9	..
Breadth of maxillaries at hinder end . . . . .	15	17	17	15	14	13
Breadth of maxillaries across orbital pro- cesses (following curve) . . . . .	64	89	88	84	60	57
Breadth of beak at base ‡ . . . . .	..	56	54	55	38	39
Breadth of beak one-quarter of its length } from base . . . . .	..	45	45	42	..	30
Breadth of maxillary at the same point . . . . .	13 $\frac{1}{4}$	13 $\frac{1}{2}$	14 $\frac{1}{2}$	13 $\frac{1}{2}$	..	10
Breadth of premaxillary at the same point . . . . .	3	6	5	6	..	3 $\frac{1}{4}$
Breadth of beak at middle . . . . .	32	33	36	32	26	22 $\frac{1}{2}$
Breadth of maxillary at middle . . . . .	11	9 $\frac{1}{2}$	10	10	7 $\frac{1}{2}$	7 $\frac{1}{4}$
Breadth of premaxillary at middle . . . . .	4	5 $\frac{1}{2}$	6	5	4	3
Breadth of beak at three-quarters of its length from base . . . . .	22	18 $\frac{1}{2}$	23	21	..	13
Breadth of maxillary at same point . . . . .	5 $\frac{1}{2}$	5	5	4 $\frac{1}{2}$	..	3
Breadth of premaxillary at same point . . . . .	4 $\frac{1}{2}$	3 $\frac{1}{2}$	5	4 $\frac{1}{2}$	..	2 $\frac{1}{2}$
Length of lower jaw in a straight line . . . . .	112	180	177	..	..	11 $\frac{1}{2}$
Height at coronoid process . . . . .	18	21	23	..	..	15
Height at middle . . . . .	..	..	13	..	..	7 $\frac{3}{4}$
Amount of curve § . . . . .	11	..	24	..	..	15

In all the characters by which the atlas of *Physalus* differs from that of *Sibbaldius*, the present specimen agrees with the former.

\* From curved border of maxillary to hinder edge of orbital process of frontal.

† From curved border of maxillary to tip of beak.

‡ All the measurements across the beak include the curve of the upper surface.

§ Greatest distance of the inner surface of the jaw from a straight line drawn between the extremities.

The transverse processes are short, thick, and rounded, growing straight out of the upper half of the sides of the body of the bone, but, as said before, incomplete at their ends. It measures  $14\frac{1}{2}$ " in height, and 23" in extreme width; 16" across the articular surface for the skull, each facet being  $12\frac{1}{4}$ " in height and 6" in width; at their lower end these do not meet by a space of 2". The neural canal is 10" in height,  $5\frac{1}{4}$ " wide at the upper end, contracts rather above its middle to  $3\frac{1}{4}$ ", then expands somewhat again. The body of the axis measures 16" across and  $7\frac{1}{2}$ " in depth; with the processes, it is  $24\frac{1}{2}$ " wide and  $16\frac{1}{2}$ " high; the neural canal is  $6\frac{1}{4}$ " wide by  $5\frac{1}{2}$ " high. The upper and lower transverse processes do not completely unite, although they approach on one side within half an inch, on the other not quite so much; their extremities, however, are not ossified. The opening between them is regularly oval,  $4\frac{1}{4}$ " long and  $3\frac{1}{4}$ " wide.

The bodies of the remaining cervical vertebræ are rounded oblongs, their arches are low, and their spines little developed; the neural canals transversely elongated, and flattened above; from the third to the sixth, each has an upper and lower transverse process, the upper ones rising somewhat from the body of the vertebræ, before taking their outward and downward course, very thin, especially at their concave margin, gradually and very slightly decreasing in length. The lower processes somewhat shorter, and considerably broader, though thin; with a tuberosity on their under edge near the base; decreasing regularly in length, that of the sixth vertebra being notably shorter than the others. In the seventh vertebra the upper process is wider than in the others, and the lower one is reduced to a mere tubercle.

*Dimensions of the Cervical Vertebræ, in inches.*

	Extreme height.	Extreme width.	Height of body.	Width of body.	Height of neural canal.	Width of neural canal.
Third .....	14	23	8	13	$4\frac{3}{4}$	$6\frac{1}{2}$
Fourth .....	14	22	$8\frac{1}{2}$	$12\frac{1}{2}$	4	$6\frac{1}{2}$
Fifth .....	$14\frac{1}{4}$	22	$8\frac{1}{4}$	12	4	
Sixth .....	15	$21\frac{1}{2}$	$8\frac{1}{2}$	$11\frac{1}{2}$	$3\frac{1}{2}$	
Seventh .....	$15\frac{1}{2}$	22	$8\frac{1}{2}$	$11\frac{3}{4}$	$3\frac{1}{2}$	$7\frac{1}{4}$

There are 15 pairs of ribs. The first has an undivided head. The tuberosity is prominent but narrow, and a thin crest extends from it for some distance along the convex border of the rib. The greatest length in a straight line is 34"; the breadth at the middle 3", at the lower end 6". The second and third ribs have both well-developed capitular processes extending towards the bodies of the vertebræ, longer and more slender in the third. In the fourth this process is nearly obsolete, and absent in all the succeeding ones. There are rough surfaces on the infero-lateral portions of the hinder edges of the bodies of the first and second dorsal vertebræ, to which those processes of the ribs were connected, probably by the intervention of a strong ligament. The length of the second rib is 49"; of the third 59".



A bone which, from its general appearance, texture, and surface, I presume must be the sternum, especially as there was no other which could have represented this portion of the skeleton, presents most anomalous characters. It is very flat on both surfaces, a little more than 1" in thickness, of an irregularly oval form, being larger on one side than the other, and slightly produced at what I suppose would be the posterior border, and notched in the anterior. It is only  $5\frac{3}{4}$ " in its greatest diameter (transverse), and 4" in the other direction. Certainly the condition of the edges gave evidence of a bone incompletely ossified; but its very small size, especially in the antero-posterior direction, for a *Physalus* of the dimensions of the one under examination, is very remarkable.

The body of the hyoid I was unable to find; but the stylo-hyals are slightly curved, compressed, with a thick convex border, and a thinner concave border, rather larger at one end than the other; 14" in length,  $4\frac{1}{4}$ " in greatest width, and 2" in thickness—presenting, in fact, the usual form seen in the genus *Physalus*. The scapula and arm-bones had also the ordinary form: the former is 21" in height, and  $35\frac{1}{2}$ " in breadth; the acromium  $7\frac{1}{2}$ " long, and  $3\frac{1}{2}$ " in breadth; the coracoid  $2\frac{1}{2}$ " long; the glenoid fossa  $10\frac{1}{2}$ " by 7". The humerus is 17" long,  $7\frac{1}{2}$ " in longest diameter, and 20" in circumference at the middle. The radius is 27" long, 6" in breadth at the upper end,  $4\frac{3}{4}$ " at the middle and  $7\frac{1}{2}$ " below, and 3" thick at the middle. The ulna is 25" long, 7" across at the top,  $3\frac{1}{2}$ " at the middle (and 2" in thickness), and  $5\frac{1}{2}$ " at the lower end. The circumference of the two bones together at their middle is  $20\frac{3}{4}$ ". The metacarpal bones are long for the size of the animal, being respectively, beginning at the radial side, 6", 8",  $6\frac{1}{2}$ ", and  $4\frac{1}{4}$ "; whereas the same bones in the adult Common Fin-Whale in the Antwerp Zoological Gardens are  $4\frac{1}{2}$ ", 6", 6", and  $4\frac{1}{2}$ ", and in the specimen in the Alexandra Park  $4\frac{3}{4}$ ", 6", 5",  $3\frac{3}{4}$ ". The phalanges are long and rather different in number to those in the specimens of the Common Fin-Whale which I have examined, being 4, 5, 5, and 3 in the several digits, commencing on the radial side with No. II. In the Antwerp *Physalus* they are 2, 7, 6, and 3. But, as in both cases they have been artificially articulated, much importance cannot be attached to these numbers.

This skeleton differs in some respects from any other that I have seen, nor can I identify it with any published description sufficiently detailed for exact comparison. That it belongs to the genus *Physalus* as above defined there is little question. The only difficulty is in the form of the sternum. It must be remembered that the individual was young, and the bone, being slow of development, is subject to considerable variation in form during growth, and also, when fully grown, to great individual diversities of form. It scarcely seems advisable, therefore, on account of this one specimen to modify the generic diagnosis as regards this bone, though such a course might be necessary if a very small oval transversely elongated sternum were found characteristic of the adult animals belonging to the species. I think that there can be no question that this character, together

with the additional two caudal vertebræ, the wide maxillaries, the more elongated metacarpals, and the slight differences in the form of the cervical vertebræ and the ribs are sufficient to establish a well-marked species; and, unless it can be identified with any that has been previously described, I would suggest the name of *latirostris* as an appropriate designation.

In the Zoological Gardens at Antwerp is a very fine articulated skeleton of a male Common Fin-Whale (*Physeter antiquorum*, Gray), of which, with the courteous assistance of M. Vekemans, the Assistant Director of the establishment, I made a careful examination. The specimen has already been the subject of a paper by Professor Van Beneden, entitled "Sur une Baleine prise près de l'île Vlieland, et dont le squelette est monté au Jardin Royal de Zoologie d'Anvers" (Bull. Acad. Bruxelles, 2<sup>e</sup> sér. tome i. 1857, p. 390).

The skeleton is complete, with the exception of one of the pelvic bones, the tympanic bones, the last pair of ribs (probably), and one or two caudal vertebræ. As at present mounted, the intervertebral spaces appear to me too wide, especially in the cervical and caudal regions; and yet the skeleton measures in a straight line but 67' 6", viz. 15' 4" for the skull and 52' 2" for the vertebral column. The length of the animal is given by Van Beneden at 22 metres, or 72' 1". It exhibits all the signs of adult though not extreme age. All the epiphyses of the vertebræ are completely joined, as well as those of the humerus and the upper end of the radius and ulna. Those of the lower end of the last two bones are partially united. The upper border of the scapula is still incomplete towards the two extremities. The number of vertebræ is sixty-one, the last being modelled in wood; but from the character of the sixtieth I should say that there ought to be two behind it. Seven are cervical and fifteen dorsal, and, according to Van Beneden, fourteen or fifteen lumbar, though the place of attachment of the first chevron bone in the skeleton indicates but thirteen as belonging to this series. The characters of the atlas and the other cervical vertebræ are quite typical of the species; the upper and lower transverse processes, from the second to the sixth inclusive, are united to form complete rings. The breadth of the atlas is 25"; of the axis 44"; of the third 37". The aperture in the base of the great wing-like lateral process of the axis is  $6\frac{1}{2}$ " long and 3" deep. The inferior process of the seventh is represented by a tubercle.

The cranium and lower jaw present little worthy of special notice, except that the articular processes of the squamosals are unusually developed laterally, giving great breadth to the posterior part of the head. The dimensions are given at p. 411. A circumstance that I have not observed in any other Whalebone Whale is that a considerable mass of bone of irregular form projects forwards from below the nasal bones in the trough of the vomer, to the extent of about two feet, only attached posteriorly. This is evidently an ossification developed in the ethmoidal cartilage.

There are fourteen pairs of ribs present; but as the fourteenth has not the characters usually met with in the last rib, and as the fifteenth

vertebra has the end of the transverse process thickened and showing traces of an articular surface, it is most probable, as Van Beneden supposes, that the fifteenth pair has been lost, and therefore that the skeleton, if complete, would present no exception to the normal number. The first rib is simple, 51'' in extreme length, and 13 $\frac{3}{4}$ '' in breadth at its lower end. The second and third have capitular processes which reach nearly to the bodies of the vertebræ; that of the second is rather the longest. There are corresponding rough tuberosities on the sides of the bodies of the first and second dorsal vertebræ. The neck becomes rudimentary in the fourth, and obsolete in the fifth and all succeeding ribs.

The sternum is trifoliate, differing from the one figured at p. 393 chiefly in having the posterior process shorter, broader at the base, and more tapering to the point. Its extreme length is 19'', and breadth 24''. The hyoid has the usual shape; its extreme breadth is 38'', and length 14''. The stylo-hyals are 19'' in length, and 5 $\frac{1}{2}$ '' in greatest breadth.

One pelvic bone is present, suspended on the left side; the other is modelled in wood. It is 15'' long and 3'' in greatest breadth, simple, straight, much compressed, slightly twisted on itself, broader generally at one end than the other, but pointed at both extremities. One edge is smooth and rounded, but furrowed by a deep linear groove; the other is irregularly tuberculated and spiculated. This form is quite different from that of the pelvic bones of the specimen in the Alexandra Park, where they are each 18 $\frac{1}{2}$ '' long, gently curved, flattened, quite smooth along the edges, and with a prominent angular projection from near the middle of the convex border.

The scapula is 31'' in height and 51'' in breadth; the acromium is 12'' long; the coracoid 5 $\frac{1}{2}$ ''. The humerus 19'' long, 9'' in greatest diameter, and 26 $\frac{1}{2}$ '' in girth at the middle. The radius is 32'' long, 7 $\frac{1}{2}$ '' in breadth at the upper and 9'' at the lower end. The ulna 36'' in extreme length, from the end of the olecranon, 30'' from the middle of its surface for articulating with the humerus, 10'' in breadth above and 6 $\frac{1}{2}$ '' below. There are six ossifications in each carpus. The phalanges appear complete: their number and the lengths of the metacarpals are given at p. 413. It should be stated that the latter are not very exact, as the ends of the bones are more or less concealed by the composition which replaces the cartilage. The baleen is present in both sides. The largest plates measure about 28'' in length.

The recent discovery of a large number of fossil remains of Cetaceans in the excavations occasioned by the fortification of the city of Antwerp has given a great impulse to the study of the osteology of the existing members of the order in Belgium; and, chiefly by the exertions of Professor Van Beneden of Louvain, a very fine collection has been brought together, in great part obtained from the Northern seas, through the co-operation of the late Professor Eschricht of Copenhagen. Many of the specimens enrich the admirable anatomical collection of the University of Louvain; but most of the larger ones have passed from the hands of M. Van Beneden to the Royal

Museum of Natural History at Brussels, where they are arranged and displayed to great advantage, under the able direction of M. Du Bus. Of this collection I shall speak first.

The first object that meets the eye on entering the room is a magnificent skeleton of *Balæna mysticetus*, the only one to be seen at present in any museum in Europe, except at Copenhagen. The singular effect produced by the enormous size of the head, as compared with the remainder of the skeleton, must be seen to be fully realized.

The cranium is 18' 9" long in a straight line, the vertebral column 31' 6", making a total of 50' 3". The epiphyses of the arm-bones are united at both ends, as are those of all the caudal vertebræ, but not those of the lumbar and dorsal vertebræ; so that the animal was in a late period of the adolescent stage. The vertebral formula is C. 7, D. 14, L. 10, C. 23=54. The tail is quite complete. This is the normal *total* number, according to Eschricht and Reinhardt; but an individual peculiarity consists in the development of an additional rudimentary rib on the left side, about 18" long, and articulating with the transverse process of the fourteenth vertebra behind the neck. This vertebra is therefore reckoned among the dorsal instead of the lumbar series. The ordinary number of dorsal vertebræ and pairs of ribs is thirteen. The two last lumbar and three first caudal vertebræ are enveloped in an immense mass of exostosed bone. The skeleton appears quite perfect; even the pelvic bones are present, though not yet articulated. There are two bones on each side, differing considerably in the details of their conformation from the same bones in the skeleton which has been lately received, though not yet mounted, at the Museum of the Royal College of Surgeons.

The osteology of the Northern Right Whale has been so fully described by Eschricht and Reinhardt that no further remarks upon this skeleton (which furnished part of the material for their memoir) are necessary.

*Megaptera longimana*.—A very fine and complete skeleton, 46' long, of a nearly adult individual. The vertebral formula is C. 7, D. 14, L. 11, C. 21=53. Ribs 14 pairs. The enormous size of the fins is grandly displayed in this specimen; they measure 12' from the head of the humerus to the tip of the phalanges. The cervical vertebræ are all free; the second to the fifth have the upper and lower transverse processes separate in all, but they are not complete at the ends. Those of the second are short, thick, and convergent, but still with a wide interval between their ends; this, according to Eschricht, is completed in the living animal by cartilage, which may in old age become ossified; but this process must take place at a relatively later period of life than in the *Balænopteridæ*. According to the same excellent authority, the processes of the succeeding vertebræ are not continued in cartilage so far as to meet; so that we could never expect to find osseous rings on them. In the Brussels specimen the upper processes increase and the lower ones decrease in length, from the third to the fifth. There is no inferior process on the sixth or seventh.

*Sibbaldius*.—Of this genus there is a very interesting skeleton, almost the exact counterpart in size to that in the Leyden Museum. It was obtained by Eschricht from the North Cape. The condition of the epiphyses shows that it is young, they being all non-united both in the vertebral column and long bones; but the ossification of the transverse processes of the cervical vertebræ has proceeded further than in that at Leyden. The skeleton is well articulated, and gives now a total length of 31' 8"; but about 6" must be added for the end of the tail, which is wanting. The dimensions of the skull are given in the Table at p. 402. The nasals are narrow, cut off nearly straight at their anterior ends, slightly hollowed on each side above. The lachrymals are thickened at their outer edge. The orbital processes of the frontals broad externally. Lower jaw light, little curved, and with a short triangular coronoid process.

There are 7 cervical, 14 dorsal, and 32 lumbo-caudal vertebræ present; about 5 of the latter are absent, which would make a total of 58. The atlas has the usual characteristics of the genus. The transverse process of the axis forms a complete ring, the aperture of which has a length of  $2\frac{1}{2}$ " and height of 2". The whole process is  $5\frac{1}{2}$ " long, but is incomplete at the end; it is  $5\frac{1}{2}$ " in height at the middle, and the opening is situated much nearer the upper than the lower margin of the process. In the third vertebra also the upper and lower processes are united; in the fourth, fifth, and sixth they are separate. The lower one of the sixth is shortest, broad, and twisted on itself. In the seventh the inferior process is represented by a small tubercle.

There are 13 ribs present on the right side, and 14 on the left. The fourteenth is very much thinner than the others, twisted backwards at its lower end, with a very slender head, articulated to the transverse process of the vertebra. The first pair of ribs have double heads; but the anterior head on both sides is very incompletely developed, and on the right side completely detached from the remainder of the bone; it has a pointed end below, merely applied to the main part of the rib; so that if it had been lost in maceration, this rib might have been supposed to be simple. On the left side it is ankylosed, but very slender. It would be interesting to ascertain, by the examination of younger specimens, whether this anterior head has always a separate centre of ossification, as it is not improbable that this singular double-headed bone is in reality formed by the coalescence of two originally distinct ribs. The second, third, and fourth ribs have small capitular processes. The stylo-hyals are very flat, but not so broad proportionately as in the Java Whale, being 11" long and  $3\frac{1}{2}$ " in greatest width. The bones of the fore limbs present the same general characters and proportions as in the Leyden specimen from the Zuyder Zee. The sternum is absent.

This specimen has been previously mentioned in this paper as an example of *Sibbaldius laticeps*, Gray, presenting some interesting individual deviations from that at Leyden, referable to the development of the two skeletons not having proceeded *pari passu* in all parts of the system.

Of the Lesser Fin-Whale (*Balænoptera rostrata*) there are two skeletons—the first a very beautiful and perfect specimen, from the same locality as the last-mentioned skeleton. The baleen is *in situ* on both sides of the mouth, never having been removed. The animal was in the adolescent stage. The epiphyses of the upper end of the radius and ulna are united, but that of the head of the humerus is still separable. The entire length is 23' 2", of which the head occupies 5' 2". The vertebral formula is C. 7, D. 11, L. 12, C. 17=47; but one or more bones are wanting from the end of the tail. The cervical vertebræ are all free. The upper and lower transverse processes of the sixth are united on the right side, but separate on the left.

The other skeleton of the same species is rather larger, but not so complete. The cervical vertebræ are all free, and none of the transverse processes (excepting those of the second) are united at their ends.

The second division of the Cetacea (the *Delphinoidea*) is represented in the Brussels Museum by two skeletons of *Hyperoodon* (one nearly adult, 23' long, with two small sharp teeth at the extremity of the lower jaw, and the other young), the unique skeleton of *Mesoplodon sowerbiensis* (described by Du Mortier and afterwards by Van Beneden), *Orca gladiator* (an adult and young), *Globiocephalus svineval* (adult), *Beluga leucas*, *Monodon monoceros*, and five examples of the genus *Delphinus*.

The resources of the museum of the University of Louvain being, of course, not equal to those of a national establishment, its collection of Cetacean skeletons, though illustrative of most of the principal types, and all in excellent condition, is necessarily limited to individuals of moderate dimensions. Hence the *Balænoidea* are not so well represented as the *Delphinoidea*; and, as they all belong to well-known species, few notes will be sufficient.

*Eubalæna australis*? (Cape Whale).—Imperfect skull, 8' 4" long, of a young individual.

*Megaptera longimana*.—Complete skeleton of young, 32' 2" long, of which the head is 8' 6". Vertebræ, C. 7, D. 14, L. and C. 31=52. Ribs 14 pairs. Sternum with a very deep notch in the middle of the upper border. Upper and lower transverse processes of the axis further apart at the ends than in the Brussels specimen. Upper processes of the third, fourth, fifth, and sixth slender, almost straight, and of nearly equal length. Lower processes much shorter, and gradually diminishing from the third to the sixth; absent in the seventh.

*Physalus antiquorum*.—A fine cranium from the Jutland coast, about 15' in length. It is rather narrow posteriorly in proportion to its length; and the nasal bones, though of the general form characteristic of the genus, are very narrow, and pointed at their hinder ends.

*Balænoptera rostrata*.—Skeleton of a young individual, marked *B. minima*, and said to belong to a small variety only found among the Right Whales of Greenland. The total length is 17' 3"; but several vertebræ are wanting from the end of the tail. The skull is 4' long. There are 7 cervical, 11 dorsal, and 12 lumbar vertebræ, and 11 pairs of ribs. The cervical vertebræ are all free, and the

upper and lower transverse processes are not united at their ends in any of them; but in the axis the union is almost complete.

There is also a skull, 3' 8" long, of a younger specimen of this species.

The skeletons of the *Delphinoidea* include a very fine perfect adult *Hyperoodon rostratum*, 24' 4" long, of which the cranium is 5' 4". The vertebral formula is C. 7, D. 9, L. 8, C. 20=44. Ribs 9 pairs. One of the sharp-pointed teeth is left *in situ* at the end of the lower jaw, nearly covered by the dried gum. Also *Orca gladiator* (adult), *Globocephalus svineval* (two adult and one foetal), *Lagenorhynchus albirostris*, *Delphinus eschrichtii* and *D. guianensis* (Van Beneden, Mém. de l'Acad. Roy., coll. in-8vo., tome xvi., figure), *Beluga leucas*, *Monodon monoceros*, and *Phocæna communis*. Of the last-named there are several specimens, including two beautifully prepared foetal skeletons. Among the collection of crania is the unique *Ziphius indicus*, Van Beneden (Mém. de l'Acad. Roy., coll. in-8vo., tome xvi., figure).

In conclusion, it may be useful to put down a list of the different species above noted, arranged systematically, with an indication of the collections in which they are contained.

#### Suborder BALENOIDEA.

*Balæna mysticetus*.—Skeleton, Brussels. Skull, Leyden.

*Eubalæna australis*?—Skeleton, Leyden. Skull, Leyden. Skull, Louvain.

*Megaptera longimana*.—Skeleton, Leyden. Skeleton, Brussels. Skeleton, Louvain.

*Physalus antiquorum*.—Skeleton, Antwerp. Skeleton, The Hague. Skull, Leyden. Skull, Louvain.

*Physalus latirostris*.—Skeleton, Utrecht.

*Sibbaldius laticeps*.—Skeleton, Leyden. Skeleton, Brussels.

*Sibbaldius schlegelii*.—Skeleton, Leyden.

*Balænoptera rostrata*.—Skeletons (two), Leyden. Skeletons (two), Brussels. Skeleton and skull, Louvain.

#### DELPHINOIDEA.

*Hyperoodon rostratum*.—Skeleton, Leyden. Skeletons (two), Brussels. Skeleton, Louvain.

*Mesoplodon sowerbiensis*.—Skeleton, Brussels.

*Ziphius indicus*.—Skull, Louvain.

*Globocephalus svineval*.—Skeletons (two), Leyden. Skeleton, Brussels. Skeletons (two adult and one young), Louvain.

*Orca gladiator*.—Skeletons, Leyden, Brussels (two adult and young), Louvain.

(Specimens of the genera *Delphinus*, *Lagenorhynchus* and *Phocæna* not always noted.)

*Beluga leucas*.—Skeletons, Leyden, Brussels, Louvain.

*Monodon monoceros*.—Skeletons, Leyden (male and female), Brussels, Louvain.

It is remarkable that, in all these fine collections, that genus of

gigantic Delphinoids, *Catodon* or Sperm-Whale, is represented only by an atlas, and the lower jaw of a very young individual, at Leyden, and, if I remember rightly, an atlas at Brussels. There is, however, in a church at Scheveningen, in Holland, a skull, in a very imperfect condition, of one of these animals, washed ashore near that place in the year 1617.

2. ON A NEW SPECIES OF GRAMPUS (*ORCA MERIDIONALIS*) FROM TASMANIA. BY WILLIAM HENRY FLOWER, F.R.S., F.R.C.S., ETC., CONSERVATOR OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

The Museum of the Royal College of Surgeons has lately received from Mr. W. L. Crowther, of Hobart Town, two skulls belonging to an animal there called "Blackfish," a term, it may be remarked, which has been applied by sailors to many different species of Cetaceans. On showing them to Dr. Gray, whose extensive experience in regard to this order is well known, he immediately pronounced them to belong to a species unknown to him. At the same time he pointed out their resemblance to the skull found in a semifossil state in Lincolnshire, described and figured by Professor Owen under the name of *Phocæna crassidens*\*, to which species Professor Reinhardt of Copenhagen has recently referred a Cetacean still existing in the North Sea†. I have since had an opportunity of examining the extensive collections of skeletons and crania of Cetacea in the Museums of Leyden, Louvain, and Brussels, and have not found in them any similar specimen.

In reply to some queries respecting the animal from which the skulls were obtained, which I addressed to my esteemed correspondent Mr. Crowther (who, besides being one of the leading medical practitioners in the colony, is also the owner of several whaling-vessels), that gentleman writes as follows:—

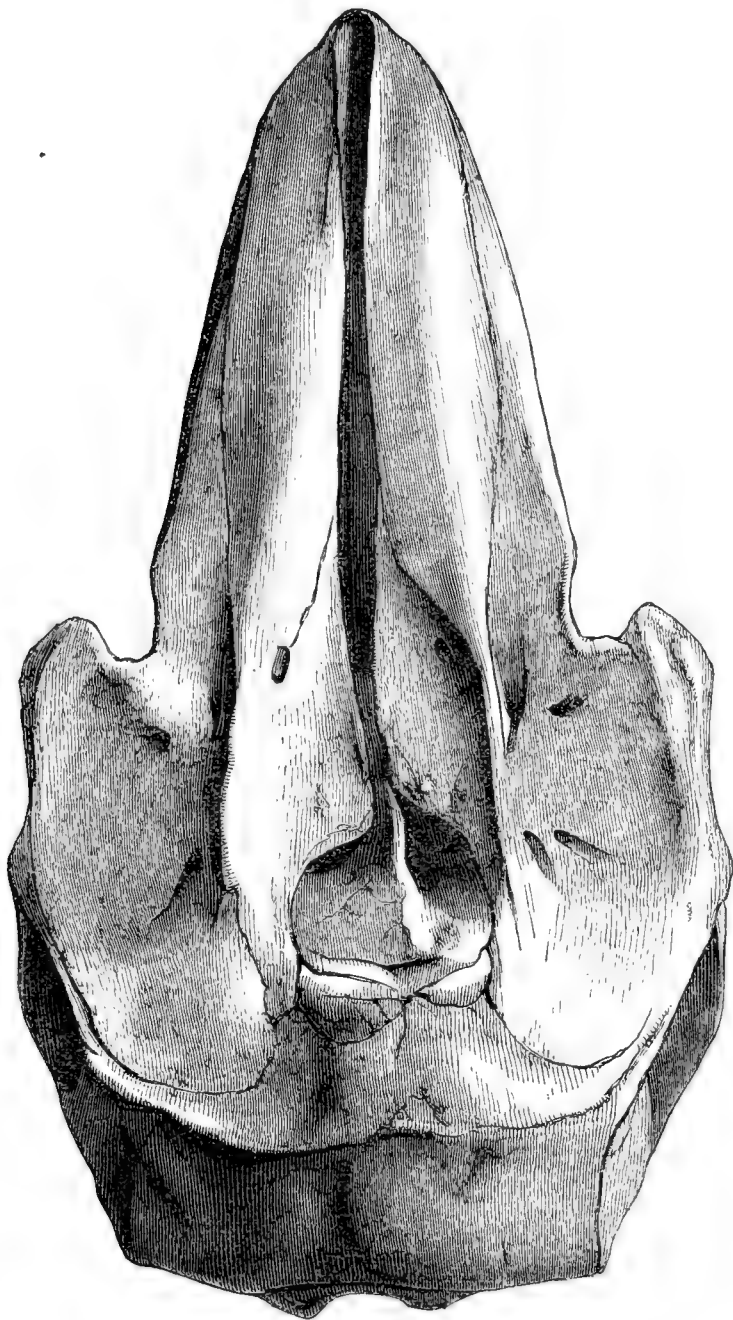
"'Blackfish.'—This fish is in reality a miniature Sperm-Whale in its habits, &c., feeding upon the same food ('squid'), geographically occupying the same localities as the Sperm-Whale, following the great equatorial currents so long as they retain their warmth, and met with in the greatest numbers in the southern hemisphere at those points where the equatorial meet the polar currents, eddies being formed in which no doubt the squid collects. I am not aware that the Blackfish preys upon anything but squid; it is essentially gregarious, countless hordes being met with where food is abundant. Length 12 to 15 feet; diameter 3 to 4 feet. Colour, black on the back and sides, lighter below. Males much larger than the females. Head obtuse, after the fashion of the Sperm-Whale. Pectoral fins small. Dorsal fin hook-shaped, and situated about two-thirds along the body towards the tail. Weight two to three tons, the former about the average. Oil, the only kind that will mix with sperm."

\* A History of British Fossil Mammals and Birds: 1846, p. 516.

† "Pseudorca crassidens, et for den Danske fauna nyt Hvaldyr" (*Særskilt Aftryk af Oversigten over d. K. D. Vid. Selsk. Forhandl. Nov. 1862*).



Fig. 1.



Upper surface of the adult skull; one-fourth natural size.

The two skulls present considerable individual peculiarities; but these all arise, I believe, from difference of age. One is perfectly adult; the suture between the frontal and occipital bones is entirely obliterated; the upper ends of the maxillaries are ankylosed to the

frontal; the teeth, though pointed at the tips, have a polished surface, and many of them are worn at the sides by the mutual action upon each other of the upper and lower series. In the other skull the ossification of the sutures is less advanced; the teeth show no signs of wear, and have a uniform slightly rugous or granulated surface. This skull differs from the other, as will be more particularly shown by the measurements, in having the facial portion and all the ridges and outgrowths of the cranium for the attachment of muscles much less developed in proportion to the size of the cerebral cavity. In all essential specific characters they agree. Unless otherwise expressed, the description and comparisons which follow refer to the adult skull.

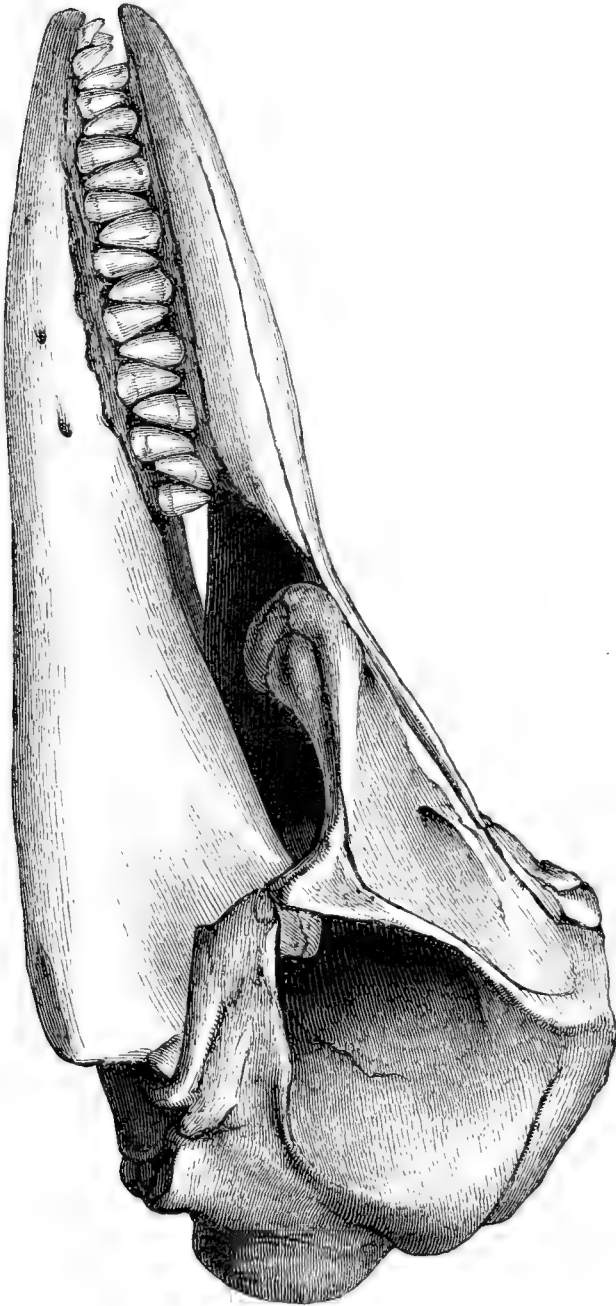
The skulls correspond in their general characters with those of the genus *Orca*, as established by Gray\*. The "teeth conical, acute, large, occupying the whole edge nearly to the notch, permanent," sharply differentiates them from all allied genera; but the definition of *Orca*, as far as it relates to the intermaxillaries "being one-half the width of the jaw-bones," would not include them. Reinhardt has raised *O. crassidens* to the rank of a genus, under the name of *Pseudorca*; and to this section our present skulls undoubtedly belong, though by a slight extension of the definition of the parent genus they might conveniently be included in it. The true affinities of the animal, however, cannot be satisfactorily decided without an examination of the characters of the remainder of the skeleton, which, with Mr. Crowther's assistance, I hope before long to be able to make.

The principal dimensions of the two skulls are as follows:—

	Adult.	Young.
	in.	in.
Length from tip of beak to condyles .....	23 $\frac{1}{4}$	20 $\frac{1}{4}$
Internal length of brain-cavity .....	7 $\frac{1}{2}$	7
Length of beak (from a line drawn between the maxillary notches, to the tip) .....	11 $\frac{1}{4}$	9 $\frac{1}{2}$
Length from tip of beak to anterior margin of superior nares ..	14 $\frac{1}{4}$	12
Length of palate (from tip of beak to posterior margin in middle line) .....	15	12 $\frac{3}{4}$
Length from tip of beak to hinder edge of posterior tooth ...	9 $\frac{1}{4}$	8 $\frac{1}{4}$
Height of skull at vertex .....	8 $\frac{3}{4}$	8 $\frac{1}{2}$
Greatest breadth (at zygomatic processes of squamosals) .....	13	11
Breadth of brain-case in parietal region .....	9 $\frac{1}{2}$	9 $\frac{3}{4}$
Breadth at supraorbital ridge .....	11 $\frac{3}{4}$	10
Breadth of the base of the beak, inside maxillary notch .....	7 $\frac{1}{4}$	6 $\frac{1}{4}$
Breadth of the middle of the beak .....	5 $\frac{3}{4}$	5 $\frac{1}{4}$
Breadth of the two premaxillaries, with their intervening space at the middle of the beak .....	4 $\frac{1}{2}$	3 $\frac{3}{4}$
Width of condyles .....	5 $\frac{3}{4}$	4 $\frac{3}{4}$
Foramen magnum, height .....	2 $\frac{1}{4}$	
Foramen magnum, width .....	2 $\frac{1}{2}$	2
Lower jaw, entire length of each ramus .....	19	16 $\frac{1}{4}$
Lower jaw, from tip to the posterior edge of last tooth .....	9 $\frac{3}{4}$	8 $\frac{1}{4}$
Length of symphysis .....	3 $\frac{1}{2}$	2 $\frac{1}{2}$
Height of ramus, at coronoid process .....	5	4
Width, posteriorly, between outside of articular surfaces .....	12 $\frac{1}{4}$	10 $\frac{1}{4}$

\* Zool. Erebus and Terror: 1846. Cat. Cetacea Brit. Mus.: 1850.

Fig. 2.



Side view of the adult skull; one-fourth natural size.

The teeth are nearly circular in section, stout, conical, pointed, incurved, and very slightly recurved. The crowns of the largest measure 1·2 inch in length, and 0·65 inch in diameter at the base.

With the exception of the two anterior and the posterior, they are of very nearly equal size throughout. Their number is the same in both skulls, viz. eight on each side above, and ten below; but though the whole number is the same, I suspect that it is not exactly the corresponding teeth which are in place in both specimens, at all events as far as the upper jaw is concerned. By comparing tooth with tooth, especially as regards their position in the alveolar margin, the older specimen would appear to have lost the small anterior pair present in the younger one; while in the latter the posterior pair appear not yet to have been developed. It must be confessed that our knowledge of the growth and succession of these organs in the Cetacea is at present so imperfect that we ought not to lay much stress upon any trifling variations in their number or character in discriminating species.

The only other species of *Orca* from the southern hemisphere hitherto known is *O. capensis*, Gray, an animal closely allied to, indeed by some naturalists thought to be identical with *O. gladiator*, the common Killer or Grampus of our seas. The principal differences between the Tasmanian skull and that of *O. capensis* are the following:—Its size is much smaller, measuring in entire length but 23 instead of 38 inches. The brain-cavity is relatively very much larger, and the outer surface of the cranium comparatively smooth. In *O. capensis* the ridges for the attachment of the muscles are enormously developed, and conceal the form of the brain-case. These differences, being those that are found between young and old individuals of the same species, might at first sight give rise to the idea that such a relationship existed between the two skulls under comparison, were it not for the signs of maturity possessed by the smaller skull, and did we not also know that a similar relation exists between the small and large species of all natural groups. But, in addition to these, in the Tasmanian skull the nasals are larger, and the prefrontal does not rise in front of them to the vertex of the head, as in *O. capensis*. A great difference is also seen in the form of the premaxillaries: in the new specimen these bones are widest at the middle of the beak, their outer border at this part being convex, approaching in the amount of their encroachment upon the maxillaries those of the genera *Grampus* and *Globiocephalus*; while in the large Cape species they are very narrow at the middle of the beak, and dilate towards their anterior termination, the outer border being concave. The form of the palate is generally the same; but it is rather more contracted behind the last tooth, and the tooth-line is rather less curved, than in *O. capensis*. The teeth are fewer in number, more regularly conical, less compressed in the antero-posterior direction. In the lower jaw the symphysis is proportionately longer, more shallow and sloping. As *O. gladiator* agrees with *O. capensis* in all the above-named points, the present species is distinctly differentiated by its cranial characteristics from the two large members of the genus.

In the 'Zoology of the Erebus and Terror,' Dr. Gray has figured and described a skull (in the British Museum, locality unknown)

under the name of *Orca intermedia*. This is evidently that of a very young individual, probably of one of the above-mentioned large species. At all events the number of the teeth ( $\frac{11}{11}$ ) and the form of the premaxillaries distinguish it from the Tasmanian skulls.

To find distinctive characters to separate the present species from *O. crassidens* is a matter of greater difficulty. I speak of the animal now existing in the northern seas, which Reinhardt has fully described in an illustrated memoir in the Danish language, and which he believes to be identical with the Lincolnshire specimen. Not having yet been able to get a translation of Professor Reinhardt's paper, I cannot make so good a comparison as is desirable, though the figures which he gives to a great extent supply the deficiency. In the first place I must remark that the *O. crassidens* is of very rare occurrence in the northern seas, having been only recently added to the Scandinavian fauna. Our "Blackfish," on the other hand, appears to be the most abundant of the Cetacea inhabiting the seas around Tasmania. It is possible that, being a warm-water animal, it may occasionally cross the line and stray into northern latitudes; but the belief is gaining ground among naturalists who have specially investigated the Cetacea, that the geographical range of the different species of the order is much more limited than at one time supposed.

Professor Reinhardt's figure of the external form of his specimen differs widely from Mr. Crowther's description, the dorsal fin being situated rather anterior to the middle of the back, and the head being small and flat, certainly offering no peculiarity which could cause it to be compared to the Sperm-Whale by men practically acquainted with the distinctive characters of these animals. In size the skulls nearly correspond, the two of which Reinhardt gives the dimensions being each 24·7 English inches long. In general characters also, in the proportions which the beak bears to the rest of the skull, and in the breadth of the intermaxillaries, they agree very closely. A minuter inspection, however, shows differences which, presuming Professor Reinhardt's figure to be correct, could scarcely be found among individuals of the same species. The Tasmanian skull is narrower in proportion to the length, the beak is much more pointed at the extremity, and the premaxillaries are of different form. In *Pseudorca crassidens* they are of nearly equal breadth from one end to the other, their outer margins being almost parallel; in the Tasmanian skulls they are contracted at the root of the beak, and then gradually expand to about the middle, beyond which they slowly diminish in breadth to the point. An examination of the skulls placed side by side might possibly reveal other differentiating characters; but I think that these are sufficient, together with the great improbability of the same species being found in such widely different regions, to justify my regarding the small Grampus from Tasmania, however familiar to the inhabitants of that country, as a species new to zoological literature, and imposing upon it the name of *Orca* (*Pseudorca*?) *meridionalis*. Probably, as in the case of some other

genera of Cetacea, we have here representative species, one in the northern and the other in the southern hemisphere; but if hereafter they should prove to be identical, the main habitat of the animal is undoubtedly in the temperate seas of the further side of the equator.

### 3. REPORT ON THE BIRDS OF PALESTINE. BY H. B. TRISTRAM, M.A., F.L.S.

#### 1. GYPAËTOS BARBATUS (L.).

A few pairs may be seen in almost every part of the country. The Lammergeyer is, however, nowhere common, though more plentiful on the eastern than on the western side of Jordan.

#### 2. VULTUR MONACHUS, L.

Rarely have I had an opportunity of identifying this magnificent Vulture, which occurs, not in flocks, but only, so far as we could observe, in pairs, throughout the country. It does not appear to breed in society; and the only nest we took was solitary in a cliff facing the Lake of Galilee, where my friend Mr. Shepherd climbed and took the single egg on February 27th, the bird having remained on her nest till we were within 6 feet of her.

#### 3. GYPS FULVUS, Gm.

Very common and a permanent resident from the south end of the Dead Sea up to the spurs of the Lebanon, among which mountains we rarely observed it. Breeds in many places in large colonies. We counted more than 120 birds together, put off their nests by the firing of our guns, in a single wady. It is more plentiful in the north than in the south, doubtless for reasons of commissariat, but everywhere is sociable; we never observed so few as a single pair in any locality. It breeds, as in Africa, in the beginning of March.

#### 4. NEOPHRON PERCNOPTERUS, L.

Universally diffused over the whole country in summer, but never seen in winter. It does not breed, like the Griffon, in colonies, but is scattered abundantly and almost equally over all parts of the country. It returns from the south about the end of March. The first we shot was obtained on April 4th. The nests are generally in the lower parts of the cliffs, and not very difficult of access, in this respect differing very decidedly from the Griffon's. The first egg we obtained was on April 1st, and the last *fresh* eggs found were on May 24th. Several birds in the dark immature plumage were seen in April, evidently not having paired, and proving that the white plumage is not attained until the third year.

#### 5. AQUILA CHRYSÆTOS, L.

Not so common in summer as in winter, when it is found abun-

dant on all the maritime plains. It appears to retire to the northern mountains to breed.

6. *AQUILA HELIACA*, Sav.

We frequently saw the Imperial Eagle. On one occasion in the early morning, in the valley of Dothan, a bird slowly passed close to us, the most magnificent specimen I ever saw, with its white scapulars splendidly distinct. We did not succeed in finding its nest; but it remains throughout the year. I had a specimen given me in Beyrout in the immature plumage, in which it has been described as *A. bifasciata*.

7. *AQUILA NÆVIA*, Br.

Not uncommon, especially in winter. A specimen, which I showed to Mr. Gurney, that gentleman pronounced to be the large variety called *A. clanga* by Pallas.

8. *AQUILA NÆVIOIDES*, Cuv.

Frequent throughout the year.

9. *AQUILA BONELLII* (Temm.).

Common at all seasons, but restricted more than the preceding to the hills and wooded districts.

10. *AQUILA PENNATA* (Gm.).

One of the first birds of prey we noted on the Lebanon in November. Seen occasionally throughout the year, but only in the north. Mr. Upcher obtained a specimen in March on the Lebanon.

11. *PANDION HALIAËTUS*, L.

Noticed frequently at all times of the year on Mount Carmel and near the Kishon.

12. *CIRCAËTOS GALLICUS*, Gm.

Beyond all doubt the most abundant of all the Eagles in Palestine, at least in spring. I am not sure that I ever saw it but once in winter; and that was in the sheltered groves of Sidon. From the beginning of March we met with it everywhere. It is rather a late breeder for an Eagle, as we found its eggs quite fresh at the end of April. We never found more than a single egg in each nest. The male bird appears to incubate by turns with the female.

13. *BUTEO VULGARIS*, Bechst.

Common in winter on the plains. Not observed in spring.

14. *BUTEO RUFINUS*, Rüpp.

Extremely numerous in every part of the country and at all times of the year. In winter it congregates in small flocks over the plains of Judæa, but during the breeding-season is segregated in pairs in

the wooded wadys. We have found the nests both in rocks and trees, generally the former. Three is the ordinary complement of eggs in a nest. I took the first nest on Mount Carmel on March 22nd, and the last we found with fresh eggs was on May 1st.

15. *PERNIS APIVORUS*, L.

In the wooded portions of the country. A permanent resident. Observed near Tyre in November, and shot by Mr. E. Bartlett near Nazareth in April.

16. *MILVUS REGALIS*, Br.

The Red Kite is universally distributed in winter, but retires in early spring from the southern deserts to the ravines of Lebanon and Gilcad to breed.

17. *MILVUS ATER*, Gm.

A migrant. Returns in immense numbers about the beginning of March, and builds generally in trees about the villages, and occasionally in the glens and among the rocks.

18. *MILVUS PARASITICUS*, Daud.

Of the same habits as the preceding, and almost equally abundant. Perhaps rather less familiar, and preferring the wadys to the villages. A late breeder, having eggs unhatched at the end of May.

19. *ELANUS MELANOPTERUS*, Daud.

Not common. A summer visitant.

20. *FALCO PEREGRINUS*, L.

A constant resident on the coast and on the western slopes of the hill-country of Judæa, Samaria, and Galilee. Not observed in the Jordan valley, nor in the east. A female was shot, while incubating, at Jaffa in the beginning of March.

21. *FALCO LANARIUS*, Schl.

Takes the place of the preceding in the whole interior, where it is universally distributed. A nest of four eggs taken near Jericho in the cliffs on February 29th. We never saw the Lanner and Peregrine in the same districts. The Lanner is trained by the great sheiks of the east of Jordan for falconry.

22. *FALCO SACER*, Schl.

This noble and unmistakeable bird only came under my observation in the oak-forests of Bashan. It seems to prefer the wide plains and deserts to the cliffs of the Jordan valley.

23. *FALCO ELEONORÆ*, Gené.

Several times noted in spring, but not in winter. Breeds in the wooded portions of Cœle-Syria.



24. *FALCO SUBBUTEO*, L.

A migrant. Rare in the south; more common in spring in the wooded districts of Galilee.

25. *FALCO ÆSALON*, Gm.

Apparently only a winter visitant. Shot both in the east and west; but not observed after March.

26. *ERYTHROPUS VESPERTINUS* (L.).

Another summer visitant to Palestine, but scarce.

27. *TINNUNCULUS ALAUDARIUS*, Br.

Everywhere common, excepting in the southern wilderness, and a constant resident.

28. *TINNUNCULUS CENCHRIS*, Naum.

A migrant, returning in the beginning of March, and building in colonies in old ruins and in caves. Very common.

29. *ASTUR PALUMBARIUS* (L.).

I never observed the Goshawk myself, but saw a skin in the possession of an Italian gentleman at Beyrout, who had purchased the bird in the flesh in the market.

30. *ACCIPITER NISUS* (L.).

Rather plentiful in winter. We never found its nest, nor did we meet with it in spring.

31. *ACCIPITER SPHENURUS*, Rüpp.

We obtained two specimens in Galilee in April and May. It appears to take the place of the Sparrow-hawk at that time, and probably returns from the south, while its congener retires to the north.

32. *CIRCUS ÆRUGINOSUS* (L.).

Very common throughout the year on all the plains.

33. *CIRCUS CYANEUS* (L.).

A permanent resident.

34. *CIRCUS CINERASCENS*, Montagu.

Obtained on the Plain of Gennesaret.

35. *CIRCUS PALLIDUS*, Sykes.

Rather more common than the preceding. Frequents the marshes under Mount Carmel.

N.B. In my article on the Birds of Palestine (*Ibis*, 1859, p. 26) I inserted as observed, but not obtained, *Micronisus gabar*, believing that I had satisfactorily identified it. I think I was probably mistaken; at least we never met with it during this expedition.

36. *ATHENE MERIDIONALIS*, Risso.

An abundant and resident species in every part of the country.

37. *KETUPA CEYLONENSIS*, Gm.

This extraordinary and most interesting addition to the fauna of Palestine was shot by me in a wild wooded glen running down into the Plain of Acre, the Wady el Kurn. We put up out of trees at least four individuals in two days. The wady possesses a perennial and well-shaded stream, which swarms with fish and crabs, the favourite and perhaps exclusive food of this Owl. I obtained my specimen on December 8th.

38. *SCOPS ZORCA*, Gm.

Very common in spring in old ruins and olive-groves, returning to Palestine about the middle of April. We found the nests both in walls and in hollow trees.

39. *BUBO ASCALAPHUS*, Sav.

A resident and widely distributed species, living in burrows in the rolling uplands of Beersheba and in caves in the deep glens of Galilee.

40. *OTUS VULGARIS*, Flem.

Rather scarce.

41. *OTUS BRACHYOTUS*, Boie.

Occurs in winter in the north and on the hill-country of the south.

42. *SYRNIUM ALUCO* (L.).

Common wherever there is timber. Frequently heard in Gilead, where I took the nest; obtained by Mr. Herschell near Jericho; and very numerous about the cedars of Lebanon.

43. *STRIX FLAMMEA*, L.

Met with by me during my first visit; but not observed in the course of our recent researches.

44. *CAPRIMULGUS EUROPÆUS*, L.

A summer visitant. Has been obtained by various travellers in every part of the country.

(*Caprimulgus ruficollis*, Temm. I saw a specimen in the possession of a Greek at Jerusalem, who assured me he had bought it in the flesh there; but I have no further authority for its insertion.)

45. *CAPRIMULGUS TAMARICIS*, n. sp., mihi, P. Z. S. 1864, p. 170.

This interesting species appears to be a permanent resident in the Dead Sea basin, where alone, in the most desolate and unfrequented parts, we obtained it in the month of January, at Air Fesbkbah, in the north-west, and Jebel Usdum, at the south end. In form and size

it is intermediate between *C. asiaticus* and *C. albonotatus*, but in coloration is very distinct from any species with which I am acquainted.

#### 46. CYPSELUS MELBA, L.

One of the earliest migrants from the south in spring. At day-break, on February 12th, we noticed large flocks passing rapidly over our tents near Jerusalem in a northerly direction. It breeds in colonies, in caves and inaccessible fissures, through the whole country, especially in the Jordan valley and the surrounding wadys.

#### 47. CYPSELUS APUS, L.

Returns from the south much later than its congener. Swarms in myriads about all the towns, but not very common in the lonely ravines. We did not observe it till the first week in April. It ascends higher than *C. melba*; and when we were on the top of Hermon, numbers of the common Swift were sporting overhead almost out of sight.

#### 48. CYPSELUS GALILÆENSIS, Antinori.

A permanent resident in the "Ghor" or Jordan valley, in the neighbourhood of which alone it is found. Although it feeds on the wing indiscriminately in company with its two congeners, it is very distinct in its habits. Its note is peculiar—a gentle and melodious wail of three semitones, sharply repeated when alarmed. It breeds in colonies, and has laid its eggs when *C. melba* arrives, and hatched its young before the return of *C. apus*. The nest is most peculiar, under an overhanging cliff, generally at a height of from 30 to 400 feet above any accessible stand-point. The nests are clustered side by side and one upon another, formed not like those of other Swifts, but of straws and quill-feathers strongly agglutinated by the bird's saliva, and without any lining. It can, however, accommodate the nests of Swallows to its purpose, of which we met with one interesting example in the case of a nest of *Hirundo rufula*.

#### 49. UPUPA EPOPS, L.

Abundant in the wooded districts. Returns about the end of March.

#### 50. OXYLOPHUS GLANDARIUS (L.).

Not uncommon. Returns at the very beginning of March. The only eggs we obtained were in the nest of *Corvus cornix* in Gilead, near Rabbath-Ammon, thus confirming Messrs. Allen and Cochrane's observations on its habits in Egypt. We first discovered its eggs in Algeria, in the nest of *Pica mauritanica*; but no Crow bred there, and there is no Magpie in Palestine. I fully anticipate, however, that on Mount Carmel, where the Great Spotted Cuckoo is common, and the Crow is not, its eggs will be found in the nest of *Garrulus melanocephalus*.

## 51. CUCULUS CANORUS, L.

Common in spring, and a victim of much objugation from the noisy *Crateropus chalybeus*.

## 52. CUCULUS LIBANOTICUS, nov. sp.

Diagn. *C. canoro simillimus, sed pollice uno et dimidio minor; alis pollice brevioribus, colore hepatico, subtus albus, nigro transversim anguste lineatus, rectrice externa rufa, fasciis nigris subsericeis: tarsi semiplumatis: dorso rufo, lineis transversis nigris, uropygio unicolore.*

On the authority of Mr. G. R. Gray, I have ventured to describe this Cuckoo as new. Its affinities are with the *C. micropterus*, Gould, and *C. gularis*, Stephens. However, it is still more closely allied to *C. canorus*, if it be more than an hepatic variety. But the tarsi do not appear to be feathered so far down, while the outer tail-feathers, and indeed the rectrices generally, are barred with black instead of white. It is with great diffidence that I have described it as new. The specimen exhibited was shot by Mr. Cochrane in April, under the Lebanon, and therefore could not be a bird of the year.

## 53. YUNX TORQUILLA, L.

A summer resident. Not obtained before the middle of April.

54. PICUS SYRIACUS, H. & Ehr. (= *P. cruentatus*, Antinori?).

Found throughout the year in all suitable localities; and the only Woodpecker ever observed in the country.

## 55. ALCYON SMYRNENSIS, L.

Found in pairs, but never in large numbers, through the whole length of the Jordan, from Banias to Engedi. Several were shot on the Dead Sea; and we took two nests, one in the banks of a stream flowing into the Sea of Galilee, and another in the bank of the lake itself. In the crop of one bird I found a snake entire; in that of another several frogs. It never occurred out of the Jordan valley, where it is a resident.

## 56. ALCEDO ISPIDA, L.

Scantly distributed through the whole country, and on the shores of the Mediterranean.

## 57. CERYLE RUDIS (L.).

Very common, and frequent in small societies, both on the sea-coast in winter and in the Jordan valley throughout the year. Breeds in colonies on the banks of streams and by the Lake of Galilee, from the end of March to the end of May. An extremely active and vivacious bird, and very different in its habits from either of the preceding.

58. *MEROPS APIASTER*, L.

A regular migrant, returning in the beginning of April in great numbers, and living in large societies in every part of the country.

59. *MEROPS ÆGYPTIUS*, Forsk.

Scarce. Was not seen by us on this expedition, though noted by Mr. Cochrane once, and obtained in the Jordan valley on a former occasion by myself.

60. *MEROPS VIRIDIS*, L.

Obtained in the Jordan valley by Mr. Herschell.

61. *CORACIAS GARRULA*, L.

Abundant everywhere in spring. Appears in the beginning of April, with the Bee-eater.

62. *TROGLODYTES EUROPÆUS*, Cuv.

Not common. Resident in the northern hills of Palestine.

63. *TICHODROMA MURARIA* (L.).

In the wadys near Gennesaret, in the deep Glen of the Litany, and in the dells of Lebanon. A permanent resident.

64. *SITTA SYRIACA*, Ehrenb.

Found among the rocks in the same localities as the former, and also in the valleys near Baniyas, south of Hermon.

65. *SITTA KRUEPERI*, Von Pelzeln, Oct. 1863.

Obtained by us in the glens south of Hermon, where Mr. Bartlett first shot it, and afterwards in the Gorge of the Litany. This Nut-hatch is more closely allied to our *S. cæsia* than to the Eastern *S. europæa*, L. (= *S. uralensis*, Licht.); but differs in the rich red of the whole under surface, and in the absence of any white tips in the coloration of the abdominal and ventral feathers, which are of a deep chestnut.

66. *PARUS MAJOR*, L.

Common and resident in all wooded districts, but never found in the Ghor. The only Tit observed south of the Lebanon. Rather more distinct in its coloration than our British specimens.

67. *PARUS ATER*, L.

Only in the Lebanon. Numerous at the Cedar-grove. The colours more distinct and bright than in English specimens.

68. *PARUS LUGUBRIS*, Natt.

Obtained by J. H. Cochrane, Esq., in the Lebanon. As in the other Palestine species, this specimen is remarkably pure and distinct in its coloration.

## 69. MELANOCORYPHA CALANDRA (L.).

Extremely common in the highlands and corn-plains in spring and summer, and in the wilderness of Judæa in winter, at which season we did not meet with it in the maritime plain. It does not descend into the Ghor.

## 70. CALANDRELLA BRACHYDACTYLA, Kaup.

A summer migrant in Central Palestine.

## 71. CALANDRELLA REBOUDIA, Loche.

We found this distinct and Saharan species in the wilderness of Beersheba, in small flocks, in February.

## 72. CALANDRELLA HERMONENSIS, nov. sp., mihi.

*Supra rufo-cinnamomea, striis brunneis indistinctis, superciliis albescentibus, gula et corpore subtus pallide rufescentibus; collari pectorali lato nigricante, in medio interrupto: alis pallide fuscis, remigibus primis in parte externa albidis, rectricibus lateralibus in parte externa et in apice albis, et proximis rectricibus linea alba angustissima.*

Long. tota poll. 6, alæ 3·6, caudæ 2·6, tarsi 0·8.

This bird is at once distinguished from *C. brachydactyla* by its larger size, longer bill, bright rufous coloration, and by the distinctness of the blackish collar, approaching that of the Calandra Lark, and by the much smaller extent of the white on the outer tail-feathers. It is yet more distinct from the *Alauda pispoletta* of Pallas. We only found it on the slopes of Hermon and Lebanon. The egg is much larger than that of *A. brachydactyla*.

## 73. AMMOMANES DESERTI, var. (Licht.).

Frequent in small bands on the highlands near the Dead Sea. Not nearly so rufous as African specimens, and it may perhaps, from the markings of the tail-feathers, be considered a distinct species.

## 74. AMMOMANES FRATERCULUS, nov. sp., mihi.

*Ab A. isabellina differt statura minore, rostro brevissimo et tenui et gula isabellina nec albida.*

Long. tota 6·1, alæ 3·5, caudæ 2·7, tarsi 0·8, rostri a rictu 0·6. Long. tota *A. isabellina*, var., 6·8, alæ 4·0, caudæ 3·0, tarsi 0·9, rostri a rictu 0·85.

## 75. ALAUDA ARVENSIS, L.

Common in the maritime plains and northern uplands in winter. Not observed afterwards.

## 76. ALAUDA CANTARELLA, Bp.

In immense flocks in the wilderness of Judæa and Beersheba in winter. Not observed elsewhere or at other times. Exactly corresponds with Mr. Swinhoe's Chinese specimens.

77. ALAUDA ARBOREA, L.

Pretty generally but sparingly distributed. Winters in the country in small bands, which disperse in spring.

78. GALERIDA CRISTATA (L.).

In the north, a permanent resident.

79. GALERIDA ABYSSINICA, Bp.

The characteristic form in the southern wilderness. I can scarcely bring myself to believe in the specific distinction of these two.

80. GALERIDA ISABELLINA, Bp.

Only met with in the Ghor es Safieh, at the south-east end of the Dead Sea.

81. GALERIDA BRACHYURA, nov. sp., mihi.

*Cristata*; corpore supra arenicolori-fusco, plumarum parte media brunnea; primariis brunneis, cervino extus limbatis; cauda nigricante, rectricibus externis cinnamomeis, rectricibus proximis cinnamomeo limbatis et duabus mediis fuscis: subtus sordide alba, gula et pectore nigro striatis: alis ad minus 0·3 poll. a fine caudæ accedentibus.

Long. tota 5·7, alæ 3·9, caudæ 2·4, tarsi 1·0, rostri a rictu 0·85.

Seems to take the place, among the Crested Larks, of the Wood-Lark among the true *Alaudinae*, and is at once distinguished by the shortness of its tail and length of its wing. We found it only in the Ghor.

82. OTOCORYS PENICILLATA, Gould.

Found in some plenty close to the snow-line in Lebanon and on the top of Hermon, but nowhere else. Never descends far from the snow-line. Mr. Swinhoe's Tientsin specimen (referred to, P. Z. S. 1863, p. 272) is quite different, and, I conceive, is the true *O. alpestris*, var., not *O. penicillata*.

83. CÆRTHILAUDA DESERTORUM, Stanley.

Scarce in the southern desert.

84. ANTHUS CAMPESTRIS, Bechst.

Generally distributed and resident.

85. ANTHUS SPINOLETTA (L.).

Taken once only, in a marsh by Merom.

86. ANTHUS PRATENSIS (L.).

Common in winter; occasionally found throughout the year.

87. ANTHUS CERVINUS, K. & Bl.

A specimen shot in winter on the coast.

88. *ANTHUS ARBOREUS*, Bechst.

Occurs sparsely throughout the country at all seasons.

89. *BUDYTES CINEREOCAPILLA* (Savi).

Of passage, only in spring, in flocks.

90. *BUDYTES NIGRICAPILLA*, Bp.

I never obtained this variety myself, but have seen it in the collections of others.

91. *MOTACILLA SULPHUREA*, Bechst.

Generally distributed in winter. Leaves in February.

92. *MOTACILLA ALBA*, L.

Extremely abundant in winter everywhere. Only a few pairs in the north of the country remain to breed. We took the nest in Galilee, among the hills.

93. *MOTACILLA LUGUBRIS*, Temm.

In my former list as obtained by Mr. Herschell. Not met with in this expedition.

94. *CINCLUS AQUATICUS*, Bechst., ? var.

Found only in the mountain-streams in the deep gorges of the Lebanon range. The white extends lower down the breast than in British specimens; the abdomen is not of so deep a chestnut, and the vent-coverts are tipped with whitish. The back of the head and the shoulders are of a more rufous tint than in any other examples I have seen.

95. *TURDUS PILARIS*, L.

Occurs but rarely in winter.

96. *TURDUS MUSICUS*, L.

Not very uncommon in winter; chiefly in the highlands. Noticed in Galilee in spring, but only occasionally.

97. *TURDUS MERULA*, L.

The Blackbird is nowhere common; but a few are to be found everywhere, and at all times of the year.

98. *IXOS XANTHOPYGIUS*, H. & Ehrenb.

One of the most characteristic birds of Palestine; known to the natives as the Bulbul. Resides the whole year, and is generally distributed, both on the sea-coast from Sidon to Jaffa, and throughout the Jordan valley, but especially plentiful in the oases near the Dead Sea. It is a magnificent songster, and builds a very neat nest rather high up in the trees, with three or four eggs covered thickly with rich red blotches and spots, and subject to great variation.



## 99. CRATEROPUS CHALYBEUS, Bp.

The most grotesque and amusing of all the birds of Palestine. It is amongst the most local species, being only found in the Dead Sea basin, and there in great abundance; but never ascends even as far as ten miles up the valley from the mouth of the Jordan, nor in any part of the Ghor. We found it at Jericho, Engedi, the Safieh, and under the north-east hills of Moab. It builds a large slovenly nest in the Zizyphus trees in March and April, and lays four or five glossy deep-blue eggs.

## 100. DRYMOICA GRACILIS, Rüpp.

Common throughout the country all the year, excepting in the hill-country. Builds a very neat domed nest near the ground, with four or five richly coloured pink eggs. It is a very noisy and conspicuous bird.

## 101. DRYMOICA —.

Found only in the most desolate wadys opening on the Salt Sea, where it flits from one scanty shrub to another. It differs from *Drymoica striaticeps*, described by me from the Sahara in 'Ibis,' 1859, p. 58, in the broader dark striæ on the head and neck, in the throat and breast striated with black, instead of the dull uniform white of the African bird, and in the deeper russet of the flanks.

## 102. CALAMOHERPE TURDOIDES, Boie.

A summer visitor.

## 103. CALAMOHERPE —.

Apparently differs from *C. turdoides*, not only in its coloration and rather smaller size, but in the second primary being less than the first, which is the longest of all.

## 104. CALAMOHERPE ARUNDINACEA, Gm.

Common. Returns from the south in the beginning of March.

## 105. CALAMOHERPE PALUSTRIS, Bechst.

Scarce.

## 106. AËDON GALACTODES (Temm.).

Identical with the European and N. African bird, and perfectly distinct from *A. familiaris*, Ménétr., which is common in Asia Minor, but which we never found in Palestine. It is the most abundant, at least the most conspicuous, warbler in spring and summer, but does not return before the middle of April. Found from the shores of the Dead Sea to the slopes of Lebanon.

## 107. CISTICOLA SCHÆNICOLA, Bp.

Local in marshy plains. A constant resident.

108. CALAMODYTA PHRAGMITIS, Bechst.

Not uncommon in spring in suitable localities.

109. CALAMODYTA MELANOPOGON (Temm.).

A single specimen shot by Mr. Bartlett in the Plain of Gennesaret in April.

110. CETTIA SERIGEA, Bp.

Frequently heard, but rarely seen, among the willows by small watercourses. A summer visitant.

111. LUSCINIOPSIS SAVII, Bp.

We obtained but a single specimen of this shy bird, on the Plain of Gennesaret in May.

112. LUSCINIOPSIS FLUVIATILIS, Meyer.

Obtained, in April and May, by the Lake of Galilee, and near the sources of the Jordan, at Lake Phiala.

113. HIPPOLAIS OLIVETORUM, Strickl.

Common in the olive-yards and oak-copses in the north of the country. Returns very late, and breeds in May and June.

114. HIPPOLAIS ELAICA, Linderm.

Extremely abundant in all parts of the country in summer. Returns to Jericho in March, and to the slopes of Hermon in April. Resorts to low shrubs and thickets, and especially to marshy spots, in preference to groves.

115. HIPPOLAIS UPCHERI, nov. sp., mihi.

*Major, cinerea, vix olivascens, subtus sordide alba; caudæ rotundata, rectricibus extimis albo marginatis; remigum primo tectrices exteriores æquante, tertio longissimo, secundo sextum æquante.*

Long. tota poll. 5·7, alæ 2·75, caudæ 2·6, rostri a rictu 0·75.

This very distinct species, which I have much pleasure in naming after my indefatigable friend and companion in the expedition, H. M. Upcher, Esq., seems to be exclusively a northern bird, never frequenting olive-groves, but the dry oak-copses and vineyards of the slopes of Lebanon and Hermon. Its nest and note are very distinct from those of its congeners.

116. PHYLLOPNEUSTE TROCHILUS (L.).

Very common in winter; never found after March. I cannot regard H. & Ehrenb.'s species *Curruca viridula* as distinct.

117. PHYLLOPNEUSTE SIBILATRIX, Bechst.

Rather plentiful on passage in spring. Never met with in winter, nor after the spring migration.

118. PHYLLOPNEUSTE RUF A (Lath.).

In vast numbers all through the winter in every part of the country. Never seen after February.

119. PHYLLOPNEUSTE BONELLII (Vieill.).

A summer visitant. Returns in the beginning of April.

120. PHYLLOPNEUSTE BREVIROSTRIS (Strickl.).

Several specimens shot in winter at Jericho and at Engedi seem referable to Mr. Strickland's Smyrna species, so far as can be determined from his diagnosis, without the opportunity of examining his type.

121. REGULOIDES SUPERCILIOSUS, Gm. (*Regulus modestus*, Gould.)

Obtained in winter in the Ghor.

122. SYLVIA MELANOCEPHALA (Gm.).

Generally distributed, and resident.

123. SYLVIA CURRUCA, Lath.

Common, but not observed until March.

124. SYLVIA CINEREA, Bp.

Extremely abundant everywhere, but not so numerous in winter as in spring. One of the earliest breeders, having eggs in the middle of March.

125. SYLVIA CONSPICILLATA, Marm.

Scarce, but resident in various localities.

126. SYLVIA ATRICAPILLA (L.).

Very common in every part of the country, and a permanent resident in all the districts. The male in winter seems to have the same plumage as the female.

127. SYLVIA RÜPPELLII, Temm.

Not very common. Resident.

128. SYLVIA HORTENSIS (Gm.).

Occasionally obtained in spring.

129. SYLVIA ORPHEA, Temm.

Frequent in spring in the wooded districts. Two specimens out of five agree with H. & Ehrenb.'s variety *Helenaë*: the other three do not; but in one instance the male is var. *Helenaë*. The female shot with him off the nest is of the ordinary European type.

130. *SYLVIA NISORIA*, Bechst.

Scarce, and chiefly observed in the dry wadys on its vernal migration. Very few appeared to remain.

131. *PHILOMELA LUSCINIA* (L.).

Generally distributed. First seen about the end of March. Remains to breed chiefly in the Jordan valley and the sheltered wadys. Never observed or heard in the olive-groves.

132. *RUBECULA FAMILIARIS*, Blyth.

The Robin is very common in all parts of the country; but not one was seen after the end of February:

133. *CYANECULA CÆRULECULA* (Pall.).

Another winter visitant, though much less common. Chiefly in the marshy lowlands.

134. *CYANECULA SUECICA* (L.).

Obtained by Messrs. Shepherd and Upcher, near Jaffa, in winter.

135. *RUTICILLA PHŒNICURA* (L.).

An abundant summer visitant, reappearing the last week in March, and remaining to breed.

136. *RUTICILLA TITHYS*, Scop.

A very common and characteristic bird on all the highlands and bare hills during the winter, and particularly on the sea-coast. I believe that it does not remain there to breed, but retires in spring to the mountain-sides further north. We found the variety *R. cairii* common, and intermingled with the ordinary type.

137. *RUTICILLA SEMIRUFA*, H. & Ehrenb.

Only found on the higher slopes of Hermon and Lebanon, where it is very shy and wary. The note is varied and powerful. We obtained the nest, with eggs not very hard set, so late as June 26th, under the cedars of Lebanon. The eggs are exactly like those of *R. phœnicura*. A very conspicuous and common bird in the narrow limits within which it occurs.

138. *PETROCINCLA SAXATILIS* (L.).

Never seen in winter. Large flocks observed on Mount Gêrizim at the time of the vernal migration. A few breed in Galilee and Lebanon.

139. *PETROCINCLA CYANEA* (L.).

Most unlike the last species in all but its localities. A very solitary bird, but resident in scattered pairs throughout the whole country, wherever there are rocks, through the year. It feeds at the water-edge on the sea-shore, on small Crustacea, and is generally to be found among old ruins. Its nest was found by Mr. Cochrane

and myself, with four eggs set on, near the Lake of Galilee, on April 2nd.

140. *BESSONORNIS ALBIGULARIS* (Von Pelzeln).

This bird has very recently been described at Vienna by Herr von Pelzeln under the name of *Saxicola albigularis*. Supported by the high authority of Mr. G. R. Gray, I have no hesitation in removing this singular and almost unique species into the genus *Bessonornis* of Smith. My knowledge of the bird's habits and appearance in life—its perching among the thickest foliage, where it pours forth a song which rivals the Nightingale's—its nest and eggs, which have no correspondence with those of the *Saxicolinæ*, but approach those of *S. orphea* and *S. nisoria* more closely than any other—all convince me that it has no affinities with the true *Saxicolinæ*. We only found it on the higher slopes of Hermon and of Lebanon. The female which I exhibit has not yet been described.

141. *DROMOLÆA MONACHA*, Rüpp.

Only found at the south end of the Dead Sea.

142. *DROMOLÆA LEUCOCEPHALA*, Br.

Obtained on the barren ravines by the Dead Sea.

143. *DROMOLÆA LEUCOPYGIA*, Br.

In similar localities as the last. Though not found together by me, I am by no means prepared to maintain their specific distinctness, as I find white feathers peeping out on the head of *D. leucopygia* at times.

144. *SAXICOLA PHILOTHAMNA*, Tristram.

We met with my old Saharan acquaintance in a district very like that in which I first discovered it, to the south-east of Beersheba, in the desert. It was not uncommon, but in a very restricted locality. A resident.

145. *SAXICOLA CENANTHE*, L.

Very common in the northern hills and on Carmel. Appears in the south only on its migration.

146. *SAXICOLA ROSTRATA*, H. & Ehrenb.

If this be a good species, which I doubt, it is more plentiful than *S. cenanthe* near the snow-line of Hermon and Lebanon, where we found it breeding abundantly.

147. *SAXICOLA ISABELLINA*, Rüpp.

A resident in the southern part of the wilderness of Judæa.

148. *SAXICOLA SALTATRIX*, Ménétr.

Found in some numbers on the higher plains of the north. Appears to be only a large variety of the preceding, if it be not identical.

149. *SAXICOLA LIBANOTICA*, H. & Ehrenb.

Generally distributed, but in very small numbers, over the hill-country and wilderness of Judæa. A permanent resident.

150. *SAXICOLA LUGENS*, Temm. (*S. leucomela*, Gould.)

Very generally occurs throughout the year in all the barer portions of the country, but neither in the plains nor in the loftier mountains.

151. *SAXICOLA LEUCOMELA*, Temm. (*S. lugens*, Licht.)

Occurs by the Dead Sea.

152. *SAXICOLA EURYMELÆNA*, H. & Ehrenb.

Very numerous on Carmel, Tabor, and in the cultivated plains, in spring. Returns to breed about the 20th of March.

153. *SAXICOLA AMPHILEUCA*, H. & Ehrenb.

Returns apparently a few days later than the preceding species. Not so numerous. The two seem never to intermingle, though in similar localities.

154. *SAXICOLA XANTHOMELÆNA*, H. & Ehrenb.

A single specimen shot at Shiloh in December.

155. *SAXICOLA DESERTI*, Rüpp.

Two specimens obtained at the north end of the Dead Sea in January.

156. *SAXICOLA HALOPHILA*, Tristram.

One specimen obtained under Jebel Usdem (the Salt Mountain). It is interesting to note that the type specimens were shot at a salt-mountain in the Sahara.

157. *PRATINCOLA MELANURA*, Rüpp. (= *Cercomela asthenia*, Bp.).

Very common throughout the year in the Dead Sea basin, particularly at Engedi. A few individuals found up the gorge of the Kedron and on the wilds between Jerusalem and Jericho. Breeds early. The eggs very like that of *Saxicola eurymelæna* or *S. stapa-zina*.

158. *PRATINCOLA RUBICOLA* (L.).

Abundant in all the lowlands and central districts through the winter; but leaves early in spring.

159. *PRATINCOLA RUBETRA* (L.).

Only observed and obtained at the time of the spring migration.

160. *ACCENTOR MODULARIS* (L.).

Scarce. A permanent resident in the north.

161. *MUSCICAPA COLLARIS*, Bechst.

Occasionally occurs in the wooded districts in spring and summer.

162. *BUTALIS GRISOLA* (L.).

Very common. Rather a late migrant, and not observed till May.

163. *HIRUNDO RUSTICA*, L.

Plentiful everywhere. Does not remain through the winter.

164. *HIRUNDO CAHIRICA*, Licht.

With the former. A few remain on the sea-coast and in the Ghor all winter; but their numbers are vastly increased in spring.

165. *HIRUNDO RUFULA*, Temm.

This beautiful Swallow is most abundant all through the country, both in the plains, the Ghor, and the hills, after the middle of March. It does not build in communities, though, like other Swallows, feeding in large flocks on the wing. The nest is like that of the House-martin, but with a long, beautifully formed entrance-passage, and is attached to the roof of a cave, or to the under side of an overhanging rock. The eggs are pure white.

166. *COTYLE RUPESTRIS* (Scop.).

A permanent resident in the wadys adjoining the Ghor, and in the deep ravines of the Litany River. Very numerous wherever found.

167. *COTYLE PALUSTRIS* (Steph.).

Only found round the Dead Sea basin, where it is a permanent resident.

168. *COTYLE RIPARIA* (L.).

A summer visitant only. Not common.

169. *CHELIDON URBICA* (L.).

Very common in the neighbourhood of towns and villages. Returns later in the spring than any of its congeners.

170. *ORIOLOUS GALBULA*, L.

Frequent in April and May. Few, if any, appear to remain to nest in the country.

171. *LANIUS COLLURIO*, L.

Abundant on the higher portions of Hermon and Lebanon, about the limit of the brushwood. Not seen in the south. A very late breeder, eggs having been taken by us as late as June 20th.

172. *LANIUS RUFUS*, Br.

Returns in the end of March, and after that time is to be seen on almost every bush. Does not, however, ascend the mountain-sides

so high as *L. collurio*. As plentiful by the Dead Sea as in Judæa, Galilee, and Gilead.

173. *LANIUS EXCUBITOR*, L.

Very common and a permanent resident, both in the Ghor and on the maritime plains.

174. *LANIUS MERIDIONALIS*, Temm.

Confined to more southern localities, and a migrant.

175. *LANIUS MINOR*, Gm.

I shot this bird in 1858 near Jaffa, but did not meet with it on this expedition. It is mentioned by Hemprich and Ehrenberg.

176. *LANIUS PERSONATUS*, Temm.

A migrant, returning in the beginning of April. Its nest is small, neat, and compact, resembling that of a Chaffinch, rather than those of other Shrikes. Very common in the wooded districts.

177. *GARRULUS MELANOCEPHALUS*, Bonelli.

Not uncommon in forests and olive-yards throughout the year. Never descends into the warmer regions of the Jordan valley. Particularly abundant in the forests of Gilead and Bashan. (The Magpie is unknown in Palestine.)

178. *CORVUS MONEDULA*, L.

Abounds at Nablous, and occurs in the hilly districts of Central Palestine.

179. *CORVUS COLLARIS*, Drummond.

Takes the place of *C. monedula* in the Ghor and on the east of Jordan. Neither species observed in the south.

180. *CORVUS AGRICOLA*, nov. sp., mihi.

*Similis C. frugilego, sed capite et corpore subtus virescenti-nigris, nec purpureo-nigris, juguli plumis lanceolatis, sicut in Corvo capensi; alias ut in C. frugilego; cauda rotundata et virescenti-nigra; facie rarissime denudata.*

A comparison of my series (and we preserved eight specimens) with *C. frugilegus*, *C. pastinator*, and *C. capensis* satisfies me that this bird is far more distinct from the common Rook than *C. pastinator* of China. It has the peculiar green-black reflections of *C. capensis* over its whole body, and especially on the head, which is blue-black in our British bird and purple in the Chinese. Our specimens were all obtained in winter and spring; yet in one only was the basal portion of the mandibles denuded entirely, and in another partially. It no way differs from our Rook in size; and is found chiefly about Jerusalem, Nablous, and the cultivated portions of Central Palestine.



181. *CORVUS CORNIX*, L.

Common, and resident on the coast and highlands. Not found in the Ghor. The *Oxylophus glandarius* deposits its eggs in its nest.

182. *CORVUS AFFINIS*, Rüpp.

Only observed in the Dead Sea basin, at the southern extremity. It is a striking and peculiar species, both on the wing and in its ringing, almost startling note, most unlike that of any other of the *Corvidæ*.

183. *CORVUS UMBRINUS*, Hedenborg; Sund. K. Vet. Ak. Handl. 1838, p. 198.

The common Raven of Jerusalem and the Jordan valley, but not on the coast. Breeds solitarily in the cliffs.

184. *CORVUS CORAX*, L.

Found in all parts of the country. Abundant about the Mosque of Omar at Jerusalem in winter, in company with the last species.

185. *PYRRHOCORAX ALPINUS*, Vieill.

Only found in small bands on the summit of Hermon and the highest parts of the Lebanon, always close to the snow-line.

186. *NECTARINIA OSEA* (Bp.).

Very numerous in the seething moist oases round the Dead Sea, where it resides throughout the year, and breeds towards the end of March. A few pairs extend as far as the Plain of Gennesaret, and I have even found it in warm glens on the south side of Mount Carmel. Its affinities are with *N. asiatica* (L.) of India and *N. affinis*, Rüpp., of Abyssinia; but in coloration it is distinct from either. The nest is a beautiful piece of workmanship, round, and suspended, like that of the *Ploceus* from the end of a twig, with an entrance halfway down the side. The eggs are whitish, with a zone of dull greenish spots. The note is not unlike the call of the Blue Tit.

187. *AMYDRUS TRISTRAMII*, Selater.

In small colonies, not only at Marsaba, but in various glens in the most desolate and precipitous ranges close to the Dead Sea. The banks of the Arnon (Wady Mojib), with its tremendous precipices, are a favourite haunt of this desert-loving bird.

188. *PASTOR ROSEUS* (L.).

Uncertain in the time of its visits. Seen by me in 1858, but not during this expedition.

189. *STURNUS VULGARIS*, L.

In large flocks in the maritime plains in winter only.

190. *STURNUS UNICOLOR*, Marm.

In winter on the Plain of Sharon.

191. *EMBERIZA MILIARIA*, L.

Very common on all the corn-plains throughout the year.

192. *EMBERIZA HORTULANA*, L.

Abundant in the hills and plains in spring. Does not appear to descend into the Ghor.

193. *EMBERIZA CIA*, L.

Found in winter on the top of Carmel, and in June breeding in the highest part of Lebanon.

194. *EMBERIZA CÆSIA*, Cretzs.

The most abundant of all the Buntings among the brushwood and scanty shrubs of Central Palestine, from Hermon to the Litany. Returns about the end of March. Prefers the hill-sides, where it builds its nest under the dwarf shrubs.

195. *EMBERIZA STRIOLATA*, Temm.

Found at Engedi in winter, in a small flock.

196. *EUSPIZA MELANOCEPHALA* (Scop.).

Returns from the south in the beginning of April, and is then very numerous both on the wooded hills and among olive-groves, where it pours forth its varied note from the tops of the highest branches. The nest is placed in a bush, not far from the ground; and the eggs mark at once the separation of this genus from *Emberiza*.

197. *COCCOTHAUSTES VULGARIS*, Br.

Observed by Mr. Cochrane in Gilead.

198. *FRINGILLA CÆLEBS*, L.

Frequent in winter. Returns to the highest parts of Lebanon in spring. Breeds plentifully, in May and June, at the Cedars.

199. *PASSER DOMESTICUS* (L.).

Abundant about the cities.

200. *PASSER CISALPINUS*, Temm.

The chestnut-headed variety, and every intermediate gradation, occur in my series. The chestnut-headed birds are mostly from Jerusalem and the east; the ash-coloured head marks the northern and maritime specimens.

201. *PASSER SALICARIUS*, Schleg.

In myriads in the Ghor. I have seen more than fifty nests on one tree, and the noise of the colonies is absolutely deafening. Quite distinct in its habits from the former species.

202. *PASSER MOABITICUS*, Tristr. P. Z. S. 1864, p. 169.

This new and lovely little species I have already described through

Dr. Sclater. Its range is most limited—only round the little fresh-water fountains and rills which run into the Dead Sea at the west and south-east.

203. *PETRONIA STULTA*, Gm.

Very common on the higher lands everywhere in spring. Returns late, and often selects for nidification the mouths and sides of old wells.

204. *PETRONIA BRACHYDACTYLA*, Bp.

This interesting desert-bird, first noticed by Hemprich, we discovered only in the bare plateaux north of Hermon, by the Litany, and in Cœlesyria. Its nest is neat and compact, in a bush; and the eggs white, with black spots, like a diminutive Golden Oriole's.

205. *CHLOROSPIZA CHLORIS*, L.

A winter visitant on the coast.

206. *CHLOROSPIZA CHLOROTICA*, Licht.

A summer visitant in all the wooded districts, and especially among the olive-groves and gardens, where its habits and nidification are exactly those of our own bird.

207. *CARDUELIS ELEGANS*, Steph.

A permanent resident, chiefly in the olive-yards.

208. *SERINUS MERIDIONALIS*, Bp.

Not uncommon in wooded districts near the coast in winter. Not met with in the interior, nor later in the season.

209. *SERINUS PUSILLUS* (Pall.).

A single specimen was obtained in the Lebanon this year by Sign. F. Fidas, of Beyrout. We never met with the bird.

210. *SERINUS AURIFRONS*, nov. sp., mihi.

*S. corpore supra flavido, fusco striato; fronte, pileo, uropygio, scapularibus aureo-flavis, fronte precipue aurea; corpore toto subtus flavescente, nec striato; collari flavissimo; remigibus nigris, flavo externe limbatis; scapularibus flavidis; rectricibus omnibus nigris, albido externe limbatis et dimidiatim interne albidis. Major quam S. meridionalis.*

Long. tota poll. 5·15, alæ 3, caudæ 2·6.

I should have supposed this bird to be the *Fringilla syriaca* of H. & Ehrenb., but that their diagnosis is quite irreconcilable with my specimens. The species is not uncommon in the shrubby districts of Hermon and at the cedars of Lebanon. The birds of the year have a rich russet hue, in place of the yellow. The nest is linnet-like, and the eggs approach those of the Goldfinch. The male has a powerful and varied note: it is much larger than the Serine Finch.

211. *CARPODACUS PHENICOPTERUS*, Bp. (*C. sanguineus*, Gould.)

Shot by J. H. Cochrane, Esq., in the north of Palestine, under Lebanon.

212. *ERYTHROSPIZA GITHAGINEA*, Licht.

In the southern deserts a resident.

213. *MONTIFRINGILLA NIVALIS* (L.).

On the summits of Hermon and Lebanon.

214. *LINOTA CANNABINA* (L.).

Common in winter through Central Palestine, and in spring in the mountains and northern wooded districts. Breeds close to the top of Hermon.

215. *COLUMBA PALUMBUS*, L.

In winter on Mount Carmel and, in countless myriads, in the forests of Gilead and Bashan. After March I never met with it.

216. *COLUMBA OENAS*, L.

Obtained in 1858. Not among my collections of this year.

217. *COLUMBA SCHIMPERI*, Bp.

The common Rock-dove of the Ghor and adjacent ravines. As plentiful as in Egypt.

218. *COLUMBA LIVIA*, L.

In the highlands and on Mount Carmel. The two species can easily be distinguished on the wing by the different coloration of the rump and by the larger size of *C. livia*.

219. *TURTUR RISORIUS*, Swains.

Rather scarce in winter in the Ghor, but abundant at the south-east end of the Dead Sea. Returns in March, and is then distributed more or less plentifully over the whole country, but especially in the Ghor.

220. *TURTUR AURITUS*, Ray.

Overspreads the whole of the Ghor and the rest of the country in incredible numbers in spring and summer, feeding chiefly on the various clovers; but never seen in winter. Returns about March 20.

221. *TURTUR SENEGALENSIS* (L.).

A permanent resident in the Ghor, and even in the gardens and courtyards of Jerusalem. Unlike *T. risorius*, its numbers do not appear to be increased by the vernal migration. Not observed in the north.

222. *PTEROCLES EXUSTUS*, Temm.

In flocks in the southern desert near Beersheba.

223. *PTEROCLES SENEGALENSIS*, Lath.

More plentiful than the last, and often in smaller bands. Obtained both to the S.E. of Beersheba and near the mouth of the Jordan.

224. *PTEROCLES ARENARIUS*, Temm.

Obtained by J. H. Cochrane, Esq., north-east of Hermon, and observed also by myself in the same district.

225. *PTEROCLES ALCHATA* (L.).

Seen several times in flocks, though not obtained. I have not the slightest hesitation in enumerating it as a Palestine species.

226. *FRANCOLINUS VULGARIS*, Bp.

Common in the plains of Gennesaret, Huleh, and Acre.

227. *CACCABIS SAXATILIS*, Bp.

Very common in every part of the country, excepting the Ghor.

228. *CACCABIS HEYII*, Temm.

Abundant in the Dead Sea basin and the adjoining ravines. Never met with elsewhere. Breeds generally in holes in and under rocks. A resident species.

229. *COTURNIX VULGARIS*, Schl.

Occasionally put up throughout the winter. In spring most abundant in all the corn-fields and grassy plains, and especially in the Ghor.

230. *STRUTHIO CAMELUS*, L.

I possess a skin procured by Aghyle Agha, the well-known Sheik of Tabor, and given to me by T. B. Sandwith, Esq., H.B.M. Consul at Caiffa. Aghyle assures me the bird was killed in the Belka, and therefore can fairly be included in the Fauna of Palestine.

231. *OTIS TARDA*, L.

I have frequently heard of this bird as found in the plain of Sharon, but never saw it. It is common in Northern Syria, and therefore probably still exists in the maritime plains.

232. *OTIS TETRAX*, L.

I am assured that the little Bustard resorts to the barley-plains in spring, but it has not come under my personal observation.

233. *HOUBARA UNDULATA*, Jacq.

In the desert portions of the Ghor, where it is a resident and breeds.

234. *ŒDICNEMUS CREPITANS* (L.).

Very common in the Ghor and in the wilderness of Judæa throughout the year.

235. *CURSORIUS ISABELLINUS*, auct.

Shot by J. H. Cochrane, Esq., near Acre.

236. *PLUVIANUS ÆGYPTIACUS* (L.).

Obtained by Mr. Herschell in the Jordan valley.

237. *GLAREOLA PRATINCOLA* (L.).

Very plentiful in spring on the plains of Huleh, where it breeds, and also on the plains of Gennesaret and of Acre.

238. *VANELLUS CRISTATUS*, Mey.

Common in winter throughout the country. Returns to the north early in March.

239. *HOPLOPTERUS SPINOSUS* (Hasselq.).

Met with in small numbers in spring wherever there is water. Not observed in winter.

240. *CHARADRIUS PLUVIALIS*, L.

Very common in winter both in the plains and on the highlands.

241. *CHARADRIUS MORINELLUS*, L.

In vast flocks in the wilderness of Judæa, near Beersheba, in winter.

242. *CHARADRIUS ASIATICUS*, Pall.

In small numbers, mingling with the last species.

243. *CHARADRIUS MONGOLICUS*, Pall.

Shot in winter on the banks of the Kishon. In its winter dress it closely resembles *C. asiaticus*, and at first sight can only be distinguished by its much smaller size. But while in *C. asiaticus* the outer rectrices are pure white, in *C. mongolicus* all the tail-feathers have alike a broad bar of brown across them.

244. *ÆGIALITES HIATICULA* (L.).

Shot on the shores of the Lake of Galilee in April.

245. *ÆGIALITES CANTIANUS* (Lath.).

Very common on the coast, both in winter and spring.

246. *ÆGIALITES MINOR* (Meyer).

Not rare on the banks of the Kishon.

247. *GRUS CINEREA*, L.

In immense flocks in winter in the southern wilderness.

248. *ARDEA CINEREA*, L.

On the coast, the Kishon, Jordan, Lake of Galilee, and marshes of Huleh.

249. *ARDEA PURPUREA*, L.

In the same localities.

250. *EGRETTA ALBA* (L.).

By the Lake of Galilee and the marshes of Huleh.

251. *EGRETTA GARZETTA* (L.).

In the same localities.

252. *BUPHUS RUSSATUS*, Wagl.

In large flocks in the Huleh marshes, and sparingly elsewhere.

253. *BUPHUS RALLOIDES*, Scop.

In the Huleh in flocks. Found in smaller numbers in all the marshes. These four last-named species were not observed till spring.

254. *ARDEOLA MINUTA* (L.).

Very common among the reeds in the northern marshes.

255. *BOTAURUS STELLARIS* (L.).

Observed in the Huleh marshes.

256. *PLATALEA LEUCORODIA*, L.

An occasional visitant. Not obtained by us; but in a local collection at Jerusalem.

257. *CICONIA ALBA*, L.

Flocks of Storks cover the whole land, hill and plain, by thousands for about a month from the first week in April. We were not able to discover it breeding.

258. *CICONIA NIGRA*, L.

In small bands throughout the winter in the barren plains by the Dead Sea.

259. *FALCINELLUS IGNEUS* (Gm.).

I am sure I once saw this bird near the Jordan, though we never obtained a specimen.

260. *RECURVIROSTRA AVOCETTA*, L.

Scarce; by the Lake of Galilee and elsewhere.

261. *HIMANTOPUS MELANOPTERUS*, Temm.

Not unfrequent in shallow marshy lakes. Breeds between Jenin and Nazareth.

262. *NUMENIUS* — ?

We saw Curlews several times in winter, but never obtained a specimen.

263. *TOTANUS STAGNATILIS*, Bechst.

Scarce.

264. *TOTANUS CALIDRIS*, Bechst.

Common in winter.

265. *TOTANUS OCHROPUS*, L.

Dispersed in all parts of the country. Remains till June.

266. *TOTANUS GLAREOLA*, L.

Obtained in winter.

267. *TRINGOIDES HYPOLEUCOS* (L.).

Very common in winter and spring.

268. *CALIDRIS ARENARIA* (L.).

Rare in winter.

269. *TRINGA CINCLUS*, L.

Very common on the coast in winter.

270. *TRINGA SUBARQUATA*, Guld.

Rare.

271. *TRINGA MINUTA*, Leisl.

Once seen on the coast in December ; and a pair shot at the south end of the Dead Sea in February, out of a small flock.

272. *SCOLOPAX RUSTICULA*, L.

Not rare in winter. Mr. H. M. Upcher shot one out of a cave, very high up in a bare and woodless ravine.

273. *SCOLOPAX GALLINAGO*, L.

Common.

274. *SCOLOPAX GALLINULA*, L.

One shot in the Plain of Esdraelon.

275. *CREX PRATENSIS*, Bechst.

Not rare. Met with at all seasons. One shot in December, in a garden at Sidon.

276. *RALLUS AQUATICUS*, L.

Scattered in all parts of the country, from the Dead Sea northwards ; a permanent resident.

277. *GALLINULA CHLOROPUS* (L.).

Common.



278. *PORPHYRIO HYACINTHINUS*, Temm.

In the marshes of Huleh.

279. *FULICA ATRA*, L.

Frequent. One shot by H. M. Upcher, Esq., under Jebel Usdem, in the Dead Sea.

280. *PHŒNICOPTERUS ANTIQUORUM*, Temm.

Shot on the Kishon, and frequently seen in other districts.

281. *CYGNUS MUSICUS*, L.

I possess a specimen which was brought into Jerusalem from the Pools of Solomon, and purchased by Dr. Chaplin, of the Jewish mission, a scientific and energetic naturalist, who presented it to me in a fresh state on December 26th.

282. *CHENALOPEX ÆGYPTIACA* (L.).

Frequently observed on the coast and by the Dead Sea.

283. *ANSER SEGETUM*, Bechst.

In the market at Beyrout.

284. *ANSER BRENTA*, Pall.

On passage.

285. *CASARCA RUTILA*, Pall.

In the Sebkhah Safieh, at the south end of the Dead Sea, and breeding in the hills of Northern Galilee.

286. *ANAS BOSCHAS*, L.

In winter.

287. *ANAS STREPERA*, L.

In winter.

288. *ANAS CRECCA*, L.

Not uncommon.

289. *ANAS MARMORATA*, Temm.

Very numerous in the marshes of Huleh, where it evidently breeds, but in places wholly inaccessible.

290. *ANAS ACUTA*, L.

In winter.

291. *RHYNCHASPIS CLYPEATA* (L.).

Observed in various districts.

292. *MARECA PENELOPE*, L.

In winter on the Jordan.

293. *FULIGULA MARILA*.

In winter on the coast.

294. *FULIGULA CRISTATA*, Ray.

In winter.

295. *FULIGULA NYROCA*, Gld.

Not uncommon. I believe it remains to breed.

296. *FULIGULA FERINA* (L.).

By far the most common of all the Ducks in winter. It swarms on the Jordan.

297. *OIDEMIA NIGRA*, L.

Noticed in winter on the coast.

298. *ERISMATURA MERSA*, Bp.

On the Lake of Galilee.

299. *MERGUS SERRATOR*, L.

Very common in winter.

300. *MERGUS ALBELLUS*, L.

Once found on the coast.

301. *PODICEPS CRISTATUS*, L.

Very common throughout the year, from the south of the Dead Sea up to the waters of Merom. Breeds in the Huleh.

302. *PODICEPS AURITUS*, L.

Most abundant on the Lake of Galilee.

303. *PODICEPS MINOR*, Lath.

Common in all parts of the country.

304. *PUFFINUS ANGLORUM*, Ray.

I found one on the shore under Mount Carmel in December.

305. *LARUS ICHTHYAËTOS*, Pall.

This most noble of all the Gull tribe is frequent in spring on the Lake of Galilee, and we also obtained a specimen in winter dress at the mouth of the Kishon.

306. *LARUS ARGENTATUS*, Brnn.

Common on the coast.

307. *LARUS FUSCUS*, L.

On the Lake of Galilee, as well as on the coast.

308. *LARUS CANUS*, L.

Common.

309. *LARUS AUDOUINI*, Payr.

On the Dead Sea, Jordan, and Lake of Galilee. Very common.

310. *LARUS GELASTES*, Licht.

On the coast.

311. *LARUS MELANOCEPHALUS*, Temm.

Obtained in my first visit, off Jaffa.

312. *LARUS RIDIBUNDUS*, L.

Extremely common.

313. *STERNA VELOX*, Rüpp.

On the Lake of Galilee.

314. *STERNA ANGLICA*, Mont.

On the coast.

315. *STERNA HYBRIDA*, Pall.

On the marshes of Huleh.

316. *STERNA CASPIA*, Pall.

Obtained in 1858 off Jaffa.

317. *HYDROCHELIDON NIGRA* (L.).

Not common.

318. *STERNULA MINUTA* (L.).

On the coast.

319. *PELECANUS ONOCROTALUS*, L.

Occasional.

320. *PELECANUS CRISPUS*, Bruch.

Occasional.

321. *PHALACROCORAX CARBO*, L.

Common on the coast.

322. *PHALACROCORAX PYGMÆUS*, Pall.

Scarce ; on streams flowing into the Mediterranean.

This list is confined strictly to species which have come under our personal observation, and, unless the contrary is stated, to those in the collections either of myself or my friends. It is still most imperfect, especially in the great classes of Grallatores and Natatores. Comparing the catalogue with those of the extremities of the Palæ-

arctic region east and west, we find, out of Mr. Swinhoe's list of 253 Chinese land-birds, 36 species common to Palestine. Out of 210 Chinese Waders and Waterfowl, 57 are common to Palestine.

Out of 230 Palestine land-birds, 79 are common to the British Isles, excluding from the British list all mere accidental stragglers; and out of 92 Palestine Gallatores and Natatores, 55 can justly be reckoned as ordinary British birds.

Of the whole 322 species noted in Palestine, 260 are included in the European lists; 31 are common to Eastern Africa, but are non-European species, or merely the most accidental stragglers, and are chiefly desert species of Nubia and the Sahara; 7 are of Eastern Asia; 4 of Northern Asia, *Serinus pusillus*, *Carpodacus erythrinus*, *Charadrius asiaticus*, and *Charadrius mongolicus*; 4 of the Gulls and Terns are characteristic of the Red Sea; and 27 species are, so far as our present knowledge extends, peculiar to Palestine and districts immediately adjacent, of which 9 species are now described for the first time, while several others, as *Cypselus galilæensis*, *Sitta krueperi*, *Bessonornis albigularis*, *Petronia brachydactyla*, *Nectarinia osea*, as well as most of Hemprich and Ehrenberg's new species, have not before been brought to England. Every species described by Hemprich and Ehrenberg has been obtained and identified during this expedition, excepting one doubtful species.

#### 4. NOTICE OF A NEW VARIETY OF GALAGO FROM QUILLIMANE (OTOGALE CRASSICAUDATA, VAR. KIRKII). BY DR. J. E. GRAY, F.R.S., ETC.

Dr. Kirk has kindly sent to the British Museum the skin and skull of a *Galago*, which he collected at Quillimane; but he says that he also observed it in other parts of Africa, as at Mozambique and on the Delta, among the palm-trees.

It is very different in colour from the specimen of *Otogale crassicaudata* in the British Museum; but we (for in the comparison I was assisted by Professor Allman and Dr. Kirk) cannot discover any perceptible difference between the skulls of the two specimens, more than what must arise from one being rather younger than the other. I have therefore determined to describe it as a variety, and apply to it the name of Dr. Kirk as a distinguishing mark. I think it very probable that these animals change considerably the colour of the fur, according to the season.

##### OTOGALE CRASSICAUDATA, VAR. KIRKII.

The fur pale ashy grey; the hairs of the general fur are black, with grey tips, and the body is scattered with long, projecting, rigid, black hairs. The cheeks and underside of the body and inside of the limbs whiter; the face, crown of the head, nape, middle of the back, shoulders, and outside of the fore limbs washed with yellowish brown, darkest on the crown, nape, and between the shoul-

ders; the fore feet and the hind feet to the heel dark brown; tail reddish brown, with numerous intermixed longer, black, thicker rigid, and slender softer hairs.

Dr. Kirk has kindly furnished me with the following particulars of the habits of this animal. It proves that man is not the only animal that likes fermented liquors, and takes them to excess after he has once tasted them. (On mentioning this fact to a friend, he told me he had, a short time ago, given a half-grown Scotch Terrier to a distiller, and that the dog had been returned to him because he could not by any correction be prevented from drinking the spirit as it came from the still, or any other spirits it could get, and would stagger and reel about, verifying the term, "a drunken dog," so often applied to inebriated men.)

"51 Thurloe Square, W., 22nd Oct., 1864.

"MY DEAR GRAY,—I am acquainted with two species of *Galago* in East Tropical Africa. The one is probably the *G. maholi* of Smith; but, never having captured specimens for comparison, there remains a doubt. Habits and appearance are identical. I have seen it frequently in the wooded mountainous regions about Tete, on the Zambesi, also on the shores of the Nyassa Lake. During the day it sits in trees or bush, is unwilling to move, and stares at the passers by; when it does make off, it goes with great speed by a series of leaps. It is active after sunset, when it will dart about, attracted by the camp-fires, making leaps of six feet almost horizontally, as noiseless as an owl.

"The second species is the *Otolicnus crassicaudatus*, differing from the specimen under that name in the British Museum in the colour of the fur, although no variety was seen among the specimens which came under my notice on the coast.

"While the *G. maholi* is peculiar to the interior, where its geographical range seems to be great, the other, or 'Great-tailed *Galago*,' is confined to the maritime region—so far as I know, never penetrating beyond the band of wood known generally as the mangrove-forests. By the Portuguese it is named 'Rat of the Cocoa-nut Palm,' that being its favourite haunt by day, nestling among the fronds; if disturbed, performing feats of agility, and darting from one palm to another. It will spring with great rapidity, adhering to any object as if it were a lump of wet clay. It has one failing; otherwise its capture were no easy task. Should a pot of palm-wine be left atop the tree, the creature drinks to excess, comes down, and rushes about intoxicated. In captivity they are wild, during the day remaining either rolled up in a ball or perched half asleep, with ears stowed, like a beetle's wing under the elytra. I had half a dozen squirrels with one in the same cage; these were good friends, the latter creeping under the 'Golgo's' soft fur and falling asleep. On introducing a few specimens of *Macroselides tetradactylus*, the 'Golgo' seized one and bit off its tail, which, however, it did not eat. The food it took was biscuit, rice, orange, banana, guava, and a little cooked meat. Stupid during the day, it became active at night, or just after dark-

ness set in. The rapidity and length of its leaps, which were absolutely noiseless, must give great facilities to its capturing live prey. I never knew it give a loud call; but it would often make a low chattering noise. It has been observed at the Luabo mouth of the Zambesi, at Quillimane, and at Mozambique. When I had my live specimen at Zanzibar, the natives there did not seem to recognize it; nevertheless it may be abundant on the mainland.

“ Ever yours, very sincerely,

“ JOHN KIRK.”

This animal is most probably the *Otolicnus crassicaudatus*, described by Dr. Peters, from Quillimane; but his figure is very much darker, and in other respects very different from the one here described; at the same time, I am well aware how difficult it is to represent animals, especially when soft-furred like the Lemurs.

I have compared the skull in the flesh of *Callotis montieri*, from Angola, with the skull of *Otogale crassicaudata*, and, as far as I could see the skull under the flesh with which it is enveloped in spirit, the two skulls and the teeth are very much alike, the orbit of *Callotis* being, if at all, but very little larger.

##### 5. NOTE ON THE CLAWED TOADS (DACTYLETHRA) OF AFRICA.

BY DR. J. E. GRAY, F.R.S., ETC.

There has long been known a Toad that has long slender fingers to its fore feet, like the *Pipæ*, and very large webbed hinder feet, some of the toes of which are armed with very distinct horny black claws—a peculiarity of structure that is quite an exception amongst the Batrachian animals.

The specimen first observed was brought from South Africa: it was described and figured by Cuvier, in the second edition of the ‘Règne Animal’ (vol. ii. p. 107, t. 7. f. 3), under the name of *Dactylethra*. This author states that the animal had been before partially known; for it is figured, but without its claws, in the ‘Planches Enluminées’ as the male *Pipa*, I suppose on account of the form of the feet. Daudin described it under the name of the *Crapaud lisse* (t. 30. f. 1); and Merrem, in his Compilations, calls it *Pipa buffonia*. It is now generally known as the *Dactylethra capensis* of Cuvier.

Dr. Peters, when examining a specimen of this animal which he obtained from Mozambique, discovered a very small cylindrical appendage, or beard, situated on the front part of the underside of the orbit; and described it as a new species, under the name of *Dactylethra mülleri*, in the ‘Monatsber. der Berlin. Acad.’ (1844, p. 37).

Dr. Hallowell, having observed the same beard under the eyes of a young specimen which he had obtained from the Gaboon through Dr. H. A. Ford, gives a long description of it, under the name of *Dactylethra mülleri*, in the ‘Proceedings of the Academy of Natural Sciences’ for 1857, p. 65.

Dr. Günther, in his excellent 'Catalogue of Batrachia Salientia in the British Museum,' published in 1858, admits the two species, and appears not to have observed the minute beard under the eyes in the specimens from South and West Africa, then in the Museum collection; but when we received, in 1862, the specimen from Natal collected by Mr. Ayres, he named it the *D. mülleri* of Peters.

Professor Auguste Duméril, in his paper on African Reptiles, published in the 'Archives du Muséum,' vol. x. (1861), makes some observations on the distinction of the two species, and figures the head of *D. capensis* and the entire animal of *D. mülleri*, showing the little beard under the eyes in the latter figure and not in the former. He also makes the head of *D. capensis* more produced and narrowed in front than in his figure of *D. mülleri*; but I cannot see any such difference between the heads of the Cape and Western African specimens in the Museum collection.

I may observe that if these naturalists had examined specimens from South Africa, either near the Cape or even so far north as Natal, they would have found the same beard in the true *Dactylethra capensis*, showing that this beard, at least, is a character of the genus, and not a peculiarity of the Mozambique or West African specimens.

In several of the specimens the beard under the eyes, at least when it is preserved in spirits, varies in size on the two sides of the animal; and in one specimen it is scarcely visible on one side, and well developed on the other.

Dr. Peters also gives as a character of his *D. mülleri*, that it has a spur at the base of the first toe; and Dr. Hallowell observes that the specimen he had from Gaboon "differs from the *Dactylethra* of the Cape, more especially in the presence of a sharp-pointed spur projecting from the cuneiform bone, which is not observed in *Dactylethra capensis*."

Dr. Günther, in his 'Catalogue' (p. 2), also uses this spur as part of the specific character. He says—

*D. lævis*. "Tarsus and metatarsus without any tubercle or spur."

*D. mülleri*. "A spur at the base of the first toe."

Professor Auguste Duméril, in the paper before referred to, figures the feet of *D. capensis* (t. 18. f. 6, 6a) for the purpose of comparing it with the feet of the other figure (of *D. mülleri*), and observes, "On peut saisir ainsi des dissemblances fort évidentes des deux espèces" (p. 232), showing the spur very distinct in the latter, and not visible in the former,—in fact, making the figure agree with the characters assigned, as in the case of the beard under the eyes, rather than as they are in nature.

On examining the specimens from the Cape of Good Hope (collected by Sir Andrew Smith and Mr. Hunter), from West Africa (collected by Mr. Fraser and Mr. Welwitsch), and from Natal (collected by the Rev. H. Callaway and Mr. T. Ayres), I find they all have exactly the same kind of spur, which is least distinctly marked in the latter specimen from Natal, called *D. mülleri* by Dr. Günther;

but the distinctness of the spur appears to depend on the whole foot being larger and more plump, and it is more distinctly developed or prominent in the smaller than in the larger specimens.

The black horny claws which cover the last joint of the three outer toes and the spur of the hind foot are deciduous in spirits. Hence the spur may have been overlooked in specimens which have been long in spirits; and the distinctness of the spur greatly depends on the presence or absence of this claw. These black claws are to be seen on the youngest specimens as soon as the toes are developed.

The skin is scattered with small white lines dispersed in a symmetrical manner, which, when examined by a magnifier of rather high power, display linear series of close minute perforations or glandular openings. Dr. Hallowell seems to have observed some of these; for he mentions "the semilunar rows of longitudinal glands on the throat;" but he does not seem to have seen that they are symmetrically distributed over nearly the whole of the body, and especially on the head, the back, and the sides, as well as the throat. He specially observes that the skin is smooth, and that there is no lateral line visible.

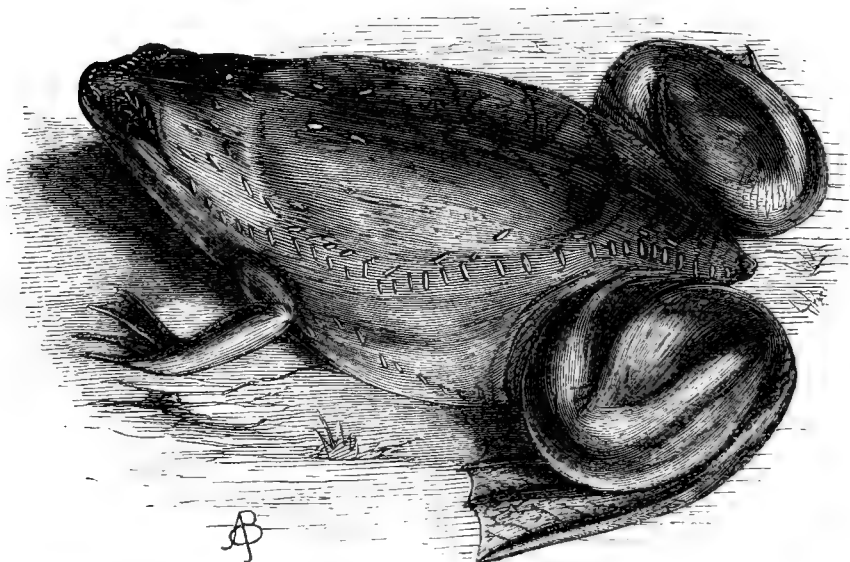
Professor Auguste Duméril does not take any notice of them in his short observations; but in his figure of *D. mülleri* (t. 18. f. 3) he represents the double series of them that surround the back like a double series of short prominences or tubercles, very unlike the sunken line of pores which they are—indeed so unlike that I should not have understood what they were intended to represent on this smooth-skinned Toad, had I not previously observed the glands, and if they were not placed exactly where the double line of pores is situated, and where there are no such prominences on the animal as his figure seems to represent.

I will now proceed to notice the distribution of the more important of these white glandular lines. There are two horizontal lines, slightly separated in the middle, at the end of the nose, under the nostril; a line between the eye and the nostril; and a series of oblique lines across the swollen band which surrounds the eye on the edge of the orbit; two rows of glands on the back of the neck, placed rather obliquely to each other, and some scattered ones on the outer side of them; two series of short lines from the middle of the temples, continued over the shoulder, along the sides, over the base of the thigh, to the upper surface of the vent; the upper line in these series is longitudinal, and the lower ones larger and transverse to the direction of the upper line. On the under parts there is a lunate series of arched linear glands across the throat and on each side of the body, commencing by an arched line round the back of the axilla, continued in a curved line, with the convex side of the curve downwards, along the side of the belly, and thence to the groin.

The disposition of these glands will appear to be of some importance in a zoological point of view when one studies the character of the genus *Silurana*. These glands, especially those on the under-side of the body, are much more distinct in some specimens than



they are in others; but I suspect this depends on the season when the specimen has been captured, and especially on the state and manner in which the specimen has been preserved.



The specimens in spirit rather vary in colour; but this may depend on the length of time that they have been in spirit, on the exposure to which they have been submitted, and on the strength of the spirit in which they were originally preserved.

The specimens of an adult male and female from West Africa, presented by Mr. Welwitsch, are of a uniform olive-brown above and yellowish below, marbled with very distinct, unequal-sized, subsymmetrically distributed olive spots.

The specimen from the Cape, presented by Sir Andrew Smith, which is in a rather soft state, is olive obscurely spotted above, pale whitish grey beneath, obscurely marked with small darker spots.

The adult specimen from Natal, collected by Mr. Ayres, and the smaller specimen from West Africa are of a uniform olive-brown above and pale grey-brown beneath, without any indication of spots.

Mr. R. B. N. Walker (to whom we are indebted for the best account of the habits of the Gorilla, and who has brought to England some most interesting animals from Western Africa) has lately been living at Lagos, where he observed some Tadpoles that were developed in abundance in a pond adjoining his residence. He put some of these in spirits, and gave them to the Free Museum at Liverpool. Mr. Moore having kindly sent me some of these specimens for examination, I was soon convinced that they had not before been observed, and therefore sent a short notice of them to the 'Annals and Magazine of Natural History' for September 1864, and named them, from their resemblance to the genus *Silurus*, *Silurana tropicalis*.

Some naturalists having expressed a doubt if the animals sent

home by Mr. Walker were not the young of the common *Dactylethra* (an opinion that I entertained myself when I first saw them, and until I had compared them with the papers on the subject), I have been induced to reconsider the question, and to study the genus. This study has led me to the conclusion that the two geographic species of *Dactylethra* are but one, which is spread over the whole of South and Western Africa; and also to retain the opinion that I have published, that the specimens brought by Mr. Walker from Lagos are probably of a distinct form. I will not take on myself to deny that they may not be the larva of *Dactylethra*, as the larva of that genus and the adult form of *Silurana* are unknown; but even if it is proved hereafter that they are only the larva of *Dactylethra*, I think that it is better for the present to keep them separate, until the change from one state to the other has been observed and recorded, and, at all events, that the description and observation of the larva is an important addition to the history of the genus.

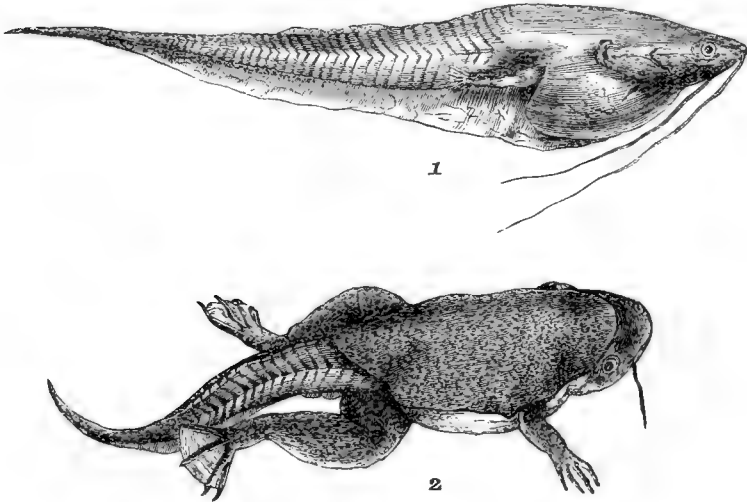
It would be a remarkable change, if the large beard that is placed at the angle of the mouth in one genus should turn into the minute beard on the lower edge of the orbit, far above and in front of the angle of the mouth, in the other; yet I am assured by an experienced herpetologist that he believes that this change does take place, and that it is only consistent with what is to be observed in the transformation of other Batrachians. No such changes have occurred to me. There is no doubt that the beard at the angle of the mouth is much longer and more slender in the young larva than it is in the oldest specimen we yet possess of the genus *Silurana*. But while the beard diminishes in length, it increases considerably in thickness, showing no inclination to disappear, and does not at all alter its place in any of the specimens I have observed either in the British Museum or at Liverpool.

The least-developed fish-formed specimen (fig. 1) is about  $2\frac{1}{2}$  inches long, and has only the hinder pair of legs developed. The legs are short and weak; and the toes are short and of nearly equal length, but with the three black claws well developed. The head is depressed, very broad and flat above, and shelving to near the back behind. The mouth is small, with a very long slender beard on the upper lip, at the angle of the mouth. The eye is on the keel on the side of the head, considerably behind the beard, placed so as to be visible from the upper and lower surface. The body is swollen; the tail compressed; the inferior fin commences in the middle of the belly, and is extended to the end of the tail.

There is a second fish-formed specimen, not more than 2 inches long and much more slender, which also has the front limbs developed, from the upper part of the sides; these limbs are weak, and the toes are short and equal. The hinder limbs are rather more developed, their toes rather more unequal; and the fin on the under part of the body and tail is also broad and more membranaceous. The mouth, beard, and eyes are exactly as in the former specimen.

The other two specimens (fig. 2) have assumed the form of the genus *Dactylethra*, having both the fore and hind limbs well deve-

loped, the eye on the side of the head only visible from the upper surface; but they have a well-developed tail attached to their bodies, with a very narrow, thin inferior membrane. The nose is blunt, rounded at the sides. The mouth small, the beard well developed at the angles. The eyes are far behind the angle of the mouth, and without any appearance of a small beard on the under part of the orbits. These specimens have a very distinct spur, covered with a black claw, at the inner side of the base of the hind foot.



I am willing to admit that there are some facts which might induce one to believe that these animals may prove to be the larva of *Dactylethra*; and, as truth is my only object, I think it right to state them, though they may only be similarities that are common to the two genera of the same family.

1. There is a small, white, round, prominent dot on the side of the nose in front, nearly on a level with the lower part of the orbit, which appears as if it might develope itself into the orbital beard of *Dactylethra*; and I think this much more likely to be the case, than that the beard of the angle of the mouth should become the suborbital beard.

2. There are the same double rows of glands which I have described as found in *Dactylethra*; but in these young animals they have a very peculiar appearance. On the forehead, rather in front of the eyes, there is a transverse groove, which is continued over the eyes, the base of the fore legs, along the side to the groin, and then bends up again, and becomes united to a similar groove on the upper surface of the body, which circumscribes an oval well-marked disk or shield that covers the back. The two rows of glands above described are placed on the margin of this shield. The glands are visible in the adult *Dactylethra*, but the disk is not distinguishable.

The disk is not distinguishable, except as a slight thickness on the back of the base of the tail, in the two fish-shaped larvæ. This shield is peculiar; it would almost seem to show that there is a certain affinity, or analogy, between the Toads and the Chelonians, or rather the freshwater Emydians.

#### DACTYLETHRIDÆ.

Head depressed; upper jaw toothed; tongue none; eyes with an inferior lid; orbits swollen, marked with transverse oblique white lines of minute pores. The Eustachian tubes united into one pharyngeal orifice. Skin smooth. Head and body with white lines of minute pores, symmetrically disposed. The back with a more or less distinct dorsal shield, commencing on the temples, and continued to the upper part of the base of the tail, marked by two series of short white lines of minute pores (the outer transverse and the inner longitudinal), and a more or less raised edge. The fore feet with four subequal tapering free toes. The hind feet with five elongated, rather unequal toes broadly webbed to the tips, the three outer toes and the spur on the outer side of the ankle furnished with black conical horny claws.

#### 1. DACTYLETHRA.

The dorsal shield indistinct, only marked by the double series of glands. Mouth large, not bearded. Orbit with a small beard on the under edge.

*D. CAPENSIS*, Cuvier. *D. lævis*, Günther. *D. mülleri*, Peters, Hallowell, Duméril.

*Hab.* South and South-eastern Africa.

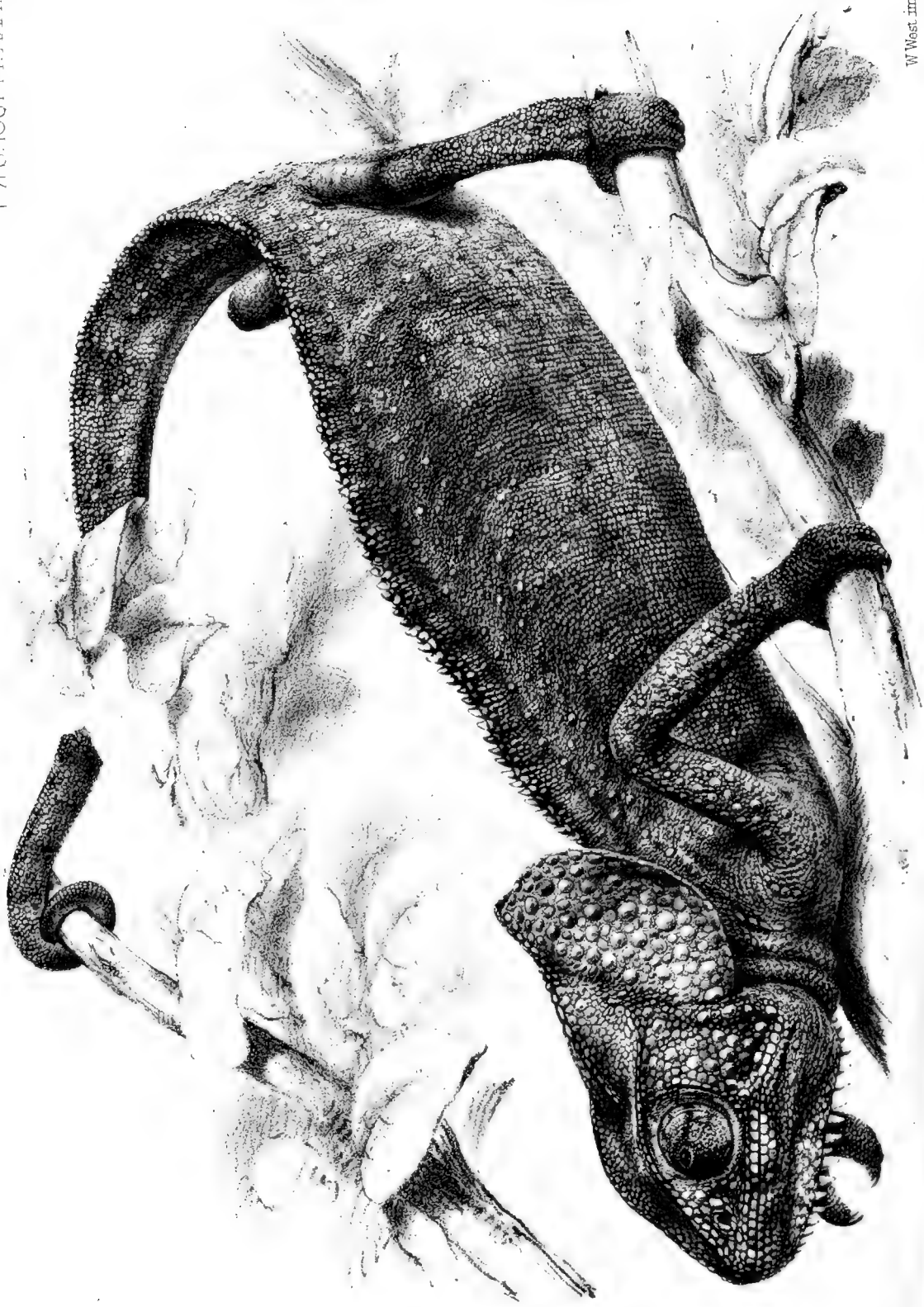
#### 2. SILURANA.

The dorsal shield very distinct, with a raised edge, and separated by a groove on the forehead. Mouth small, with an elongated beard on each side at the angle of the gape. Orbit without any beard. The larva fish-like; head flat, broad, truncated; mouth small, two-bearded; eyes in the keel of the side, shown above and below; body swollen; tail elongate, compressed; the belly and underside of the tail with a broad, membranaceous fin continued to the end of the tail.

*S. TROPICALIS*, Gray, Ann. & Mag. N. H. ser. 3, vol. xiv. p. 316.

*Hab.* Lagos (*R. B. N. Walker, Esq.*).









G. H. Ford.

W. West imp.

1. *Ensirostris melleri*. 2. *Sauroceras rhinoceratum*.



6. REVISION OF THE GENERA AND SPECIES OF CHAMÆLEONIDÆ,  
WITH THE DESCRIPTION OF SOME NEW SPECIES. BY DR.  
J. E. GRAY, F.R.S., F.L.S., ETC.

(Plates XXXI., XXXII.)

The Chameleons form one of the most natural family of Lizards, as well as one of the most clearly defined. The distinction of the species from one another, as is almost always the case in a natural group, is difficult, and requires careful study and consideration. The species in general are well marked when the characters are eliminated; but there are a few species, as *Chamæleon vulgaris* and *C. senegalensis*, which have a broad geographical distribution, that offer several variations such as, if the differences did not appear gradually to pass into each other, might induce one to believe that they were specific; but they can hardly be even considered as local varieties, for the same variation seems to occur in specimens from different localities often situated far apart.

There is considerable difference in the sexes, especially of the horned species which, I believe, was first established in my 'Monograph;' but this difference does not appear to be common to all the species of the Horned Chameleons; for while the female of *C. owenii*, *C. bifidus*, and *C. parsonii* are hornless, the expansions on the sides of the nose of *C. pardalis*, which are analogous to the horn in *C. bifidus*, are as much expanded in the adult female as in the males of that species.

The female specimens are much more common in museums than males; they are perhaps more easily caught when they come to the ground to deposit their eggs: and this appears more probable from the fact that females containing eggs are often to be found among those collected. In some cases, even where there is a series of specimens, they are all females; at least I have not, from the external appearance, been able to discover a male of *C. senegalensis* or *C. dilepis*.

Dr. Hallowell (Journ. Acad. Nat. Sc. Philad. vii. 99) thought at one time that the occipital lobes were peculiar to the females; I also was once inclined to believe this might be the case, before I had seen his remark, from observing that all our specimens of *C. dilepis* appear to be females; but I had the same difficulty in finding any males of *C. senegalensis* or other allied species; and M. A. Dumeril specially observes that "the cutaneous prolongation is not a character of the female *C. dilepis*" (Arch. du Mus. x. 174).

There is considerable variation in the distinction and height of the occipital crest in the specimens of *C. vulgaris* and in some other species. This often arises from the animals having been kept in confinement without (or with only a very limited supply of) food, until the muscles have shrunk. This should make one careful in using the height of the crest as a character, more especially as many of the specimens in museums have been kept alive in confinement either in the country which they naturally inhabit or in some other, as collectors like to have them alive as pets.

Yet the well-fed and fresh-caught specimens seem to vary considerably in this particular; for example, specimens of *C. vulgaris* from India, as a rule, seem to have the occipital crest higher and more arched than African specimens; but still there are in the Museum collection some African specimens which have quite as high crests.

Little attention seems to have been paid to the coloration of the species, probably because the animal greatly changes its colour during life; and specimens in spirits of some species, such as of *C. vulgaris*, offer many variations, from bright yellow to dark lead-grey. Yet in some species the distribution of the colours, at least in specimens in spirits, seems to form permanent specific marks, as, for example, the lines or white spots or white bands on the sides of several species.

The number of species has gradually increased. In my Monograph, published in the 'Catalogue of Lizards in the British Museum,' printed in 1845, I described eighteen species; the present revision contains thirty, distributed into fourteen genera.

Since the above Monograph, Dr. Hallowell has described three or four species from West Africa, in the 'Journal' and 'Proceedings' of the Academy of Natural Sciences of Philadelphia; but unfortunately I have not been able to make any of the specimens in the Museum collection agree with his descriptions. M. A. Duméril, in the 'Archives du Muséum,' has described and figured two new species, and he has given figures of the heads of fifteen other species. I have referred to these figures, as they elucidate several species described in my Monograph which had not before been figured. Unfortunately the figures are not as accurate as they might be; and one, that of *C. cucullatus*, is either absolutely erroneous or is from a Chameleon that differs very considerably in the proportion of the head, and in having a dentated crest on the chin, from the species to which M. A. Duméril has referred it, which was originally described by me from specimens in the British Museum collection—the account in the 'Erpétologie Générale' having been copied from my description.

Dr. Andrew Smith, in the fifth number of the 'South-African Quarterly Journal,' published at the Cape of Good Hope in October 1831, describes two new species, viz. *C. namaquensis* and *C. tænia-bronchus*; and in the Appendix to his 'Zoology of South Africa,' 1849, he describes a third, under the name of *C. gutturalis*. I have not been able to identify the two latter.

Dr. Fitzinger, in his 'Systema Reptilium,' published at Vienna in 1843, is the only author, as far as I know, who has attempted to divide the Chameleons into genera. He separates the family into two genera—*Chamæleon*, with homogeneous, and *Bradypodium* with heterogeneous scales. The rest of the lengthened characters which he gives for the genera are only transcripts of one another. He divides the first genus into three sections, viz. *Chamæleon*, *Triceras*, and *Furcifer*. The genera and the sections consist of species which have very little affinity, and appear to be very incongruously associated together: for example, *Furcifer* consists of *C. bifurcus*, *C. parsonii*,

and *C. brookesii*; and *Bradypodium* of *C. pardalis*, *C. verrucosus*, *C. pumilus*, and *C. cucullatus*. The species are not characterized, except by the synonyms appended. It appears that he divides *C. vulgaris* into four, and *C. senegalensis* into two species.

The species have hitherto, except in the instance of Fitzinger above cited, all been referred to a single genus, in which they have been generally arranged in an artificial manner, merely to facilitate the finding of their names.

The species throw themselves into groups agreeing in natural characters: these groups are quite as distinct as the groups in the other families, which are regarded as genera; I have therefore so regarded them. If a comparison of genera of different families is to be established, and their affinities to each other studied, the genera in the different families should be formed on the same plan.

The Chameleons are essentially confined to Africa and the islands near to that continent. Thus, as far as we at present know, the following species, *Chamæleon calypttratus*, *C. verrucosus*, *C. balteatus*, *Apola lateralis*, *Calumma cucullata*, *Crassonota nasuta*, *Sauroceras rhinoceratum*, *Dicranosaura bifurca*, and *D. parsonii*, are confined to Madagascar; *Cyneosaura pardalis* to the Isle of Bourbon; *Lophosaura tigris* to the Seychelles; *C. burchelli*, *Pterosauria cristata*, and *Triceras owenii* to Fernando Po and perhaps Old Calabar; *C. gracilis* to West Africa—Liberia; *C. petersii* to Mozambique; *Ensirostris melleri* to Eastern Africa; *C. auratus* to Arabia; *C. granulosis*, *Brookesia superciliaris*, and *C. senegalensis* to W. Africa; *C. lævigatus* to Central Africa; *C. affinis* to Abyssinia; *Phumanola namaquensis* to South-east Africa; *Lophosaura pumila* and *L. ventralis* to South Africa. *C. dilepis* is common to the west and south-east coast of Africa; while *C. vulgaris* is distributed over North and South Africa, Asia Minor, India, and Singapore.

Fam. CHAMÆLEONIDÆ, Gray, Cat. Lizards Brit. Mus. 264 (1845).

#### CHAMÆLEON, Gronovius, Fitz.

##### *Synopsis of the Genera.*

##### A. *The nose and orbit simple, not horned.*

1. CHAMÆLEON. Back and belly with a series of compressed elongated scales.
2. APOLA. Back-edge broad, with two series of minute scales; belly dentated.
3. PTEROSAURUS. Back and tail with a high fin, supported by bony rays, smooth-edged; belly dentated.
4. MICROSAURA. Back and chin crested; occiput keeled, compressed; sides smooth, divided into two square disks.
5. PHUMANOLA. Back rounded, with a series of large bony tubercles covered with scales.

6. **LOPHOSAURA.** Chin with a series of elongated processes covered with scales.
7. **CALUMMA.** Orbit with large lobes, covered with scales behind; back dentated; belly and chin rounded, not dentated.

B. *Nose simple; orbit angularly produced in front.*

8. **BROOKESIA.**

C. *Nose and orbit with cylindrical horns, covered with a sheath.*

9. **TRICERAS.** Horns, one on the nose and one on the front of each orbit.

D. *Nose with one or two bony prominences covered with scales.*

10. **CRASSONOTA.** Nose compressed in front, with a flexible compressed lobe covered with scales; back with a distant series of slender elongated scales.
11. **ENSIROSTRIS.** Nose-horn single, bony, central, sharp-edged above; occiput lobed behind; back with a lobed, erect fin.
12. **SAUROCERAS.** Nose-horn single, bony, central, sharp-edged below, grooved above; occiput simple behind; back dentate.
13. **DICRANOSAURA.** Nose-horns two, produced, compressed; back compressed; belly and chin rounded.
14. **CYNEOSAURA.** Nose dilated, and toothed on each side in front; back, chin, and belly dentate.

A. *Nose of male and female simple, not dilated; orbit simple.*

1. **CHAMÆLEON.**

Nose (of both sexes) simple, without any appendages or horns; the chin simple; orbit round, simple. The back, chin, and belly with a series of compressed elongated scales, forming a dentated crest.

a. *Occiput produced and acute behind, with raised central keel, with small scales behind the temples.* Calyptosaura.

1. **CHAMÆLEON CALYPTRATUS**, A. Dum. Arch. du Mus. vi. t. 21. f. 1.

The occipital ridge very high and large; scales equal, small.

*Hab.* Madagascar (*Mus. Paris.*).

I only know this species from the description and figure of M. A. Duméril.

2. **CHAMÆLEON VERRUCOSUS**, Gray, Cat. B. M. 267; Dum. & Bib. Erp. Gén. iii. t. 27. f. 1. B.M.

*Bradypodium verrucosum*, Fitz. Syst. Rept. 43.

Scales unequal; sides with several series of larger tubercles.

*Hab.* Madagascar. Males and females similar.

The series of scales on the belly and chin becomes less distinct in the older specimens.

- b. *Occiput produced and acute behind, with a raised central keel and with a flat space edged with a series of large scales, from the apex to the sides of the temple.* Chamæleon.

3. CHAMÆLEON VULGARIS, Gray, Cat. B.M. 265; A. Dum. Arch. du Mus. vi. t. 22. f. 1 (head). B.M.

The occipital crest moderate, upper edge arched; the side margin with a series of large scales, and more or less elevated; scales equal.

In spirits, brown, with two more or less interrupted pale longitudinal bands on each side; eyelids dark-rayed.

*Hab.* Africa and Asia; and naturalized in Europe.

Var. *marmoratus*. Forehead very concave; eyebrows and occipital crest very high. In spirits, pale brown, marbled with irregular black cross marks.

*Hab.* Dukhun (*Col. Sykes*).

In the British Museum there are specimens from S. Europe (*P. B. Well*); N. Africa, Egypt (*J. Burton*), Algiers and Tunis (*Fraser*), Tripoli (*Ritchie*); S. Africa (*Col. Denham*); Asia Minor, Xanthus (*Fellows*); India, Calcutta (*Hardwicke, Livesay*), Dukhun (*Sykes*), Anamallay Mountains (*Beddome*), Singapore (*Cantor*); Japan (*Zool. Soc.*).

After a most careful comparison, I have not been able to discover any distinction between the African and Asiatic specimens. The Asiatic ones have the bands on the sides less marked; indeed they are generally absent, but in some specimens they are clearly indicated. I was much tempted to separate them on this ground; but this character, and the height of the occipital crest, would not hold out after a rigorous examination and comparison.

Fitzinger, in his 'Systema Reptilium,' gives the names of *C. coromandelicus* to the Chameleon of India, *C. africanus* from Africa, *C. rimulosus* to that from Egypt, and *C. hispanicus* to that from Spain; but these species, or presumed species, are not characterized.

#### 4. CHAMÆLEON AURATUS.

B.M.

The scales large; dorsal, chin, and ventral crest well developed. The occiput extended and rather pointed behind, covered above with rather convex scales. The dorsal ridge is strongly toothed.

In spirits, pale yellow, with many bright yellow spots, and without any white spots or bands.

*Hab.* Arabia (*H. Christy*).

There is a second specimen, allied to this Chameleon, in the Museum collection, which differs in the occipital keel being very much lower and flatter; but in other respects they are very much alike. The one with the flatter occipital keel was received from the Zoological Gardens, and was said to have been sent from Mexico.

- c. *Occiput produced and acute behind, with a distinct central keel, with large hood-like occipital flaps, from apex to side of the temple, covered with flat scales.*

5. CHAMÆLEON PETERSII, n. s.

B.M.

*C. dilepis*, Peters, MS.

Back compressed, with a series of large compressed scales; forehead narrow, covered with flat scales with a strong sharp edge on each; occiput contracted and short-edged behind, with a well-raised central keel arched on its upper edge; occipital flaps broad, rounded, covered with large, flat, hexagonal scales; scales small, equal; chin and belly dentated, covered with flat scales.

In spirits, dark green, with a white spot behind the temple, and also a white streak from the axilla; forehead, temple, and side of occiput white.

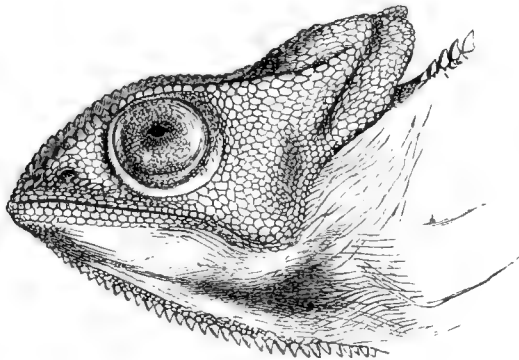
*Hab.* E. Africa, Mozambique (*MacLeod, Dr. Peters*).

Var. *kirkii*. The occipital lobes smaller.

B.M.

*C. dilepis*, Gray, P. Z. S. 1864.

*Hab.* Eastern Africa (*Dr. Kirk*). A female.



*Chamæleo petersii.*

- d. *Occiput produced and acute behind, with a low keel, and two large broad flaps behind, covered with large, irregular, convex shields; scales of body and limbs with larger tubercles.*

6. CHAMÆLEON MONACHUS. (Pl. XXXI.)

B.M.

Brown (in spirits), dorsal keel and body white-speckled, upper and lower lip at the gape and ventral crest white; the occipital flaps large, with irregular, unequal, flat shields; the body and limbs with low, convex, larger tubercles.

*C. cucullatus*, A. Duméril, Arch. du Mus. vi. t. 6. f. 9 (not Gray).

*C. parsonii*, Cat. Mus. Zool. Soc. MS.

*Hab.* Madagascar.

The head of this species is not well figured as that of *C. cucullatus* by M. A. Duméril. It is at once known from that species

by the form of the occiput, and the crest on the chin and belly. It is a fine large species. We received it from the Zoological Society in 1855.

e. *Occiput broad and rounded behind, flat above, with a scarcely raised central line behind.*

† *The sides of the occiput with small granular scales.* Erizia.

\* *Chin and belly with a distinct denticulate line of white scales.*

7. CHAMÆLEON SENEGALENSIS, Gray, Cat. B. M. 286; A. Dum. Arch. du Mus. vi. t. 22. f. 7 (fig. bad); Fitz. Syst. Rept. 41. B.M.

? *C. leptopus*, Fitz. Syst. Rept. 41.

Scales large; head broad and rounded behind; occiput covered above with convex scales.

In spirits, brown or purplish.

*Hab.* West Africa, Senegal (*Earl of Derby*).

8. CHAMÆLEON LÆVIGATUS, Gray, P. Z. S. 1863; Ann. & Mag. N. H. 1863, xii. 248. B.M.

Scales minute; the dorsal crest very indistinct, only visible on the nape; head rhombic behind; occiput covered above with flat thin scales.

*Hab.* Central Africa, Chartoom (*Petherick*).

Probably only a young specimen of the preceding.

9. CHAMÆLEON GRACILIS, Hallowell, Journ. Acad. N. S. Philad. viii. 324, t. 18 (♀ and eggs); Proc. Ac. N. S. Philad. 1854, 99; A. Dum. Arch. du Mus. x. 173 (a note only). B.M.

*C. senegalensis*, var., Gray, Cat.

Scales large; head broad and acute behind; occiput covered above with convex scales.

In spirits, olive, with a white spot on the shoulder, or interrupted on the upper part of the back, and with a band of white spots from the axilla.

*Hab.* W. Africa, Senegal (*A. Gerrard*), Angola, Congo, Cuanga, and Pungo Adongo (*Dr. Welwitsch*), ? Liberia (*Dr. Ford*).

Var. ? *leiocephalus*.

B.M.

Scales and colour like the former; the scales on the crown and occiput above flat, smooth, hexagonal.

*C. dilepis*, Gray, Cat. Mus.

*Hab.* W. Africa, Fantee (*Capt. Marryat*), Ashantee (*Mus. Leyden*).

The figure of Dr. Hallowell is a moderately good representation of this species; but the name is not the best, as it is a stouter and stronger species than *C. senegalensis*.

\*\* *Chin without any white dentated ridge of scales ; belly dentated.*

10. CHAMÆLEON AFFINIS, Rüppell ; Gray, P. Z. S. 1863 ; Ann. & Mag. N. H. 1863, xii. 248.

*C. abyssinicus*, Wiegmann, Mus. Berolin. ; Fitz. Syst. Rept. 43.

Lead-coloured (in spirits), with two white long spots on the temple behind the eyes, upper part of back with an interrupted broad white band ; scales large, subequal.

*Hab.* Abyssinia, from Mus. Francofort.

\*\*\* *Chin dentated ; middle of belly not dentated.*

11. CHAMÆLEON BALTEATUS, A. Dum. Arch. du Mus. vi. 260, t. 21. f. 2 ; x. 174.

Back dentated ; scales subequal, brown ; edge of jaws, middle of the belly, and tail, a broad oblique streak from shoulder to groin, and a streak on each side of the belly yellowish ; chin slightly dentated ; "middle of the belly not dentated" (Arch. Mus. x. 174).

*Hab.* Madagascar (*Mus. Paris.*). A single specimen. I have not seen this species.

The following species appear to belong to this division :—

12. CHAMÆLEON GRANULOSUS, Hallowell, Proc. Acad. N. S. Philad. 1856, 147.

Grey ; belly bluish ; scales on the sides unequal, tubercular ; four or five rows of flat quadrangular scales between the dorsal denticulations and the lateral tubercles.

*Hab.* West Africa (*Mus. Philad.*). A single specimen.

13. CHAMÆLEON BURCHELLI, Hallowell, Proc. Acad. N. S. Philad. 1856, 147.

Greenish, with a lateral yellow stripe ; scales of body unequal, tubercular, subrhomboid, interspersed with very small granules ; of sides of head, rather large, flattened.

*Hab.* Fernando Po (*Mus. Philad.*). A single specimen.

†† *Sides of the occiput with a fleshy lobe, covered with scales from the apex of the occiput to the middle of the temple.* Dilepis.

14. CHAMÆLEON DILEPIS, Leach ; Gray, Cat. B. M. 266 ; A. Smith, Zool. S. Africa, App. 3 ; A. Dum. Arch. du Mus. vi. t. 22. f. 8 (not good). B.M.

*C. bilobus*, Kuhl ; Fitz. Syst. Rept. 41.

Dorsal crest of a single series of short conical scales ; scales of body conical, convex, of crown and forehead flat, larger.

In spirits, bluish brown, a short white streak at angle of mouth, and a white band from the axilla along the sides of the belly, and another over the shoulder.



*Hab.* West Africa (*Richardson*), Gaboon (*Bowdich*), the type specimen described by Dr. Leach; S. Africa, Latakoo (*A. Smith*), Port Natal (*Rev. H. Calloway, Ayres*).

## 2. APOLA.

Nose of both sexes simple; orbit rounded. Chin and belly dentated. Back compressed; upper edge flat, with a series of minute scales on each side. Occiput keeled. Scales granular, equal.

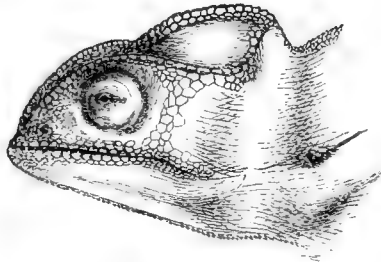
### 1. APOLA LATERALIS.

B.M.

*Chameleo lateralis*, Gray, Cat. B. M. 264; A. Dum. Arch. du Mus. vi. t. 22. f. 6 (head).

Pale brown, with a narrow, continued pale streak on the middle of the sides; ventral line white.

*Hab.* Madagascar.



*Apola lateralis.*

## 3. PTEROSAURUS.

Nose and chin simple. Back and tail with a high crest, supported by long bony rays. Belly slightly dentated. Chin and back smooth-edged. Orbit rounded. Occiput much produced, sloping, acute behind, flat above, or rather concave, without any central ridge; hinder sides covered with very small scales. Scales small, with scattered larger ones.

### 1. PTEROSAURUS CRÍSTATA.

B.M.

*Chameleo cristatus*, Gray, Cat. B. M. 264.

Sides with a series of larger circular scales.

In spirits—red-brown, with numerous large, equal, roundish, white spots.

*Hab.* Fernando Po; Old Calabar (*Murray*).

One of the Museum specimens has two dark spots in front of the upper part of the nose over the nostrils. Is this a sexual character?

## 4. MICROSAURA.

The occiput much narrowed and compressed behind, flat above, with a slightly raised central keel; the side of the occiput with a smooth space, separated from the smooth temple by a central nodulous

ridge (as in *Lophosaura*). Back and chin with a crest of small compressed scales. Belly not dentated. Scales of body unequal; of legs equal, flat.

1. *MICROSAURA MELANOCEPHALA*.

B.M.

White (in spirits), head and shoulders black, fore legs blackish; scales of the body granular, small, convex; with a longitudinal series of large, circular, slightly raised tubercles on the middle of each side, and with a similar series of small tubercles on the sides of the middle of the back; scales of the legs larger than those of the body, flat, equal.

*Hab.* S. Africa, Port Natal, 1862.



Head of *Microsaura melanocephala*.

5. *PHUMANOLA*.

Nose and chin simple. Back with a series of large bony tubercles covered with scales. Orbit very prominent, rounded. Occiput triangular, with a central nodulous ridge; small convex scales. Scales uniform, convex. Forehead, crown, and back of chin and belly not toothed. Tail cylindrical, rounded above.

1. *PHUMANOLA NAMAQUENSIS*.

B.M.

*Chamæleo namaquensis*, A. Smith, Zool. Journ. 1831; A. Dum. Arch. du Mus. vi. t. 22. f. 3\*.

*C. tuberculiferus*, Gray, Cat. B. M. 267.

In spirits, dark brown, paler below; sides black-spotted, with a series of irregular-shaped, black-edged, pale spots along the middle; belly with a dark-edged, central, broad longitudinal band.

*Hab.* S. Africa—Little Namaqua Land, near the mouth of the Gariiep or Orange River (*A. Smith*).

6. *LOPHOSAURA*.

Nose simple, without appendages. Chin with a series of skinny lobules beneath. Occiput produced, acute behind, keeled above. Back and throat often dentated. Scales unequal. Belly not toothed.

a. *Back compressed, with a continuous series of large compressed scales; scales unequal.* *Lophosaura*.

1. *LOPHOSAURA PUMILA*.

B.M.

*Chameleo pumilus*, Gray, Cat. B. M. 269; A. Dum. Arch. du Mus. vi. t. 22. f. 5.

*Bradypodium pumilum*, Fitz. Syst. Rept. 43.

Scales of body and limbs moderate, unequal, with one or two series of large scales on the sides; sides of occiput and temples covered with flat scales.

In spirits, bluish, with a white streak from the orbit to the shoulder, and from the temples along the sides of the back.

*Hab.* South Africa; Cape of Good Hope.

Var. *fordii*. Scales larger, more acute; tubercles on the side of the back large, elongate, keeled; throat-fringe elongate, covered with acute scales; scales of belly small, equal.

*Hab.* S. Africa, on branches of underwood; from Haslar Hospital.

*Trup sutchees* of the Cape Colouist; that is, "Tread lightly."

## 2. LOPHOSAURA VENTRALIS.

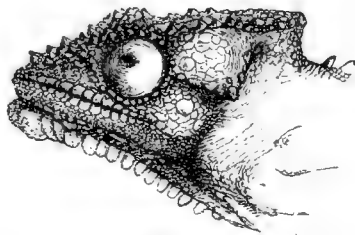
B.M.

*Chameleo ventralis*, Gray, Cat. B. M. 268.

*C. pusillus*, var.?, A. Smith, S. A. Zool. App. 2; A. Dum. *l. c.* 261.

Scales small, with three or four series of large, flat, oval scales, with convex centres, on the sides, and several series on the sides of the belly, and two series on the sides of the tail.

*Hab.* S. Africa. Male and female.



*Lophosaura ventralis*.

b. *The back with a series of distant conical compressed scales; tail and belly not crested.* Archaius.

## 3. LOPHOSAURA TIGRIS.

B.M.

*Chameleo tigris*, Gray, Cat. B. M. 268; A. Dum. Arch. du Mus. vi. t. 22. f. 3.

Scales of temple, occiput, back, and limbs uniform, small, granular.

In spirits, yellow, brown-spotted; spots sometimes confluent, forming short longitudinal lines.

*Hab.* Seychelles Islands.

*Chamæleo gutturalis*, A. Smith, Append. Z. S. A. 3.

"Back and tail surmounted with three rows of three-sided tubercles; body and tail covered with small scales and subconic tubercles; sides with two longitudinal rows of large subovate flat plates; chin and throat fringed longitudinally with long, small, thin, narrow and pointed lobes of skin. Length  $6\frac{1}{2}$  inches.

"*Hab.* S. Africa.

"Distinguished from *C. pumilus* by the length of the lobes of the

guttural fringes, and their being smooth and destitute of granular scales."

We have no specimen of this genus which has the scaleless lobes of the chin as here described.

*Chamæleo tæniabronchus*, A. Smith, S. Afr. Quart. Journ. 1831, p. 17.

"Yellowish green, with two longitudinal buff stripes along each side, and four or six smooth, oblong, jet-black stripes along the sides of the throat, best seen when the animal inflates itself, or when the skin is extended laterally; occipital casque narrow, produced, armed above with three dentated ridges, one on each side, and another along the centre; back with a ridge of short conical tubercles, inclined backwards; chin and throat with a short, dentated longitudinal fringe; scales of the body small and granular; temples divided longitudinally by a dentated ridge.

"*Hab.* Algoa Bay. One specimen,  $4\frac{1}{4}$  inches long."

## 7. CALUMMA.

Nose and chin simple; orbits rounded. Occiput lozenge-shaped, produced behind, and shelving on the sides, with very large flaps on the hinder side edges. Back compressed, with a series of compressed conical scales. Chin and belly rounded, not dentated, without any line of conical scales (female).

### 1. CALUMMA CUCULLATA.

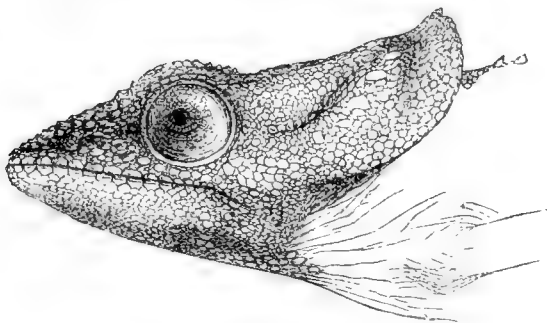
B.M.

*Chameleo cucullatus*, Gray, Cat. B. M. 267.

*Bradypodium cucullatum*, Fitz. Syst. Rept. 43.

*Hab.* Madagascar. A single female specimen.

A. Duméril (Arch. du Mus. vi. t. 22. f. 9) figured a "*C. capuchon*" with a well-marked dentated line of scales on the chin. It is a very distinct species. Described above (at page 470) as *C. monachus*.



*Calumma cucullata.*

B. *Nose simple; orbit angularly produced in front.*

## 8. BROOKESIA.

Nose of both sexes simple. The eyebrows produced above into

triangular horns. Scales very minute. Chin, back, and belly not toothed; the sides of the back with a longitudinal series, and the chin with an arched series, of subulate erect scales. Tail short, compressed at the base.

1. BROOKESIA SUPERCILIARIS.

B.M.

*Chamæleo superciliaris*, Kuhl.

*C. brookesianus*, Gray, Cat. B. M. 270; cop., A. Dum. Arch. du Mus. vi. t. 22. f. 14.

*Chamæleon brookesii*, Fitz. Syst. Rept.

*Hab.* West Africa.

C. *Nose and orbit of male with cylindrical horns.*

9. TRICERAS.

*Chamæleon*, § *Triceras*, Fitz. Syst. Rept. 43.

The nose of the male with three horn-like processes, covered with a conical, continuous, horny sheath—one from the front of each orbit, and the other from the middle of the nose. Chin simple. Back, chin, and belly not crested. Occiput flat, with a slightly raised central line. Scales uniform, granular.

1. TRICERAS OWENII.

B.M.

*Chameleo owenii*, Gray, Cat. 269; Zool. Misc. t. 4; cop., A. Dum. Arch. du Mus. vi. t. 22. f. 10 (head).

♀. *C. bibronii*, Martin.

*Chamæleon owenii*, Fitz. Syst. Rept. 102.

Dark brown in spirits, with several series of oval longitudinal spots; those on side of back forming a pale band; eyelid dark-rayed.

*Hab.* Fernando Po (*Capt. Edw. Owen*).

D. *Nose with one or two bony processes covered with scales; orbits simple, unarmed.*

10. CRASSONOTA.

The nose (of male?) compressed in front, with a flexible compressed lobe covered with scales. Chin simple; orbit rounded. Back rounded, with a series of small, distant, slender, flexible, single scales. Chin and belly rounded, not dentated. Tail rounded above. Occiput flat above, produced behind, shelving on the sides, and covered with small scales. Scales equal, thin.

1. CRASSONOTA NASUTA.

B.M.

*Chameleo nasutus*, Gray, Cat. B. M. 268; A. Smith, Zool. S. Africa, App. 3; A. Dum. Arch. du Mus. vi. t. 22. f. 4 (head bad).

*Chamæleon nasutus*, Fitz. Syst. Rept. 42.

Pale brown; belly paler; head and limbs white-spotted.

*Hab.* Madagascar.

Var. "With three isolated spines, each about a line in length, on

the vertebral line, about midway between the head and the base of the tail.

“*Hab.* Eastward of Port Natal.

“Length: head and body 1 inch 10 lines; tail 1 inch 9 lines. Appears to be an adult.” (*A. Smith*, l. c.)

### 11. ENSIROSTRIS.

Nose (of male, at least) with a single central compressed bony horn, sharp-edged above. Orbit rounded. Chin and belly simple, not dentated. Back and tail with a high crest of roundish lobes covered with scales. Occiput keeled, acutely produced behind, shelving on the sides, and with a broad hood-like lobe covered with scales on each side behind; scales unequal, granular, with larger rounded scattered tubercles.

#### 1. ENSIROSTRIS MELLERI. (Pl. XXXII. fig. 1.) B.M.

Stuffed, grey-brown, with whitish cross-bands on the body.

*Hab.* E. Africa, on the mountains in the interior (*Dr. Meller*). A single specimen, probably a male.

The head and hood are somewhat like those of *Calumma cucullata*; but the back-crest and the scales are very different, too different to be sexes of the same species, as I was once inclined to think they might be.

### 12. SAUROCERAS.

Nose (of male, at least) with a single central elongated bony horn, with a deep angular channel on the upper, and a sharp edge on the lower side. Orbit rounded. Back rather compressed, with a series of compressed conical scales. Tail compressed above. Occiput keeled, acutely produced behind, shelving on the sides, with a raised edge below, covered with small scales behind. Scales unequal, granular, with large interspersed tubercles.

#### 1. SAUROCERAS RHINOCERATUM. (Pl. XXXII. fig. 2.) B.M.

*Chameleo rhinoceratus*, Gray, Cat. B. M. 267.

*Hab.* Madagascar. A single small specimen.

### 13. DICRANOSAURA.

Nose of male produced on the sides into two compressed bony horns covered with scales; of female, simple, hornless. Orbit rounded. Occiput flat above, produced, broad, and rounded behind, with small scales on its hinder sides. Back compressed, keeled, sometimes dentated in front. Chin and belly not toothed. Scales equal.

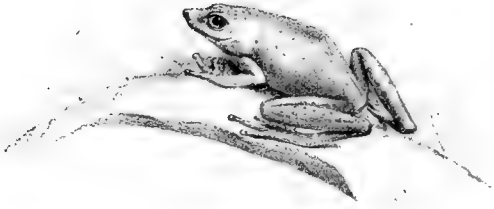
#### 1. DICRANOSAURA BIFURCA. B.M.

*Chameleo bifurcus*, Gray, Cat. B. M. 268; A. Dum. Arch. du Mus. vi. t. 22. f. 3.

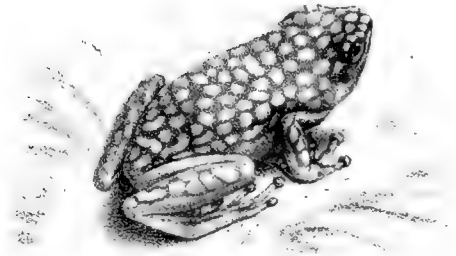
*Chamæleon brongniartii*, Fitz. Syst. Rept. 42.

Nose-horns elongate; back dentated in front. Grey (in spirits),





3



4



1



2



with a broad white streak down each side of the belly ; scales equal, square.

*Hab.* Madagascar. Male and female.

Var. *crassicornis*.

B.M.

One of the males, with the horns only partly developed, has them very thick and trigonal at the base, so as nearly to reach across the nose. In another young male, about the same size, they are compressed and far apart at the base, as in the type specimens.

2. DICRANOSAURA PARSONII.

B.M.

*Chameleo parsonii*, Gray, Cat. B. M. 264 ; A. Dum. Arch. du Mus. vi. t. 22. f. 12.

*Chamæleon parsonii*, Fitz. Syst. Rept. 42.

The nose-horns erect, lobed ; back rounded, not dentated in front.

*Hab.* Madagascar.

There is only a female of this species in the Museum.

14. CYNEOSAURA.

Nose of both sexes flat in front, with the sides dilated, serrated, and covered with large scales. The occiput flat, with a sharp-edged, narrow, central keel above, produced, broad, and rounded behind. Orbit simple. Back compressed, with a series of large compressed scales. Chin and belly dentated. Scales unequal.

1. CYNEOSAURA PARDALIS.

B.M.

*Chameleo pardalis*, Gray, Cat. B. M. 266 ; A. Dum. Arch. du Mus. vi. t. 22. f. 11 (head).

*Bradypodium pardalis*, Fitz. Syst. Rept. 43.

Brown in spirits, with a broad white streak down the middle of the sides.

*Hab.* Bourbon ; Madagascar.

7. DESCRIPTIONS OF NEW SPECIES OF BATRACHIANS FROM WEST AFRICA. BY A. GÜNTHER, M.A., M.D., Ph.D., F.Z.S.

(Plate XXXIII.)

PYXICEPHALUS RUGOSUS. (Pl. XXXIII. fig. 1.)

Similar to *P. delalandii*. Habit rather stout ; head broad, the distance between the angles of the mouth being equal to the length of the head ; snout obtuse, as long as the diameter of the eye, with the upper part somewhat projecting beyond the mouth, and with the loreal region obliquely sloping outwards. Lower jaw without prominent apophyses ; eustachian openings narrower than the choanæ ; vomerine teeth in two short oblique series between the choanæ. Tympanum indistinct, smaller than the orbit. Upper parts of the head and body with prominent glandular folds and tubercles ; tubercles in the interorbital region disposed in pairs ; *two glandular folds*

commence behind each superciliary, and converge towards those of the other side, curving again outwards behind the nape. Limbs of moderate length: the second finger is shorter than the first, and the fourth shorter than the second, the third being the longest. The distance between the vent and heel is scarcely less than the length of the body; tarsus with a longitudinal fold; metatarsal tubercle compressed, well developed; toes webbed at the base only; the third a little longer than the fifth. Lower parts of the body smooth.

The upper parts of the head and body are variegated with reddish olive and dark brown, all the dark-brown markings having narrow whitish edges. Two dark-brown bands, the posterior of which is subtriangular, cross the interorbital region. A large subquadrangular space between the inner nuchal folds is reddish olive, with some darker markings; the band-like space between the nuchal folds of each side is dark brown; the foremost part of the snout, a spot below the orbit, tympanum, numerous irregular spots on the hinder part of the body, and, finally, cross bands on the fore and hind limbs are dark brown. Lower parts uniform white.

	lines.
Length of the body . . . . .	18 $\frac{1}{2}$
Width between the angles of the mouth . . . . .	7 $\frac{2}{3}$
Diameter of the eye . . . . .	2
Length of fore limb . . . . .	13
——— of third toe (from base at metacarpus) . . . . .	4 $\frac{1}{2}$
——— of hind limb . . . . .	29 $\frac{1}{2}$
Distance between vent and heel . . . . .	17
Length of fourth toe (from the base at metatarsus)	9

Two specimens of this species were collected by Dr. Welwitsch at Pungo Andongo (Angola).\*

#### PHRYNOBATRACHUS NATALENSIS.

This species occurs also on the west coast; however, specimens from Angola have the toes a little more slender than those from Natal.

Snout rather pointed, somewhat longer than the diameter of the eye (without canthus rostralis), the loreal region obliquely sloping outwards. No fold in front or behind the orbit. Choanæ and eustachian openings very small; tongue narrow, deeply notched behind. Tympanum indistinct, small. Upper parts with flat, smooth tuber-

\* The celebrated traveller and botanist, Dr. Welwitsch, has presented to the British Museum a very interesting collection of reptiles from the different provinces of Angola which he visited:—*Crocodilus vulgaris*, from Pungo Andongo; *Monitor niloticus*, from Condo; *Scelotes bipes*, L., *Agama occipitalis*, Gray, *Chamæleo senegalensis*, from Condo; *Chamæleo tuberculiferus*, Gray, from Mossamedes; *Dasyplettis palmarum*, Leach, *Psammophis oxyrhynchus*, Reinhardt, from Pungo Andongo; *Ahetulla irregularis*, Leach, *Boodon lineatus*, Gthr., *Causus rhombeatus*, Wazl., *Dendraspis welwitschii*, Gthr., *Atractaspis irregularis*, Reinh. (this specimen has the five anterior subcaudal shields entire, and the other seventeen divided! it is from Pungo Andongo); *Clotho arietans*, Merr., and *Vipera caudalis*, Smith, from Mossamedes; *Dactylethra levis* and *Hyperolius marmoratus*, Rapp, from Huilla, from 5000 to 6000 feet above the level of the sea; *Rana oxyrhyncha*, Sundev.; *Bufo pantherinus*, Boie.

cles; lower parts smooth, except the very expansible skin of the throat in the male, which is folded. Limbs of moderate length; the first finger is scarcely longer than the second and fourth, which are equal in length, the third being the longest. The distance between vent and metatarsal tubercles is only a little more than the length of the body; metatarsus with two tubercles, tarsus with a third on the middle of its inner edge. Toes tapering, half-webbed, the third being a little longer than the fifth; the fourth very slender. Dark-brownish olive, with indistinct darker spots on the sides; lower parts white; throat of the male brown, of the female dotted with brown

	lines.
Length of the body . . . . .	15
——— of the fore leg . . . . .	9
——— of the hind leg . . . . .	23
Distance between vent and heel . . . . .	12½
Length of tarsus, with fourth toe . . . . .	10½
——— of fourth toe, without tarsus . . . . .	7

The British Museum has received several examples of this species from M. Barboza du Bocage; they were collected in the province Duque de Braganca.

*Phrynobatrachus natalensis*, Günth. Proc. Zool. Soc. 1862, p. 190, is identical with *Stenorhynchus natalensis*, Smith—a frog which I omitted to compare when describing *Phrynobatrachus*. *Dicroglossus angustirostris*, Cope, Proc. Acad. Nat. Sc. Philad. 1862, p. 341, is likewise identical with that species. Peters proposed the generic name of *Leptoparius* for that of *Stenorhynchus*, because the latter is preoccupied (Monatsber. Akad. Wiss. Berl. 1863, p. 452); *Phrynobatrachus*, however, has the priority.

#### CYSTIGNATHUS BOCAGII. (Pl. XXXIII. fig. 2.)

Similar in habit to *C. senegalensis*. Head broad and short, with the snout obtusely rounded; canthus rostralis short; loreal region flat, oblique; eye of moderate size, tympanum rather indistinct, much smaller than the eye. Vomerine teeth in two short groups, between the choanæ, which are small; tongue broad behind, truncated, with each hinder corner slightly produced; fore limbs of moderate length; hind limbs and toes short; a rather large, compressed, ovate tubercle at the base of the inner toe. Upper parts smooth; all the lower parts, from the chin to the vent, coarsely granulated; skin between the angle of the mouth and the eye granular. Upper parts and throat brownish black, the remainder whitish.

	lines.
Length of body . . . . .	20
Width between the angles of the mouth . . . . .	8
Length of fore limb . . . . .	12
——— of third and fourth toes . . . . .	3½
——— of hind limb . . . . .	26
——— of fourth toe (from the tarsus) . . . . .	8
——— of fifth toe . . . . .	6¼
Distance between vent and heel . . . . .	14½

For the knowledge of this species I am indebted to M. Barboza du Bocage, who has allowed me to examine the unique specimen brought from the province of Duque de Braganca (Angola) to the Lisbon Museum.

*HYPEROLIUS NASUTUS.* (Pl. XXXIII. fig. 3.)

Snout much produced, acutely pointed, with the canthus rostralis angular, and the loreal region flat; diameter of the eye more than half as long as the snout; tympanum hidden; tongue deeply notched; limbs slender; fingers slightly, toes half webbed. Upper parts smooth; belly faintly granulated. Reddish white, with more or less numerous brown dots on the head and back.

Length of body .....	lines.
———— of hind limb .....	$11\frac{1}{2}$
Distance between vent and heel .....	$17\frac{1}{2}$
Length of fore limb.....	$11\frac{1}{2}$
	8

This species inhabits the province Duque de Braganca, whence we have received it through M. Barboza du Bocage. Other specimens are in the Lisbon Museum.

*HYPEROLIUS RETICULATUS.* (Pl. XXXIII. fig. 4.)

Snout broad, rather depressed, of moderate length, somewhat truncated in front, with the loreal region flat and vertical. Tympanum small, but distinct; tongue heart-shaped, notched behind. Limbs of moderate length; fingers one-third, toes two-thirds webbed. Upper parts smooth; belly finely granulated. All the upper parts densely covered with round white spots, as large as the eye, and separated from one another by the brown ground-colour, which appears as a regular network. Femur entirely colourless.

Length of body .....	lines.
———— of hind limb .....	15
Distance between vent and heel .....	23
Length of fore limb.....	$13\frac{1}{2}$
	9

A single specimen is in the collection of the British Museum, and comes probably from West Africa.

8. NOTES ON SUNDRY MAMMALIA. BY E. BLYTH.

*The Species of Chevrotain.*

The excellent memoir by M. Alphonse Milne-Edwards on the Chevrotains, or 'Mouse-Deer,' with its accompanying coloured figures, leaves little to be accomplished in the way of further elucidating the specific types of these animals.

The fairly recognizable subordinate types, respectively, of India with Ceylon, and of the Malay countries, *Meminna* and *Tragulus* of

Gray, are united under the latter name by M.-Edwards, who acknowledges five specific forms, as *T. meminna*, *T. javanicus*, *T. napu*, *T. kanchil*, and *T. stanleyanus*.

*T. meminna*, seu *Meminna indica*, Gray, inhabits India with Ceylon exclusively—the *M. malaccensis*, Gray, differing in no respect whatever, and most assuredly being as foreign to the Malayan peninsula as *T. stanleyanus* is to Ceylon, even though a specimen of the latter may have chanced to find its way to England *via* Ceylon. Long-experienced observers in that island, as Mr. E. L. Layard and the late Dr. Kelaart, Dr. Templeton, Mr. Brodie, Sir J. Emerson Tennent, and others, are not likely to have overlooked so conspicuous a little animal as a second species of Chevrotain, did it really exist as an inhabitant of Ceylon. Both in its more bulky form and in its markings, the *Meminna* singularly resembles the *Hyomoschus aquaticus* of West Africa.

The name *javanicus* is rightly assigned by M.-Edwards to a small and very distinct species, which I described by the name *T. pelandoc* in the Journ. As. Soc. B. xxvii. 277, remarking that “this species accords better than any other with Buffon’s figure of *le Chevrotain de Java*.” I have reason to doubt, however, that it inhabits the Malayan peninsula, the *T. javanicus* of the late Dr. Cantor’s catalogue of the Mammalia of that peninsula (J. A. S. B. xv. 262) being the comparatively large *T. napu*, F. Cuvier and A. M.-Edwards, which has been undistinguished as a separate species by Dr. Gray.

The common Chevrotain of the Malayan peninsula is *T. kanchil*, the range of which extends to the southern Tenasserim provinces as high as Yé, beyond which no species of the group has been observed northward in the provinces east of the Bay of Bengal. The *T. affinis*, Gray, was originally founded on a specimen of *T. kanchil*, believed to be from Malacca, which wants the ordinary *medial* line on the chest; but those sent by the late M. Mouhot from Cambogia, and likewise referred by Dr. Gray to his *T. affinis*, would seem to be of a race in which that medial line is normally absent, and which is also more uniformly coloured than the others, being not so dark, with the posterior nuchal streak little more than indicated, and the lines in front of the neck are not nigrescent, but of the same hue as the back.

The *T. napu* also inhabits the Malayan peninsula, but is there much rarer than the *T. kanchil*, and the two bear the native names adopted as their specific appellations; but it appears from Dr. Cantor that the *T. kanchil* is denominated *Pelandoc* by some Malays, while elsewhere it is not unlikely that the *T. javanicus* may be specially so designated, by people who know it as a different species from the *T. kanchil*. In Calcutta, the *T. kanchil* is the only kind which is at all commonly to be procured of the dealers in animals, and I have never seen *T. javanicus* in their possession, and *Tragulus meminna* but rarely.

*T. stanleyanus* is given by M.-Edwards from the Sunda Islands. I have seen numerous examples of this race, and among them some which were so far intermediate in colouring as to lead to a suspicion that it is no other than a local race or variety of *T. napu*, though, in general, the markings of the neck are broader and less abruptly

defined. In the Calcutta Museum there is also a pair different from any noticed by M.-Edwards, that probably indicate a third local race of *T. napu*. They are remarkable (more especially the female) for the blackish hue of the whole neck, and of the two dark streaks alternating with three white ones in front of it. General colour rufous (as in *T. stanleyanus*), the black tips to the hairs showing much; the breast and towards the hind legs white, separated by fulvous, which occupies the medial region of the belly, extending quite across it. From hock to point of succentorial hoof, 4 inches. Their habitat is unknown.

The Malayan Chevrotains divide themselves primarily into large and small. Of the large, there is the *T. napu*, with two kindred races, the rufous *T. stanleyanus* and the black-necked rufous race. Of the small, the *T. javanicus* and the *T. kanchil* are a degree better distinguished, and would be generally recognized as species; while the Cambodian *T. affinis* differs only slightly in colouring from the *T. kanchil*, though perhaps constantly wanting the medial dark line on the chest.

#### *The Asiatic Civets.*

Besides the common *Viverra zibetha*, L. (or *Zibet* of Buffon), inhabiting Bengal, Nipal, Assam, &c., and the small *V. tanggalunga*, Gray, inhabiting the southern half of the Malayan peninsula, Java, and the Philippines, there are two large races of Asiatic Civet which need recognition. One of them inhabits Southern Malabar and probably Ceylon, and is only distinguishable from the ordinary African *V. civetta* by its dorsal mane commencing from between the shoulders, instead of (Hyæna-like) between the ears. The other is the *V. tanggalunga* apud Cantor, but not of Gray, from the northern half of the Malayan peninsula, and also the *V. megaspila*, nobis (Journ. As. Soc. B. xxxi. 345), from Upper Pegu; and the *V. zibetha* apud Waterhouse (Cat. Zool. Soc. Mus. 1838, no. 252), from Sumatra, I believe, from recollection of the specimen, to be no other; but the *V. zibetha* of Cantor, from Province Wellesley, is identical with the Bengal race. There is an African Civet now living in the Society's Garden which greatly resembles in its markings the *megaspila* race of Pegu &c. As compared with that of Travancore or S. Malabar, the body-spots are fewer and much larger, and entire for the most part, or showing little tendency to group into ocelli; and on the sides they tend less to form into vertical bands or stripes. *V. zibetha* of Bengal, *V. civettina* of S. Malabar, and *V. megaspila* of Pegu &c., are of the same large size as *V. civetta* of Africa, and it is probable that their skeletons would not be distinguishable; but *V. tanggalunga* of the Malay countries is a much smaller species, and is much more minutely spotted than the others. All are represented in the Derby Museum of Liverpool, the *V. megaspila* by an adult from the late Dr. Cantor's collection, while an immature specimen of the same, also from Dr. Cantor's collection, is now in the "India Museum" at Fyfe House. The small *Viverricula malaccensis* (seu *indica*, *rasse*, *pallida*, &c.) is generally diffused over

India with Ceylon, the Indo-Chinese and Malayan countries, and probably S. China.

*Martes flavigula* (Boddaërt).—There are different races of this animal which require to be noted. That common in the Himalaya, extending to the mountain-range which separates Arakan from Pegu, and probably also that of the Amûr region, has the face, cheeks, and nape blackish brown, abruptly demarcated; chin and throat white; breast and fore part of the body pale yellowish brown, mostly darker along the middle of the back, and passing to blackish brown upon the croup, fore limbs, hind quarters, and tail. Of this type of colouring I have seen very numerous examples; but others from the Nilgiris, in Southern India, have the entire upper parts uniform blackish brown, with the white throat and yellowish breast of the preceding, and not further differing. The latter I formerly supposed to be *M. Guatkinsii*, C. H. Smith (in Jardine's Nat. Libr.), although this is stated to be from the N. W. Himalaya; and it appears that the name truly applies to the Himalayan race in summer vesture, as shown by Mr. A. Leith Adams (Proc. Zool. Soc. 1858, p. 516). In this case, the detached Nilgiri race may yet have a peculiar winter pelage; and such, I suspect, is illustrated by a specimen from some part of S. India, which Mr. W. Elliot sent for my inspection some years ago, and of which the following is a description:—Upper parts nearly uniform brown, paler on the sides; chin, throat, and breast as usual; the lower parts dark, with some irregular blackish spots between the fore limbs; a peripheral blackish mark behind the ear (indicative of the margin of the black cap of the Himalayan race), continued less distinctly forward; the brown of the crown and nape less dark than in Himalayan specimens, and continued uniformly on the shoulders and croup, scarcely paling along the middle of the back; tail much browner than in the others, and the limbs scarcely so dark. Perhaps, however, the latter may be a peculiar race, and that of the Nilgiris may have the entire upper parts permanently black. Lastly, a very distinguishable race (original *M. flavigula*, Bodd.?) inhabits the Malayan peninsula, of which I have seen numerous examples. It resembles the Himalayan race, but the fur is constantly much shorter, and the tail consequently is less bushy; the blackish cap is merely indicated by pale brown, but with a peripheral dark line passing from behind each ear. All that I have seen were quite similar.

#### *The Unicorn Goat of Tibet.*

Some years ago Mr. Robert Schlagintweit called the attention of the zoological section of the British Association to the united horns of what he termed the "Unicorn Sheep" of Tibet, mentioning that the horns were separate in the young animal, each growing, as usual, from the centre of ossification of the frontal bone; but, turning towards each other, they met and were finally enveloped in the same cortical or cuticular integument, like two fingers of the hand inserted into one finger of a glove. A skull bearing such horns, but with the

tips sawn off, presented by B. H. Hodgson, Esq., to the "India Museum" now at Fyfe House, appears to me to be that of a Goat, and not of a Sheep. A similar skull, with the horns conjoined for the same distance, but with divergent tips, is in the British Museum; and there is a frontlet, with horns quite similar to the last, in that of the Royal Society of Dublin. In the Zoological Gardens, Regent's Park, there is now living a long-haired Sikhim or Tibetan Goat, in which the horns are parallel and nearly approximate, but without meeting; and I have little or no doubt that it is of the same race of domestic Goat which occasionally bears the so-called "Unicorn" appendage.

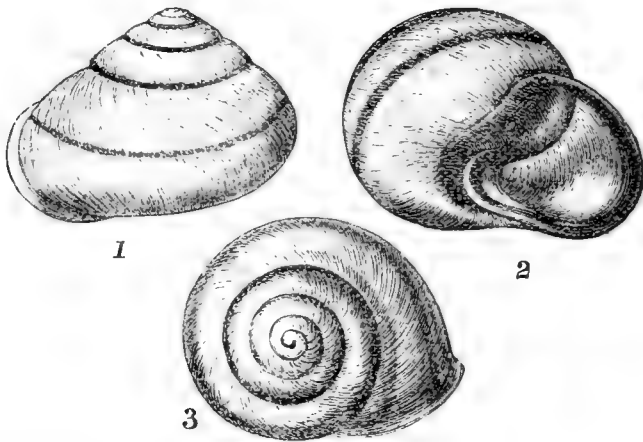
9. DESCRIPTIONS OF TWO NEW SPECIES OF AUSTRALIAN LAND SHELLS. BY JAMES C. COX, M.D., F.R.C.S. EDINBURGH.

SUCCINEA EUCALYPTI\*.

*S. testa globoso-conica, ventricoso-inflata, anfractibus tribus subintense brunnea, rugosa, minute striata, apice rosea; apertura ovato-rotundata.*

Diam. maj.  $4\frac{1}{2}$ , min. 4 mill.

This shell, a specimen of which I send, I have named *eucalypti*, from the fact of its being *always found* under the bark of the *Eucalyptus*-trees, about 4 feet from the ground, on high dry hills near the Blue Mountains. When fresh, the rose-coloured apex is very well marked.



HELIX MACLEAYI.

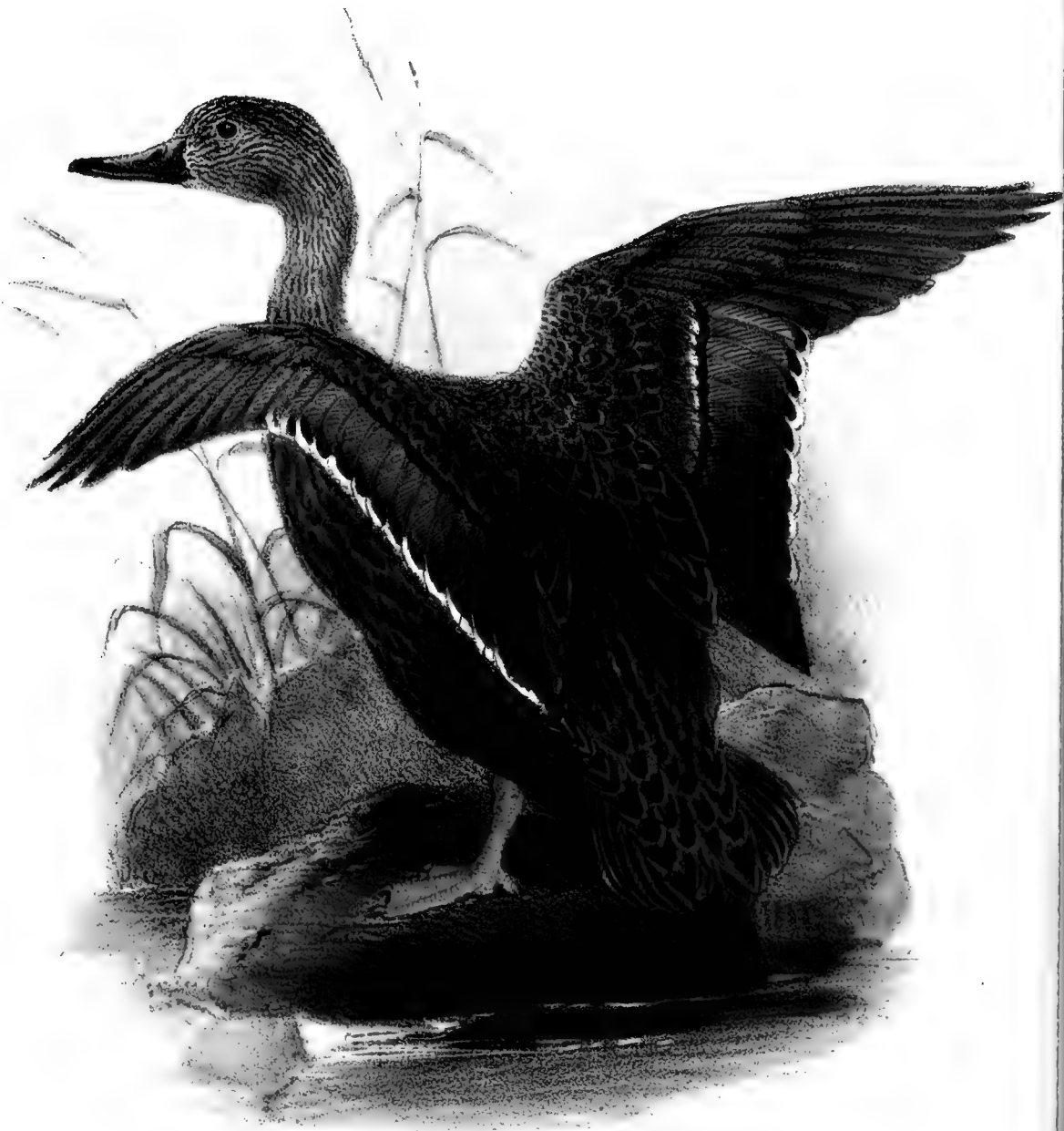
*H. testa imperforata, globoso-depressa, solidiuscula; epidermide cinereo-fusca, minute striata, apice violacea; fascia nigra cingulata; spira obtusa; sutura impressa, alba; anfractibus sex, convexiusculis; apertura lunato-subcirculari, marginibus expansis, undique intense purpureo-violacea.*

*Hab.* Port Denison, Queensland.

\* The type specimens of this species have been deposited in the British Museum.







$\frac{1}{4}$

J. Wet del et lith

M & N. Hanhart. imp

ANUS. MEINERL.

10. DESCRIPTION OF A NEW SPECIES OF DUCK FROM MADAGASCAR. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XXXIV.)

In the 'Proceedings' of this Society for 1863 (p. 160) I have given a list of the Mammals and Birds collected by Dr. C. Meller during his journey up to Antananarivo. I there included a species of Duck, of which two examples were obtained in the marshes near Analamazotra, under the name *Dafila erythrorhyncha* (Gm.). My attention having been again called to this bird through meeting with fresh specimens in the collection of the Royal Institution at Woolwich, lately obtained in Madagascar by Mr. J. Caldwell, I have been induced to reexamine it. On comparing it with the fine series of Anatidæ in the British Museum, I find it is certainly not *Dafila erythrorhyncha*; indeed it is very little like that species. As it is moreover not in the British Museum, and cannot be associated with any other species mentioned by Hartlaub in his work on the 'Birds of Madagascar,' I believe I am justified in considering it as probably new to science. I propose therefore to call it, after its discoverer,

*ANAS MELLERI*, sp. nov. (Pl. XXXIV.)

*Supra nigra, plumis omnibus brunneo late marginatis; subtus brunnea, plumarum omnium macula mediali nigra: capite et cervice brunneis, nigro striolatis; pileo obscuriore et crebrius striolato: alis fusco-nigris, tectricum marginibus brunnescentibus; speculo alari æneo-viridi, supra et subtus nigro marginato; secundariorum apicibus et tectricibus subalutibus albis: caudæ rectricibus et tectricibus superioribus dorso concoloribus: rostro nigro: pedibus carneis.*

Long. tota 22·0, alæ 9·25, caudæ 3·5, rostri a rictu 2·6, tarsi 1·75.

*Hab.* In Madagascar.

This Duck seems to belong to the group of true *Anas*, represented by *A. superciliosa* of Australia, *A. obscura* of North America, and others, in which the sexes are alike. There is no trace of a superciliary mark, and the species is not very much like any other that I am acquainted with. Dr. Meller's two specimens were, as I have already stated, obtained in the marshes near Analamazotra. The native name is said to be *Harki*. The iris is marked "sienna-brown." Mr. J. Caldwell's example was procured at Antananarivo, in September 1862, and is marked "*female*." Mr. A. Newton has likewise a specimen of the same Duck, obtained by Dr. Roch at Tamatave\*.

I may take this opportunity of mentioning that the collection of the Royal Institution at Woolwich also contains an example of *Turtur semitorquatus*, Sw., from Madagascar. This bird I have already

\* See Ibis, 1863, p. 174, where this bird is wrongly called *Anas xanthorhyncha*.

recorded as being met with in the Comoro Islands (see Ibis, 1864, p. 300); so that its existence in Madagascar also might have been anticipated.

11. REPORT ON A COLLECTION OF REPTILES AND FISHES FROM PALESTINE. BY A. GÜNTHER, M.A., M.D., Ph.D., F.Z.S.

The natural history of Palestine has been very incompletely known, and there are only a very few collections in which specimens illustrating its reptiles and fishes are exhibited. Hasselquist was the first who described a fish from the Lake of Galilee; and several others from the Jordan are mentioned in Cuvier and Valenciennes's 'Histoire Naturelle des Poissons.' Of reptiles only a few species of Snakes were mentioned by M. Jan in a pamphlet entitled 'Elenco sistematico degli Ofidi.'

The British Museum received first a few species from a collection made by Th. W. Beddome, Esq., who visited Palestine in 1862, and fell a victim to a malignant fever during his return. The species collected by him will be mentioned below. A magnificent collection has been formed by the Rev. H. B. Tristram; indeed we believe that it is the most ample ever brought to Europe, and that it fully illustrates the character of the fauna. Comparatively few of the species are new and apparently peculiar to Palestine, nearly all the reptiles being identical with, or closely allied to, species belonging to the Mediterranean fauna proper. Only one species (*Daboia xanthina*) reminds us of the Indian fauna. The most interesting form is the new genus of Snakes described below, the affinities of which are rather obscure.

The ichthyological part of Mr. Tristram's collection shows the affinity of the Jordan with the Nile and other rivers of tropical Africa, *Chromis* and *Hemichromis* being truly African forms, whilst nearly all the other species are identical with, or very closely allied to, fishes from the fresh waters of Syria.

*List of the Species.*

Those marked with an asterisk (\*) are new.

TORTOISES.

*Testudo græca*, L. Everywhere.  
*Emys caspica*, Gm.

SAURIANS.

*Lacerta viridis*, L. Jerusalem, Merom, Mount Hermon.  
*L. lævis*, Gray. Jerusalem, Dead Sea.  
*Zootoca muralis*, Laur. Syria, Beyrout.  
*Z. deserti*, Gthr. Lebanon.  
\**Z. tristrami*, Gthr. Lebanon.  
*Mesalina pardalis*, Licht. Beersheba.  
*Pseudopus pallasii*, Oppel. Mount Hermon.  
*Ophiomorus miliaris*, Pall. Mount Hermon.  
*Ophiops elegans*, Ménétr. Galilee, Mount Hermon.

- \**Seps monodactylus*, Gthr. Galilee, Merom, Mount Hermon.  
*Plestiodon auratus*, Schn. Dead Sea.  
*Euprepes fellowsii*, Gray. Jerusalem, Merom, Mount Hermon,  
Galilee, Beersheba.  
*Gongylus ocellatus*, Forsk. Jerusalem, Dead Sea, Gilead.  
*Ptyodactylus gecko*, Hasselq. Jerusalem, Mount Hermon, Dead  
Sea.  
*Stenodactylus guttatus*, Cuv.  
*Gymnodactylus geckoïdes*, Spix. Mount Carmel.  
*Stellio cordylina*, Laur. Galilee.  
*Trapelus sinaita*, Heyden. Dead Sea.  
*Chamæleon vulgaris*, Daud. Merom, Galilee, Dead Sea.

## OPHIDIANS.

- \**Rhynchocalamus melanocephalus*, Gthr. Merom.  
*Ablabes coronella*, Schl.† Lebanon, Merom, Galilee.  
*Ablabes modestus*‡, Martin. Galilee, Lebanon, Mount Hermon.  
*Ablabes decemlineatus*, D. & B. Galilee, Lebanon, Merom. This  
species differs constantly from *A. modestus* in having the posterior  
and anterior chin-shields of equal length, whilst in *A. modestus* the  
anterior are much longer than the posterior. Moreover it has never  
the black markings on the head and neck.  
*Zamenis dahlii*, Schleg. Mount Tabor.  
*Z. ventrimaculatus*, Gray. Dead Sea.  
*Z. caudolineatus*§, Gthr. Jerusalem, Hiram's Tomb, Nazareth.  
*Z. atrovirens*, Shaw. Galilee, Merom.  
Var. *carbonaria*||. Galilee, Merom.  
*Tropidonotus hydrus*, Pall. Jerusalem, Galilee, Merom, Lake  
Phiala.  
*Tachymenis vivax*, Fitz. Jerusalem, Mount Tabor.  
*Cælopeltis lacertina*, Wagl. Jerusalem, Galilee.  
*Eryx jaculus*, Hasselq. Galilee.  
*Daboia xanthina*¶, Gray. Galilee.  
*Vipera euphratica*, Martin. Galilee.  
*V. ammodytes*, L. Syria, Lebanon.  
*Echis arenicola*, Boie. Dead Sea.

## BATRACHIANS.

- Rana esculenta*, L. Dead Sea\*\*, Galilee, Merom, plains of Phœ-  
nicia.  
*Bufo pantherinus*, Boie. Dead Sea\*\*, Mount Carmel.  
*Hyla arborea*, L. Dead Sea, Jerusalem, Wady-el-Kurn.

† *Calamaria coronella*, Schleg. This is not a true *Calamaria*, having two pairs  
of frontal shields. The loreal shield is small, sometimes absent; specimens with-  
out loreal have been called *Homalosoma coronelloides*, Jan.

‡ *Eirenis rothii*, Jan, is not specifically distinct.

§ All the specimens from Palestine have the scales in 25 series.

|| Some of the specimens are entirely black, and have the eye a little smaller.

¶ *Vipera confluenta*, Cope, is very closely allied to it.

\*\* Among the numerous specimens of *Rana esculenta* and *Bufo pantherinus* col-

## FISHES.

*Blennius lupulus*, Bonap. This species was first discovered by Mr. Th. W. Beddome in the Lake of Galilee, and has been found again by Mr. Tristram in the Nahr el Kelb. Unfortunately I have no opportunity of comparing our specimens with examples from Italy; but they agree perfectly with the description and figure given by Bonaparte.

*Chromis nilotica*, Hasselq. Lake of Galilee, Dead Sea. All the specimens have  $D. \frac{16}{12-13}$ ;  $A. \frac{3}{10}$ . Although Hasselquist himself distinguishes a *Sparus galilæus*, attributing to it seventeen dorsal spines, it is not improbable that he took his notes from the same species which I consider as identical with the *Chromis* of the Nile. Hasselquist evidently drew up the description of the Galilean fish in a hurried manner, and never had an opportunity of comparing it with a specimen from the Nile. It even seems as if he never thought of the affinity of these fishes, referring one to *Sparus*, the other to *Labrus*. It would be also very singular that Mr. Tristram, although collecting these fishes in great number, should not have found the only species known to Hasselquist. Yet it is not very improbable that the species seen by Hasselquist is a fourth form of this family, inhabiting the Lake of Galilee. This species and the *Hemichromis* mentioned hereafter are the most common in the Lake.

\**Chromis simonis*, Gthr. Lake of Galilee.

\**C. andreae*, Gthr. Lake of Galilee.

\**Hemichromis sacra*, Gthr. Lake of Galilee.

*Clarias macracanthus*, Gthr. Lake of Galilee.

*Cyprinodon mento*, Heckel. Ramoth-Gilead.

*C. cypris*, Heckel. Jordan.

*C. sophiæ*, Heckel. Dead Sea, near the entrance of rivulets.

*Barbus longiceps*, Cuv. & Val. Lake of Galilee.

*Labeobarbus canis*†, Cuv. & Val. Lake of Galilee.

*Scaphiodon capoëta*†, Güldenst. Lake of Galilee, Jordan, streamlets by the Dead Sea, Nahr el Kelb, Wady el Kurn.

*Acanthobrama*, sp.?, young. This species has been found by Mr. Beddome; but no example is in Mr. Tristram's collection.

*Discognathus rufus*, Heckel. Ramoth-Gilead.

*Cobitis insignis*, Heckel. Dead Sea, close to the entrance of rivulets.

\**C. galilæa*, Gthr. Lake of Galilee.

?*Anguilla microptera*, Kaup. Three half-grown specimens from Nahr el Kelb best agree with the Eel called *A. microptera* by Kaup; but it appears to me very doubtful whether the numerous species distinguished by that gentleman will stand the test of a critical re-

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lected on the shores of the Dead Sea, there is one example of both these species which is provided with numerous tubercles. These tubercles are minute in the Frog, spine-like and very large and prominent in the Toad. Other specimens collected at the same localities are smooth, or provided with flat tubercles only.

† Specimens of these species have also been collected by Mr. T. W. Beddome.

sion; and it is not improbable that the Eel of the Jordan will prove to be of the same species as that of the Nile.

*Descriptions of the New Species.*

ZOOTOCA TRISTRAMI.

Dorsal scales distinctly imbricate, smooth, those along the vertebral line half as large as the loreal shield; ventral shields in nine longitudinal and in twenty-eight transverse series. Collar rather indistinct, and not continued across the middle of the chest. Gular scales between the chin-fold and the collar large; those between the chin-fold and the chin very small. Temple with granular scales; an oblong shield along the outer margin of the occipital. Vertical cuneiform, tapering behind. Upper parts brownish red, with irregular black and white markings, arranged in cross bands on the sides, and not continued across the vertebral line.

Length of body  $2\frac{1}{2}$  inches.

Lebanon.

SEPS MONODACTYLUS.

Limbs extremely small, not divided into toes: the anterior scarcely half as long as the snout; the posterior as long as a scale. The middle of the trunk surrounded by twenty scales. Uniform olive-green above, whitish below. Otherwise similar to *S. tridactylus*.

Galilee, Merom, Mount Hermon.

RHYNCHOCALAMUS (g. n. *Calamaridarum*).

Body rather elongate, cylindrical; head small, not distinct from neck; tail of moderate length. Rostral shield enlarged, without longitudinal keel, far produced backwards between the anterior frontals; two pairs of frontal shields; one nasal. Scales smooth, in fifteen rows; subcaudals in two rows. Maxillary teeth few in number, comparatively strong, subequal in size; the posterior broad at the base, with an impression, but without longitudinal groove; palatine teeth none.

RHYNCHOCALAMUS MELANOCEPHALUS.

Head small, depressed, triangular, the snout being somewhat pointed. Eye small, with round pupil. Frontal shields of moderate size, the posterior not twice as large as the anterior; vertical six-sided, with a very obtuse angle in front, and with a pointed one behind, rather longer than broad; occipitals not much longer than vertical, rounded behind. Nasal oblong; loreal squarish, one anterior and one post-ocular. Six upper labials, the third and fourth entering the orbit, and the sixth being the largest. Temporals 1+1. There are two pairs of chin-shields; but the posterior are small, almost scale-like, only half the size of the anterior, and separated from each other by a scale; there are three pairs of lower labials, in contact with the anterior chin-shields. Scales with a single minute apical groove. Ventrals 218; anal bifid; subcaudals 54. Upper

parts reddish olive, lower ones white; upper surface of the head, rostral shield, and nape of the neck black; upper lip white, a white line running across the rostral shield.

Length of head  $\frac{1}{3}$  inch, of trunk 14 inches, of tail 3 inches.

Merom.

#### CHROMIS SIMONIS.

D.  $\frac{15}{10}$ . A.  $\frac{3}{9}$ . L. lat. 31.

The height of the body is contained twice and a half in the total length (without caudal); the length of the head twice and three-quarters. Snout rather obtuse, *with the lower jaw slightly projecting beyond the upper*; the maxillary extends to below the middle of the præorbital, which is as wide as the orbit. Teeth small: there are about thirty-seven on each side, of the outer series, in the upper jaw. The eye is situated nearer to the end of the snout than to that of the operculum; there are three series of scales on the cheek, and the naked portion of the præoperculum is much narrower than the orbit.

The dorsal fin commences before the root of the pectoral; its spines are of moderate strength, gradually increasing in length behind, the length of the last being two-fifths of that of the head; the soft dorsal extends to, or somewhat beyond, the base of the caudal; the third anal spine as long as the thirteenth of the dorsal fin. Caudal fin slightly rounded. Pectoral fin extending somewhat beyond the origin of the anal; ventral not reaching the vent.

There are three and a half longitudinal series of scales between the origin of the dorsal fin and the lateral line; extremity of the operculum scaleless; scales on the belly very small. Coloration uniform.

Only two specimens were procured from the Lake of Galilee; they are 7 inches long.

#### CHROMIS ANDREÆ.

D.  $\frac{15}{12}$ . A.  $\frac{3}{10}$ . Lin. lat. 31.

The height of the body is contained twice and a half or twice and two-thirds in the total length (without caudal); the length of the head rather more than thrice. Head not much longer than high; snout rather obtuse, with the jaws equal in length anteriorly, or with the upper slightly projecting beyond the lower. Teeth small, there being from twenty to twenty-three on each side, of the outer series, in the upper jaw; maxillary extending to below the middle of the præorbital, which is as wide as the orbit. Eye situated in the middle of the length of the head; there are three series of scales on the cheek, and the naked limb of the præoperculum is much narrower than the orbit; extremity of the operculum naked.

The dorsal fin commences vertically above the root of the pectoral; its spines are of moderate strength, gradually increasing in length behind, the last being half as long as the head. The soft dorsal is produced into a point, which extends nearly to the middle of the caudal fin. Anal spines stout, the third being as long as, but



much stronger than, the twelfth of the dorsal fin. Caudal fin truncated, scaleless, not much shorter than the head. The pectoral does not quite extend to the origin of the anal; the ventral reaches the vent.

There are three and a half longitudinal series of scales between the origin of the dorsal fin and the lateral line. Scales in the thoracic region very small, much smaller than those on the belly. Body uniformly coloured; extremity of the operculum black; dorsal and caudal fins with numerous round whitish spots.

Three specimens were collected in the Lake of Galilee. The larger is  $7\frac{1}{2}$  inches long; the two others 5 in.

#### HEMICHROMIS SACRA.

D.  $\frac{14}{11}$ . A.  $\frac{3}{8}$ . L. lat. 31.

The height of the body is contained twice and three-fourths in the total length (without caudal); the length of the head twice and a third. Head much longer than high, the snout being compressed and much produced; its extent is two-fifths of the length of the head; lower jaw very prominent; the maxillary extending to below the middle of the præorbital, which is much wider than the orbit. Teeth pectiniform, in a band; those of the outer series are somewhat larger than the others; but there are no anterior canine teeth. The eye occupies the middle of the length of the head, and is situated immediately below the upper profile. Scales on the cheek in four series; the naked portion of the præoperculum as wide as the orbit. The dorsal fin commences somewhat in front of the root of the pectoral; its spines are of moderate strength, gradually increasing in length behind, the length of the last being two-sevenths of that of the head; the soft portion extends to the root of the caudal when laid backwards; the third anal spine is the longest, as long as the twelfth of the dorsal fin. Caudal fin slightly rounded, more than half as long as the head, not scaly. The pectoral extends somewhat beyond the origin of the anal; ventral not reaching to the vent. Scales not serrated: there are four longitudinal series between the origin of the dorsal and the lateral line; those on the belly are very small. Extremity of the operculum naked. Greenish olive above, silvery on the sides and below; fins greyish; extremity of the operculum pearl-coloured; sometimes an oblong blackish spot on the middle of the side of the body.

This is a common species in the Lake of Galilee and in the Jordan. The specimens collected are from 7 to 9 inches long.

#### COBITIS GALILÆA.

D. 2/9. A. 2/6. Scaleless; caudal fin truncated. The length of the head is one-sixth of the total. The origin of the dorsal fin is somewhat nearer to the extremity of the snout than to the root of the caudal.

This species was discovered by Th. W. Beddome, Esq., who brought one specimen from the Lake of Galilee.

## 12. NOTES ON THE ZOOLOGY OF SPITSBERGEN. BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

In the month of May last, Mr. Edward Birkbeck offered me a berth in his yacht, the 'Sultana,' R. T. Y. C., on a voyage to Spitsbergen. As this was a country I had long been desirous to visit, I was very glad of the opportunity of seeing it, which had so unexpectedly presented itself. On the 31st of May I found myself on board the vessel at Lowestoft, and the following morning we sailed northward. After a passage protracted by some tedious calms, we cast anchor in the Bay of Hammerfest on the evening of the 26th June. Here it was necessary to stay for some days, while a Norwegian "*jægt*" was being equipped to accompany us, and to take us, if necessary, into the ice, where the yacht, from her extreme length, would become embarrassed, and from her slight build dangerous. Late in the evening of the 2nd July the necessary preparations were completed, and the 'Semmline,' a sloop of some thirty or forty tons, got under way. The next morning the 'Sultana' followed, and, overhauling her consort in the narrow seas, in the course of the afternoon lost sight both of her and the land of Norway. On the afternoon of the 6th July we made the South Cape of Spitsbergen, bearing N.E.

Our first rendezvous having been appointed about halfway up the deep bay marked on English charts as Wibelan's Water, and known to Norsk walrus-hunters as Stor Fjord, which indents the archipelago of islands forming Spitsbergen, our course was altered accordingly; but we were soon brought up, after passing a good deal of drift ice, by the appearance of very closely packed ice, stretching across as far as the state of the atmosphere would allow us to see it. This to our pilot, a man whose knowledge of Spitsbergen is scarcely surpassed by any one, was a manifest indication of the fjord being completely blocked up, and he did not hesitate to order us to proceed to our second rendezvous in Ice Sound, on the west coast. Thither we made sail, trying as we passed northward successively to enter Horn and Bell Sounds, both of which we found to be impracticable from the same cause as had been the Stor Fjord. On nearing Ice Sound, on the afternoon of the 8th July, we found a good deal of ice drifting out of its mouth; but it was of such a kind as to cause no risk to the ship, with our careful captain and pilot. While we were watching with interest the novel scene presented to us by the varied shapes of the frozen masses through which we were navigating, there was a cry of "White Whales!" and a "school" of *Beluga catodon* passed across our bows. Though there were the vivid hues of drifting ice-blocks with which to contrast them, I was agreeably pleased to see that their colour stood this high trial. When, some years ago, I saw the so-called "White Porpoises" of the river St. Lawrence, identified by Dr. Gray (Cat. Brit. Mus. Cetacea, pp. 78, 79) with this species, they had a very tallowy appearance; now the worst that could be said of these beasts is that they looked the colour and consistency of a good spermaceti candle. There were

at least six or eight of them swimming at very short distances from one another, and they glided rapidly through the water with an easy and almost graceful roll, now and then emerging from the surface sufficiently to show the whole of their bodies.

It is not my intention now to say much concerning the birds of Spitsbergen; but I must mention that the sound we were entering presents one of the most wonderful sights to the eye of the ornithologist that can possibly be conceived. The species which frequent Spitsbergen are few in number, much fewer than had been thought prior to the publication of Herr A. J. Malmgren's admirably critical papers\*; but the number of individuals is past all computation. It will be sufficient here to name the species I observed at this time, and this I shall do somewhat in the order of their comparative abundance. First *Mergulus alle*, *Uria arra*, and *Cepphus grylle*; then *Rissa tridactyla*, *Somateria mollissima*, *Procellaria glacialis*, *Fratercula glacialis*, *Larus glaucus*, and, lastly, an *Anser* which I shall specify hereafter. All these, excepting *Larus glaucus*, we found breeding around Ice Sound, indeed, I may say, in the immediate neighbourhood of Safe Haven, a commodious inlet on its northern shore, where the yacht dropped her anchor on the morning of the 9th July.

The whole of the next week was employed by our party in exploring, with different objects in view, the shores of the sound, or, as it should be more properly called, fjord, for it extends at least fifty miles into the interior, and appears to have no connexion with Wibelan's Water or any other inlet of importance. Almost every depression on its northern side is occupied by a glacier, which generally fills it nearly to the brim, and, with but one exception, these glaciers are only terminated by the sea; but along its southern shore are some four or five bays of various sizes, and between them various valleys which, being quite free from ice, are more or less fertile and afford sufficient pasturage for numerous herds of *Rangifer tarandus*. These Deer are tolerably abundant: they are certainly smaller than the Lapland Reins, whether wild or tame; and though I can hardly profess to speak generally on the subject, yet all the antlers which I saw in Spitsbergen seemed to me to be slighter in the beam than those of the continental race; nevertheless, the points being in old stags considerably elongated, the expanse of antler was not much inferior. The average type of a good Spitsbergen head is very well represented by the first figure in the 'Fauna Boreali-Americana' (vol. i. p. 240), of the so-called Barren-ground Caribou (*Cervus tarandus*, var. *a. arctica*, Richardson); and it is probable that the same causes which influence the development of the antlers in the Rein-Deer of the *mauvaises terres* in North America affect in like manner those of their Spitsbergen brethren. These last are said, by persons who have wintered there, not to migrate from the country; at least they or their tracks on the snow are seen "as soon as it begins to get light" in spring. At the same time it is just possible that some of them may wander over the frozen sea by way

\* Öfersigt af Kongl. Vetenskaps-Akademiens Förhandlingar, 11 Febr. 1863.

of Giles Land—and other islands, perhaps, of which we have as yet no knowledge—to Nova Zembla, and so on to the country of the Samoides. Certainly a hind killed by my friend Mr. Graham Manners-Sutton had one ear slit in a manner which was recognized by some of the ‘Semmline’s’ crew (most of them Quæns) as a mark of ownership. I must, however, add that, averse as I am to doubt the technical knowledge of an expert, the slit in question seemed to me as if it might have been very well caused by another Deer in fighting, or, even if it were of human origin, such as might have been made by some one who had caught the animal when a calf, and let it go again; but this last solution of the difficulty excited a laugh at my simplicity among the Quæns, who could not conceive it possible that a hungry hunter should show compassion towards the very youngest deer. All that we saw the first week of our being in the country still retained a considerable quantity of their nearly white winter clothing, thus rendering their detection, when viewed against the dark-coloured ground, a very easy matter even at a great distance. These animals also were in poor condition, contrasting in this respect strongly with those killed about a month later, when their bodies on being flayed were found to be covered with fat nearly two inches thick. At this time they had entirely got rid of their overcoats, and were clothed entirely in a short but close felt of dark mouse-colour. Judging from the gralloch, in the summer, lichens seem to form only a small article in their diet, their food then consisting chiefly of mosses, grasses, and any other herbage.

The Arctic Fox (*Canis lagopus*) is pretty numerous along the shores of Ice Sound; and we not only frequently saw examples of it, but in the immediate neighbourhood of the cliffs wherein the *Alcidae* were nesting one could, by listening almost at any time in the twenty-four hours, hear its yapping bark. It is of course the chief enemy of all the different kinds of birds, and their dread of it appears to influence them greatly in their choice of breeding-quarters. What the Foxes do to get a living in winter when the birds have left the country—for I imagine that the Ptarmigan (*Lagopus hemileucurus*) is the only species that is permanently resident—is one of the most curious questions that has presented itself to my mind for some time. The greater number of them are said to remain on the land, and to be as active during the long polar night as they are in summer; yet there are no berries by which they might eke out their existence, and there can be no open water, on the margin of which they might find food, within miles of their haunts. The most natural explanation that occurs to one is that they lay up a stock of provisions; but nobody, that I am aware of, has ever found such a store-closet\*, or has observed any tendency to hoarding in their habits. In Spitsbergen I believe that none of the varieties known as the Blue, the Black, or the Silver Fox have been noticed. The summer pelt does

\* Since the above was written, it has occurred to me that a considerable collection of shells of *Mya truncata*, which I found one day on the moraine of a glacier in Safe Haven, may possibly have been due to the causes suggested in the text.

not differ from what it ordinarily is in other countries, and the winter coat seems to be invariably white\*.

We noticed two species of *Phocidæ* in the waters of Ice Fjord. I am indebted to Mr. Malmgren for the information that these are the *Callocephalus fœtidus* and *Phoca barbata* of Dr. Gray's 'Catalogue of Mammalia in the British Museum.' The former is called by the Norwegians who frequent the coast of Spitsbergen "Steen-Kobbe," or Stone-Seal, probably because it is usually seen near rocks, or at any rate at no great distance from land; the latter is known as "Stor Kobbe," Great Seal, or less frequently "Blaa Kobbe," Blue Seal. How this last name came to be applied to it I do not know. As far as I can judge, it is very inappropriate. When dry, its fur is of a dirty yellowish white; and a beast of this species lying on a floe has exactly the appearance of a lump of discoloured ice, so that the hunter often takes one for the other. In the water it seems to be much of the same colour as most Seals—a dark iron-grey above, lighter beneath. It is a very powerful animal: I saw one that had received three Enfield-bullets through the nape of its neck, and had been bleeding profusely for about half an hour; yet it nearly succeeded in capsizing a large whale-boat with five men in her, owing to the clumsiness of the harpooner. We constantly saw this species at a considerable distance from land—ten to twenty miles, off the west coast of Spitsbergen, mostly between Bell Sound and Ice Fjord; and a young male of the previous year was shot from the deck of the yacht, and afterwards harpooned, on the 29th July, about fifteen miles from South Cape.

We saw no other mammals in Ice Fjord. Our pilot pointed out to me one day a place where, many years ago, a *jægt's* crew, of which he himself was one, killed nine Polar Bears; but no such good fortune attended us. This same man informed me that he knew of the occurrence in Spitsbergen of a "Hermelin," a species which has not hitherto been recorded from that country, though it is probable that the "creature, somewhat larger than a weasel, with short ears, long tail, and skin spotted white and black," stated to have been seen on Low Island by Dr. Irving in Lord Mulgrave's Voyage†, was nothing else but *Mustela erminea*.

I must here mention the pleasure it was to me, and, I am sure, to all

\* I have never seen it remarked, though it is unquestionably the case, that nearly all the Icelandic examples of *Canis lagopus* are "Blue" Foxes; that is to say, their winter coat is of nearly the same colour as their summer coat. This fact, I think, must be taken in connexion with the comparatively mild climate which Iceland enjoys in winter, and, if so, is analogous to the circumstance of the Alpine Hare (*Lepus timidus*, Linn., non auct.) always becoming white in winter in Scandinavia, generally so in Scotland, and but seldom in Ireland. The Common Squirrel (*Sciurus vulgaris*) is another case in point; and all three may be considered illustrative of the vexed questions of the specific distinctions between the Great Northern Falcons (*Falco gyrfalco*, *F. candicans*, and *F. islandicus*), and of the specific identity of the Red and Willow Grouse (*Lagopus scoticus* and *L. albus*).

† 'A Voyage towards the North Pole undertaken by His Majesty's command, 1773.' By Constantine John Phipps. London: 1774, page 58.

the other members of our party, to fall in with the Swedish Scientific Expedition, who are engaged in making a series of preliminary surveys, preparatory to measuring an arc of the meridian, in Spitsbergen. To Professors Nordenskjöld and Dunér and Herr Malmgren our best thanks are due for their kindness in furnishing us with much valuable information, the results of their former arduous explorations in this distant country.

On leaving England there had been two points in the ornithology of Spitsbergen to which I had especially meant to apply myself. The first was the obtaining of a good series of specimens of the Spitsbergen *Lagopus*, a single example of which, brought from that country in 1855 by my friends Mr. W. Sturge and the late Mr. E. Evans, had been described by Mr. Gould in our 'Proceedings' for 1858 (p. 354) as a distinct species under the name of *L. hemileucurus*; the second was the determination of the large species of Wild Goose, which the same gentlemen found breeding on the shores of Ice Fjord (Ibis, 1859, pp. 171, 172). Of the latter, as I have already mentioned, we saw a considerable number; and though we failed in our efforts to obtain a specimen, yet, through Mr. Malmgren's kindness, I am able to declare that the species is *Anser brachyrhynchus*, since I saw and examined two examples in his possession. Of the first, though, I regret to say, unsuccessful in finding out its haunts, I likewise had the pleasure of being shown by Mr. Malmgren an adult male, killed but a few days previously, and still unskinned. Its plumage, however, presented scarcely any trace of the great vernal change which takes place in this group of birds; and, except that I am confident that the Ptarmigan of Spitsbergen is distinct from that of continental Europe and Britain, I hardly like to form an opinion respecting its specific distinctness from the Ptarmigan of Iceland, Greenland, and Labrador, which I am inclined to consider as forming but one species, to which the name *L. rupestris*, being the oldest, should probably be applied.

After passing an agreeable week in Ice Fjord, and being joined by our Norwegian consort, we returned southwards, and proceeded towards the most western of the Thousand Islands. Here some of our party were transhipped to go to the eastward in the *jægt* in search of Walruses, while the 'Sultana' made another attempt to ascend the Stor Fjord; but, finding the ice at a distance of about twenty miles above the bight still unmoved, she was compelled to retrace her course, and await the return of the *jægt* party off the Thousand Islands. In Stor Fjord we made the acquaintance of the third species of Seal known in Spitsbergen, the very widely distributed *Pagophilus grænländicus* of Dr. Gray's Catalogue. This animal is known to the frequenters of the coast as the "Jan-Mayen Kobbe" and "Svart-side;" but most generally as the "Springer," from its lively actions in the water. It is of a social disposition, and we saw it in herds not less than fifty in number. These were very fond of swimming in line, their heads alone above water, engaged in a game of "follow-my-leader;" for on the first Seal making a roll over, or a spring into the air, each Seal of the whole procession, on arriving

at the same spot, did the like, and exactly in the same manner. While viewing this singular proceeding (and I had many opportunities of doing so), I could not but be struck with the plausibility of one of the suggested explanations of the appearance which has obtained so wide-spread a notoriety under the name of the "Great Sea Serpent." If any rule of the game in which *Pagophilus grælandicus* loves to indulge ever would permit the leading Seal to swim (say) one-third out of water, as I have often seen *Phoca barbata* do, I could quite understand any person, not an unromantic naturalist, on witnessing for the first time such a sight as I have tried to describe, honestly believing that the mythical monster was actually before his eyes. I never had the opportunity of closely examining a "Springer;" but one learned immediately to distinguish this species from the other two I have mentioned: not only its wonderful activity in the water, but its elongated head (even when the size of its body, just about intermediate between *P. barbata* and *Callocephalus fætidus*, was not to be ascertained) was quite sufficient for that purpose. This species resorts in great numbers to the ice in the neighbourhood of Jan Mayen, whence one of its common names; and in former years several vessels were annually equipped at Tromsø and Hammerfest in pursuit of it; but I believe that of late this practice has been a good deal discontinued.

Although none of our party were lucky enough to get a glimpse of a Walrus, I cannot refrain from mentioning here some circumstances connected with the history and habits of that curious and mighty beast. It is pretty well known that in the summer of 1853 a living example was deposited in our Gardens, which, however, after a few days languished and died, probably from having been fed on a diet so unnatural to it as oatcake\*. Yet this is by no means the only instance of this animal being brought alive to England. So long ago as 1608, the ship 'God-speed,' commanded by Master Thomas Welden, performed a voyage to Cherie, now commonly called Bear Island, and in the account of the expedition it is written—

"On the twelfth [July] we took into our ship two young Morses, male and female, alieve: the female died before we came into *England*: the male liued about ten weeks. When wee had watered, we set sayle for *England* about foure of the clocke in the morning. \* \* \*

"The twentieth of August, wee arriued at *London*; and hauing dispatched some priuate businesse, we brought our liuing Morse to the Court, where the king and many honourable personages beheld it with admiration for the strangenesse of the same, the like whereof had neuer before beene seene alieve in *England*. Not long after it fell sicke and died. As the beaste in shape is very strange, so is it of strange docilitie and apt to be taught, as by good experience we often proued"†.

\* See 'Zoological Sketches,' by J. Wolf; edited by P. L. Sclater. Cf. also J. E. Gray, P. Z. S. 1853, p. 112.

† HAKLUYTUS POSTHUMUS OR PURCHAS HIS PILGRIMES, &c. By Samuel Purchas, B.D. London: 1624, vol. iii. p. 560.

Now surely what a rude skipper, in the days of James I., could without any preparation accomplish, this Society ought to have no great difficulty in effecting; and I trust that the example may not be lost upon those who control our operations. From inquiries I have made, I find it is quite the exception for any year to pass without an opportunity of capturing alive one or more young examples of *Trichechus rosmarus* occurring to the twenty or thirty ships which annually sail from the northern ports of Norway, to pursue this animal in the Spitsbergen seas. It has several times happened that young Walruses thus taken are brought to Hammerfest; but, the voyage ended, they are sold to the first purchaser, generally for a very trifling sum, and, their food and accommodation not being duly considered, they of course soon die. Lord Dufferin bought one which had been taken to Bergen, and succeeded in bringing it alive to Ullapool\*; and Mr. Lamont mentions another which he saw in the possession of Captain Erichsen†. In making an attempt to place a live Walrus in our Gardens, I do not think we ought to be discouraged by the bad luck which has attended our efforts in the case of the larger marine Mammalia. Every person I have spoken with on the subject corroborates the account given by honest Master Welden of the "strange docilitie" of this beast; and that in a mere financial point of view the attempt would be worth undertaking is, I think, manifest. To the general public perhaps the most permanently attractive animals exhibited in our Gardens are the Hippopotamuses and the Seals. What then would be the case of a species like the Walrus, wherein the active intelligence of the latter is added to the powerful bulk of the former? There is also another consideration why we should make the attempt. In a few years it is probable that the difficulties of obtaining a live example of the Walrus will be much greater. Its numbers are apparently decreasing with woful rapidity. The time is certainly not very far distant when *Trichechus rosmarus* will be as extinct in the Spitsbergen seas as *Rhytina gigas* is in those of Behring's Straits. I see no reason to doubt the assertion, or perhaps it would be safer to say the inference, that in former days Walruses habitually frequented the coasts of Finmark; in the sixteenth and seventeenth centuries they were certainly abundant about Bear Island: they are spoken of there, as "lying like hogges upon heaps" by the old writer I have before quoted; yet for the last thirty years probably not one has been seen there. Now they are hemmed in by the packed ice of the Polar Sea on the one side and their merciless enemies on the other. The result cannot admit of any doubt.

But to continue my story from this digression, which I hope, however, may not be without its use. On the 10th of August our two ships again joined company; and, finding it was useless attempting either to get up the Stor Fjord or sail further to the eastward, we again rounded the South Cape and made for the northward. The season, however, being now so far advanced, our pilot declined the

\* 'Letters from High Latitudes,' pp. 387-389.

† 'Seasons with the Sea-Horses,' pp. 26, 27.



responsibility of taking the yacht further north than Ice Fjord; and accordingly, after having to steer considerably to the westward to avoid the heavy ice which beset the coast about Horn Sound, we found ourselves, on the afternoon of the 14th, once more at our old anchorage in Safe Haven. Here we remained another week, most of our party finding plenty of occupation in deer-stalking; but I was not able to add much to my stock of zoological knowledge. The Deer were now in magnificent condition, and nineteen were shot, making, with those obtained the week the yacht was there in July, a total of forty-seven. On the night of the 17th the salt water of the Haven was frozen over, and two days afterwards the sun set. On the morning of the 21st we weighed anchor, homeward bound. On the 24th we spoke a Norwegian *jægt*, engaged in the fishing of *Scymnus borealis*, an example of which was hauled up just as we passed\*. The same day we sighted Bear Island, which on our outward voyage we had not seen, owing to the fog; and on the 27th we reached Hammerfest.

It remains for me to add a few words on the Cetaceans we saw. I have already mentioned *Beluga catodon*, which we observed also on two other occasions. This is the only species of which I can speak definitely, though we certainly saw at least four others. Of these, the first was a large black fin-backed Whale, noticed three or four times; the second a smaller animal, perhaps about thirty or forty feet long, of which some half a dozen came and played round the yacht on the 12th of August. In general form, especially in the *esocine* shape of the head, these corresponded very closely with the engraving given by Dr. Scoresby (Arctic Regions, vol. ii. pl. 13. f. 2) as that of *Balæna rostrata* (= *Balænoptera rostrata*, J. E. Gray); but I rather hesitate to refer them positively to that species, on account of their colour, which was apparently of a uniform light reddish brown. I had an excellent opportunity of observing these Whales, for they kept with us about a quarter of an hour, sometimes passing under the ship, and often coming up close alongside, within perhaps thirty yards. On the following day I saw a school of Grampuses, with extremely long and high dorsal fins; but this was the only occasion on which the species was noticed. Some kind of Porpoise, on the contrary, was seen more than once†. In addition to these

\* This fishery has of late years assumed considerable importance. The vessels employed in it mostly do not go so far north, but keep about midway between Bear Island and the North Cape of Europe. There they anchor in deep water with a light cable, which they cut if it comes on to blow suddenly. The Sharks are caught with a baited hook at the end of a very long line. As soon as one is hooked, he is hauled up on deck by a windlass, and beaten on the head until he is motionless. His liver, which alone is required of him, is then cut out; and, his entrails being fully inflated with air, his body is heaved overboard to float away quite clear of the vessel. The cause of this apparently wanton cruelty is alleged to be the difficulty of otherwise disposing of the carcase; for the fishermen say that if the animal were killed, they would not catch another Shark until the dead one was entirely eaten up by his brethren, a process that might involve a delay of some days.

† I feel very confident of the truth of this statement; but I find no mention made of any Porpoise in the Spitsbergen seas by either Scoresby or Malmgren.

Cetaceans, the Right Whale (*Balæna mysticetus*) and the Narwhal (*Monodon monoceras*) are well known to inhabit the Spitzbergen seas. Mr. Malmgren, in his careful paper before alluded to, enumerates six or perhaps seven species of Whales, not reckoning a Porpoise. We therefore have seven or eight Cetaceans, seven Carnivores (including *Ursus maritimus*, on which I have no remark to make), and one Ruminant as the sum total of the Mammalian fauna of Spitzbergen. Without extending these notes by going into details, I may here state that I think the bird-fauna cannot be reckoned as more than twenty-seven species. We therefore have the singular result of a country, say as large as Ireland, where the number of Mammalian bears to the number of Ornithic species the ratio of 15 or 16 to 27.

13. A REVISION OF THE GENERA AND SPECIES OF VIVERRINE ANIMALS (VIVERRIDÆ), FOUNDED ON THE COLLECTION IN THE BRITISH MUSEUM. BY DR. J. E. GRAY, F.R.S.

Having received from Dr. Meller a Viverrine animal from Eastern Africa which appeared to be new, I was induced to compare it with the specimens in the Museum. Here I found two specimens received in 1855 from M. Verreaux of Paris, under the name of *Herpestes mutzigella* of Rüppell from Eastern Africa, quite different from, and three or four times as large as the adult animals of that species which were received from Dr. Rüppell as type specimens—besides another different species from the same part of the world, which we purchased of M. Parzudaki, also under the name of *Herpestes mutzigella*.

Being desirous of determining these species and some other unnamed specimens with accuracy, I was induced to reexamine all the specimens of the skins and osteological preparations that are in the British Museum, very many of which are the original specimens on which many species have been described; and as the materials grew under my hand into an essay on the species of the tribe, I have sent it to the Society in the hope that it may assist to elucidate the numerous species of this group of carnivorous Mammalia.

The *Viverridæ* include a considerable number of the middle-sized and small Carnivora. They are all natives of the Old World—that is to say, Africa and Asia (one of the species spreading itself over some of the southern parts of Europe)—except the genus *Bassaris*, which inhabits Mexico.

The greater number of the species are found in Africa, and several are confined to Madagascar; others are inhabitants of various parts

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This fact I unfortunately had not noticed until my return home; so that (Porpoises being in general of so common occurrence on a sea voyage) I neglected to record, as I otherwise should certainly have done, the dates and localities of their appearance. It is of course possible that what I took to be Porpoises were only the young of some larger Cetacean; but I do not think this was the case.

of Asia. Some species of the genera, as here revised, come from Africa, and others from Asia; but I do not know of any species but *Viverricula malaccensis* which is common to the two sections of the Old World.

The essential character of the Viverridæ is to have two tubercular grinders on each side of the upper jaw, and one on each side of the lower. In the genera *Linsang* and *Poiana* the hinder upper tubercular grinder is absent, and the teeth agree in number with those of the genus *Felis*; but the shape of the skull and teeth show that they belong to this family. In *Crossarchus* and *Suricata* the lower hinder grinder is absent; and in some species of the genera, where these teeth are present, they are often reduced to a very small size. There are generally three false grinders before the flesh-tooth; but in some genera the front one, which is often very small, is entirely wanting, or sometimes falls out early.

Mr. Waterhouse, in the 'Proceedings of the Zoological Society' for 1839, in a paper "On the Dentition of Carnivora," observes, "The *Viverridæ* have the same form of skull as the *Canidæ*, but differ in having the posterior portion more produced; the long palate is carried farther back, and the small back molar, observable in the lower jaw of the Dog, is here wanting. They have, therefore, but one true molar on either side of the lower jaw, and two true molars on each side of the upper jaw." The form of the palate here relied on is not found in all the genera of the family, and sometimes varies in genera which are very nearly allied both in external characters and dentition.

The Hyæna, Mr. Waterhouse was inclined to regard as an aberrant form of Viverridæ. Its carnassier has a large inner lobe, and in this respect also resembles the *Viverra*'s, and not the Cat's.

(See also some observations by me on the change of the teeth, &c., in some of the genera, in a paper in the 'Proceedings of the Zoological Society' for 1832, pp. 32, 62.)

There can be no doubt that the skull affords very important characters, especially for the division of the species into groups or genera, and also for the distinction of the species; but no one can examine an extensive series of skulls, even of animals obtained from the same locality, without being struck with the variation the skull presents during the growth and age of the animal, and also the variation which the specimens of the same age present, showing that the skull and the teeth are quite as liable to vary in form in each species (within certain limits, these limits being different in the various species) as any other part of the animal; so that a species cannot be said to be firmly established until the external form, the bones, and the habit of the species have been carefully studied, distinctly showing that the labours of the palæontologist in a zoological point of view are very unsatisfactory, from the necessary want of material for forming a reliable determination of species.

The late Mr. Turner made some very interesting observations on the base of the crania of the Carnivora, with a new distribution of the genera (see Proc. Zool. Soc. 1848, p. 63). It is to be regretted

that he died so young, and could not continue his researches; for I have no doubt he would have thrown great light on the structure of the skulls of this group, as he always followed my studies like a shadow. Thus when I published my "Arrangement of the Hollow-horned Ruminants" in 1846 (Ann. N. H. xviii. p. 227), he shortly after read his paper on their skulls (see Proc. Zool. Soc. 1850, p. 164); when I commenced the study of the species of Edentata by a monograph of *Bradypus* in Proc. Zool. Soc. 1849, p. 65, he read his paper on the skull of Edentata in 1851. Being an observant and careful osteologist, he observed many particulars that a general zoologist would have overlooked; but this limitation of his study confined his views; so that he would not allow such genera as *Saiga*, *Pantholops*, or *Tamandua* (which have such striking external characters), because he did not observe such differences in the skulls as he considered of generic importance.

The impulse that Cuvier gave to zoology by the study of the skeletons and teeth of Mammalia, as shown in the 'Ossemens Fossiles,' made such an impression on the succeeding students of zoology, that most of them, overlooking the importance that Cuvier himself attached to external characters, have confined themselves far too exclusively to the characters offered by these parts, overlooking the fact that bones and teeth are liable to vary like other parts of the animal, and that characters in the teeth that may be of great importance in most groups may be of comparatively little value in the others. Thus in the *Paradoxuri*, which every one must allow form a very natural group, well characterized by its habits as well as its external character, the skulls and the flesh-teeth offer such variations in form in the different species that they would be considered as good generic characters in any other tribe of Viverridæ.

The notes on the skull and teeth in this paper are always taken from those of the adult animal, unless it is stated to the contrary.

The Viverridæ have been divided into many genera, some only containing a single species, while one or two other genera have been left as magazines containing a number of heterogeneous species which had not been particularly examined. The characters of some of the published genera have not been made out on any uniform plan. Indeed that is the system of the day, to search out some animal which has some striking character, and to form it into a genus, leaving the greater number of species in the family under the old generic denomination, which, when examined with care, have quite as distinct characters. This is an evil which requires remedying, and I have tried to obviate it by submitting all the species of the group to the same kind of revision as M. Geoffroy submitted the old species when he rearranged the collection in the Jardin des Plantes more than half a century ago.

M. Temminck, in the 'Esquisses Zoologiques,' p. 100, has inquired if *H. widdringtonii* is a species or a local variety. He had never seen the animal; but this shows the spirit in which he seems always to have looked on the species described by others which were not in his museum. In the same work he gives a short *résumé* of the spe-

cies of the genera *Herpestes* and *Paradoxurus*, and states that the catalogues are encumbered with many double and triple *emplois*, which must be erased from the systematic catalogue. After citing some examples of species which have been described nearly simultaneously by zoologists living in distant countries, as *H. urinator*, *H. paludosus*, *H. penicillatus*, and *Cynictis steedmani* (which certainly are not instances deserving much blame, especially when we consider the many cases in which M. Temminck himself has described species in Holland which had been long previously described in England), he proceeds to propose to unite some species which are, in my opinion, perfectly distinct (some even belonging to different sections of the genus) according to characters that are almost universally adopted, and which he himself uses in other places. In the revision of the genus *Paradoxurus* in his monograph, and again in the above work, he has united together species which have not the slightest relation to each other, and which he never could have united if he had seen authentic specimens of them. Thus he unites *P. grayi*, *P. nipalensis*, and *P. laniger* to *P. larvatus*, and *P. crossi* and *P. pallasii* to *P. musanga*, regarding *P. bondar* as separate. Now if he had united *P. grayi*, *P. nipalensis*, *P. laniger*, *P. crossi*, and *P. bondar* together, he would have had the excuse that they all have some similarity of external appearance; and he might have been misled if he had only casually looked at them through the glass of the cases in the museum, as he looked at some specimens which he says he saw when in England. Synonyms cannot be determined by such an examination, nor is science advanced by such assertions.

M. Temminck was an eminent ornithologist, and has studied some groups of Mammalia, perhaps not with so much success. He was an amiable naturalist, but has carried his political anglophobia (so well seen in his 'Essay on the Dutch Colonial Possessions') into his zoological studies. This blinded him to the labours of the zoologists of this country, the richness of our collection, and thus rendered his observations in regard to their work not worthy of attention, as they otherwise might have been. It is to be observed that he never had a regular scientific training, never attempted to form scientific specific characters, and is rather to be regarded as a patron and amateur than as a scientific zoologist. He was the first in his country, as the late Earl of Derby was in this.

The arrangement of the genera of Viverridæ into natural groups is not easy; for though they naturally place themselves together in a certain kind of order, the difficulty is to find a character that is common to the genera that appear to be most related to each other.

I published an arrangement of the genera of this family then known, according to the characters afforded by the hairiness and baldness of the sole of the hind feet, in the 'Proceedings of the Zoological Society' for 1832, p. 63, which is well adapted for the purpose, though, like other arrangements, it is not infallible, nor to be used too strictly, or it will separate genera naturally allied to each other.

The continued study of the subject has shown me several other

characters which I had before overlooked. I propose the following arrangement as one which seems best adapted to exhibit the natural affinities of the genera, as far as they can be shown in a linear series, and as one that will enable the student to determine the species. Thus, for example, I would propose to divide the tribes characterized in the paper (in the 'Proceedings of the Zoological Society') above referred to into two groups, according to the form and the hairiness of the toes and the form of the claws, characterized by the foot and claw of the Cat and of the Dog or the Bear.

The bones of the toes of the animals of the first group, as in the Cats, form an angularly arched line, the last phalanges being bent up, so that the animal when it walks does not blunt its claws, which are only exerted when it wants to catch or tear some other animal. In the second group, which I have called *Dog-footed*, the bones of the toes form a more or less extended, slightly arched line; and the claws, being always exposed, and worn when the animal walks, are more or less blunt at the end. The more typical Dog-footed animals often scratch holes in the ground; and some have strong elongated arched claws for the purpose.

The groups are well defined and very distinct, and the above characters are well marked in most of the genera; but some few genera have feet that seem nearly intermediate between the two groups. In such cases the whole appearance of the animal must be taken into consideration, and the genera placed with those to which they seem most allied in habit and manners.

The difference in the form of the foot and claws is common to three families of the Carnivora; and, as it is connected with considerable peculiarity in the habit of the animal, it forms a good character to separate the tribes and genera into groups, thus:—

VIVERRIDÆ.	URSIDÆ.	MUSTELIDÆ.
A. <i>Toes arched; claws acute, retractile.</i>		
<i>Eluropoda.</i>	<i>Dendropoda.</i>	<i>Acanthopoda.</i>
Viverrina.	Ailurina.	Mustelina.
Genettina.	Cercoleptina.	Lutrina.
Paradoxurina.	Procyonina.	
B. <i>Toes straight; claws exerted, blunt.</i>		
<i>Cynopoda.</i>	<i>Brachypoda.</i>	<i>Platypoda.</i>
Herpestina.	Ursina.	Mephitina.
Mungosina.		Mydaina.
		Melina.

The genera of the three other families of Carnivora have a uniform kind of foot. Thus the *Felidæ* have a hairy foot, curved toes, and sharp claws; and the *Canidæ* and *Hyenidæ* straight toes and exerted, blunt claws.

The animals of the different families which have sharp retractile claws have habits in common. Thus the Cats, the Genets, the *Paradoxuri*, the Martins, the *Ailuri*, and the *Cercoleptæ* defend them-

selves by lying on their back and using both the hind and front feet to claw with; they walk softly, and jump on their prey.

The animals with exerted claws generally scratch the ground into holes, and defend themselves with their front feet; and some, as the Suricate and the Bears, sit on their haunches; and the Bear, the Coatimondi, the Raccoon, &c. use their fore feet as hands to take their food, as well as in defence.

*Synopsis of the Genera.*

I. The Cat-footed (*Æluropoda*). *The toes curved, arched, hairy, webbed; claws sharp, retractile.*

A. Typical. Digitigrade. *The underside of the feet hairy, except the pads, metatarsus, and sometimes a small part of the tarsus. Upper flesh-tooth elongate; upper tubercular grinder small, transverse. Nose short; underside flat, with a central groove. Viverracea.*

1. *Body robust; tubercular grinders 2/1, 2/1; back of tarsus hairy. Viverrina.*

PROTELES. Legs elongate; front longest. Head short, broad; ears long. Tail short, bushy. An anomalous genus allied to *Hyæna*.

VIVERRA. Legs moderate, equal. Head elongate. Tail conical, ringed. Back crested. Orbit of skull incomplete.

BASSARIS. Tail cylindrical, ringed. Legs equal, moderate. Back not crested. Orbit of skull incomplete.

VIVERRICULA. Legs moderate, equal. Tail conical, ringed. Back not crested; heel with a small bald spot. Orbit of skull complete.

2. *Body robust; tubercular grinders 2/1, 2/1; underside of the tarsus with a narrow naked streak. Genettina.*

GENETTA. Back with a black suberectile streak.

FOSSA. Back without any central streak.

3. *Body slender, elongate; tubercular grinders 1/1. Prionodontina.*

POIANA. Back of tarsus with a narrow naked streak.

PRIONODON. Back of tarsus hairy.

B. Aberrant. Subplantigrade. *The underside of the toes and more or less of the back of the tarsus naked, callous. Flesh-tooth strong, upper tubercular grinders large, broad.*

1. *Nose produced; underside convex, hairy, without any central longitudinal groove; hinder part of the tarsus bald, callous. Face produced. Cynogalina.*

CYNOGALE. Tail short, cylindrical.

2. *Nose short, underside flat, with a central groove.*

a. *The hinder part of the tarsus hairy to the palm; the tail bushy.*  
Galidiina.

GALIDIA.

b. *The upper part of the hinder part of the tarsus hairy; tail ringed.* Hemigalina.

HEMIGALEA.

c. *The hinder part of the tarsus bald, callous.*

\* *Tail thick, strong, prehensile.* Arctictidina.

ARCTICTIS.

\*\* *Tail very long, subconvolute; frenum naked, glandular; head elongate.* Paradoxurina.

PARADOXURUS. *Flesh-tooth elongate, triangular; tubercular teeth oblong. Orbit very incomplete.*

PAGUMA. *Flesh-tooth short, triangular, large. Orbit very imperfect.*

ARCTOGALE. *Flesh-tooth triangular, small. Orbit nearly complete. Palate very narrow, elongate.*

NANDINIA. *Flesh-tooth elongate, triangular; tubercular teeth triangular, transverse. Orbit rather incomplete. Palate narrow, short.*

\*\*\* *Tail long, bushy; head short, broad; frenum hairy?*  
Cryptoproctina.

CRYPTOPROCTA.

II. *The Dog-footed (Cynopoda). The toes elongate, separate, more or less hairy; claws exerted, blunt; feet narrow, underside bald or only covered with short hairs. Orbit of skull complete, or nearly complete, behind.*

A. *Nose short; underside flat, with a central groove.* Herpesteacea.

1. *Head elongate, conical; tail conical or cylindrical.* Herpestina.

\* *Front claws elongate, compressed; back streaked.*

GALIDICTIS. *Toes 5-5. Tail subcylindrical, covered with long hair. Back striped.*

\*\* *The front claws short, compressed; back grizzled; flesh-tooth long, narrow.*

HERPESTES. *Toes 5-5. Tail conical, with long hair. Teeth moderate.*

ATHYLAX. *Toes 5-5. Tail conical, with long hair. Teeth very large.*



CALOGALE. Toes 5-5. Tail cylindrical, elongate, covered with shortish hairs; tip pencilled.

GALERELLA. Toes 5-4. Tail cylindrical, elongate, covered with short hair.

\*\* *The front claws short, compressed; flesh-tooth broad, triangular.*

CALICTIS. Toes 5-5. Tail conical, with long hairs. Back grizzled. Pupil oblong, transverse.

ARIELA. Toes 5-5. Tail elongate, subcylindrical. Back cross-banded.

ICHNEUMIA. Toes 5-5. Legs rather high. Tail conical, bushy. Back grizzled.

? BDEOGALE. Toes 4-4. Legs moderate. Tail conical, bushy. Back grizzled. Soles hairy?

\*\*\* *Front claws elongate, produced; tail conical, with long hair; back grizzled.*

URVA. Toes 5-5. Head elongate. Soles of hind feet hairy. False grinders 3/4.

TÆNIOGALE. Toes 5-5. Head elongate. Soles of hind feet bald. False grinders 3/4.

ONYCHOGALE. Toes 5-5. Head elongate. Soles of hind feet hairy. Front claws very long. False grinders 3/4.

HELOGALE. Toes 5-5. Nose short. False grinders 2/3. Body slender. Soles bald.

2. *Head short, ventricose; tail bushy, expanded laterally; claws elongate.* Cynictidina.

CYNICTIS. Toes 5-4.

B. *Nose produced; underside convex, hairy, without any bald central groove.* Rhinogaleacea.

1. *Head elongate; nose short; teeth 40; false grinders 3/4.* Mungosina.

RHINOGALE. Tail conical. Toes 5-5. Front claws short.

MUNGOS. Tail conical. Toes 5-5. Front claws elongate.

2. *Head ventricose; nose elongate; teeth 36; false grinders 3/3, 3/3.* Crossarchina.

EUPLERES. Toes 5-5. Claws short, hooked. Hind soles hairy.

CROSSARCHUS. Toes 5-5. Claws hooked. Hind soles bald.

SURICATA. Toes 5-4. Claws elongate, slender. Hind soles hairy.

The shortness of the characters that I give to some genera has been objected to by some writers, especially by amateurs who have not studied the Linnean brevity and method of description. They overlook the fact that the characters of the sections and subsections of the family that precede the genus form an essential part of the generic character, in the same manner that the section of the genus is part of the specific character of the species that the section contains. The definition of the subsections of the families and genera requires more study, analysis, and consideration than the writing out of a long generic character, that contains particulars that are common to a number of allied genera, such as the writers who make the complaint usually give. At the same time, the use of such detailed characters requires a greater exertion on the reader's part to eliminate the essential particulars, which are the real characters of the group. In the above table, the most easily seen and often empirical characters are purposely chosen, for facility of use and brevity. I have even used the colour of the animal for this purpose; for it has a great influence on the formation of a natural genus—more than many zoologists are willing to admit. Even those who know this fact avoid making use of it, apparently fearing that it might not be considered scientific! In the body of the essay, longer generic characters are given. Those who object to analytic characters forget the immense number of animals now known, and the great advantage of a rapid way of discovering the name of the animal they seek, and whose history they desire to know. As Mr. W. S. Macleay justly observes, "the modern art of describing is too long, often insufferably long, while human life remains as short as ever."—*Illust. Zool. South Africa*, p. 54.

### I. THE CAT-FOOTED VIVERRIDÆ (*Æluropoda*)

have broad feet, with short arched toes, covered with abundant close-spreading hair, united together at the base by a more or less distinct web, and armed with short, sharp, retractile claws. They are covered with a soft elastic fur, except the anomalous genus *Arctictis*, which has a very harsh fur and a prehensile tail.

- A. Digitigrade. *The underside of the hind feet hairy, except the pads of the toes, the metatarsus, and sometimes a small part of the tarsus; the upper flesh-tooth elongate; upper tubercular small, transverse; nose short, underside flat, with a central groove.*

#### Tribe I. VIVERRINA.

*The body robust; tubercular teeth 2/1, 2/1; the back of the hind feet hairy, except the pad of the toes and the metatarsus.*

There is a deep pouch for secreting civet, in the form of a deep cavity on each side of the anus (P. Z. S. 1832, p. 63).

All the genera of this tribe are restricted to the Old World, except *Bassaris*, which is American. This American group is peculiar in

having two tubercles on the inner lobe of the flesh-tooth, while this tooth in all the other genera has only a single lobe on the crown of that process of the tooth.

### 1. PROTELES.

Head short, broad; muzzle truncated; ears long and pointed. The body short; neck and back crested; legs elongate, front longest; tail short, bushy. Toes 5—4. Teeth 32; false grinders  $\frac{1-1}{1-1}$ ; tubercular grinders 2/1. Looks like a small *Hyæna*, with the teeth of a Civet.

*Proteles*, I. Geoff. Mém. Mus. ii. 370, 1824; Ann. Sci. Nat. viii. 252; A. Smith, S. Afr. Q. Journ. i. 48.

#### PROTELES CRISTATUS.

B.M.

*Proteles cristatus*, Gray, Cat. Mam. B. M. 47; Gerrard, Cat. Ost. B. M. 70.

*P. lalandii*, I. Geoff. Mém. Mus. xi. 370, t. 20; Mag. Zool. 1841, i. t. 30; Fischer, Syn. Mamm. 195; Schinz, Syn. Mamm. i. 424.

*Viverra cristata* (*Grey Jackal*), Sparrm. Voy. ii. 177.

*P. typicus*, A. Smith, S. A. Q. J. i. 48.

*Viverra ? hyænoïdes*, Cuvier, MS.; Desm. Mamm. 538.

*P. hyænoïdes*, Blainv.

*Genette hyenöide*, Cuv. Oss. Foss. iv. 388.

*Proteus*, Edinb. Phil. Journ. ii. 103.

*Hyæna Genet*, Griffith, A. K. t.

*Hab.* S. Africa: Cape (called "Nadron"); Natal (*A. Smith*), ("Aard Wolf").

"Female lighter; under fur less abundant."—*A. Smith*.

### 2. VIVERRA.

*Viverra*, Linn.; Gray, P. Z. S. 1832, p. 63.

Head long; muzzle acute; pupil oblong, vertical. Neck with large black and white marblings. Body short, compressed; back black-crested; legs moderate, equal; tail moderate, tapering, ringed. Toes 5—5; claws semiretractile. Teeth 40; false grinders  $\frac{2-3}{3-3}$ .

*Hab.* Africa and Asia.

\* *Tail black.* African.

#### 1. VIVERRA CIVETTA.

B.M.

Tail black; sides spotted.

*Viverra civetta*, Schreb. Säugeeth. t. 111; A. Smith, S. A. Q. J. i. 44; Bennett, Tower Menag. 99, fig.; Gray, Cat. Mam. B. M. 47; Gerrard, Cat. Ost. B. M. 70; Schinz, Syn. Mamm. i. 361; Temm. Esq. Zool. 88.

*Civette*, Buffon, ix. 299, t. 34.

Var.? *Viverra poortmanni*, Pucheran, Rev. et Mag. Zool. vii. 154, 1853; Arch. der Naturg. 1856, p. 44.

*Hab.* Africa: Abyssinia; Fernando Po (*Thompson*); Guinea (called "Kaukans") (*Temm.*); Gaboon (*Aubry Le Comte*).

\*\* Tail black, ringed. Asiatic.

## 2. VIVERRA ZIBETHA.

B.M.

Tail ringed.

*Viverra zibetha*, Linn. S. N. i. 65; Fischer, Syn. Mamm. 168; Gray, Illust. Ind. Zool. ii. t. 5; Proc. Zool. Soc. 1832, p. 63; Cat. Mamm. B. M. 47; Gerrard, Cat. Ost. B. M. 71; Schinz, Syn. Mamm. i. 362; Horsfield, Cat. Mus. India House, 54.

*Meles zibethica*, Linn. S. N.

*Viverra undulata*, Gray, Spic. Zool. t. 8.

*V. civettoides*, *V. melanurus*, *V. orientalis*, Hodgson, J. Asiatic Soc. Bengal, x. 909.

*Zibet*, Buffon, ix. 299, t. 31.

*Hab.* Asia: Bengal (*Horsfield*); India (*Hardwick*); Calcutta (*Oldham*); Nepal (*Hodgson*); China (*J. Reeve*); Formosa (*Swinhoe*); ? Isle of Negros (*Cuming*) (skull B.M.); ? Malay peninsula (*Horsfield*).

Skull elongate, narrow. Nose compressed. Orbit incomplete behind. Teeth very like *Genetta*; upper hinder tubercular small, oblong, transverse, with two outer and one large inner tubercle. Lower jaw shelving in front; lower edge rather arched, without any tubercles below the end of the tooth-line; the tubercular grinders subcircular, with three lobes on the crown.

## 3. VIVERRA TANGALUNGA.

B.M.

Tail black above, and ringed on the lower side.

*Viverra tangalunga*, Gray, P. Z. S. 1832, p. 63; Cat. Mamm. B. M. 48; Cantor, Mamm.; Horsfield, Cat. Mus. India House, 57.

*Viverra zibetha*, Raffles, Linn. Trans. xiii. 231; F. Cuvier, Mam. Lithog. t.

*Hab.* Sumatra (called "Tangalung") (*Raffles*); Borneo, Celebes, Amboyna (*Müller*); Malayan peninsula (*Cantor*).

What is *Viverra megaspila*, Blyth, Journ. Asiat. Soc. Bengal, 1862, p. 321?

## 3. BASSARIS.

*Bassaris*, Licht. Isis, 1831, p. 510.

Body elongate; back not crested. Legs moderate, equal. Tail elongate, bushy, dark-ringed. Toes 5—5, separate; claws acute. Teeth 38; false grinders  $\frac{2-2}{3-3}$ ; tubercular grinders  $\frac{2-2}{2-2}$ .

*Hab.* Mexico.

## BASSARIS ASTUTA.

B.M.

Fur grey.

*Bassaris astuta*, Licht. Isis, 1831, p. 510; Darst. Säugeth. t. 42;

Gray, Cat. Mam. B. M. 50; Gerrard, Cat. Ost. B. M. 72; Baird, Mamm. N. Amer. t. 74. f. 2; Mexico, 13; Eydoux, Voy. Bonite, t. (skeleton); De Blainv. Ostéogr. Viverra, t. 12 (teeth).

*Tepe maxthalon*, Hernand, Voy. Fav. t. 4 & 18.

Var. *fulvescens*. Far more fulvous, perhaps of a different season. B. M.

*Bassaris sumichrasti*, De Saussure, Rev. et Mag. de Zool. 1860, p. 5, t. 1.

*Hab.* Mexico (called "Cat Squirrel," often domesticated) (*Philips*).

Skull ovate, rather produced in front, more compressed. Orbits large, incomplete behind; lower edge confluent with the zygomatic arch; zygomatic arch slender, short, and much bowed out. The brain-case swollen; the contraction rather in front of the hinder edge of the orbit. The teeth normal. False grinders  $\frac{2}{4}$ ,  $\frac{2}{4}$ , the upper compressed, second without any internal lobe. The flesh-tooth triangular; inner lobe broad, on the inner side of the front edge, with two distinct conical tubercles; outer side about one-third longer than the front margin. The tubercular grinders large, rather broader than long, with four small tubercles on the outer and three on the inner side; inner edge rounded; the hinder tubercular oblong, transverse, like the former one, but smaller. The lower jaw shelving in front; the lower edge arched; the tubercular grinders large, oblong, longitudinal, with two large tubercles on the front and two smaller in an oblique line on the hinder part of the crown. Length of skull  $3\frac{1}{4}$  inches; width of the brain-case  $1\frac{1}{3}$  inch, of the zygomatic arch  $2\frac{1}{2}$  inches.

De Saussure's figures represent the animal as if it were spotted, and the tail with only a few broad rings.

#### 4. VIVERRICULA.

*Viverricula*, Hodgson, Journ. Asiat. Soc. Beng. x. 909.

Head tapering. Throat with lunate dark bands. Body elongate; back not crested. Legs moderate, equal. Tail almost as long as the body, tapering, dark-ringed. Toes 5—5; claws acute, compressed. Pupil oblong, vertical. Teeth 40; false grinders  $\frac{3-3}{3-3}$ ; flesh-tooth longer than broad in front, inner lobe on the front margin; tubercular grinders  $\frac{2-2}{2-2}$ .

*Hab.* Asia.

Like a Genet, but with hairy soles to the feet, a shorter tail, and no crest. Foot with a small bald spot on the side of the palm-pad (see Hodgson, J. A. S. B. t. 31. f. 8).

#### VIVERRICULA MALACCENSIS.

B. M.

Grey; back with seven black or dark streaks more or less broken up into spots; shoulders, sides, and legs spotted; feet deep brown and black; tail with seven or eight black rings.

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*Viverricula malaccensis*, Cantor, Cat. Mam. Malay. 29.

*Viverra malaccensis*, Gmelin, S. N. 92 (from Sonn.); Gray, Cat. Mamm. B. M. 48; Gerrard, Cat. Ost. B. M. 70.

*V. gunda*, Hamilton, Buchanan, Icon.

*V. rasse*, Horsf. Zool. Java, t. ; P. Z. S. ii. (1832), p. 23; Schinz, Syn. Mamm. i. 362.

*V. indica*, Geoff. MS. ; Fischer, Syn. Mamm. 171; Desm. Mamm. 210; Gervais, Mag. Zool. 1835, p. 10, t. 19; Horsf. P. Z. S. ii. (1832) p. 23.

? *V. bengalensis*, Gray, Illust. Ind. Zool. i. t. 4.

*V. leveriana*, Shaw, Mus. Lever. t. 21.

*Genetta manillensis*, Eydoux.

*G. indica*, Lesson, Man. 174.

*Genette rasse*, F. Cuvier, Mamm. Lithogr. t.

*Civette de Malacca*, Sonnerat, Voy. ii. 144, t. 91.

*Viverricula indica*, Hodgson, Journ. Asiat. Soc. Beng. x. 909; Calcutta J. N. H. ii. 47.

Var. (paler spots less distinct). *Viverra pallida*, Gray, Proc. Zool. Soc. ii. 63; Illust. Ind. Zool. ii. t. 6; Cat. Mam. B. M. 48; Gerrard, Cat. Ost. B. M. 71; Swinhoe, P. Z. S. 1862.

*Hab.* Asia; Madras (*Elliot*); Gangootra, Nepal (*Hodgson*); Java (*Horsfield*).

Dr. Horsfield believed there were two species combined under this name (see Proc. Zool. Soc. ii. 23, 1832):—

*V. rasse*. Back with eight *broad* longitudinal lines; the three lateral lines on each side interrupted and obscure.

*V. indica*. Back with eight *narrow* longitudinal lines; the lateral lines continued.

I formerly thought that *V. pallida* from China, in which the spots and stripes are very indistinct, might be different; but a series of specimens from different localities seems to show a gradation from one to the other.

This species differs very much in colour from different localities and perhaps in different seasons. The stripes and spots are sometimes very black and distinct; at others, as in *V. pallida*, they are very indistinct, scarcely to be distinguished from the general colour of the fur.

The skull elongate, compressed; nose compressed. The orbit imperfect behind, confluent with the temporal fossæ. Grinders:—false  $\frac{3}{4}$ ,  $\frac{3}{4}$ ; front upper small, compressed; the third rather thicker, without any internal lobe; the flesh-tooth trigonal, oblique, elongate, half as long again as the width on the front margin—the internal lobe trigonal, on the inner side of the front edge; the front tuberculars trigonal, outer side oblique; front edge rather wider than the length of the outer margin; the hinder tubercular subcircular, with three lobes. The lower jaw slender; lower edge slightly curved, without any prominence under the end of the tooth-line; the tubercular grinders subcircular, with three nearly equal lobes.

Length of skull  $3\frac{3}{4}$  inches; width of brain-case  $1\frac{1}{6}$  inch, at zygomatic arches  $1\frac{3}{4}$  inch.

I wrote to my excellent friend Dr. Peters to inquire if the *Tunga* of Anjuan could be the *V. fossa*, and if it was not a *Genetta*. He assured me that it agrees in all particulars with the Indian *V. rasse*, and, "like it, has no bald streak along the sole. It has a hairy sole to the hind feet, and a small callous spot to the pads of the palms towards the heel."—*Letter*, 24th Nov. 1864.

Dr. Peters regards the animal called the *Tunga*, which is common on the island of Anjuan, one of the Comoro Islands, near Madagascar, on the east coast of Africa, as the same as the *Viverra rasse* of Dr. Horsfield: he says it agrees with it in colour, in the form of the ears, and in the bristly quality of its fur; and it has the soles of its feet covered with hair as in that animal. He also observes that the fauna of these islands agrees more with those of Madagascar and India than with that of continental Africa (see Peters, *Reise nach Messamb.*, Mammalia, 113). If the animal is identical, it is the only species of the family I know common to Asia and Africa.

### Tribe 2. GENETTINA.

*The body robust; tubercular grinders 2/1, 2/1; the underside of the tarsus of the hind feet with a narrow bald line extending from the pads nearly to the heel. The orbit of the skull is very imperfect, only contracted above. The fur is soft, spotted or cloudy, and the tail ringed.*

#### 5. GENETTA, CUV. Mamm. Lithog.

*Genetta*, Brisson, R. A. 252; Gray, P. Z. S. ii. (1832) p. 63.

*Viverra*, § *Genetta*, Cuvier, R. A.; Gray, Proc. Zool. Soc. 1832; Cat. Mamm. B. M. 49.

The body elongate; back with a broad, continued, more or less crested, black streak. Tail long, slender, hairy, ringed. Legs moderate. Feet hairy. Toes 5—5; the sole of the hind foot with a narrow longitudinal bald streak. Claws short, retractile. Skull elongate, narrow. Teeth 40; false grinders  $\frac{3-3}{4-4}$ ; flesh-tooth elongate; tubercular grinders  $\frac{2-2}{1-1}$ .

*Hab.* Africa and South Europe.

Sir A. Smith observes, "They strike and scratch with the fore feet, like a cat. They spring on their prey, and climb with great facility."

The form and colour of the tail seem the best characters for the distinction of the species; the pale bands even vary a little in width and distinctness. The form, colour, and disposition of the spots vary much; they are sometimes confluent.

\* *Tail tapering, with elongate, rather spreading hairs, and with numerous black and white rings; tip white.*

#### 1. GENETTA VULGARIS.

B.M.

Blackish grey, black-spotted; tail elongate, with white and black

rings of nearly equal length, the tip whitish; vertebral line black, subcristate; the fore legs and the feet grey, black-spotted; the hind legs black behind near the hock.

*Genetta vulgaris*, Gray, P. Z. S. ii. (1832) p. 63; Lesson, Man. 173; Gerrard, Cat. Ost. B. M. 71.

*Viverra maculata*, Gray, Zool. Misc. 9, t. 9; A. Smith, S. African Quart. Journ. ii. 136.

*G. afra*, F. Cuv. Mamm. Lithogr. t.

*Viverra genetta*, Linn.; Fischer, Syn. Mamm. 169.

*Genetta bonapartei*, Loche, Mag. Zool. 1857, t. 18.

*Hab.* South Europe, North Africa, and Asia: in B. M., from Nismes (*Verreaux*); Madrid, Algiers (*Loche*); Tangiers (*Favier*); Barbary (*Gray*); Asia, Mount Carmel (*Tristram*).

The length of the rings varies in different specimens, depending on the length of the hairs of the tail. In some, two or more of the rings are more or less confluent, especially on the upper part and near the end of the tail.

I cannot find any difference between the specimens from Europe, Algiers, Tangiers, and Mount Carmel. The distinctness and darkness of the streak upon the forehead differs in specimens from the same localities.

## 2. GENETTA FELINA.

B.M.

Blackish grey, black-spotted; vertebral line black; tail elongate, white-and-black ringed, rings of nearly equal length; tip whitish; the outer side of the fore and hind legs black; feet blackish.

*Genetta felina*, Gray, Proc. Zool. Soc. ii. (1832) p. 63; Cat. Mamm. B. M. 49; A. Smith, S. A. Quart. Journ. i. 47.

*Viverra felina*, Thunb. Sv. Akad. xxxii. 166, t. 7; Fischer, Syn. Mamm. 170; Temm. Esq. Zool. 92.

*G. vulgaris?*, A. Smith, S. Afr. Quart. Journ. ii. 45.

*Hab.* South Africa: Cape of Good Hope (*Verreaux*) (the Musk-cat of the colonist); Latakoo, common (*A. Smith*).

The chief difference between this and *G. vulgaris* is that the legs and feet are blacker, the head is darker, with a more distinct black streak up the forehead between the eyes.

*Genetta rubiginosa*, Pucheran (Rev. et Mag. de Zool. vii. 1855, 154; Arch. für Naturg. 1856, p. 44:—

“*Griseo-albescens, fulvo lavata, maculis dorsalibus fere toto rubiginosis; cauda ad basim quatuor annulis rubiginosis, quatuor deinde nigris prædita.*

“*Hab.* Cape of Good Hope”—*J. Verreaux*), is probably the same.

## 3. GENETTA SENEGALENSIS.

B.M.

Pale yellowish grey, brown-spotted; vertebral line black, subcristate behind; tail elongate, slender, yellow-and-black ringed, the pale rings the longest; tip of tail pale; the hinder part of the hind legs blackish or dark brown.



*Genetta senegalensis*, Gray, P. Z. S. ii. (1832) p. 63; Cat. Mamm. B. M. 49; Gerrard, Cat. Oss. B. M. 71.

*Viverra senegalensis*, Fischer, Syn. 170 (from F. Cuv.); Temm. Esq. Zool. 92.

*Genette de Sénégal*, F. Cuv. Man. Lith. t. .

?*Genetta aubryana*, Pucheran, Rev. et Mag. de Zool. vii. (1855) p. 154; Arch. für Naturg. 1856, p. 44.

*Fossane*, Brown, Illust. t. 43.

*Hab.* West Africa: Senegal (*Verreaux*); ? Gaboon (*Aubry le Comte*); Sennaar (*Brit. Mus.* 46, 6, 15, 43). East Africa: Abyssinia (*B. M.* 44, 5, 17, 27); Dongola (*B. M.* 46, 9, 2, 27). North Africa (*B. M.* 43, 12, 28, 2).

Skull tapering in front; nose compressed. Orbit very large, very incomplete behind; the zygomatic arch confluent with the lower edge of the orbit, moderate. False grinders  $3/4$ ,  $3/4$ ; upper rather far apart, front small, second compressed, with a small lobe on each end; third compressed, with a small lobe on the middle of the inner side and one at the hinder end. The flesh-tooth triangular, much longer than the breadth at the front edge, with a moderate-sized internal lobe rather behind the front inner angle. The tubercular grinders trigonal, with a sloping outer edge; the front twice as wide as long on the outer edge; the hinder small. The lower jaw slender, erect, with a shelving chin or short symphysis and a curved lower edge without any tubercles under the end of the tooth-line; the tubercular grinder roundish, with two large anterior lateral and a similar-sized posterior central lobe. Length of skull  $3\frac{1}{6}$  inches; width of brain-case  $1\frac{1}{2}$ , at zygoma  $1\frac{5}{8}$ .

**\*\*Tail subcylindrical, with shortish fur; end black, with imperfect rings; tip black, base with alternate, equally long, black and white rings.**

#### 4. GENETTA TIGRINA. B. M.

Grey brown, with black spots, the larger more or less brown in the centre; the hind feet darker; the tail elongate, cylindrical, black, with rather broad white rings, narrower than the black one; tip of tail black.

*Genetta tigrina*, Gray, Cat. Mamm. B. M. 49; Gerrard, Cat. Ost. B. M. 71; A. Smith, S. Afr. Q. Journ. i. 46.

*Viverra tigrina*, Schrb. Säugeth. t. 115; Fischer, Syn. Mamm. 170.

*Genetta vulgaris*, Rüppell.

*G. amer*, Rüppell; Gray, Cat. Mamm. B. M. 49.

*G. abyssinica*, Rüppell, Fauna Abyss. t. 11.

*Viverra abyssinica*, Gerrard, Cat. Oss. B. M. 71; Schinz, Syn. Mamm. i. 364.

*Viverra genetta*, Peters, Mossamb. Mamm. 113.

*Hab.* South Africa: Cape of Good Hope (the Musk-cat of the colonists); Natal and East Africa (*Verreaux*); Mozambique (*Peters, Kirk*); Abyssinia (*Rüppell*).

\*\*\* *Tail subcylindrical, with shortish fur, black; middle part with some imperfect rings beneath, the base with a few narrow white rings.*

5. GENETTA PARDINA. The Berbe.

B.M.

Fur reddish grey brown, with black spots more or less brown in the centre; the feet and hinder part of hind legs brown; tail elongate, covered with shortish hairs, with narrow pale or reddish rings on the basal half, black at the end, with very indistinct narrow or pale rings.

*Genetta pardina*, I. Geoff. Mag. Zool. 1832, t. 8; Gray, Cat. Mamm. B.M. 50; Temm. Esq. Zool. 93.

*Genette pantharine*, F. Cuvier, Mamm. Lithogr. t.

*Genetta poënsis*, Waterhouse, Proc. Zool. Soc. 1838, p. 59 (from a flat skin); Schinz, Syn. Mamm. i. 366.

*Viverra genettoides*, Temm. Esq. Zool. 89, 1853?

*Genetta fieldiana*, Du Chaillu, Proc. Boston N. H. Soc. vii. (1860) p. 302; Gray, Ann. & Mag. N. H. viii. 60; Arch. f. Naturg. 1862, p. 128 (from the Gaboon).

*G. servalina*, Pucheran, Rev. et Mag. de Zool. vii. (1855) p. 154; Arch. für Naturg. 1856, p. 44.

*Berbe*, Bosmann, Voy. Guinea, 31. f. 5; Buffon, H. N. xiii.

*Hab.* Fernando Po (*Waterhouse*); Guinea (*Temm.*); Gaboon (*Du Chaillu*); West Africa (*B.M.*); interior of Senegal (*I. Geoffroy*).

The specimens vary considerably in the size of the spots; in some they are brown with black edge, in others almost uniformly black; but I can see no characters by which they can be separated.

*Genetta poënsis* seems to be the same variety as that described by I. Geoffroy and M. Du Chaillu.

6. FOSSA.

The back without any black subcrested vertebral streak; the soles of the hind feet hairy, with —————?

FOSSA DAUBENTONII.

*Viverra fossa*, Schreb. Säugeth. t. 114 (from Buffon); Fischer, Syn. Mamm. 170; Schinz, Syn. Mamm. i. 369.

*Genetta fossa*, Gray, P. Z. S. 1822; A. Smith, S. Afr. Q. Journ. i. 46; Lesson, Mamm. 174; Pucheran, Ann. & Mag. N. H. 1855, p. 41.

*Fossane*, Buffon, H. N. xiii. 163, t. 20.

*Hab.* Madagascar (*Mus. Paris.*).

“Fur grey black, rufous-varied, a white spot over the hinder angle of the eye; back and nape with black lines, four of which extend from the nape to the tail, continuous to the middle of the back, and the last of their length broken into very close spots; the sides, shoulders, and thighs with spots placed in three lines on each side; lips, chin, and beneath dirty white; tail with many narrow half-rings, of a reddish colour, which do not extend to the lower side;

feet yellowish white. Length of body and head 17 inches; of tail  $8\frac{1}{2}$  inches. There are no subcaudal glands.

“*Hab.* Madagascar (*Poivre, Mus. Acad. Sci.* 1761).”—*Buffon, H. N.* xiii. 163, t. 21.

I do not know any other description of this species; that of all other authors, including Dr. A. Smith, is a mere copy of the above. There does not appear to be any central dorsal stripe, so characteristic of the Genets; the soles of the front feet have not been described.

### Tribe 3. PRIONODONTINA.

*Body slender, elongate; limbs very short; tubercular grinders 1/1; fur soft, close, erect; the tail very long, cylindrical, ringed.*

#### 7. PRIONODON.

*Prionodon* (subgenus of *Felis*), Horsf. Java, Hodgson.

*Linsang*, Gray, Cat. Mamm. B. M. 48; Müller, Zool. Ind. Arch.

Body very slender; back not crested. Legs short. Tail very long, cylindrical, dark-ringed. Toes 5—5. Claws very acute. Skull elongate. Teeth 38; false grinders  $\frac{3-3}{3-3}$ ; flesh-tooth elongate; tubercular grinders  $\frac{1-1}{2-2}$ .

*Hab.* Asia and Africa.

##### 1. PRIONODON GRACILIS.

B.M.

Fur white; back with broad black cross bands; sides of neck with a broad black streak continued along the sides, confluent with the bands of the back; back of neck with five parallel black streaks. Tail with seven black and white streaks; a second streak, broken into spots, from the side of the neck to the haunches. Legs with small black spots.

*Linsang gracilis*, Müller, Zool. Ind. Arch. i. 28, t.; Gray, Cat. Mamm. B. M. 48; Gerrard, Cat. Ost. B. M. 72.

*Viverra? linsang*, Hardw. Linn. Trans. xiii. 256, t. 24; De Blainv. Ostéogr. t. 12 (teeth).

*Felis (Prionodon) gracilis*, Horsf. Zool. Java, t.

*Viverra hardwickii*, Lesson, Man. 172 (not Gray).

*V. genetta*, Deschamps, MS. B.M.

*Paradoxurus prehensilis*, Schinz, Cuv. Thierr. iv. 349.

*Viverra gracilis*, Desm. Mamm. 539; Schinz, Syn. Mamm. i. 363.

*Paradoxurus linsang*, Fischer, Syn. Mamm. 159, 1829.

*Hab.* Asia: Malacca?, Siam?, Sumatra?, Java? (*Horsfield*).

##### 2. PRIONODON PARDICOLOR.

B.M.

Pale whitish grey; back of neck and shoulders with three streaks, diverging from the vertebral line; back with two series of large square spots; the shoulders, sides, and legs with round black spots; an elongated spot on the middle of the front part of the back, between the square spots on the sides of the body.

*Prionodon pardicolor*, Hodgson, Calcutta Journ. N. H. ii. 37, t. 1. f. 3 & 6, 1841.

*Linsang pardicolor*, Gray, Cat. Mamm. B. M. 49; Gerrard, Cat. Ost. B. M. 72.

*Viverra perdicator*, Schinz, Syn. Mamm. i. 366 (misprint).

*Hab.* Nepal.

The skull elongate; nose rather short, compressed; brain-case narrow in front, swollen over the ears, and contracted and produced behind. Orbits not defined behind, confluent with the temporal cavity; zygomatic arch slender. Palate contracted behind. Teeth 38; upper false grinders compressed; flesh-tooth narrow, much longer than wide in front; the outer edge three-lobed, inner tubercle on the front edge; tubercular grinders transversely trigonal, much wider than long, the outer edge sloped, and the hinder lobes in the middle of the hinder edge. There is no hinder tubercular; but the one present is quite like the front tubercular in the typical Viverridæ.

The skulls of the two species are very similar; but the skull is rather larger, the palate narrower in front and behind, and the bullæ of the ears are narrower and less ventricose in *P. gracilis* than in *P. pardicolor*.

The following are the measurements in inches and twelfths in *P. gracilis*:—length of skull 1" 7<sup>'''</sup>; width at brain-case 11<sup>'''</sup>; width of zygomatic arch 1" 3½<sup>'''</sup>; length of nose 9<sup>'''</sup>. *P. pardicolor*:—length of skull 2" 6<sup>'''</sup>; width of brain-case 10½<sup>'''</sup>; width of zygomatic arch 1" 2½<sup>'''</sup>; length of nose 8½<sup>'''</sup>.

#### 8. POIANA.

Head small; ears rounded. Body slender, elongate; fur soft, close, short, nearly uniform in length, spotted; no central dark vertebral line. Legs rather short. Feet hairy, cat-like; toes 5—5, short; hind soles covered with hair; with a short narrow naked line, forked below, and only reaching to the middle of the foot above. Claws retractile. Tail cylindrical, black-ringed.

*Hab.* Africa.

Very like *Prionodon* in external appearance, but with the feet of *Genetta*.

#### POIANA RICHARDSONI.

B.M.

Pale brown, black-spotted; spots on the back larger, square; spots on sides and feet smaller, rounded.

*Linsang richardsoni*, Gerrard, Cat. Ost. B. M. 72.

*Viverra genettoides*, Temm. Esq. Zool. 89, 1853?

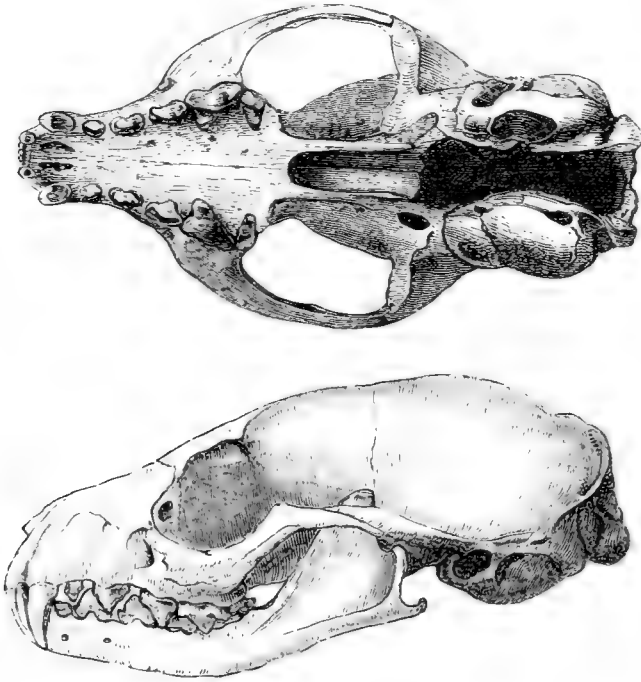
*Genetta richardsoni*, Thompson, Ann. N. H. 1842.

*Genetta poënsis* (jun.), Waterh. P. Z. S. 1838, p. 59.

*Hab.* West Africa: Fernando Po (*Thompson*); Guinea (*Temm.*).

Skull and teeth very like *Prionodon*; but the brain-case is ovate and more ventricose. The orbits not defined behind, and confluent with the temporal cavity; zygomatic arch stronger. The nose is compressed. The palate is very narrow behind. Teeth 38; the

upper false grinders compressed; the flesh-tooth considerably longer than broad in front, with a roundish inner lobe on the front edge, separated from the other lobe by a notch; the tubercular grinders transverse, triangular, broad, with a small lobe in the middle of the hinder edge. There is no second tubercular grinder in the upper jaw. Length of skull 2" 9"', of nose 9"'; width of brain-case 1 1/2"', of zygomatic arch 1" 5'''.



*Poiana richardsoni.*

- B. Aberrant Cat-footed Viverridæ. *Subplantigrade*. *The underside of the toes and more or less of the back of the tarsus near the foot bald and callous. The flesh-tooth is massive and strong; the tubercular grinder large, broad.*
1. *Nose produced, convex, and hairy beneath, without any central longitudinal groove. The orbit of the skull only slightly defined above.*

#### Tribe 4. CYNOGALINA.

*The toes short, covered with dense hairs, slightly webbed at the base; the claws short, compressed, retractile; the soles of the hind feet broad, bald for about two-thirds of their length; the heel hairy. The nose rather produced, with a bald muzzle, convex, and hairy beneath, without any central groove. The frenum covered with hair. The fur very dense, close, erect, soft, and elastic. Tail short, cylindrical.*

## 9. CYNOGALE.

*Cynogale*, Gray, Mag. N. H. 1836, i. 579; Proc. Zool. Soc. 1836, p. 86; Cat. Mamm. B. M. 53.

*Lamictis*, De Blainv. Compt. Rend. 1837, 56.

*Potamophilus*, S. Müller, Zool. Ind. Arch. 103, 1839.

Head elongate. Nose broad, swollen; under side hairy, without any central groove. Ears small, rounded, covered with short hairs. Whiskers rigid, elongate, and some longer; more rigid bristles under the ears and over the eyes. Tail much shorter than the body, cylindrical, covered with short hair like that of the body; frenum covered with hair. Teeth 40; false grinders  $3/3$ ,  $3/3$ ; tubercular grinders  $2/2$ ,  $2/2$ .

## CYNOGALE BENNETTII.

B.M.

*Cynogale bennettii*, Gray, Mag. Nat. Hist. i. 579, 1836; Proc. Zool. Soc. 1836, p. 86; Cat. Mamm. B. M. 53; Eydoux & Soul. Voy. Bonite, t.; Gerrard, Cat. Ost. B. M. 78; De Blainv. Ostéogr. Viverra, t. 12 (teeth).

*Viverra (Lamictis) carchanas*, Jourdan, Ann. Sci. Nat. viii. 281, t. 8 a, 1837; De Blainv. Ann. Sci. Nat. xiii.

*Potamophilus barbatus*, S. Müller, Zool. Ind. Arch. t. 17.

*Cynogale barbata*, Schinz, Syn. Mamm. i. 388.

*Hab.* Borneo (*Honeywood*).

Skull elongate; face much produced, compressed; orbits not defined at all behind, confluent with the zygomatic cavity; zygomatic arch strong; forehead between the orbits very narrow. Teeth 40; canines compressed; false grinders compressed, third without any inner lobe; flesh-tooth triangular, largely tubercular, nearly as wide as the length of the outer edge—inner lobe very large, rounded internally on the middle of the inner side; tubercular grinders large, rounder on the inner edge, rather wider than the length of the outer edge; the hinder one smaller, but similar to the front one in shape.

Length of the skull  $4'' 9'''$ , of nose  $1'' 10'''$ ; width of brain-case  $1'' 4\frac{1}{2}'''$ , of zygomatic arch  $2'' 2\frac{1}{2}'''$ .

2. *Nose short, flat, with a central longitudinal groove on the lower surface.*

## Tribe 5. GALIDIINA.

*The hind part of the tarsus hairy to the palm; the tail bushy.*

## 10. GALIDIA.

*Galidia*, I. Geoff. Compt. Rendus, 1837, p. 580; Mag. de Zool. 1839, pp. 27 & 38, t. 14, 17.

Ears elongate. Body slender. Legs short. Tail elongate, cylindrical, rather larger at the end, ringed? Toes 5—5, arched, webbed; front subequal; the toes and palm bald; the tarsus hairy behind. Claws acute, compressed, retractile. Skull rather ventricose; face

short; forehead arched; crown flat. Teeth 36 or 38; false grinders  $3/3$ ,  $3/3$ , front very small; flesh-tooth triangular, elongate, longer than broad, and falls early; tubercular grinders  $2/1$ , transverse, the second very small (see skull, *G. elegans*, Geoff. *l. c.* t. 17).

We only possess *Galidia elegans*; and the feet of that species have no relation to those of an *Herpestes*, to which M. I. Geoffroy compares them; they are much more those of a Genet, having short, arched, webbed toes and very acute retractile claws.

\* *Tail ringed*; "soles of hind feet narrow." *Galidia*.

### 1. GALIDIA ELEGANS.

B.M.

Dark chestnut-brown; tail nearly as long as the body, black-ringed. Length 15 inches; tail 12 inches.

*Galidia elegans*, I. Geoff. Mag. de Zool. 1839, p. 27, t. 14 & 17; Schinz, Syn. Mamm. i. 378; Gerrard, Cat. Ost. B. M. 76.

*Margusta (Galidia) elegans*, Blainv. Ost. t. 9.

*Genetta?*, A. Smith, S. Afr. Quart. Journ. 52 (see I. Geoff.).

*Vounsira*, Flacourt, Histoire de Madagascar, p. 154, 1661.

*Vausire*, Buffon & Daubenton?

*Hab.* Madagascar (called *Vounsira*).

Skull oblong, rather elongate; forehead shelving, rather convex; the crown flat; the brain-case nearly two-thirds the entire length. False grinders  $3/3$ , the first very small, deciduous, the second and third compressed; the flesh-tooth trigonal, considerably longer than broad at the front edge—the internal tubercle large, and a little behind the front margin. Tubercular grinders—the first subtruncate, oblong, rather wider than long, contracted in the inner side; the second very small, transverse, oblong (see I. Geoff. *l. c.* t. 17).

In the figure cited the brain-cavity is nearly three-fifths the entire length of the skull (that is, measured to the back of the orbits); and the zygomatic arch is rather wider than half the length of the skull.

\*\* *Tail one colour*; "soles of hind feet more bald." *Salanoia*.

### 2. GALIDIA CONCOLOR.

Red brown, black-dotted; tail like back, much shorter than the body; ears broad and short. Length 13 inches; tail 7 inches.

*Galidia concolor*, I. Geoff. Mag. Zool. 1839, p. 30, t. 15; Coquerel, Mag. de Zool. xi. 465; Schinz, Syn. Mamm. i. 377.

*G. unicolor*, I. Geoff. Compt. Rend. Acad. Sci. 1837, v. 581.

*Hab.* Madagascar.

### 3. GALIDIA OLIVACEA.

Olive-brown, yellow-dotted; tail same colour as the body; false grinders  $3/2$ ; tubercular grinders broader than in *G. elegans*, especially the hinder ones.

*Galidia olivacea*, I. Geoff. Mag. de Zool. 1839, t. 16; Schinz, Syn. Mamm. i. 378.

*Hab.* Madagascar (*Bernier*) (called "Salano").

? *La petite fouine de Madagascar*, Sganzin in Rev. et Mag. de Zool. 1855, p. 41.

#### Tribe 6. HEMIGALINA.

*The toes and the middle of the lower part of the tarsus bald; the upper part and sides of lower part hairy. Tail ringed. Fur soft. Frenum hairy. Orbit imperfect.*

#### 11. HEMIGALEA.

*Hemigalea (Hemigalus)*, Jourdan, Compt. Rend. 1837; Ann. Sci. Nat. viii. 276, 1837 (not characterized).

Head conical. Nose bald, flat, and with a distinct central groove below; nostrils lateral. Ears moderate, ovate, covered with hair externally. Whiskers numerous, very long, rather rigid, with tufts of slender bristles on the throat, cheeks, and eyebrows. Toes 5—5. Claws acute, semiretractile. Hind feet semiplantigrade; the upper part of the sole hairy, with a narrow bald sole in front below. Frenum covered with hair. Teeth 40; false grinders 3/4, 3/4; tubercular grinders 2/1, 2/1.

The genus is only very indistinctly characterized by M. Jourdan in the papers referred to.

#### HEMIGALEA HARDWICKII.

B.M.

Pale yellow; three streaks on the head, two streaks on the nape, some marks on the ears, five crescent-like bands across the back, two rings on the base of the tail, and the end of the tail black.

*Viverra hardwickii*, Gray, Spic. Zool. ii. 9, t. 1 (not Lesson).

*Hylogale zebré*, Voyage de la Bonite, t.

*Viverra boiéi*, S. Müller, Zool. Ind. Arch. t. 18; Schinz, Syn. Mamm. i. 363.

*Hemigale zebré*, Jourdan, Ann. Sci. Nat. viii. 277.

*Paradoxurus derbianus*, Gray, Loudon's Mag. N. II. i. (1837) p. 579; Proc. Zool. Soc. 1837, p. 67; De Blainv. Ost. Atlas, t. 7, t. 12 (teeth).

*P. ? zebra*, Gray, Loudon's Mag. N. H. i. (1837) p. 579 (from a drawing).

*P. philippensis* (partly), Schinz, Syn. Mamm. i. 387.

*Hab.* Malacca (*Major Farquhar*); Borneo (*Lowe*).

The skull agrees with *Genetta* and *Nandinia* in the hinder opening of the palate being only a short distance behind the line between the back edges of the hinder tubercular grinders. The orbit is very incomplete. The teeth are short, broad, and very unlike those of *Genetta* and *Nandinia*—somewhat similar to those of the genus *Paguma*. The first and second false grinders are compressed, the third has an inner lobe on the middle of the inner side. The flesh-tooth is triangular, scarcely longer than the width of the middle of the tooth, the large inner lobe occupies nearly the whole inner



side. The tubercular grinders are oblong, triangular, much wider than long, rounded on the inner side; the hinder one like the front, but only about half the size. The nose of the skull is elongate. The brain-cavity ovate, ventricose, not suddenly constricted in front. Forehead shelving, rather convex. The bullæ of the ears are oblong, elongate, vesicular, truncated behind, and keeled on the outer edge. Length of the skull 3" 9''' , of nose 1" 4½''' , of zygomatic arch and orbit 1" 6''' ; width of brain-case 1" 3''' , of back of mouth 6" 1½''' , of zygoma 1" 10''' .

#### Tribe 7. ARCTICTIDINA.

*The hinder part of the tarsus bald and callous. The tail thick, strong, and prehensile. Fur harsh, bristly. Ears pencilled. Frenum hairy. Orbit of skull imperfect, only defined by a prominence above.*

#### 12. ARCTICTIS.

*Arctictis*, Temm. Monogr. xx. 21, 1820?

*Ictides*, F. Cuvier; Valenciennes, Ann. des Sci. Nat. iv. 57, 1825; Férus. Bull. Sci. v. 266, 1825.

Head conical. Whiskers numerous, long, rigid, more slender on the cheeks, throat, and eyebrows. Nose acute; underside flat, with a broad central groove. Eyes small. Ears closely covered with long hairs, forming a pencil. Toes 5—5. Claws compressed, acute, retractile. Soles of hind feet broad, entirely bald and callous to the heel. Tail conical, covered with long hair, convolute. Frenum covered with hair? Teeth 36; false grinders 2/3, 2/3; tubercular grinders 2/1, 2/1.

#### ARCTICTIS BINTURONG.

B.M.

Black. Younger with more or less long white tips to the hairs; young, pale dirty yellow.

*Viverra ? binturong*, Raffles, Linn. Trans. xii. 253.

*Arctictis binturong*, Temm. Monogr. ii. 308; Fischer, Syn. Mamm. i. 157; Gray, List Mamm. B. M. 54; Gerrard, Cat. Osteol. B. M. 78; Cantor, Cat. Malay. 54; Horsfield, Cat. India House Mus. 94.

*A. penicillatus*, Temm. Monogr. ii. t. 62; Müller, Zool. Ind. Arch. 32.

*Paradoxurus albifrons*, F. Cuvier, Mém. Mus. ix. 44, t. 4; Mamm. Lithogr. t.

*Ictides*, F. Cuv. Dents Mamm. 104, t. 34.

*Ictides ater*, F. Cuvier, Mamm. Lithogr. t.

*I. albifrons*, Valenc. Ann. Sci. Nat. iv. 57, t. 1; F. Cuvier, Mém. Mus. ix. t. 4.

*Hab.* Malacca (*Farquhar*, 1819); Sumatra (*Raffles*); Java (*Temminck*); Tenasserim and Arracan (*Cantor*); Assam, Nepal (*Blyth*).

Varies in the quantity and length of white tips of the hairs.

Major Farquhar says, "It climbs trees, assisted by its prehensile

tail, in which it has uncommon strength." M. F. Cuvier (Mém. Mus. ix. 46) doubts this fact; but he is wrong, as any one may see by observing the living animal in the Zoological Gardens.

Skull of young animal elongate. Teeth 36; canines slender; grinders small and far apart; the false grinders, first and second conical, the third compressed; the flesh-tooth small, triangular, inner side rounded; tubercular grinder oblong, trigonal, with a rounded inner edge, larger than the flesh-tooth. Length of skull 4" 6"', of nose 1" 6"'; width of brain-case 1" 7"', of zygomatic arch 2" 4"'.

In the adult skull, false grinders 3/, 3/, compressed, the third triangular; the flesh-tooth triangular, as broad as long, inner edge rounded, with the inner tubercle in the middle; the tubercular grinders small, the first triangular, somewhat like the flesh-tooth, but smaller, the hinder very small, cylindrical (*Temm. Monogr.* ii. t. 50).

The skeleton agrees with *Paradoxurus* in the large number (34) of caudal vertebræ, but differs from it in having a more plantigrade character in the bones of the feet (*Temm. Monogr.* ii. 307).

M. Temminck (*Monogr.* ii. 308) proposed to arrange *P. aureus* of F. Cuvier with this genus, as it could not be classed with any other group, observing that it is described from a very young specimen not more than one or two months old; and he objects to species being described on such specimens.

#### Tribe 8. PARADOXURINA.

*The hind part of the tarsus bald and callous. The tail cylindrical, hairy, very long, of many vertebræ, revolute. The frenum with a secretory gland. Head elongate. Orbit of skull generally only defined by a slight prominence above. Pupil linear, erect.*

This is an exceedingly natural group, well defined by its external characters and general appearance; at the same time the form of the skull and the teeth of the different species present so great an amount of variation that, if one studied the skull only, one would be inclined to distribute them among several different tribes of Carnivora—an instance, among many, which shows the necessity of studying the animal as a whole, and of not devoting one's attention more to the osteological than the external characters, or *vice versâ*.

The gland on the frenum, which is the peculiar character of the genus, was known to Pallas, who called the species *Viverra hermaproditæ* on account of it. It was redescribed and figured by Otto, but overlooked by F. Cuvier when he named the genus from a specimen with a distorted tail!

"M. Temminck observes, "Nom générique donné à tout hasard par F. Cuvier, dont il faut se garder de ne rendre l'application strictement applicable à aucune des espèces de ce groupe."

"La forme et le pouvoir que M. F. Cuvier attribue à cette queue sont basés sur des observations faites sur un sujet soumis à l'état captif, mais ne sont nullement caractérisés pas moins spécifiquement pour son *Pougonne*, notre *Paradoxurus typus*—la Marte des Palmiers du Buffon."—*Mon. Mamm.* ii. 312.

If M. Temminck had observed many of these animals alive, he would have found that many of them have the habit of curling up the end of the tail as it lies on the ground, and that the ends of the tails of those in confinement are often worn away on the side from this habit (see also Bennett, P. Z. S. 1835, p. 118).

M. Temminck describes the claws as "not retractile" (Monogr. ii. p. 312); but Mr. Turner, in his interesting observations on the anatomy of *Paradoxurus typus*, describing the feline habit of the animal, states that the claws are quite as retractile, and scale off at the ends to keep them sharp, as in the Cat; he also says the preputial gland secretes the odorous exhalation (see Proc. Zool. Soc. 1849, p. 24).

"The *Paradoxuri* are in habits like the Civets; their glandular secretion is peculiar, not civet- or musk-like."—Cantor, *Cat.* 32.

Tail very long; caudal vertebræ 36 or 38.

The species of this group have been very imperfectly understood. In the 'Proceedings of the Zoological Society' for 1832 I gave a monograph of the species which the specimens and other materials then available afforded; and I revised the species in the 'Magazine of Natural History' for 1837. The number of species described being so much larger than was then known on the Continent, seems to have excited the distrust of the Continental zoologists as to their distinctness.

M. Temminck, in the second volume of his 'Monographie,' published an essay on the genus, and states that he was indebted to Mr. Ogilby for his assistance. But I fear he must have misunderstood some of Mr. Ogilby's observations; for I can hardly think that an English zoologist, who, from his position as Secretary of the Zoological Society, must have seen many species of the genus alive, could have had such an imperfect acquaintance with the specimens that are to be seen in our menageries.

M. Temminck's 'Monograph' is accurate as far as regards the species which inhabit the Asiatic possessions now or formerly under the Dutch rule. But M. Temminck seems to be entirely unacquainted with the species of continental India and China; he confused, under the same description, species that are very unlike in external characters: some of his figures of the skull do not agree with the skulls of the species which we have extracted from the skins. I may observe that it was formerly the great defect of the osteological collection at Leyden that many of the skeletons had been purchased at sales of private collections in London and elsewhere; so that the accuracy of the determination of the species from which the skulls were obtained solely depended on the accuracy or knowledge of the proprietor, generally more of an anatomist than a zoologist; and as the skin was not kept, there was no means of verifying the name. Hence it is very likely the Nepal *P. grayi* was called in the collection from which it was obtained *P. musanga* of Java. M. Schlegel has been remedying this defect by the preparation of skeletons from well-determined specimens.

M. Jourdan observes, "Ce que nous pouvons dire c'est que dans la collection ostéologique du Muséum il existe des têtes osseuses qui,

sous le nom commun de *Paradoxurus typus*, indiquent au moins quatre espèces, et que dans chaque une d'elles on peut aisément distinguer un degré tranchant et différent de disposition carnassière."—*Ann. Sci. Nat.* viii. 275, 1837.

The development of the auditory bulla is variable in the genera and species. In *Paguma*, *Paradoxurus*, and *Arctogale* the bulla is large, ventricose, slightly keeled along the lower edge, with a triangular end. In *Nandinia* it is very small, not inflated, and scarcely raised. It varies in form in the different species of *Paradoxurus*, being smallest in *P. bondar*.

The hinder part of the palate of the skull also affords good characters, thus:—

1. The hinder opening of the palate is wide, and nearly in a line with the hinder edge of the last grinder, in *Paradoxurus* and *Nandinia*.

2. The hinder opening of the palate is wide, and further back than the hinder edge of the last grinder, in *Paguma* and *Arctictis*.

3. The hinder opening of the palate is narrow, at the end of a narrow depressed tube, and considerably further back than the hinder edge of the last grinder, in *Arctogale*.

The specimens which are in the British Museum Collection may be divided and arranged thus, from what has been called the "most carnivorous" to the "most omnivorous" form of teeth.

1. The flesh-tooth very narrow, with a small internal process on the front edge. *Nandinia binotata*.

2. The flesh-tooth rather narrow, with a rather small internal lobe on the front edge. *Paradoxurus bondar*.

3. The flesh-tooth rather wider, with a moderate-sized internal lobe on the front edge; teeth moderate. *P. crossii*, *P. nigrifrons*, and *P. zeylanicus*.

4. The flesh-tooth triangular, broad, massive, with a large internal lobe occupying a great part of the inner side.

*a.* The teeth elongate, large, massive. *Paradoxurus musanga*, *P. philippensis*, *P. macrodus*, and *Paguma leucomystax*.

*b.* The teeth shorter and broader, moderate or small. *Paguma grayi*, *P. larvata*, and *Arctogale trivirgata*.

They may be arranged, according to the form of the adult skull, thus:—

1. The brain-case wide in front, scarcely constricted. Orbit indistinctly marked. Nose broad. *Paguma larvata* and *P. leucomystax*.

2. The brain-case wide in front, and distinctly constricted. Nose rather elongate.

- a.* Orbit marked only with a short blunt process on the upper hinder edge. *Paguma grayi*.
- b.* Orbit marked with a rather short, acute, well-marked process on the upper hinder edge. *Nandinia binotata*.
3. The brain-case narrow, and evidently and distinctly constricted in front. The orbit undefined.
- a.* The face broad; width at the tubercular grinder about four-fifths the length of the palate. *Paradoxurus philippensis*, *P. crossii*, *P. nigrifrons*, *P. fasciatus*, and *P. macrodus*.
- b.* The face rather elongate; width at the tubercular grinder two-thirds of the length of the palate. *P. zeylanicus*, *P. bondar*, and *P. hermaphroditus*.
4. The brain-case narrow, suddenly and distinctly constricted in front. The orbit well defined behind. *Arctogale trivirgata*.

The following table may facilitate the determination of the species in the Museum from their external appearance:—

- I. *Fur thick, very hairy, rigid, not striped, without any spots under the eyes.* *Paguma leucomystax*.
- II. *Fur very thick, long, with longer rigid hairs, not striped or spotted, but with a spot under the eye.* *Paguma grayi*, *Paradoxurus bondar*.
- III. *Fur thick, soft, with longer rigid hairs, with a spot under the eye.* *Paradoxurus hermaphroditus*.
- IV. *Fur very thick, close, soft, of nearly uniform length, with a spot under the eyes; cheek whitish, with small dark spots.* *Paradoxurus crossii*, *Paguma larvata*, *Paradoxurus philippensis*, *P. nigrifrons*, *P. musanga*, and *P. dubius* (*cheek dark*).
- V. *Fur soft; back striped; with no spots under the eyes or on the face.* *Arctogale trivirgata*.
- VI. *Fur soft, thick, close; back spotted; with two yellow spots on the shoulder.* *Nandinia binotata*.
- VII. *Fur very soft, of a uniform colour, with no spot under the eye or on the face.* *Paradoxurus zeylanicus*.

### 13. NANDINIA, Gray.

Nose conical; underside flat, with a distinct central groove. Frenum covered with hair (?). Nose of skull compressed, produced. The brain-case rather constricted in front behind the orbit. The orbit incomplete, with a well-marked acute process from the

forehead, and none from the zygomatic arch behind. The forehead flat, rhombic; produced, angular behind the orbit. Palate wide behind. Teeth 40; false grinders  $\frac{3}{4}$ ,  $\frac{3}{4}$ ; flesh-tooth elongate, narrow, with a small internal lobe on the front edge; the hinder tubercular very small, circular.

The skull is figured by De Blainville (Ostéogr., Viverra, t. 6) as that of *Paradoxurus? hamiltonii*.

#### NANDINIA BINOTATA.

Nape with three black parallel streaks, one from the forehead, the other from the ears. Back with numerous black spots. Withers each with a yellow spot. Lips, throat, and beneath rufous grey. Legs grizzled, not spotted. Tail elongate, tapering, with many narrow black rings; end blackish. Length 23 inches; tail 19 inches.

*Nandinia binotata*, Gray, Cat. Mamm. B. M. 54; Gerrard, Cat. Osteol. B. M. 80.

*Viverra binotata*, Reinwardt, MS.; Gray, Spic. Zool. 9; Smith, S. African Quart. Journ. ii. 134.

*Paradoxurus hamiltonii*, Gray, Proc. Zool. Soc. 1832, p. 67; Illust. Ind. Zool. t.; Temm. Monogr. ii. 336, t. 65. f. 1.

*Paradoxurus? binotatus*, Gray, P. Z. S. 1832, p. 68.

*P. binotatus*, Temm. Monogr. ii. 336, t. 65. f. 7-9 (skull); Esq. Zool. 119, 120.

*Hab.* West Africa: Fernando Po (*Cross*); Ashantee (*Mus. Leyden.*); Guinea (*Mus. Leyden.*).

Varies in the brightness and rufous tint of the fur, and also in the size of the spots; in some they are much larger, and apparently fewer, than in others.

Orbit of skull not defined behind, confluent with the zygomatic cavity. Upper false grinders 3, compressed, first small, third without any distinct inner lobes; flesh-tooth elongate, outer edge considerably longer than the width of the front edge, inner tubercle on the front edge; tubercular grinders two, front triangular, rather wider than the length of the outer edge, hinder small, circular. Length of skull 3" 4"', of nose 1" 1"'; width of brain-case 1"  $2\frac{1}{2}$ "', of zygomata 1" 10'''.

#### 14. PARADOXURUS.

*Paradoxurus*, F. Cuv. Mamm. Lithogr. ii. t., 1821.

*Platyschista*, Otto, Nov. Act. Acad. Leop. xvii. 1090, 1835.

*Viverra hermaphrodita*, Pallas.

Head conical. Nose flat, and with a central groove beneath. Whiskers numerous, strong, elongate. Toes 5—5. Frenum bald, glandular. The skull with the brain-case strongly and suddenly constricted in front; forehead small, transverse, truncated behind. The orbit very incomplete, with only a short conical prominence above behind, and none on the zygomatic arch below; hinder part of the palate moderate, with only a very slight notch at each side on

its front edge, Teeth 40, large; false grinders,  $\frac{3-3}{3-2}$ ; the flesh-tooth triangular or subelongate; the tubercular oblong, transverse.

M. Temminck, in his 'Monographies de Mammalogie,' vol. ii. p. 312 (published in 1855), has given a monograph of this genus; the synonyms are very incorrect.

\* *The skull elongate; the nose slender; the width of the head at the last tooth two-thirds the length of the palate; the flesh-tooth elongate, rather narrow, with a small internal lobe on the front edge.* Bondar.

### 1. PARADOXURUS BONDAR.

Fur very long, hairy, rather rigid, dirty yellowish white varied with the long black tips of the longer and more rigid hairs; end of nose brown, generally with a white central streak. The feet, outer side of fore legs, and end of the tail blackish.

*Ichneumon bondar*, Buchanan, MS.

*Viverra bondar*, De Blainville, Journ. de Phys.; Fischer, Syn. Mamm. 172.

*Paguma bondar*, Horsfield, Cat. Mus. E. Ind. Comp. 68.

*Paradoxurus bondar*, Gray, P. Z. S. 1832, p. 66; Illust. Ind. Zool. t.; Temm. Esq. Zool. 120; Gerrard, Cat. Osteol. B. M. 79; Schinz, Syn. Mamm. i. 385.

*Par. pennantii*, Gray, P. Z. S. 1832, p. 66; Illust. Ind. Zool. t.

*Par. hirsutus*, Hodgson, Asiatic Researches, xix. 72, 1836.

*Genetta bondar*, Lesson, Mamm. 175.

*Hab.* Nepal; North Behar and Tarai (*Hodgson*).

This species is easily known from *P. grayi* by the rigid harshness of the fur and the dark colour of the outside of the legs.

Skull narrow, elongate. False grinders distant, the third trigonal; flesh-tooth narrow, elongate, the outer edge longer than the width of the front edge, with the inner lobe on the front margin; tubercular grinder oblong, transverse, rather narrower and rounded on the inner side, wider than long; the hinder tubercular small, oblong, subcircular. Length of skull 4"  $1\frac{1}{2}$ ", of nose 1" 5"; width of brain-case 1"  $4\frac{1}{2}$ ", of zygoma 2" 3".

\*\* *The skull moderately broad; the width of the head at the last tooth about four-fifths of the length of the palate; the flesh-tooth rather longer than wide in front, with a moderate-sized internal lobe on the front edge.* Platyschista.

### 2. PARADOXURUS ZEYLANICUS.

B.M.

Nearly uniform brown or dark brown; the longer hairs with a bright golden tint; ears nearly naked; whiskers pale brown; tail subcylindrical, sometimes with a single yellow or pale subterminal band; heel of hind feet hairy. Length of body and head 21 inches, tail 17 inches.

*Paradoxurus zeylanicus*, Gray, Cat. Mamm. B. M. 55 ; Gerrard, Cat. Osteol. B. M. 79 ; Kelaart, Fauna Zeyl.

*Viverra zeylanica*, Pallas in Schreb. Säugeth. 45 ; Fischer, Syn. Mamm. 172.

*V. ceylonensis*, Bodd.

? *Paradoxurus aureus*, Desm. Mamm. 540 ; F. Cuvier, Mém. Mus. ix. 47, t. 4 ; Gerrard, Cat. Osteol. B. M. 79.

*P. typicus*, De Blainv. Ostéogr. Viverra, t. 12 (teeth), t. 7 (skull).

? *Arctictis aureus*, Fischer, Syn. Mamm. 158.

*Hab.* Ceylon (*Pallas, Kelaart*).

These animals differ in the intensity of the colour of the fur : some are bright golden, and others much more brown ; the latter is *P. fuscus* of Kelaart. One of our specimens has a bright yellow ring near the tip of the tail.

Third upper false grinders with only a slight indication of a lobe in the middle of the inner edge ; the flesh-tooth with the outer edge scarcely longer than the width of the front edge ; first tubercular large (with the inner edge narrower than the outer one), larger than in *P. philippensis*.

The figure of the skull and of the teeth of the skull named *Paradoxurus typicus* in De Blainville's 'Ostéographie,' tt. 7 & 12, exactly represents the skull and teeth of our *Paradoxurus aureus* received in the skin from Ceylon.

Dr. Kelaart has described, and we have in the British Museum, two varieties of *P. zeylanicus* differing in the intensity of the colour of the fur. In the British Museum we have three skulls, with their permanent teeth, said to have been sent from Ceylon, one being from the skin in the collection sent by Dr. Kelaart : one is larger and rather broader than the other two, which are younger. In two of them the flesh-teeth are nearly similar, with a moderate-sized internal lobe, and the first and hinder upper tubercular grinders are much larger in one of these than in the other. In the third skull, which is the larger, the internal lobe of the flesh-tooth is much longer, compared with the size of the outer portion, than in the preceding skulls ; and the first tubercular grinder is much larger, longer, and more massive compared with its width than in either of the preceding ; in this skull the hinder tubercular is yet not developed.

Is it that these skulls belong to, and are characteristic of, the two animals which we have thus wrongly called varieties ? or does the difference merely arise from their being of two sexes ? Genera have been formed on less differences in the Carnivora.

### 3. PARADOXURUS HERMAPHRODITUS.

B.M.

Fur long, rigid, harsh, blackish more or less varied with the pale colours of the lower part of the hairs, scarcely showing three indistinct black streaks on the back ; under fur thick, soft, and very pale reddish ; the feet and end of the tail black ; spot under the eye and the forehead paler, more or less grey or whitish.

*Viverra hermaphrodita*, Pallas, Schreb. Säugeth. 426.



*Paradoxurus hermaphrodita*, Gray, P. Z. S. 1832, p. 69.

*Platyschista pallasii*, Otto, N. Act. Leop. xvii. 1089, t. 71, 72.

*Viverra nigra*, Desm. Mamm. 208, from Buffon, Suppl. iii. t. 47.

*La Marte des Palmiers, ou le Pougonne*, F. Cuv. Mamm. Lithogr.

*Paradoxurus typus*, F. Cuv. Mamm. Lithogr. ; Fischer, Syn. Mamm. 158 ; Temm. Monogr. ii. 215 ; Esq. Zool. 126 ; Ogilby, Zool. Journ. iv. 303 ; Horsfield, Cat. India House Mus. 60 ; Gerrard, Cat. Osteol. B. M. 80 ; Schinz, Syn. Mamm. i. 384.

*Genette de France*, Buffon, H. N. vii. 58 ; Suppl. iii. t. 47.

*Musk or Musky Weasel*, Penn. Quadr.

*Hab.* Continental India, in the plains : Bengal (*Temm.*) ; Madras (*Jerdon*).

This species differs from the preceding in being small and much blacker. Only one of the wild specimens in the Museum, in a good state of fur, shows any indication of the three black dorsal streaks ; but the fur can easily be placed so as to make three more or less interrupted ones apparent : and some of the specimens, which have the tips of the longer hairs worn off, have a somewhat striped appearance on the back ; but this is evidently only depending on the bad state of the specimens from their having been kept in confinement.

The skull is very like that of *P. zeylanicus* ; the teeth are rather larger ; the nose rather narrower in front ; the flesh-tooth is rather broad and thick ; the front tubercular grinder is transverse, narrower on the inner side, and contracted in front and behind in the middle ; the hinder tubercular is very small and circular ; the palate-edge is arched behind. The skull is very old, and the orbit is rather more defined behind than usual.

The *Viverra hermaphrodita* of Pallas is thus described :—“ Ashy black hairs, grey at the base, black at the tip ; beneath pale, a white spot under the eye ; ears, throat, and feet black ; nose, whiskers, and back with three black streaks ; tail longer than the body, black at the tip ; claws yellow. Most probably this species is also the *Platyschista pallasii* of Otto ; but his figure makes the stripes on the back more distinct than they are usually seen, and the sides of the body too spotted ; but it is easy to make a specimen look like the figure.

The figure of the teeth of *P. typus*, in De Blainville's ‘Ostéographie,’ better represents the teeth of our *P. zeylanicus* than of *P. typus*. Perhaps it is not from the skeleton found on plate 2, which is said to be the animal described by F. Cuvier. The chief difference between the skulls of the two species is, that the internal lobe of the flesh-tooth in *P. zeylanicus* is in a straight line with the front edge of the tooth, whereas in *P. typus* it is rather in front of the outer part of the front edge of the tooth.

The skeleton of the animal first described by F. Cuvier as *Paradoxurus typus* is engraved by De Blainville, Ostéogr. t. 2.

#### 4. PARADOXURUS CROSSII.

B.M.

Fur short and close, erect, pale iron-grey without any spots or stripes, spot on side of nose, under orbit, forehead, and base of ears whitish ; nose dark brown ; feet and ends of the tail black.

*Paradoxurus crossii*, Gray, Proc. Zool. Soc. ii. 67, 1832; Illust. Ind. Zool. ii. t. 7.

*P. musanga*, var., Temm. Esq. Zool. 120.

*Paguma crossii*, Gray, Cat. Mamm. B. M. 54; Gerrard, Cat. Osteol. B. M. 79.

*Hab.* India (*Brit. Mus.*).

Described from an adult specimen that was confined in the Surrey Zoological Gardens. It is very like *P. grayi*; but the fur is short, thick, and very close, and the colouring of the face is rather different. The nose is brown in the centre, with the brown colour extending under the eyes; the spot under the eye is small and indistinct.

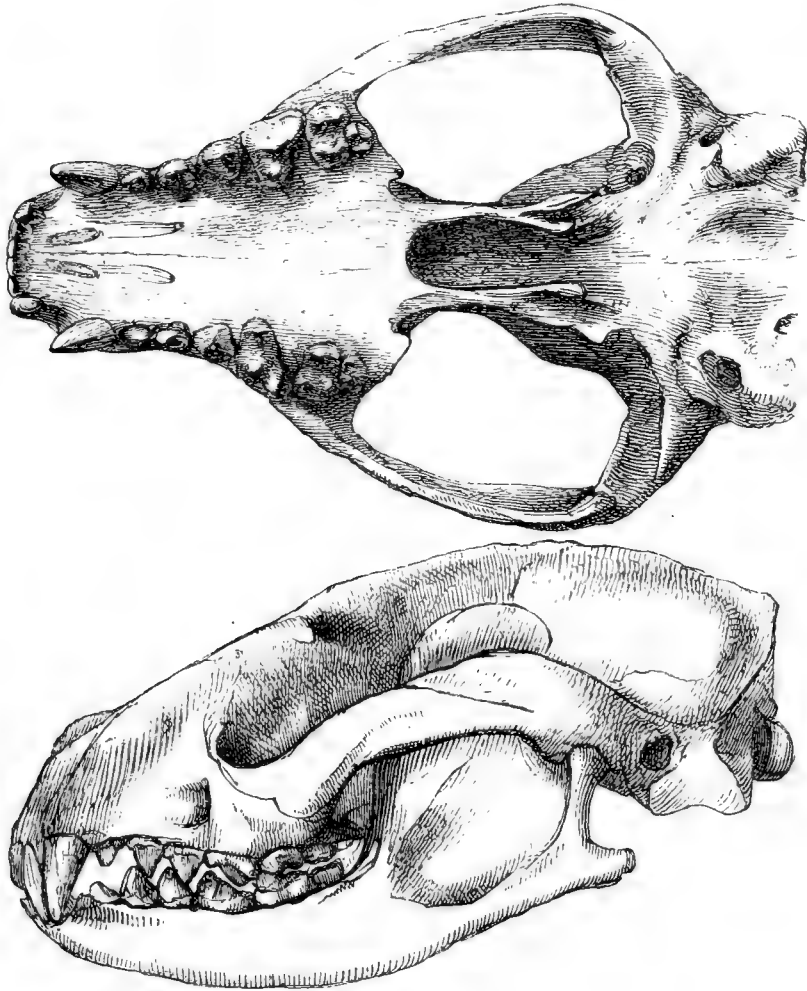
The skulls of the type specimens of *P. crossii* and *P. nigrifrons* in the British Museum are very much alike in general shape, in the breadth of the palate compared with the length, and in the form of the grinders, including the flesh-tooth. Considering the variations which individuals of the same species present, if we had had only the skulls, not knowing the characters of the fur and the colours of the two species, we might have considered them to be varieties of the same species. But knowing that they are the skulls of two very distinct species, one can perceive that the nasal bones are much longer, and the condyles of the skull larger and more oblique, in *P. crossii* than the same parts in the skull of *P. nigrifrons*. The bulla of the ears is differently shaped, ending below in small acute-keeled prominences in *P. crossii*, while in *P. nigrifrons* the whole outer hinder edge is strongly keeled. *P. crossii* is rather narrower at the zygoma. These differences might be peculiar to the individual in each case; and I should not have considered them of specific importance, if I had not known the external characters and appearance of the animals.

The measurements of the two skulls are as follows, in inches and twelfths:—

	<i>P. crossii.</i>	<i>P. nigrifrons.</i>
Length of skull .....	3'' 9'''	3'' 10 $\frac{1}{2}$ '''
——— of nose.....	1 3	1 3
——— of palate .....	1 9	1 9
Width of last grinders.....	1 3 $\frac{1}{2}$	1 4
——— of brain-case.....	1 3	1 3
——— of zygoma.....	2 4 $\frac{1}{2}$	2 1 $\frac{1}{2}$

M. Temminck refers *Paradoxurus crossii* to *P. musanga*, and observes that "it is established on the same specimens as served as the model for the figure of Horsfield." How he could have made such an extraordinary mistake I cannot conceive. *P. crossii* was described from a specimen living in the Surrey Zoological Gardens, which did not arrive in this country until several years after Dr. Horsfield's work was published; and Dr. Horsfield's figure was drawn from a stuffed specimen collected by himself in Java, and for years exhibited in the Museum at the India House; while the type specimen of *P. crossii* was, and is still, in the collection of the British Museum. I feel that little reliance can be placed on M. Temminck's statements as to his observations on type specimens. Probably in

this case he was misled by misunderstanding some observations of Mr. Ogilby.



Skull of *Paradoxurus crossii*.

5. PARADOXURUS NIGRIFRONS.

B.M.

Fur short, close, blackish grey varied with the black tips to the longer hairs; nose, crown, cheeks, and upper part of the throat and feet reddish black; tail-end black; a whitish spot on side of nose, under, and above the eyes; a streak at the base of the ears, and the sides of the throat behind the dark cheeks, whitish.

*Paradoxurus nigrifrons*, Gray, Cat. Mamm. B. M. 55; Illustr. Ind. Zool. t.; Gerrard, Cat. Osteol. B. M. 79.

*Hab.* India (*Brit. Mus.*). Single specimen.

The specimen is very like *P. crossii* in the nature and colour of

the fur; but it is rather darker in every part, and the crown and cheeks are reddish black, being in *P. crossii* grey or whitish.

In the blackness of the cheeks and throat and the paleness of the forehead this species is allied to *P. musanga*; but the fur is shorter, and I cannot find any indications of dorsal streaks or spots, and the whiteness of the forehead is much more indistinct and diffused than in any specimens of that species I have seen. The specimen has been in confinement; but its fur is in very good condition.

\*\*\* *The skull broad; the width of the head at the last tooth about two-thirds of the length of the palate; the flesh-tooth broad, massive, triangular, with a large internal lobe occupying two-thirds of the inner side.* Macrodon.

#### 6. PARADOXURUS FASCIATUS.

Fur short, close, blackish grey; back with five longitudinal black streaks, more or less broken, especially the side ones, into spots; sides, shoulders, and thighs with small spots; face, occiput, chin, throat, and end of tail black; forehead, spot on side of nose, and under orbit white.

*Viverra fasciata*, Desm. Mamm. 209.

*Genetta fasciata*, Lesson, Mamm. 174.

*V. geoffroyii*, Fischer, Syn. Mamm. 171.

*Paradoxurus musanga*, Gray, P. Z. S. 1832, p. 16.

*P. musanga*, var. *javanica*, Horsf. Java, t.; Temm. Monogr. ii. 317, t. 53. f. 2-5, t. 54. f. 1, 2, 3 (skulls); Esquis. Zool. 120; Horsf. Cat. India House Mus. 62; Gerrard, Cat. Osteol. B. M. 80; Schinz, Syn. Mamm. i. 382.

*Viverra musanga*, Raffles, Linn. Trans. xiii. 255.

*Musang*, Marsden, Sumatra, 110, t. 12.

*Paradoxurus typus*, var. *sumatranus*, Fischer, Syn. Mamm. 159.

*P. setosus*, Homb. & Jacq. Voy. de l'Astr. Zool. iii. 25, t.

Var. Forehead more white:—

? *Paradoxurus pallasii*, Gray, P. Z. S. 1832, p. 67; Illust. Ind. Zool. t.; Horsfield, Cat. India House Mus. 63.

? *P. albifrons*, Bennett, in Zool. Gardens List (not of Cuvier).

Var. Tip of tail white.

*Hab.* Malacca, Java, Sumatra, Borneo (*Horsfield*).

M. Temminck confounds *Paradoxurus crossii* and *P. pallasii* with this species (see Esquis. Zool. 220).

The size of the spots on the face and the extent and pureness of the white on the forehead vary; but the animal always has a distinct brown or black mark on the back of the cheeks, most distinctly defined on the lower part of the face. The species has been divided into several on account of these differences.

A specimen from Borneo in the Museum is so black that the spots are scarcely to be distinguished; but there are specimens in the collection that are intermediate between it and those which have the common colour of the species.

The skull is like that of *P. nigrifrons*; the teeth are much more thick and massive; the flesh-tooth broader, and with a much larger internal lobe; the first tubercular is more square, nearly as wide on the inner as on the outer side; the hinder tubercular is small, subcircular; the palate has an angular notch behind; the zygomatic arch is also a little wider.

The length of the skull 4", of the nose 1" 4"', of palate 1" 10½"', width at tubercular grinder 1" 6"', at zygoma 2" 3"', of brain-case 1" 5'''.

*Paradoxurus quinquelineatus* and *Paradoxurus musangoides*, Gray, Loudon's Mag. N. H. i. 579, 1837, are perhaps only varieties of the young animal of this species.

*Viverra fasciata*, Desm. Mamm. 209 (not of Gmelin), described as pale yellow, with longitudinal series of brown spots, end of the nose and frontal cross band white, is also probably the same. It cannot be *Viverricula madagascariensis*, as the forehead is not particularly white. This is perhaps the *Platyschista* ——? which Otto notices in 'Nova Acta Acad. Leop. Carol.' xvii. 1102.

*Hab.* Java? (*Mus. Paris.*).

#### 7. PARADOXURUS DUBIUS.

B. M., type.

Pale yellowish ashy brown, with three indistinct, rather interrupted, darker bands and some indistinct darker spots on the sides; head, ears, and feet chestnut; forehead with an indistinct whitish band; spot on side of nose and under eyes white.

*Paradoxurus dubius*, Gray, P. Z. S. 1832, p. 66; Cat. M. B. M. 56.

*Hab.* Java (*Brit. Mus.*).

The skull is in the skin; so I have not been able to examine it. This species may be only a very pale variety of *P. fasciatus*.

#### 8. PARADOXURUS PHILIPPENSIS.

B. M., type.

Fur blackish, with a silvery gloss; spot under eyes distinct; cheeks dark brown; head, feet, and the greater part of the tail blacker; the back with three indistinct narrow black streaks, which converge near the rump, and with a series of very indistinct small ones on the upper part of the sides; sides of forehead, chest, and beneath whiter; whiskers white and black; ears hairy.

Var. Dorsal stripes none. B. M.

Var. Albino, yellowish white. B. M.

*P. aureus*, Waterhouse, Cat. Zool. Soc.

*Martes philippensis*, Camellus, Phil. Trans. xxv. 2204.

*Paradoxurus zeylanicus* (partly), Gray, Cat. Mamm. B. M. 55.

*P. philippensis*, Temm. Monogr. ii., Esq. Z. 120 (not Jourdan).

*Hab.* Manilla, Philippines: Casmiguind (*Cuming*).

The colours vary much in intensity, and in the lighter and darker specimens the spots and streaks are scarcely visible; the white on the side of the forehead in front of the base of the ears also varies in distinctness and extent; the spot under the eyes is generally distinct. This species is like *P. nigrifrons* and *P. musanga* in many

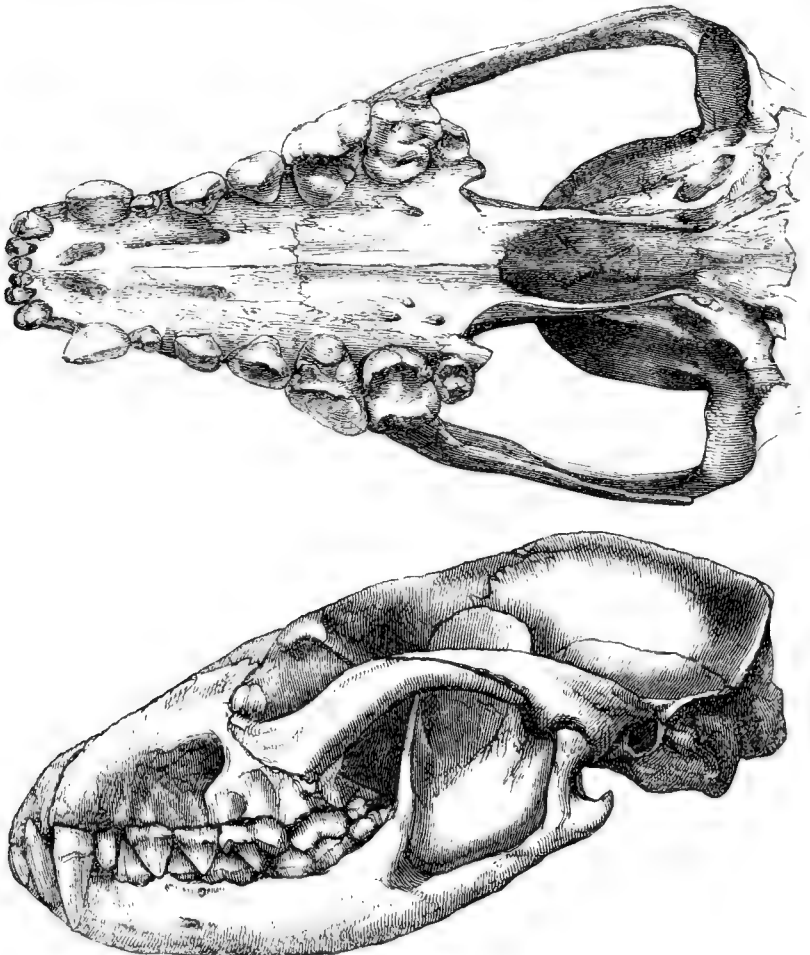
respects; but it differs from them both in the crown of the head being paler like the back, and from *P. nigrifrons* in having three dorsal stripes; but in one specimen, from the Philippines, these stripes are quite invisible; yet in every other respect this is like the other specimens, and it differs from the specimen of *P. nigrifrons* in the colour of the crown.

Third upper false grinder with a well-marked linear tubercle on the hinder inner edge; the flesh-tooth tubercular, the outer edge not longer than the width of the front margin; front tubercular tooth oblong, the inner and outer edge of about the same width, smaller than in *P. zeylanicus*.

9. PARADOXURUS MACRODUS.

B.M., type.

The skull with a rather elongated nose; the third upper false



Skull of *Paradoxurus macrodus*.

grinder has a well-marked cingillum and a rudimentary lobe on the inner side. The flesh-tooth is very massive, with four large and two

small cones ; the inner lobe occupies more than half the inner part of the tooth, with two unequal cones, the front one being nearly as large as the middle one on the outer side. The front tubercular very large, oblong, with nearly equal sides and large tubercles ; the hinder upper tubercular much smaller, circular.

Length of skull 4'' 4''', of nose 1'' 6''' ; width of brain-case 1'' 5''' , of zygoma 2'' 3'''.

*Hab.* — ?

This skull was received from the Museum of the Zoological Society ; it was marked in the catalogue, "Skull of a Genet undetermined."

#### 15. PAGUMA.

*Paguma*, Gray, Zool. Misc. 9, 1831 ; Proc. Zool. Soc. i. 95, 1831 ; ii. 65, 1832.

? *Amblyodon*, Jourdan, Compt. Rend. 1837.

Nose flat beneath, with a central longitudinal groove. The skull broad, short. Brain-case broad between the orbits, only moderately constricted in front ; forehead triangular behind, extending beyond the back edge of the orbits. The orbit very incomplete, with a very short acute prominence above behind, and none on the zygomatic arch below ; hinder part of palate broad, with a very slight notch on each side of its front edge ; the front of the palate broad, about as wide as three-fourths of its length. Teeth small or moderate ; flesh-tooth triangular, the front edge about as broad as long on the outer edge ; the front tubercular oblong, inner edge shorter, rounded.

The skull of this genus is easily known by the distinct forehead, the edge of the temporal muscles even in the oldest specimen leaving a plane triangular space over the back of the eyes.

This genus was first established on an animal that had not completely shed its teeth ; but the examination of the adult skull has justified the separation.

The following are the most prominent peculiarities of the skulls of the three species :—

1. *P. larvata* is the smallest, has the broadest nose, as shown by the shape of the roof of the mouth or palate, and the smallest teeth.

2. *P. grayi* is next in size, has a longer and narrower nose, larger teeth, and a larger and more convex forehead.

3. *P. leucomystax* is the largest, with a short, very broad nose, and wide palate, and very large massive teeth.

The hinder opening of the palate in *P. larvata* and *P. leucomystax* is angularly cut out behind ; in *P. grayi*, arched out. The brain-case is widest and least contracted in front in *P. larvata* and *P. leucomystax*, and most so in *P. grayi*. This contraction becomes more decided as the specimens increase in age.

\* *Skull short ; brain-case scarcely constricted in front ; the nose very broad.* *Paguma*.

#### 1. PAGUMA LARVATA.

B.M., type.

Fur grey brown ; head, neck, whiskers, feet, and end of the tail

black; chest, streak up the face and forehead, and spots above and beneath the eyes whitish grey.

*Paguma larvata*, Gray, P. Z. S. 1830, p. 95; 1831, p. 65; Gerrard, Cat. Osteol. B. M. 79.

*Gulo larvatus*, Temm.; H. Smith, Griffith's A. K. ii. 281, t.

*Viverra larvata*, Gray, Spic. Zool. 9.

*Paradoxurus larvatus*, Gray, P. Z. S. 1832, p. 67; Illust. Ind. Zool. t.; Temm. Monogr. ii. t. 65. f. 1-3, t. 55. f. 1-3 (skull); Esq. Zool. 120; Schinz, Syn. Mamm. i. 384.

*Hab.* China (*J. Reeves*, 1827); Formosa (*Swinhoe*).

M. Temminck has confused *Paradoxurus grayi*, *P. nipalensis*, and *P. laniger* with this species, and gives Himalaya and Thibet as the habitat (see Esq. Zool. 126).

Flesh-tooth oblong, trigonal, rounded at the corners, about as wide as the length of the outer edge; the inner lobe occupying nearly the whole of the inner side, rounded internally. The soles are bald nearly to the heel. The hair is dull grey brown, with a black ring and whitish tips; the hairs of the blacker part are black nearly to the base; the white on the chest is spread out laterally on the front of the shoulder.

M. Temminck, after giving the proper synonyms of this species, continues, "M. Ogilby indique encore *Paradoxurus laniger*, Hodgson, et *P. grayi*, Bennet" (Proc. Zool. Soc. for 1836, p. 118); and adds, "Patrie: M. Ogilby, qui a vu à Londres une douzaine d'individus de cette espèce, me dit qu'elle vient du continent de l'Inde. Elle vit dans toute la chaîne basse des monts Himalaya. Le plus grand nombre vient du Népal. Il est probable que le sujet du musée dans les Pays-Bas vient aussi de cette contrée, ayant été acquis à Londres."—*Mon. Mamm.* ii. 331.

The whole of these observations of Mr. Ogilby refer to a species quite distinct (indeed having no relation to *P. larvata*), which does inhabit Nepal, while *P. larvata* has not hitherto been received from anywhere but China, and appears to be the species of that country. It is the less excusable that M. Temminck should have made such a comparison, when the true habitat is given in the description of the animal in the 'Proceedings of the Zoological Society,' which he quotes, and I have never yet seen the *P. larvata* alive in this country.

## 2. PAGUMA LEUCOMYSTAX.

B.M., type.

Black brown with elongated black shining hairs; orbits dark brown; face pale, without any orbital spots, a large spot at the lower angle of the ear; tip of the tail black (rarely white); whiskers rigid, white; ears large and rounded, not bearded.

*Paguma leucomystax*, Gray, Cat. Mam. B. M. 55; Gerrard, Cat. Osteol. B. M. 79.

*Paradoxurus leucomystax*, Gray, Loud. Mag. N. H. 1837; S. Müller, Verh. i. 55; Temm. Monogr. ii. 325, t. 64. f. 4-6 (skull); Schinz, Syn. Mamm. i. 383.



Var. 1. Tip of tail white; white on face more extended:—

*Paradoxurus jourdani*, Gray, Loudon's Mag. N. H. i. 579, 1837, from Mus. Leyden.

*P. ogilbii*, Fraser, Zool. Typica, t.; Temm. Esq. Zool. 120.

*P. leucocephalus*, Gray, Voy. Samarang. (B.M.)

*P. philippensis* (partly), Schinz, Syn. 387.

Var. 2. Albino.

*Hab.* Sumatra and Borneo (*Mus. Leyden.*).

The lower and longest whiskers are white, and the upper ones (which are placed just above them) are black and more slender.

The half-grown specimen, which I described as *Paradoxurus leucocephalus*, appears, on recomparison with the series of specimens, to be only a specimen with more white on the head than usual. The fur is in a bad state, the animal having been kept in confinement. The tip of the tail is white, as in the *P. ogilbii* of Fraser, which agrees with it in the whiteness of the head.

\*\* *Skull rather longer; brain-case slightly constricted in front; nose rather elongate, narrower; teeth small.* Amblyodon.

### 3. PAGUMA GRAYI (type), Bennett & Hodgson.

B.M.

Fur long and rigid, rather woolly, iron-grey, beneath paler; base of ears and sides of nose browner; tail elongate, flat at the base.

*Paguma grayi*, Gray, Cat. Mamm. B. M. 54; Cat. Hodgson Coll. 9; Gerrard, Cat. Osteol. Brit. Mus. 78; Horsfield, Cat. India House Mus. 66.

*Paradoxurus grayi*, Bennett, P. Z. S. 1835, p. 18.

*P. larvatus*, var., Temm. Esq. Zool. 120 (!).

*P. bondar*, Temm. Monog. ii. 332, t. 55. f. 1-4 (skull, not syn.).

? *P. leucopus*, Ogilby, Zool. Journ. iv. 303, ? var.

*P. nipalensis*, Hodgson, Asiatic Research. Bengal, xix. 76, 1836; Schinz, Syn. Mamm. i. 387.

*Amblyodon doré*, Jourdan, Ann. Sci. Nat. viii. 276, 1837.

*Paradoxurus auratus*, De Blainville, Ostéographie (Viverra), t. 12 (teeth).

*Hab.* India: Nepal.

The spot on the side of the face, under the eye, is sometimes very indistinct. The blackish ends of the hairs of the back, when crowded together at the crease of the neck, and when brushed towards the middle of the back, give the appearance of a dark band or streak; but there is no real band or streak in this species.

Skull swollen. False grinders moderate, rather compressed, conical, blunt, without any internal process; the flesh-tooth triangular, rather longer on the outer edge than the width of the front edge; the internal tubercles triangular, rather behind the front edge, inner side rather angular; tubercular grinders oblong, transverse, about as wide as the length of the outer edge, inner side narrower and rounded; hinder tubercular very small, circular.

Length of skull 4" 6 $\frac{1}{2}$ "', of nose 1" 5 $\frac{1}{2}$ "'; width of brain-case 1" 6"', of zygoma 2" 6'''.

This skull is much more ventricose, and the head is much shorter and broader, than in *P. bondar*.

*Paradoxurus leucopus*, Ogilby, Zool. Journ. iv. 300, t. 35, 1829, Temm. Esq. Zool. 120, "band round the loins, the feet, and the tip of the tail pure white," is probably, from the description, an accidental variety of the *P. grayi*. The specimen does not appear to have been preserved.

I believe the specimen which I described in 1837, under the name of *P. jourdanii*, 'Mag. of Nat. Hist.' i. 579, from a specimen which M. Jourdan purchased in London for the Lyons Museum, is the same as the one here described.

The only character that M. Jourdan gives is the following:— "Cette à laquelle il a donné le nom d'*Amblyodon doré* est celle qui offre la disposition dentaire la plus omnivore, celle qui, par conséquent, rappelle le mieux ce qui a lieu dans les *Rasores*, chez lesquels les deux bords dentaires sont presque égaux en hauteur et en épaisseur, également tuberculeux, et ont les deux arrières molaires approchant le plus d'être égales et semblables dans leurs côtés interne et externe."

"L'*Amblyodon* a un pelage fort grossier, rude, assez long et presque unicolore, seulement plus foncé en dessus, autour des yeux, avec les extrémités noires en dessus, comme la *Mustela*."—*Ann. Sci. Nat.* viii. 276, 1837.

This character suits more than one Indian species; but fortunately M. de Blainville, in his valuable 'Ostéographie,' has figured a skull under the name of *Paradoxurus auratus*, which is probably the one named by M. Jourdan, and certainly is the same as the *Paradoxurus grayi* of Mr. Bennett. It may be observed that M. Jourdan was in England shortly after I had described the species in the 'Magazine of Natural History': he saw my specimens, and even referred to my paper in his 'Mémoire' (p. 275); but he redescribed my *Paradoxurus derbianus* as *Hemigale zebra*, and *P. jourdanii* as *Amblyodon doré*, without reference to their synonyms, though the latter is from the same specimen, I believe, as I described with his permission.

*Paradoxurus laniger*, Hodgson, MS. (*Paguma laniger*, Gray, Cat. Mamm. B. M. 55).

*P. larvatus*, var., Temm. Esq. Zool. 120 (!); Monogr. ii.

*Hab.* Nepal (Hodgson).

This species is only known from a skin without any skull, and in a very bad state.

## 16. ARCTOGALE.

*Arctogale*, Peters, Handb. für Zool. 98 (ined.).

Head conical. Nose compressed, flat, and with a central groove beneath. Whiskers slender, very long, brown. Ears rounded, covered with short hair. Toes 5—5; claws short, retractile. Soles

of hind feet broad, bald nearly to the heel. Tail elongate, slender, subcylindrical. The frenum covered with hair. Teeth 40.

Skull elongate. Nose produced. Brain-case rather wide, but constricted and subcylindrical in front. Forehead broad, angular behind, and extending beyond the back edge of the orbits. The orbits nearly complete behind, there being an elongated slender process from the side of the forehead and a well-marked angle on the upper edge of the zygomatic arch. Hinder part of the palate very narrow, with a deep notch on each side in front, on a level with the hinder tubercular; front of palate as wide as two-thirds its length. Teeth small; the flesh-tooth triangular, with a long, narrow internal lobe; tubercular grinders oblong, the first nearly as long as broad.

“I have formed this into a genus, on account of the smallness of the teeth and the protraction of the palate.”—*Peters's Letter*, Nov. 11, 1864.

I had already distinguished the genus, but gladly adopt Dr. Peters's unpublished name to prevent the useless increase of generic names.

#### ARCTOGALE TRIVIRGATA.

B.M., type.

Blackish brown, slightly silvered with the pale tips to the hairs; back with three narrow black streaks; throat, chest, and undersides dirty white; the head and tail black; feet blackish brown.

*Paguma trivirgata*, Gray, Cat. Mamm. B. M. 55; Gerrard, Cat. Osteol. B. M. 79; Temm. Monogr. ii. 335, t. 53. f. 1 (skeleton); Horsfield, Cat. India House Mus. 64.

*Viverra trivirgata*, Reinhardt, in Mus. Leyden.

*Paradoxurus trivirgatus*, Gray, P. Z. S. 1832, p. 67; Temm. Esq. Zool. 120.

*P. lævidens*, fide Parzudaki's MS.

*Hab.* Java and Sumatra (*Temm.*); Malacca (*Finlayson*); Tenasserim (*Blyth*).

The black streak varies in distinctness and length in the different specimens, being sometimes very black and extending from the back of the head to the base of the tail, in others only distinctly visible in the middle of the back. The head and end of the tail are always blacker, and the throat whitish. There is no white spot under or above the eye; so that it cannot be *Viverra hermaphrodita* of Pallas, which is described as having three dorsal streaks; and I cannot observe any baldness of the frenum in the stuffed specimens. The tail in some lights looks as if it were very obscurely marked with narrow blackish rings; but they are not distinctly defined in any light.

The Museum procured a young specimen from M. Parzudaki, of Paris, under the name of “*P. lævidens*, inter *P. laratum* et *P. grayi intermedius*, Ceylon.” The habitat and the affinities are mistakes.

*Species of this group requiring further examination.*

PARADOXURUS STIGMATICUS, Temm. Esq. Zool. 120.

Fur short and smooth; that of the nape, upper part of the body, the

sides, the four members, and the tail is red-brown, with a silvery lustre; the silky hairs of all parts are tipped with yellowish white. Head black brown, with a fulvous lustre; a pure-white longitudinal band extends from the forehead to the origin of the muffle, covering the ridge of the nose; the ears naked externally, with the base of the inner side hairy. The tail and the end of the tail chocolate.

Length of head and body 17 inches, tail 19 inches.

*Hab.* Borneo (*Schwaner, Temm., Mus. Leyden.*).

A single, very old, male specimen. Size and form of *P. trivirgatus*.

**PARADOXURUS LEUCOTIS**, Blyth, in Horsf. Cat. India House Mus. 66.

Fur rather long, soft, silky; of upper part of the body, neck, head, and two-thirds of the tail tawny, becoming reddish brown on the back and sides; thighs and legs, throat and abdomen, lighter; tail very long, and deep chestnut-brown; whiskers long, blackish brown; nose with a central white line; ears scarcely covered with scattered yellowish hairs.

*Hab.* Tenasserim, Arracan (*Mus. India*).

**PARADOXURUS STRICTUS.**

*Paradoxurus strictus*, Hodgson, Ann. & Mag. Nat. Hist. 1855, xvi. 105.

General colour grey, with a slight rusty shade; two prominent white spots on each side of the head, one beneath the eye oblong, tending forward, one behind the eye larger, triangular, tending backward; five continuous stripes, regularly defined and straight, of a deep black colour, commencing on the neck, extend over the whole length of the body, having on each side beneath an interrupted band of black spots. Abdomen grey. Tail exceeding the body in length; mixed grey and black at the base; the terminal portion black, the colour increasing in deepness towards the extremity. Legs black. Throat grey, with a medial black stripe. Ears developed.

Length from the snout to the root of the tail 23 inches, of the tail 25 inches.

*Hab.* India.

**PARADOXURUS QUADRISRIPTUS.**

*Paradoxurus quadriscriptus*, Hodgson, Ann. & Mag. Nat. Hist. 1855, xvi. 106; Gray, P. Z. S. 1853, p. 191.

General colour grey, with a slight rufous shade extending over the whole of the body, over one-half of the tail, over the forehead and the lower part of the ear. On the back and parts adjoining, four well-defined continuous black stripes pass from the neck to the rump, having a shorter interrupted band on each side. The bridge of the nose in the middle, a well-defined narrow streak from the canthus of the eye, the neck, the feet, and the terminal part of the tail are black; on the upper part of the neck the hairy covering is slightly variegated black and grey, the separate piles being grey at

the base and black at the tip. The fur is soft, lengthened, and straggling.

The entire length of this species is 50 inches, 26 of which are occupied by the head and body, and 24 by the tail.

I could not discover any external differences between the specimens which Mr. Hodgson sent, under the name of *P. quadriscriptus*, from Nepal, and *P. musanga* (see Proc. Zool. Soc. 1853, p. 191). The skull has not been compared.

PARADOXURUS PREHENSILIS, Gray, P. Z. S. 1832, ii. 66; *Illust. Ind. Zool.*; *Horsf. Cat. India House Mus.* 63; *Temm. Esq. Zool.* 120.

*Ichneumon prehensilis*, Hamilton, MS. India House.

*Viverra prehensilis*, De Blainv. in *Desm. Mamm.* 208.

*Hab.* India.

The species, which has only been described from Dr. Buchanan Hamilton's drawing, copied in my 'Indian Zoology,' has not yet occurred to me. M. Temminck, who never could have seen it, states it to be "a constant variety" of *Paradoxurus musanga* (*Esq. Zool.* 120); but, as far as I know, *P. musanga* is confined to the Malay Islands.

PARADOXURUS FINLAYSONII, Gray, P. Z. S. 1832, p. 68, from Mr. Finlayson's drawing in Library of E. India Company; *Horsfield, Cat. India House Mus.* 65.

*Hab.* Malacca (*Finlayson's drawing*).

Probably the same as *P. musanga*.

PARADOXURUS CRASSICEPS, Pucheran, *Rev. et Mag. Zool.* vii. 392; *Arch. für Naturg.* 1856, p. 43.

PARADOXURUS ANNULATUS, Wagner, in *Schreber's Säugeth. Suppl.* ii. 253; *Schinz, Syn. Mamm.* i. 386.

*P. supra niger fulvo mixtus, subtus ferrugineus, lutescens; cauda nigro annulata, auriculis dense pilosis.*

*Hab.* —? (*Mus. Munich*).

#### Tribe 9. CRYPTOPROCTINA.

*The hinder part of the tarsus bald and callous; the tail long, covered with long flaccid hair; the head short, subglobose; the orbit of the skull incomplete behind.*

#### 17. CRYPTOPROCTA.

*Cryptoprocta*, Bennett, P. Z. S. 1832, p. 46; *Trans. Zool. Soc.* i. 137.

Head conical. Whiskers rigid, very long. Ears large, covered with short hair externally. Nose with a distinct, naked, central longitudinal groove below. Tail elongate, covered with long flaccid hair. Soles of feet naked. Toes united by a web.

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## CRYPTOPROCTA FEROX.

B.M.

Fur pale brown; hair short, uniform, that of the back with a small pale tip; under fur dusky.

*Cryptoprocta ferox*, Bennett, P. Z. S. 1833, p. 46; Trans. Zool. Soc. i. 137, t. 14; Gerrard, Cat. Ost. B. M. 81; De Blainv. Ost. Atlas, 15, 96, t. 6 & 12; Schinz, Syn. Mamm. i. 381.

*C. typicus*, A. Smith, S. African Quart. Journ. ii. 134.

*Hab.* Madagascar (*Charles Telfair*).

The skull of the *Cryptoprocta*, with its milk-teeth, is ovate, with a very short, rather compressed nose, large orbit, imperfect behind, and very short, much turned-out, slender zygomatic arches. The teeth are somewhat like those of a *Viverra malaccensis* of the same age; but the face is much shorter, and the palate broader in front, and the flesh-tooth more compressed longitudinally. The false grinders  $\frac{2}{3}$ ; the upper front are small and much worn. The flesh-tooth is long, compressed, with slight processes, without any tubercle on the middle of the inner side. The tubercular is triangular; the front edge rather the longer; the outer edges oblique, and inner one narrow, rounded, with three slightly raised tubercles on the front, and one on the hinder part of the crown.

Length of the skull 3 inches; width of brain-case, over ears,  $1\frac{1}{3}$  inch, at zygomatic arch  $1\frac{2}{3}$  inch.

The *Cryptoprocta* "has an anal pouch, and when violently enraged it emits a most disagreeable smell, very like that of *Mephites*; when at liberty, it lies constantly in a rolling position, sleeping always on its side or even on its back, holding with its fore feet the small wires of its cage."

See M. J. Geoffroy's observations on this genus (Mag. Zool. 1839, p. 25). He says it is very different from *Galidia*—which no one could doubt, if he studied the description of the feet:—

"Le *Cryptoprocta* de Bennett, peut-être le même que l'*Eupleres* de M. Doyer, semble plutôt être le représentant des *Paradoxures* de Madagascar."—*Jourdan, Ann. Sci. Nat.* viii. 272, 1837. This is a mistake, as any one may prove, by comparing the skulls, which are both figured in De Blainville's 'Ostéographie.' M. Pucheran also appears to think that this animal and the one described as *Eupleres goudotii* may not be different (see Rev. et Mag. Zool. 1858, p. 40).

II. THE DOG-FOOTED VIVERRIDÆ (*Cynopoda*).

The hind feet slender; underside bald, or more or less covered with scattered hairs. The toes slender, free, compressed, straight, slightly hairy; the claws exerted, exposed, blunt at the end. The orbit of the skull complete, or only slightly imperfect on the hinder edge. The body elongate; legs generally short. The fur is generally harsh, grizzled. The back is not crested. The tail conical or cylindrical, hairy, not dark-ringed. The anal pouches shallow, or not present.

A. *The nose short ; underside flat, with a central longitudinal furrow.* Herpestacea.

Tribe 10. HERPESTINA.

*Head elongate, conical ; tail conical or cylindrical ; back streaked ; claws elongate, compressed.*

18. GALIDICTIS.

*Galidictis*, I. Geoff. Compt. Rend. 1837, p. 580 ; Mag. Zool. 1839, t. 18 ; Schinz, Syn. Mamm. i. 360 ; Gray, P. Z. S. 1848, p. 21 (not Hodgson).

*Galictis*, I. Geoff. Compt. Rend. 1837, p. 581.

Nose flat, and with a groove below. Ears moderate. Tail bushy. Whiskers slender. Toes 5—5 ; front claws elongate, compressed, much arched ; thumb low down, with a long claw. Hinder toes :—third and fourth longest, subequal ; great toes low down ; claws all moderate, compressed. Soles broad, bald the whole width to the heel. False grinders 3/3. Tail subcylindrical, curved, with long hairs. Back streaked.

1. GALIDICTIS VITTATA.

B.M.

*Galidictis vittata*, Gray, P. Z. S. 1848, p. 21, pl. 1 ; in Zool. Sulphur, t. ; Coquerel, Mag. de Zool. xi. 465, t. 18. f. 2.

Grey, black-and-white grizzled ; back and sides with eight nearly equal, parallel, narrow, black-brown streaks ; chin and beneath pale brown ; hind feet and outer sides of fore legs reddish brown ; tail subcylindrical, bushy, black-and-grey grizzled, white towards the end ; hairs elongate, brownish white, with two, rarely three, broad black rings.

*Hab.* Madagascar (*T. Thompson*) (*Mus. Brit.*).

The skull described in the Proc. Zool. Soc. is not quite adult ; it has a small adult false molar.

2. GALIDICTIS STRIATA.

Pale brown ; seven or nine longitudinal black streaks, the middle one on each side behind short ; head and limbs pale brown ; tail whitish.

*Galidictis striata*, I. Geoff. Mag. de Zool. 1839, t. 18, 19 ; Schinz, Syn. Mamm. i. 360 ; Gerrard, Cat. Ost. B. M. 76.

*Galictis striata*, I. Geoff. Compt. Rend. Acad. Sci. 1837, p. 581.

*Mustela striata*, Geoff. Mus. Paris. ; Fischer, Syn. Mamm. 224.

*Pictorius striatus*, Cuvier, Règne An. ed. 2, p. 144.

*La Belette grise de Madagascar*, Sganzin, Rev. et Mag. Zool. 1855, 41.

*Hab.* Madagascar.

In the figure the brain-cavity is nearly three-fifths the entire length of the skull ; and the skull at the widest part of the zygomatic arch is as large as the brain-cavity. Skull oblong, rather elongate ; brain-cavity rather more than half the entire length ; orbit very incomplete behind ; forehead arched ; crown flat ; upper false grinders two, com-

pressed; the flesh-tooth elongate, trigonal, much longer than broad at the front edge—the internal tubercle moderate, on the front edge; tubercular grinders transverse, the first rather trigonal, narrow on the inner side, the second oblong, much smaller (see I. Geoff. *l. c.* t. 19).

b. *Back grizzled; claws short, curved.*

#### 19. HERPESTES.

*Herpestes*, Illiger.

*Mangusta*, Olivier.

*Ichneumon*, Geoff.

Body elongate; limbs moderate; back grizzled. Tail conical, covered with long hairs. Toes 5—5; claws short, compressed. Pupil linear, erect. Skull elongate. Teeth 40; false grinders  $\frac{3-3}{4-4}$ ; flesh-tooth elongate, narrow, longer than broad on the front edge; tubercular grinders transverse.

\* *Animal large; hair of body and tail long, harsh; tail ending in a black pencil.*

#### 1. HERPESTES ICHNEUMON.

B.M.

Grey, hairs largely ringed; head and middle of the back darker; legs reddish; feet and end of tail black, with a long flaccid pencil; under fur short, reddish.

*Herpestes ichneumon*, Gray, Cat. Mamm. B. M. 51; Gerrard, Cat. Ost. B. M. 73.

*Viverra ichneumon*, Linn. S. N.

*Herpestes pharaonis*, A. Smith, S. A. Quart. Journ. i. 49; Schinz, Syn. Mamm. i. 367.

*Ichneumon pharaonis*, Geoff. Mém. Egypt.

*Mangusta ichneumon*, Fischer, Syn. 163.

*Ichneumon ægypti*, Tiedem. Zool. i. 364.

*Mangouste d'Égypte*, F. Cuv. Mamm. Lith. t.

*Mangouste d'Alger*, F. Cuv. Mamm. Lith. t.

*Hab.* North Africa: Egypt; Senegal (*Reade, B. M.*); Cape Eilpila, 1850.

The skull is elongate, rather slender; the brain-case (that is, from the occiput to the back edge of the orbit) is three-fifths of the entire length; the crown is straight; the forehead arched and rather convex; the orbits are not quite complete behind. The teeth are normal, moderate-sized; the flesh-grinders of the upper jaw rather narrow, the front being two-thirds the length of the outer edge; the front tubercular trigonal, transverse; the hinder one small and oblong, transverse. Length  $3\frac{8}{12}$  inches, width at zygomatic arch 2 inches—the same as the length of the brain-case; width of brain-case  $1\frac{5}{8}$  inch. The skull is contracted in front, just over the back edge of the orbits. Lower jaw very shelving in front; false grinders  $\frac{4}{4}$ ; tubercular grinder oblong, elongate, moderate, with a very obscure anterior lobe, two lateral and one larger hinder lobe.



## 2. HERPESTES CAFFER.

B.M.

Like the preceding, but darker; under fur shorter, red; end of tail with a long, black, flaccid pencil.

*Herpestes caffer*, Licht. Verz. der Säugeth. 1835; Wagner, Gel. Anz. ix.; Gray, Cat. Mamm. B. M. 51; Gerrard, Cat. Ost. B. M. 73; Schinz, Syn. Mamm. i. 368; A. Smith, S. A. Q. J. 50.

*Viverra caffra*, Gmelin, S. N.

*Ichneumon pharaonis*, Verreaux.

*Hab.* S. Africa, on plains away from the sea; Natal (*Kraus*).

The skull of *H. caffer* is elongate, larger and longer than that of the adult *H. ichneumon*, and is more convex on the forehead and behind the orbit. The front of the brain-case is contracted some distance behind the back edge of the orbit, while in *H. ichneumon* this contraction is just over that part. The zygomatic arch is very long, much longer than in *H. ichneumon*, and not so arched out as it is in the latter species. Like as the two species are externally, they are very distinct in the form of their skulls. The teeth of the two species are very similar; but the teeth of *H. caffer* are considerably longer, stronger, and rather wider proportionately, especially the tubercular teeth.

Length of skull 4 inches; width at zygomatic arch  $2\frac{1}{8}$  inches, of middle of brain-case  $1\frac{5}{8}$  inch.

Lower jaw very shelving in front, with a prominence on the lower edge under the end of the tooth-line; false grinders  $\frac{4}{4}$ ; tubercular moderate, oblong, with two anterior lateral and one larger posterior prominence.

The great difference between the skulls of these two species, which are so like externally, should act as a caution to naturalists, who complain so frequently that species are often separated on too slight external characters. Temminck, for example, would unite *H. ichneumon*, *H. caffer*, and *H. widdringtonii* as one species, and at most only as "permanent local varieties," whatever those may be.

## 3. HERPESTES DORSALIS.

*Ichneumon pharaonis*, var., A. Smith, S. A. Q. J. 49.

"Back with a narrow, moderately distinct, golden-yellow stripe from nose to tip of tail, and another on each side of the face, which diverges from the front, passes over the eyes, and terminates on the side of the head.

"*Hab.* South Africa.

"Length: head and body 18 inches; tail 15 inches (not adult)."

## 4. HERPESTES WIDDRINGTONII.

B.M.

Like *H. pharaonis*; but fur shorter, under fur more abundant and longer, giving the animal a reddish tint; tail pencilled, distinct, but shorter:

*Herpestes widdringtonii*, Gray, Ann. Nat. Hist. ix. 49, 1842; Cat. Mamm. B. M. 51; Gerrard, Cat. Ost. B. M. 73; Schinz, Syn. Mamm. i. 375.

*Hab.* South of Europe: Sierra Morena (*Widdrington*).

## 5. HERPESTES NUMIDIANUS.

B.M.

*Herpestes numidianus*, F. Cuvier, Mamm. Lith. t. ; Verreaux, MS.

Like *H. ichneumon*, but blacker; the rings of the hairs very distinct; throat, legs, and feet black.

*Hab.* Numidia (*Verreaux*).

## 6. HERPESTES MADAGASCARIENSIS.

*Ichneumon madagascariensis*, A. Smith, S. African Quart. Journ. 56.

“Hair of the head, throat, breast, belly, and lower part of the extremities short, that of the other parts longer. The colour of the upper and lateral parts of head and of lower parts of extremities brown red freely speckled with black and white; the upper and lateral parts of the neck, body, and the whole of the tail speckled, being black, brown red and pale reddish white, each hair annulated with these three colours, which are darkest upon the back; throat and lower part of the neck pale tawny; breast, belly, and inner side of extremities dirty pale rufous, speckled with white; woolly hair yellowish white; tail rather thick towards the root, very slender at the point; outer surface of ears thickly covered with short brownish-yellow hairs, inner surface more thickly with a dull tawny sort; whiskers black; nails dark horn-colour. Length of body and head  $15\frac{1}{2}$  inches, of tail 14 inches.

“*Hab.* Madagascar (*A. Smith*).

“Size and form of *H. caffer*, but colours much lighter; and when placed side by side, various other differences are evident.”

## 7. ? HERPESTES BENNETTII.

Red brown, slightly grizzled with whitish; tail rather depressed, underside pale red, tip black-pencilled.

*Herpestes bennettii*, Gray, Loudon's Mag. N. H. i. 578.

*Hab.* Madagascar (*Mus. Zool. Soc.*). Specimen not to be found.

## 8. HERPESTES JERDONII.

B.M.

Grey, closely and broadly white-ringed; the head darker; the feet darker brown, only slightly annulated; tail conical, with a black pencil of elongated, flaccid, black hairs.

*Hab.* Asia: Madras (*Jerdon*, 1846).

This is very like *H. ichneumon*, but rather paler.

Length of head and body 19 inches, of tail 17.

Skull (aged) elongated; orbit complete. The false grinders  $\frac{3}{4}$ ; the front very small; the second and third triangular, with an internal lobe. The flesh-tooth narrow, elongate; outer edge much longer than the width of the front margin; internal lobe small, slender, on the front edge. Tubercular transverse; first triangular, very short and broad, outer edge oblique, inner part very narrow, acute; second very small, oblong. The hinder part of the palate contracted, with a small wing on each side on the upper, and with an acute keel on each side of the lower edge, ending in a long process behind, with

a nodus on the outer side near the end; internal opening narrow, transverse. Lower jaw rather strong; chin shelving, lower edge straight, angle produced, lobe keeled on the inner upper margin. Length of skull about 2" 3''' (imperfect), of nose 11''; width of back of mouth 1" 1'''.

*Ichneumon edwardsii*, Geoff. Egypt, 138, from Edw. Birds, 199. t. 199.

*Ichneumon major*, Geoff. l. c. 139, from *Grande mangouste*, Buff. Supp. iii. 173, t. 28. These species are only known from the figures cited.

\*\* *Smaller animal: hair shorter; tail with a small black or red tip.*

#### 9. HERPESTES APICULATUS.

B.M.

Fur harsh, dark grey, grizzled with broad black-and-white rings; hair rather elongate, with black tip and a broad white subterminal band; tail with a very slight black tip, from the dark end of the terminal hairs.

*Herpestes apiculatus*, Gray, Cat. Mamm. B. M. 51.

*H. pulverulentus*, Wagner, Supp. Schreb. Säugeth. t. 116. f. 2; Schinz, Syn. Mamm. i. 374.

*H. caffer*, Verreaux, MS.

Length 14 inches; tail 11 inches. (B.M.)

*Hab.* South Africa, Cape of Good Hope, on rocks near the sea (*A. Smith*).

\*\*\* *Smaller animal: hair of body shorter; tail coloured like the back.*

† *African.*

#### 10. HERPESTES PUNCTATISSIMUS.

Fur short; the hairs at the base of the tail twice as long as those of the body; the upper part of the body and limbs pale yellow, dotted with very fine blackish-brown rings, covering all the parts except the chin; the middle part of the neck and belly dirty white; the hairs of the tail, to the extreme point, have many rings; the tip of the tail pale reddish.

Length of head and body 10½ inches, tail 9 inches.

*Herpestes punctatissimus*, Temm. Esq. Zool. 108.

*Hab.* Central and Eastern Africa (*Temm., Mus. Leyden.*).

Teeth very strong, much larger than others of the same size.

#### 11. HERPESTES LOEMPO.

B.M.

Under fur pale ochraceous; longer hairs black-tipped; fur of head, neck, and back yellow-dotted; back and nape blacker; tail variegated at the base and tufted with long black hairs, which are yellowish at the base; legs deep black.

*Herpestes loempo*, Temm. Esq. Zool. 93, 1853.

*H. mutgigella*, Verreaux, MS. (not Rüppell).

*Arompo*, Bosman, Guinea, 33. f. 8.

In the specimen not in complete fur the ochraceous undercoat is seen through the longer hairs.

*Hab.* Guinea, near the graves. (Called "Loempo" by a negro at Guinea.)

This species has the toes and other parts of the body, and especially the form of the tail, of *Ichneumon*, but the normal teeth of *Herpestes* (Temm. 94).

The skull is long, ventricose; face and forehead flat, shelving gradually to the back of the orbit, and then shelving in a straight line towards the hinder part of the head. The cavities for the temporal muscles are very large, and they extend in front, and meet together on the crown at a line rather in front of the hinder edge of the orbit. The orbits are large, the hinder edge entire; the hinder part of the skull is broad; the hinder part of the palate between the temporal muscles is narrow and elongate, the hinder opening being nearer the hinder than the front edge of the temporal fossæ. The hinder grinders are slender; the crown of the flesh-tooth is triangular, the front side being the shortest, with the inner tubercle on the straight front edge.

## 12. HERPESTES PLUTO.

B.M.

Black; sides of the head, neck, and front of the body pale brownish, with broad white subterminal bands on the ends of the hairs; hairs harsh; tail black, grey at the base, hairs not ringed at the end; front of thighs, legs, and feet black.

*Herpestes pluto*, Temm. Esq. Zool. 93, 1853.

*Hab.* Guinea (*Temminck*); West Coast of Africa (*Gerrard*), adult; ? East Africa (*Verreaux*).

The adult specimens from *Gerrard* and *Verreaux* are rather paler than the younger one from *Leyden*; length of head and body 20 inches, tail 14 inches. Younger from *Guinea*, length of body and head 16 inches, tail 11 inches. They have also a slight indication of a crest of longer black hairs on the back of the neck.

Skull short, broad; nose shelving; forehead convex; crown flat; orbits complete. False grinders 3/3; first conical, blunt; the second compressed; the third trigonal, with a distinct internal and hinder tubercle. Flesh-tooth rather longer than wide on the front edge; the inner tubercle on front edge, broad, rounded. Tubercular grinders transverse; the front about twice as wide as long, rounded on the inner edge; the second smaller, rather oblong, with two well-marked tubercles, rather narrower and more acute on the hinder part of the inner edge.

Skull—length  $3\frac{1}{2}$  inches; width at zygoma  $2\frac{1}{10}$  inches, of brain-cavity  $1\frac{1}{4}$  inch.

"Like the *H. loempo*; the head and muzzle longer; tail shorter, covered with hairs like those of the body; fur of body, limbs, and

tail intense shining black ; under fur sombre or dark brown ; the fur of the chin, throat, and cheeks black, with very small yellow dots ; all the rest intense black. The younger are marked with very fine dots, produced by the yellow rings on the black hairs."—*Temm.*

This does not agree with the specimen (which appears to be changing its teeth) which we received from the Leyden Museum.

### 13. HERPESTES IODOPRYMNUM.

"*Supra ex albido griseoque variegatus, capite, collo, maniculis atque podariis cinerascens, hypochondriis viridi-griseis, prymna saturate castanea, pectore, abdomine cristaque unicoloribus ex rufescente isabellinis; cauda longe disticha, basim versus villosissima, supra et infra ad apicem nigrum usque castanea, rhinario et plantis denudatis nigris.*

"Long. tota 24 inches.

*Herpestes iodoprymnus*, Heuglin, Nov. Acta Leop. xxix. 23.

"*Hab.* Eastern Abyssinia."

### 14. HERPESTES LEFEBVRII.

*Herpestes lefebvrii*, DesMurs et Prevost ; Heuglin, Nov. Act. Leop. xxix. 23 ; Lefebvre, Voy. Mamm. t. 1 (not described).

*Hab.* N.E. Africa (*Heuglin*).

†† *Asiatic.*

### 15. HERPESTES GRISEUS.

B.M.

Pale grey, largely white-ringed ; head and legs darker ; hairs harsh, elongate, with a very broad, white, subterminal ring ; feet blackish ; tail bushy ; cheeks and throat more or less reddish.

*Herpestes griseus*, Desm. Mamm. 212 ; Ogilby, Proc. Zool. Soc. 1835 ; Gray, Cat. Mamm. B. M. 52 ; Gerrard, Cat. Ost. B. M. 75 ; Horsfield, Cat. India House Mus. 90.

*Ichneumon griseus*, Geoff. Egypt. ii. 157.

*Mangusta grisea*, Fischer, Syn. Mamm. 164.

*Herpestes pallidus*, Schinz, Syn. Mamm. i. 373.

*Viverra grisea*, Thunb. Mém. Acad. Pétersb. iii. 306.

*Hab.* India : Bengal (*Oldham*) ; Travancore (*P. Poole*) ; "Sumatra" (*Raffles, Waterh. Cat.*) ; Dukhun (*Sykes*) ; Nepal (*Hodgson*).

Var. *Paler*, with a reddish tinge, and the pale rings rather narrower.

*Hab.* India (*Hardwick*).

Skull and teeth normal ; orbit complete ; nose short, thick ; false grinders 3—3, first conical, roundish, third triangular. Flesh-tooth rather longer than broad in front. Tubercular transverse ; the first with the outer side sloping ; the hinder small, oblong, short. Lower jaw shelving in front. Skull—length  $2\frac{3}{4}$  inches ; width of brain-case  $2\frac{3}{4}$  inches, at zygomatic arch  $1\frac{5}{2}$  inch.

## 16. HERPESTES PERSICUS.

B.M.

Pale ashy, very closely and abundantly black-and-white punctulated; hair short and soft, with black ends and a broad white band near the tip; the chin and underside uniform ashy; tail conical, tapering, coloured like the back; feet like the back, but with shorter hair.

*Hab.* Persia: Rhugistan and Mohammerah, date-groves (*Kennet, Loftus*, 1853).

Skulls (adult) rather elongate; nose short; forehead very broad, convex; the orbits complete; lower jaw moderately strong, chin shelving. Teeth 40, normal; the third false grinder subtriangular, with small, central, prominent lobe; the flesh-tooth elongate, sub-trigonal, the outer side considerably longer than the front one, the inner tubercle small, on the front edge; the front tubercular triangular, transverse, with a very sloping outer edge. Length of skull 2" 6"', of nose 7½"', width of under palate behind 9½"', of brain-case 10"', of zygomatic arch 1" 3'''.

Somewhat like *Calogale nyula*, but much paler and more uniform in dotting; the head shorter and broader, and the tail conical, tapering, thicker at the base.

## 17. HERPESTES FUSCUS.

B.M.

Black brown, white-dotted; hair very long and harsh; ends black, with a narrow pale band very near the tip; throat and belly reddish brown; tail bushy, like the back.

*Herpestes fuscus*, Waterhouse, P. Z. S. 1838, p. 55; Gerrard, Cat. Ost. B. M. 74; Schinz, Syn. Mamm. i. 372.

*Hab.* India (*Waterhouse*); Madras (*Jerdon*, 1846).

Mr. Waterhouse's type is in the B. M.: length of body and head 10 inches, tail 17 inches. The one from Madras is smaller.

The skull is intermediate in form between that of *H. ichneumon* and that of *H. paludosus*; the brain-case is nearly of the same external form as the latter, but not quite so ventricose; the orbit is small and rather incomplete behind; the zygomatic arch is rather convex, but, as in *H. ichneumon*, the convexity is more on the hinder end, while it is regularly bowed out in *H. paludosus*. The teeth of the upper jaw are very like those of *H. ichneumon*; but the outer edge of the front tubercular is not so oblique, and the hinder tubercular is even smaller; they are very much slenderer and less bulky than the teeth of *H. paludosus*. Lower jaw very shelving in front; lower edge arched, narrow behind; false grinders 4—4; tubercular oblong, elongate, rather small, crown four-lobed, one lobe at each end and two in the middle portion.

The length of the skull 3½ inches; the width of the brain-case 1¼ inch, of the zygomatic arches 1½ inch.

## 18. HERPESTES JAVANICUS.

B.M.

Dark black brown, very minutely punctured with yellow; head redder; tail conical; claws short, conical.

*Herpestes javanicus*, Desm. Mamm. 212; Gray, Cat. Mamm. B. M. 51; Gerrard, Cat. Ost. B. M. 73; Schinz, Syn. Mamm. i. 372; Horsf. Cat. India House Mus. 88.

*Mangusta javanica*, Horsf. Zool. Java, t.

*Mustela galera*, Desm. (fide icon. ined.).

*Viverra mangusta*, Temm.

*Ichneumon javanicus*, Geoff. Mém. Egypt, ii. 157.

*Hab.* Java and Sumatra (*Horsfield, Müller*); Penang and Malay peninsula (*Cantor*).

*Young.*—Pale bay; some of the hair of the tail with long grey tips.

*Hab.* Sumatra (*Raffles*).

#### 19. HERPESTES SEMITORQUATUS.

B.M.

Dark red brown, very slightly punctulated; cheeks and side of the neck uniform pale bay; legs and feet black; tail black, with some white tips to the hairs.

Length of body and head 18 inches, tail 11 inches.

*Herpestes semitorquatus*, Gray, Zool. Sulphur, t. 3. f. 1-3, 1849; Gerrard, Cat. Ost. B. M. 74.

*Hab.* Borneo (*Belcher*).

Like *H. brachyurus* in some respects; but the tail is longer, and the sides of the neck bright pale red, separated from the other parts by a defined line.

The skull is not quite adult, much broader compared with its length than even that of *H. paludosus*. The contraction in the front of the brain-cavity is slight, and rather in front of the back edge of the orbit. The orbit is rather large, and slightly incomplete behind; the zygomatic arch is rather short, and not much bowed out. The teeth are normal, and very like those of *H. ichneumon*; they occupy a rather shorter space. Length of the skull  $3\frac{1}{8}$  inches; width of the brain-case  $1\frac{5}{12}$ , of the zygomatic arch  $1\frac{1}{2}$  inch. Skull short and broad.

Lower jaw: chin shelving; lower edge arched, without any prominence under the end of the tooth-line; false grinders 4-4; the front false grinder small, deciduous; the tubercular grinders oblong, longitudinal, with two unequal anterior and one large posterior tubercle.

#### 20. HERPESTES EXILIS.

“*Pallide flavo nigroque annulatis; capite et dorso cinnamomeo et nigro annulatis; pedibus nigrescentibus, gula cinnamomea, ventre pallidior; cauda pilosa, non penicillata, palmis plantisque nudis.*”

“Long. corp.  $10\frac{1}{2}$  inches, caudæ 8 inches.”

*Herpestes exilis*, Eydoux, Zool. de la Bonite, t. 3. f. 7-9; Schinz, Syn. Mamm. i. 375.

“*Hab.* East Indies, Touranne (*Eydoux*).”

#### 21. HERPESTES MALACCENSIS.

Dull ashy, beneath rather paler; hairs black, white-and-yellow

ringed; orbits, ears, and tip of nose naked, violet; tail the colour of the body, very thick at the base, ending with yellow hairs.

*Herpestes malaccensis*, F. Cuv. Mamm. Lithog. t.

*Mangusta malaccensis*, Fischer, Syn. 164.

*Herpestes pallidus*, var., Schinz, Syn. Mamm. i. 373.

*H. frederici*, Desm. Dict. S. Nat. xxix. 60.

*H. leschenaultii*, Schinz, Cuv. Thierr. t.

*Hab.* Malacca, Pondicherry (*Leschenault*).

\*\*\*\* *Smaller; tail like back, much shorter than the body.*

## 22. HERPESTES BRACHYURUS.

B.M.

Black, hairs yellow-ringed; under fur brown; face, cheeks, and sides of neck yellower; belly and tail darker; throat pale yellow brown; fore legs and feet blackish; tail thick, about half as long as the body. Length of head and body 18 inches, tail  $7\frac{1}{2}$  inches.

*Herpestes brachyurus*, Gray, Mag. N. H. i. 578, 1836; Voy. of the Samarang, Mam. t. 4. f. 123, 1849; Gerrard, Cat. Ost. B. M. 74.

*Mangusta brachyura*, De Blainv. Ost. Atlas, t. 6.

*Hab.* Borneo (Malacca).

The skull is most like that of *H. caffer*, but shorter; the brain-case, the zygomatic arches, and the face are shorter and more ventricose; the forehead broader and regularly convex. The constriction of the front of the brain-case is rather behind the orbit, and not much contracted; the orbit is rather small and complete behind. The teeth are normal, and very like in proportion and form to those of *H. ichneumon*, but rather larger in all parts, as the skull is larger; brain-case five-eighths of entire length.

Length of the skull  $3\frac{5}{6}$  inches; width of brain-case  $1\frac{2}{6}$  inch, at zygomatic arch  $2\frac{1}{2}$  inches.

## 20. ATHYLAX.

*Atilax*, F. Cuvier, Mamm. Lithogr. 1826, iii. t.

*Athylax*, I. Geoff. Mag. Zool. 1837; De Blainv. Plates.

*Galera*, Brown, Hist. Jam. i. 85, 1756.

Like *Herpestes*, but teeth and jaws stronger. Toes 5—5; claws blunt. Skull elongate. Teeth 40, normal, very massive, with large acute tubercles on the crown; the false grinders  $\frac{3}{4}$ . The lower jaw very strong, with a well-marked chin, and a tubercle on the lower edge under the posterior end of the tooth-line (De Blainv. Ost. Viverra, t. 5). The grinders much longer and broader, with larger and higher tubercles, and the hinder upper tubercular grinder much larger than in most, if not in any other, of the genera; but in the disposition and number of the tubercles they are just like those in the other species.

M. I. Geoffroy compares this genus with his *Galidia*, and concludes that they are distinct (see Mag. de Zool. 1839, p. 25).



This genus is separated from *Herpestes* by the large size and thickness of the teeth and the strength of the lower jaw, with its two distinct prominences. The skull and lower jaw of both species, if they are distinct, are figured by De Blainville, as above referred to.

### 1. ATHYLAX VANSIRE.

*Atilax vansire*, F. Cuvier, Mamm. Lithog. 411. t.; Dict. Sci. Nat. t.

*Mustela galera*, Erxl. Syst. 453; Schreb. Säugeth. t. 155.

*Viverra galera*, Shaw.

*Herpestes galera*, Desm. Mamm. 212; Wagner, Gel. Anzeig. ix.

*Mangusta galera*, Fischer, Syn. 165.

*Mangouste vansire*, Geoff.

*Mangusta (Athylax) galera*, De Blainv. Ostéogr. Viverra, t. 5 (skull).

*Ichneumon vansire*, A. Smith, S. A. Q. J. 53.

*I. galera*, Geoff. Hist. Egypt, 138.

*Vansire*, Buffon, H. N. xiii. 157, t. 21.

*Hab.* Madagascar.

According to De Blainville's figure, the skull is more solid and stronger than that of *A. paludosus*.

Temminck thinks this a variety or local state of *Herpestes paludosus* (Esq. Zool. 100).

The description of the *Vansire*, from a stuffed specimen, is as follows:—"The fur is less long than that of a Marten or Polecat, of the same dark brown colour on all parts of the body; the under fur is brown; the longer hairs are brown at the roots; the remainder blackish and reddish, which succeed each other at small intervals to the tip. These two colours occupy all the length of the hairs of the tail. Toes 5—5. Length of body and head 13 inches, tail 7 inches, hair  $2\frac{1}{2}$  inches long. Madagascar."—*Buffon*, H. N. xiii. 169, t. 21.

In the figure, the claws are represented as long, compressed, arched, acute.

The skull of the animal figured by F. Cuvier is engraved in De Blainv. Ostéogr. t. 5.

### 2. ATHYLAX PALUDOSUS.

B.M.

Brown, closely yellow-punctulated; hair elongate.

*Herpestes paludosus*, Cuv. R. A.; Gray, Cat. Mamm. B. M. 52; Gerrard, Cat. Ost. B. M. 74.

*Mangusta urinatrix*, A. Smith, Zool. Journ. iv. 237.

*H. palustris*, Rüppell.

*H. griseus*, Burchell, Cat.

*H. caffer*, Mus. Stuttgart.

*H. paludinosus*, Peters, Reise Mossamb. Säugeth. 119.

*H. atilax* (partly), Schinz, Syn. Mamm. i. 371.

*Ichneumon urinatrix*, A. Smith, S. African Quart. Journ. i. 51.

*Mangusta paludinosus*, De Blainv. Ostéogr. Viverra, t. 5 (skull), t. 12 (teeth).

*Hab.* S. Africa, Cape of Good Hope, on the banks of the rivers ; a great diver (*A. Smith*) ; E. Africa, Quillimane (*Peters*).

*Var.* Black-brown, only very slightly punctulated, except on the side of the throat.

*Var.* Canine teeth very strong,

*Hab.* Guinea (*Gervais*).

The skull is wider, compared with its length, than in most species of the genus ; the brain-case is more convex ; the contraction in the front of the brain-case is not so great or so sudden as in *Herpestes ichneumon* and *H. caffer*, and is only a very small distance behind the hinder edge of the orbit. The orbit is very incomplete behind. The teeth are normal ; they are all much more bulky and broader than in any of the other species of the genus which I have seen ; the hinder upper false grinder is triangular, with nearly equal sides ; the flesh-tooth is very strong, the front edge being nearly four-fifths of the length on the outer side ; the first tubercular is not twice as broad as the length of the outer edge. The brain-case is about five-eighths of the entire length. The hinder part of the palate contracted, flat, with a diverging crest on each side above, and a ridge on each side below, with the aperture transverse, in a line with the base of the lateral crest. The bullæ large, vesicular, rounded below and behind.

Length of the skull  $3\frac{1}{2}$  inches ; width of brain-case  $1\frac{1}{2}$  inch, at zygomatic arch  $2\frac{1}{6}$  inches.

The zygomatic arch, in comparative length and convexity, is very like that of the skull of *H. ichneumon*.

Lower jaw strong, short, with a distinct chin-angle in front ; teeth very large and strong ; tubercular oblong, longitudinal, large, with two anterior and one broad hinder lobe, the angle behind with flattened expanded processes.

### 3. ATHYLAX ROBUSTUS.

B.M.

Brown, very minutely and closely punctured ; the head blacker, with a subvertical band ; the edge of the lower jaw and cheeks under the ears yellowish, not punctulated ; legs and feet nearly black ; tail black brown, punctulated.

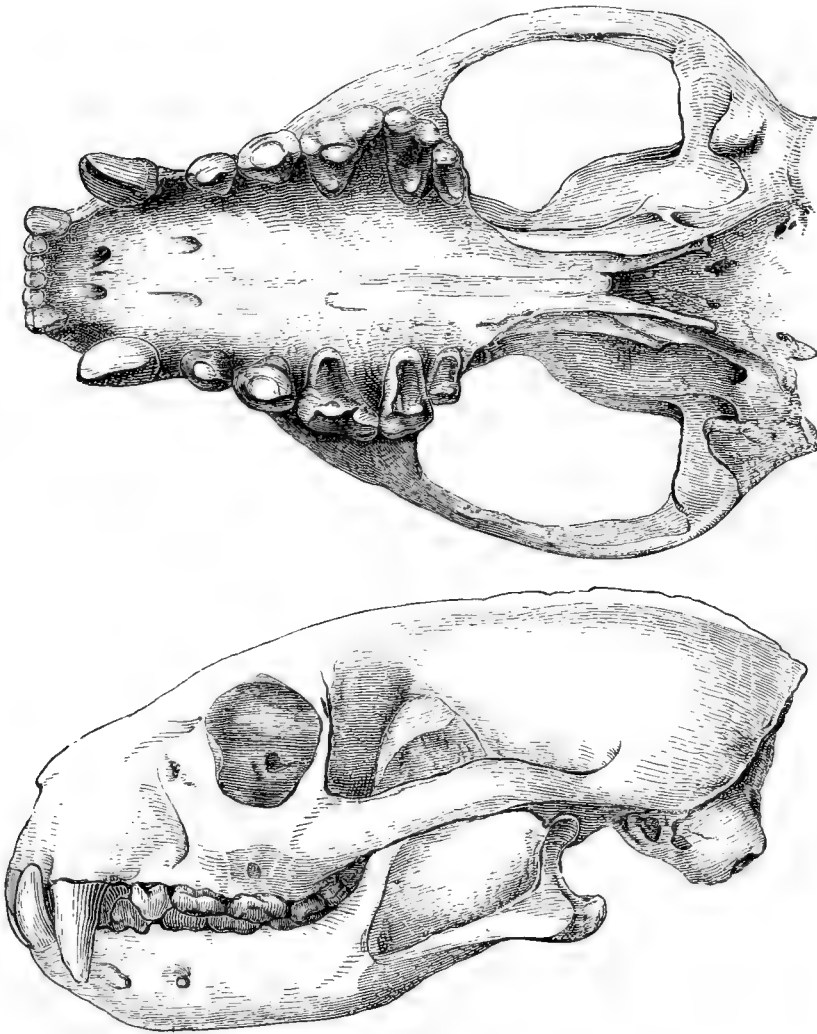
*Hab.* Africa : "White Nile" (no. 6168, adult ; no. 6169, younger) (*Parzudaki*).

Very like *A. paludosus*, but paler, and with the pale cheeks ; the teeth are very large and strong, like those of the *A. paludosus* variety from Guinea.

Lower jaw like that of *A. paludosus*, but not quite so strong, and more sloping in front ; the compressed teeth rather large ; the tubercular oblong, elongate, moderate, with two large lobes in front, and one larger behind.

Skull elongate ; nose short, thick ; forehead convex ; orbits complete. Teeth 36 ; the false grinders  $\frac{2}{3}$ , with a short space between the canine and the first false molar, where a small tooth may have fallen out. The false grinders triangular, with a triangular tubercle on the middle of the inner side. The flesh-tooth massive,

triangular, nearly as wide in front as long on the outer side, with a large internal tubercle on a line with the front edge. Tubercular



Skull of *Athylax robustus*.

grinders transverse; the front triangular, much wider than long, outer edge oblique, inner edge narrow; hinder one oblong, much smaller. The hinder part of the palate produced nearly to a line with the condyles, keeled on each side, and with a strong keel on each side of the lower surface, edging the very narrow contracted hinder opening. Ear-bullæ very large, vesicular, rounded below and behind. Lower jaw strong, solid, nearly as high behind as in front; chin shelving; gonyx long, the angle produced, bent up at the end, and keeled on the outer lower edge. Length of skull  $4\frac{6}{12}$  inches,

of nose  $1\frac{1}{2}$  inch; width of brain-case  $1\frac{1}{2}$  inch, of back of mouth  $1\frac{1}{2}$  inch, of zygomatic arch  $2\frac{1}{2}$  inches.

## 21. CALOGALE.

Body elongate. Tail very long, slender, cylindrical, covered with short hair, with longer at the tip. Toes 5—5; claws short, triangular, acute. Pupil linear, erect. Skull elongate; brain-case elongate, two-thirds the length of skull (see Peters, Reise, t. 28). Teeth 40; false grinders  $\frac{2}{3}$ ,  $\frac{2}{3}$ , compressed; flesh-tooth narrow, much longer than broad, with inner tubercles on front edge; tubercular grinders  $\frac{2-2}{1-1}$ , transverse, hinder very small.

\* *Tail like back, rather thick.*

### 1. CALOGALE NYULA.

B.M.

Pale grey, very closely and minutely black-and-white punctulated; tail elongate, rather tapering, coloured like the back.

*Herpestes nyula*, Hodgson, J. A. S. Beng. 1836, p. 236; Gray, Cat. Mamm. B. M. 52; Gerrard, Cat. Ost. B. M. 75; Horsf. Cat. India House Mus. 92.

*H. pallidus* (partly), Schinz, Syn. Mamm. i. 373.

*H. nigula*, Hodgson, Calcutta Journ. N. II. iv. 287.

*Hab.* India: Nepal, Open Tarai (*Hodgson*); Salt Range (*Oldham*). Length of head and body 15 inches, tail 12 inches.

The largest species of the genus, but much smaller than *Herpestes griseus*, which it somewhat resembles.

Skull very like *H. griseus*, but nose longer; orbit complete, and more compressed and tapering; the flesh-tooth and the front tubercular grinder rather larger and more massive.

Skull—length  $2\frac{3}{4}$  inches; width at brain-case 1 inch, at zygomatic arch  $1\frac{1}{3}$  inch.

These animals have the tail rather more bushy than the more typical *Calogale*; but they have the narrow skull and longer narrow brain-case and slender narrow flesh-tooth of the genus.

### 2. CALOGALE NEPALENSIS.

B.M.

Dark grey, very minutely and closely punctulated, with black and pale-whitish hairs, with a broad subterminal pale band; tail subcylindrical, pencilled at the end, coloured like the back.

Length 13 inches, tail 11 inches.

*Herpestes nepalensis*, Gray, Mag. N. H. 578, 1836; Hodgson, J. A. S. Beng. 235; Gerrard, Cat. Osteol. B. M. 74; Horsfield, Cat. India House Mus. 91.

*H. auropunctatus*, Hodgson, J. A. Soc. Beng. i. 578; Schinz, Syn. Mamm. i. 373.

*H. javanicus*, Hodgson.

*H. griseus*, Hodgson, Journ. Asiat. Soc. Beng. xiv. 346.

*H. pallipes*, Blyth, J. Asiat. Soc. Beng. xiv. 346.

*Hab.* India: Nepal, hill regions (*Hodgson*); Assam (*McClelland*); Afghanistan (*Griffith*).

Skull—orbit complete, like *C. grisea* and *C. nyula*, but smaller; the nose short, like *C. grisea*, but more compressed; teeth normal, very like *C. nyula*, the hinder tubercular being larger than in *C. grisea*.

Skull, length  $1\frac{5}{12}$  inch; width at brain-case  $\frac{4}{5}$  inch, at zygoma  $1\frac{1}{4}$  inch.

### 3. CALOGALE RUTILA.

B.M.

Grizzled chestnut-brown, variegated with black and white rings on the hairs; head and limbs darker chestnut, with scarcely any, or very narrow, white rings; lips and throat and under part of the body uniform duller brown, not grizzled; ears brown; the nape with longer hairs, forming broad short crests.

*Herpestes rutilus*, Gray, P. Z. S. 1861, p. 136.

*Hab.* Cambogia (*Mouhot*), one specimen.

### 4. CALOGALE MICROCEPHALA.

Head very small; teeth very small; ears close, short; nose very short and narrow. Fur finely dotted all over, deep brown and dull yellow, of the under part dirty white; the under fur ashy at the base, with a very broad yellow band; the hairs silky, blackish brown, with small ochraceous rings; the hairs of the tail with broader rings, those of the tip similar.

Length of head and body 10 inches, of tail  $9\frac{1}{2}$  inches.

*Herpestes microcephalus*, Temm. Esq. Zool. 113.

*Hab.* —? (*Mus. Leyden, procured at Havre*).

\*\* *Tail-end bright bay, very slender.*

### 5. CALOGALE SANGUINEA.

Head ashy, black-dotted; body isabella-red; hair with tip and rings brown; throat, chest, and belly white; feet pale; tail isabella and black, varied, tip bright red brown.

Length of head and body  $11\frac{1}{2}$  inches, of tail  $12\frac{1}{2}$  inches.

*Herpestes sanguineus*, Rüpp. Fauna Abyss. 27, t. 8 & 10 (skull); Schinz, Syn. Mamm. i. 370.

*Hab.* Abyssinia.

### 6. CALOGALE GRANTII.

B.M.

Pale yellow brown, nearly uniform, very slightly grizzled, with white tips to the hairs; end of tail bay.

*Herpestes badius*, Sclater, P. Z. S. 1864, p. 100.

*Hab.* East Africa: Mgunda Mkali (*Capt. Speke*).

\*\*\* *Tail-end black, very slender.*

### 7. CALOGALE MUTGIGELLA.

B.M.

Dark olive-brown, very minutely punctulated; tail-end black.

Length of body and head  $13\frac{1}{2}$  inches, of tail  $11\frac{1}{2}$  inches.

*Herpestes mutgigella*, Rüpp. Fauna Abyss. t. 9. f. 1; Gray, Cat. Mamm. B. M. 51; Gerrard, Cat. Osteol. B. M. 75; Schinz, Syn. Mamm. i. 370.

*Hab.* Abyssinia.

Skull rather elongate, narrow, like that of *C. nyula*; nose flat; forehead and crown in one line; brain-case ovate, flat-topped, contracted in the front over the orbit; orbit incomplete; false grinders 2-3/3, front small, hinder rather compressed, with a small internal and a small hinder acute tubercle; flesh-tooth much longer than broad—inner tubercles small, on front edge; tubercular grinders transverse, the first trigonal, the outer edge broader, the inner narrow, acute; the second very small, nearly like the first in form.

Skull  $2\frac{1}{2}$  inches wide at the broadest part; brain-case 1 inch.

#### 8. CALOGALE ORNATA.

*Herpestes ornatus*, Peters, Monatsb. Akad. Berlin, 1852, p. 81; Reise n. Mossamb. Säugeth. i. 117, t. 26, 1852; Gerrard, Cat. Osteol. B. M. 75; Temm. Esq. Zool. 115.

*Hab.* Eastern Africa: Tete, lat. 17 (*Smith*).

The figure is very like *C. mutgigella*; but the grizzling of the back seems to form more irregularly waved cross streaks; perhaps this is only the attempt of the artist to represent the grizzling. The figure of the skull also resembles that of the former species.

Temminck regards this as a variety of *C. mutgigella* (Esq. Zool. 116).

#### 9. CALOGALE PUNCTULATA.

B.M.

Reddish grey, minutely black-and-grey punctured; face redder; under fur black; long hairs brown, upper half whitish, with a broad black subapical band and a bay tip; tail-end black; front claw rather slender, acute; inner toes very short, claws short.

*Herpestes punctulatus*, Gray, P. Z. S. 1849, p. 11.

*H. badius*, var. 2, Temm. Esq. Zool. 105.

*Hab.* South-east Africa: Port Natal (*Williams*).

Like *C. mutgigella*, but redder; face red bay.

#### 10. CALOGALE MELANURA.

B.M.

Reddish brown, minute, punctulate; hair short; tail-end black; front claws acute, short.

*Cynictis melanura*, Martin, P. Z. S. 1830, p. 56; Fraser, Zool. Typica, t.; Gerrard, Cat. Ost. B. M. 77; Schinz, Syn. Mamm. i. 377.

*Herpestes melanura*, Gray, P. Z. S. 1838, p. 5.

*H. badius*, var. 3, Temm. Esq. Zool. 107.

*Hab.* West Africa, Sierra Leone (*Capt. P. L. Strachan*); Damara Land (*Alexander*).

Var.? Rather paler (not in good state). B.M.

*Herpestes ochromeles*, Pucheran (*vide* Verreaux).

*Hab.* "Central Africa" (*Verreaux*).

Skull elongate, very much contracted in front over the orbit; the flesh-tooth trigonal, longer than broad; hinder tubercular very minute, transverse.

11. CALOGALE BADIA. B.M.

Bright bay, nearly uniform; end of tail black.

Young? pale brown, with an obscure waved appearance from the broad bands on the hairs.

*Herpestes badius*, A. Smith, *Illust. Zool. S. A. Mamm. t. 4, ♀*; Gray, *Cat. Mamm. B. M. 51*; Gerrard, *Cat. Ost. B. M. 74*; Schinz, *Syn. Mamm. i. 373*; Temm. *Esq. Zool. 98?*

*Ichneumon ratlamuchi*, A. Smith, *App. Report, 1836, p. 42.*

*Herpestes cawii*, A. Smith.

*Hab.* South Africa, on plains away from the sea; ? Guinea (called "Koukeboe") (*Temm.*), perhaps a variety or species.

M. Temminck thinks that *Herpestes punctatus* and *Cynictis melanura* are varieties of this species (*Temm. Esq. Zool. 100*).

Skull rather elongate, compressed; brain-case elongate, contracted in front; orbit complete in the adult, incomplete in the young. The false grinders 3—3; the first very small; second compressed, conical; third subcompressed, placed obliquely, with a very minute, scarcely appreciable internal lobe, and no hinder one. Flesh-tooth trigonal, considerably longer than broad; the internal lobe small, on the front edge. The first tubercular grinder transverse, outer edge oblique, inner (narrower) rounded; the second very minute, linear, with two tubercles.

12. CALOGALE VENATICA. B.M.

Dark bay, white-grizzled, the longer hairs white-tipped; tail-end black.

*Herpestes badius*, var., Gray, *P. Z. S. 1849, p. 11*; Peters, *Reise n. Mossamb. Säugeth. 119.*

*Hab.* East Africa.

13. CALOGALE GRACILIS. B.M.

Brown or blackish brown, scarcely grizzled; fur on side of the neck shorter and very minutely grizzled; end of tail blacker.

*Herpestes gracilis*, Rüppell, *Fauna Abyss. t. 8. f. 1, t. 10*; Schinz, *Syn. Mamm. i. 369.*

*Ichneumia gracilis*, I. Geoff. *Mag. Zool. 1839, p. 17*; Gray, *Cat. Mamm. B. M. 53*; Gerrard, *Cat. Ost. B. M. 76.*

*I. nigricaudatus*, I. Geoff. *MS., l. c. 18.*

*Hab.* Abyssinia (*Rüppell*).

M. I. Geoffroy objects to the name, because this species is stouter than the other *Herpestæ*; he does not appear to have seen any specimen. (*Mag. Zool. 1839, p. 18*).

## 14. CALOGALE? THYSANURA.

*Minor, pilis fusco et pallide luteo annulatis; pedibus fuscis; cauda longa, penicillo magno aterrimo terminata.*

Length of head and body 12 inches, of tail 13 inches.

*Herpestes thysanurus*, Wagner, München. gelehrt. Anz. ix. 449; Schreb. Säugeth. Supp. ii. p. 301; Schinz, Syn. Mamm. i. 368.

*Hab.* India: Cashmere.

## 22. GALERELLA.

Body slender. Legs short. Tail elongate, slender, tapering, covered with shortish hairs. Toes 5—4. Claws short, compressed, acute. Skull elongate; brain-case rather ventricose. Face short. Teeth 38; false grinders 3/3, 3/3; flesh-tooth triangular, longer than broad; tubercular grinders 2/1, 2/1, transverse.

## GALERELLA OCHRACEA.

B.M.

Pale brown, minutely punctulated; throat, underside, and inside of the limbs white; tail-end black; front thumb very small, low down.

*Cynictis ochraceus*, Gerrard, Cat. Ost. B. M. 77.

*Herpestes ochraceus*, Gray, P. Z. S. 1848, p. 138, pl. VIII.; Ann. & Mag. N. H. 1849, iv. 376.

*H. mutgigella*, var., Temm. Esq. Zool. 116.

*Hab.* East Africa: Abyssinia (*F. H. Hora*).

M. Temminck regards this as only a seasonal state of *H. mutgigella* (Esq. Zool. 116), not observing that it has no internal toe on the hind feet.

Skull elongate; brain-case rather ventricose; face short, forehead arched; flesh-tooth triangular, much longer than broad, inner tubercle anterior; false grinders  $\frac{3-3}{2-2}$ ; the hinder tubercular very small; orbit incomplete behind; not so contracted in front over the back of the orbit. Like *Calogale badia* in size, but brain-case more ventricose.

## 23. CALICTIS.

The pupil oblong, transverse. Claws rather arched, compressed. Tail thick, conical, tapering. Ears rounded. Skull elongate. Face short. Teeth 40; false grinders  $\frac{3-3}{4-4}$ ; the flesh-tooth triangular, scarcely longer than broad; tubercular grinders  $\frac{2-2}{1-1}$ .

The skull elongate, rather narrow, much contracted in front of the brain-case; orbit rather incomplete; the nose shelving; crown flat. The false grinders 3/3; the first very small; second compressed; third trigonal, with a small internal and a small hinder lobe. The flesh-tooth triangular, scarcely longer than broad in front, the inner lobe on the front edge. Tubercular grinders transverse; the first sub-trigonal, oblique, much broader than long; the second very minute.

The skull 3 inches long, and brain-cavity  $1\frac{1}{2}$  inch broad behind.



## CALICTIS SMITHII.

B.M.

Reddish brown, very closely pale-grizzled, hair with red-brown ends, and subconical white bands; feet and tip of tail black.

*Herpestes smithii*, Gray, Loudon's Mag. N. Hist. 1837, i. 2; Cat. Mamm. B. M. 51; Proc. Zool. Soc. 1851, p. 131, pl. xxxi.; Ann. & Mag. N. H. 1853, xii. 47; Gerrard, Cat. Ost. B. M. 74; Temm. Esq. Zool. 97.

*Hab.* Ceylon (*A. Grace*).

M. Temminck, misled by some dealer, believes that this animal inhabits Cape Coast and Guinea. He complains of the shortness of my diagnosis; but says himself it is well characterized by a shorter but nearly identical one (see Temm. Esq. Zool. 98).

## 24. ARIELA.

*Helogale* (part.), Gray, P. Z. S. 1861, p. 308.

Body elongate. Tail slender, elongated, subcylindrical, thickest at the base. Toes 5—5. Skull elongate. Face short. Teeth 40; false grinders  $\frac{2-2}{3-3}$ ; flesh-tooth trigonal, rather broader than long, inner lobe long, rounded, on front edge; tubercular grinders 2/1, 2/1.

## ARIELA TÆNIONOTA.

B.M. (skull only).

Hair of head, under part of neck, and lower part of the extremities short, elsewhere pretty long; centre of the face, forehead, crown, cheeks, and space between the eyes and ears black, freely pencilled with white. Muzzle, upper and lower lips, and space under lower jaw light chestnut; outer surface of the ears brownish, inner surface dirty reddish white; back and sides of neck, shoulders, anterior part of back and sides, and outer surface of anterior extremities finely pencilled black and white; the rest of back and upper part of sides banded transversely deep black and yellowish white or light yellow-brown; flanks and outer surface of hinder extremities towards the body pencilled dull black and yellowish white; lower part of neck, breast, belly, and lower surface of extremities black; tail slender, thickest towards the root, for about two-thirds of its length pencilled black-brown and pale ferruginous; last third nearly uniform black.

Length of head and body 15 inches, of tail  $7\frac{1}{2}$  inches.

*Helogale tænionota*, Gray, P. Z. S. 1861, p. 308; Gerrard, Cat. Ost. B. M. 76.

*Herpestes tænionotus*, A. Smith, S. African Journ. 52, 1834.

*H. zebra* (partly), Schinz, Syn. Mamm. i. 371.

*Ichneumon tænionotus*, A. Smith, S. Afr. Quart. Journ. 50.

*Hab.* South Africa: Natal (*A. Smith*).

The flesh-tooth broader than long; the inner lobe long, rounded, on the front edge. The first false grinders conical, compressed; the second trigonal, with an internal tubercle. The tubercular grinders transverse; the first large, with a long internal lobe, rather thinner, narrower than the outer edge, and rounded within. Orbit incomplete behind. Skull elongate.

## 25. ICHNEUMIA.

*Ichneumia*, I. Geoff. Compt. Rend. 1837, p. 582; Mag. Zool. 1839, pp. 13 & 31.

*Lasiopus*, I. Geoff. Cour. d'Hist. Nat. des Mamm. 57, 1835.

Body compressed. Legs rather long. Fur grizzled. Tail conical, bushy. Toes 5—5. Claws rather elongate, sharp. The greater part of the soles of the hind feet are covered with hair. Teeth 40; false grinders  $\frac{3-3}{4-4}$ ; flesh-tooth triangular; tubercular grinders  $\frac{2-2}{1-1}$ .

The most Viverrine form of this subtribe.

M. Geoffroy separates this genus on account of its peculiar dentition, which he describes:—false grinders 3/4, true 1/1, tubercular 2/1 (Mag. Zool. 1839, p. 7). M. Geoffroy's figures are lower on their legs and more vermiform than our specimen of *I. albicauda*.

Dr. A. Smith, when first describing this species, observed, "Its teeth exhibit a slight difference in form, and are not so closely set as in the true Ichneumons. This peculiarity, in addition to the state of the soles of the feet, may, when its manners and habits are better known, require it to be separated from the present genus" (South African Quart. Journ. 52, 1834).

"Shorter and more robust, and stands higher on its limbs, than *Herpestes*."—*A. Smith*.

## 1. ICHNEUMIA ALBICAUDA.

B.M.

Tail white, nearly to the base.

*Ichneumia albicauda*, I. Geoff. Mag. Zool. 1839, p. 13, 35, t. 11; Gray, Cat. Mamm. B. M. 53.

*Herpestes albicaudus*, Cuvier, Règ. Anim. ed. 2, 1834.

*H. albicaudatus*, A. Smith, S. Afr. Quart. Journ. 181, 1834; Schinz, Syn. Mamm. i. 369.

*Mangusta albicauda*, De Blainv. Ostéogr. Viverra, t. 12 (teeth).

*Hab.* Africa: Port Natal (*A. Smith*); Senegal (*Heudelot*); Galam (*Delambre*).

## 2. ICHNEUMIA LEUCURA.

*Herpestes leucurus*, Ehrenb. Sym. Phys. Mamm. t. 12, cop. Schreb. Säugeth. t. 116; Rüppell, Abyss. Fauna, i. 27; Peters, Reise n. Mossamb. Säugeth. 119; Schinz, Syn. Mamm. i. 369.

*Hab.* East Africa: Nubia and Dongola (*Ehrenb.*).

This may be the same as the preceding. See observations of M. I. Geoffroy, Mag. Zool. 1839, p. 14, note.

## 3. ICHNEUMIA ALBESCENS.

Pale brown; tip of tail white.

*Ichneumia albescens*, I. Geoff. Mag. Zool. 1839, p. 35, t. 12; Gerrard, Cat. Ost. B. M. 76.

*Hab.* East Africa: Sennaar (*Botta*).

Skull ovate, swollen; the brain-cavity one-half the length; nose shelving; forehead and crown rather convex; orbit incomplete be-

hind. False grinders  $3/3$ ; the third triangular, sides of equal length, with an internal tubercle on the hinder edge. The flesh-tooth triangular, rather longer than wide in front, narrow behind; the internal tubercle anterior, rounded internally. The tubercular grinders large, oblong, trigonal, about half as wide again as long; the hinder rather the smallest (see I. Geoff. Mag. Zool. 1839, t. 13).

In the figure the brain-cavity is half the length of the skull, and the skull is as wide at the widest part of the zygomatic arch as the length of the brain-cavity.

#### 4. ICHNEUMIA NIGRICAUDA.

*Ichneumia nigricauda*, Pucheran, Rev. et Mag. Zool. vii. 39; Arch. für Naturg. 1856, p. 43.

*Hab.* Senegal.

#### 26. BDEOGALE.

*Bdeogale*, W. Peters, Reise n. Mossamb. Mamm. 119 (1850).

Toes 4—4, short. Heel hairy to the soles. Claws compressed. Tail bushy. Skull, orbits incomplete behind (t. 27 & 28). False grinders 3—3; hinder broad, triangular. Flesh-tooth triangular, broad; sides nearly equal; angles rounded (t. 27. f. 4).

*Hab.* Africa.

The teeth are like those of *Rhinogale*, and the nose is rather produced and rounded below in the figure; so that perhaps this genus ought to be arranged near to it; but it differs from it in having four toes on each foot.

#### 1. BDEOGALE CRASSICAUDA.

Blackish-ashy hair, black-and-white ringed; limbs and tail black.

*Bdeogale crassicauda*, W. Peters, Monatsb. K. Akad. Berl. 1852, p. 81; Reise n. Mossamb. Mamm. 120, t. 27; Temm. Esq. Zool. 115; Gerrard, Cat. Ost. B. M. 72.

*Hab.* East Africa: Tete, Boror (*Peters, Mus. Berlin*).

#### 2. BDEOGALE PUISA.

Brown hairs, black-and-yellow ringed; limbs and tail blackish brown.

*Bdeogale puisa*, W. Peters, Monatsb. K. Akad. Berl. 1852, p. 82; Reise n. Mossamb. Mamm. 124, t. 28; Temm. Esq. Zool. 115; Gerrard, Cat. Ost. B. M. 72.

*Hab.* East Africa: Mossimboa (*Peters, Mus. Berlin*).

#### 3. BDEOGALE NIGRIPES.

“Body whitish; tail snow-white; feet black.”

*Bdeogale nigripes*, Pucheran, Rev. et Mag. Zool. vii. 111; Arch. für Naturg. 1856, p. 44.

*Hab.* Gaboon (*Aubry Lecomte, Mus. Paris*).

“Larger than the other species.”

## 27. URVA.

*Urva*, Hodgson; Gray, Cat. Mam. B. M. 50.

*Mesobema*, Hodgson.

Head broad. Ears rounded. Nose rather produced, with a longitudinal groove beneath. Body elongate. Legs short. Tail conical, attenuated, covered with long hairs. Toes 5—5; claws compressed, rather short, curved; inner toes of fore and hind feet very short, with short claws rather high up the foot. Claws brown. Hind part of the soles of hind feet covered with hair, that is bent towards the centre on each side. The front part bald, oblong, narrow behind, occupying less than two-thirds of the foot, with three subequal pads in front and two elongated pads on each side of the hinder edge (Hodgson, J. A. S. B. t. 31. f. 5). Front upper false grinders 2, compressed; the third subtriangular, with a very small subposterior internal tubercle, and a small posterior marginal one; flesh-tooth large, elongate, triangular, nearly twice as long as the front margin, with a large internal lobe on the front edge; tubercular grinders transverse, twice as broad as long on the outer edge; hinder tubercular very small, oblong, transverse.

URVA CANCRIVORA. The *Urva*.

B.M.

Black-grizzled, hairs with a very broad white subterminal ring; a white streak on the side of the neck; legs and feet black; tail ashy red at the end.

*Urva cancrivora*, Hodgson, Journ. Asiat. Soc. Beng. vi. 560; Gray, Cat. Mamm. B. M. 50; Gerrard, Cat. Ost. B. M. 73; Schinz, Syn. Mamm. i. 358; Horsfield, Cat. India House Mus. 93.

*Mesobema cancrivorus*, Hodgson, Journ. Asiat. Soc. Bengal, x. 910; Calcutta Journ. N. H. ii. 214, iv. 287.

*Gulo urva*, Hodgson, Journ. Asiat. Soc. Beng. v. 238; Calcutta Journ. N. H. ii. 45, t. 13½. f. 2.

*Hab.* India—Nepal, in caverns, Central Northern region (*Hodgson*); Afghanistan (*Griffith*); Arakan (*Blyth*).

Fur lax, elongate, ringed, blackish ashy, more or less grizzled by the white tips to the hairs; lips and cheeks whitish; a long streak on the side of neck white; legs and feet black; tail bushy, appearing more or less irregularly banded from the dark band on the hairs.

The not quite adult skull of *Urva cancrivora* is very like that of *Teniogale vitticollis*, but considerably smaller. The orbit is incomplete. The zygomatic arches not so bowed out, with most convex part nearer the hinder end. The nose is rather thick. The contraction of the brain-case is just over the hinder part of the orbit; the brain-case is rather longer (perhaps  $\frac{1}{10}$ th) than the face. The teeth are normal, and very like in form and proportion to those of *T. vitticollis*; but they are rather narrower, and the first tubercular molar is shorter and broader, more oblong, and the hinder tubercular molar smaller. Length of the skull  $3\frac{1}{2}$  inches; width of the brain-case  $1\frac{4}{6}$  inch, of the zygomatic arch 2 inches.

Lower jaw slender; chin gradually shelving; the lower edge

curved, arched up behind, to near the condyle behind. The false grinders 4—4; the front small, concave. Tubercular grinders moderate, oblong, elongate, with two small anterior and two large high posterior prominences.

In the 'Illustrations of Indian Zoology' I figured an animal under the name of *Viverra ? fusca*, from one of General Hardwick's drawings. In the 'Ann. & Mag. Nat. Hist.,' 1842, p. 260, I proposed for it a genus named *Osmetectis*. As yet I have never seen or heard of an animal from India that agrees with the figure. It has been supposed that it may be *Urva cancrivora* of Hodgson; but it does not well represent that species.

## 28. TÆNIOGALE.

*Mungos*, sp. ?, Ogilby, P. Z. S. 1835, p. 103.

Whiskers weak, slender. Nose grooved beneath. Toes 5—5. Claws compressed, rather elongate, very acute. Thumb short; claw distinct, rather elevated. Great toes very short, indistinct, with a small claw; hinder claws broader. Soles of the hind feet quite bald to the heel. Ears rounded. Skull oval. Teeth 42; false grinders 3/4, 3/4, first conical, second and third with three unequal tubercles; tubercular grinders  $\frac{2-2}{1-1}$ , first upper triangular, large, second short, twice as broad as long (Ogilby, *l. c.*).

Mr. Ogilby described this animal as having 42 teeth, 3 false grinders in the upper, and 4 in the lower jaw. Perhaps one tooth in the lower jaw was in exchange.

### TÆNIOGALE VITTICOLLIS.

B.M.

Black, red-washed; hair very long, soft, black, with long red tips; head black, minutely punctulated; legs and feet black; tail black; streak on side of throat black; the front claw elongate, compressed, arched.

*Mungos vitticollis*, Gray, Cat. Mam. B. M. 50 (not Ogilby); Gerrard, Cat. Ost. B. M. 72.

*Herpestes vitticollis*, Bennett, P. Z. S. 1835, p. 67; Madras Journ. 1839, p. 103, t. 2; Schinz, Syn. Mamm. 374; Temm. Esq. Zool. 111.

*Mangusta vitticollis*, Elliot, Madras Journ. of Lit. & Sci. 1840, p. 12, t. 1; De Blainv. Ostéogr. 48, t. 96.

*Mungos ? vitticollis*, Ogilby, P. Z. S. 1835, p. 103.

*Hab.* India: Madras, in thick forests (*W. Elliot*); Travancore (*P. Poole*).

Varies in the greyness of the fur and the extent and darkness of the red bay on the sides of the neck and body, there being least on the specimens that have the most grey and distinctly white rigid hairs. In some specimens (perhaps in some seasons) the whole animal has a bright bay tint from the tips of the longest hairs.

The skull is elongate, like that of *Athylax paludosus*; but the brain-case is more ventricose and higher, and the orbit smaller and

complete behind. The zygomatic arch is rather short and very much bowed out, the most convex part of the arch being rather behind the middle of its length. The contraction of the brain-case is rather behind the back of the orbit. The teeth are normal, nearly as massive as, and agreeing very generally in proportion of parts and position or form of the internal lobes with those of *A. paludosus*; but they are rather slender and longer comparatively in all their parts. The palate also is much narrower and longer. The third upper false molar has a small central internal lobe. The front edge of the flesh-tooth is fully two-thirds the length of the outer edge; the hinder lobe of it is narrow, and angular behind. The front tubercular molar has a very oblique outer edge. The brain-case is rather more than half the entire length.

The length of the skull  $3\frac{3}{4}$  inches; the width of the brain-case  $1\frac{5}{8}$  inch, of the zygomatic arch  $2\frac{1}{4}$  inches.

The lower jaw broad in front, narrow behind, without any tubercles on the lower edge under the end of the tooth-line. False grinders 4—4; the front very small, curved, close at the front of the second. The tubercular grinder very large, oblong, subcircular, with two large unequal tubercles on the front and a very large one on the hinder part of the crown.

The lower jaw of *Urva* is distinguished from that of the genus *Herpestes* by having no prominence or tubercle on the lower edge under the hinder end of the tooth-line.

### 29. ONYCHOGALE.

Body slender. Tail conical, hairy, about as long as the body. Toes 5—5; inner toes small; front claws very long, compressed, curved. Teeth 40; false grinders  $3/4$ ,  $3/4$ .

The hinder end of the skull deeply and sharply notched, instead of being transversely truncated as in the small *Herpestes*. The notch in the living animal is filled up with a cartilaginous septum.

#### ONYCHOGALE MACCARTHIE.

B.M.

Red brown; hair elongate, flaccid, pale brown, with a broad, thick, subterminal band and a long whitish-brown tip; fur of hands and face shorter. Feet blackish brown; hair white-tipped. Tail redder; hair elongate, red, one-coloured. Ears rounded, hairy.

*Herpestes maccarthiæ*, Gray, B. M.; Gerrard, Cat. Osteol. B. M. 75.

*Cynictis maccarthiæ*, Gray, P. Z. S. 1851, p. 131, Mamm. pl. xxxi.; Ann. & Mag. N. H. 1853, xii. 47.

*Herpestes fulvescens*, Kelaart, Ceylon.

Hab. Ceylon (*Lady MacCarthy*).

### 30. HELOGALE.

*Helogale*, Gray, P. Z. S. 1861, p. 308; Arch. für Naturg. xxviii. (1862) p. 128.

Body slender. Head oval. Ears distant. Toes 5—5; the inner

toe small; front claws rather elongate, compressed, acute. Soles of the hind feet partly bald. Tail conical, covered with elongate hairs. Skull short, broad. Face short. Teeth 36 (see P. Z. S. 1861, p. 308, fig.); false grinders  $\frac{2-2}{3-3}$ ; the flesh-tooth triangular; tubercular grinders  $\frac{2-2}{1-1}$ .

*Herpestes tænio-notus*, A. Smith, which I referred to this genus, is distinct.

### 1. HELOGALE PARVULA.

B.M.

Fur uniform blackish brown, very minutely pale-punctulated. Length of body and head 7 inches, of tail 7 inches.

*Helogale parvulus*, Gray, P. Z. S. 1861, p. 308 (fig. skull); Gerrard, Cat. Ost. B. M. 76; Hensel, Arch. für Naturg. xxviii. 128.

*Herpestes parvulus*, Sundeval; Temm. Esq. Zool. 110.

*Hab.* South Africa: Port Natal (*Sundeval*).

The skull moderate, swollen; brain-cavity ovate, contracted over the back of the orbit; nose arched; orbit incomplete behind; false grinders 2/2, front compressed, moderate, second trigonal; flesh-tooth small, broader than long, with the inner tubercle on the front edge; tubercular grinders transverse, much broader than long, the hinder about half the size of the other.

### 2. HELOGALE UNDULATA.

*H. nigro et rufo-flavido undulatus, subtus unâque rufus; cauda corpore brevior, sine penicillo.*

*Herpestes undulatus*, Peters, Reise nach Mossamb. Säugeth. 114, t. 25, 1852; Gerrard, Cat. Osteol. B. M. 76; Temm. Esq. Zool. 115.

*Hab.* Eastern Africa: Mossambique; Quitangonka; from lat. 10° to 15° S.

Allied to *Herpestes microcephalus*, according to Temm. Esq. Zool. 118.

The grinders 5/5; the front claw much longer than the hinder; the skull ventricose, with a short nose.

## Tribe 11. CYNICTIDINA.

*Head short, ventricose; tail bushy, expanded laterally; claws elongate; orbit of the skull complete behind.*

### 31. CYNICTIS.

*Cynictis*, Ogilby, P. Z. S. 1833, p. 48.

Body slender. Ears short, rounded. Nose truncate, with a distinct central longitudinal groove. Tail with long hairs, flattened horizontally. Legs short. Toes 5—4; front claws elongate, compressed, arched. Soles of feet partly covered with hair. Skull short and broad, ventricose. Face moderate; forehead swollen. Teeth 38; false grinders 3/3, 3/3; flesh-tooth triangular, sides subequal; tubercular grinders 2/1, 2/1.

“M. I. Geoffroy observed that the skull described by Mr. Ogilby,

on which he founded his genus, had lost the front upper false grinder.”  
—*Mag. Zool.* 1843, p. 7, note.

*C. melanura*, Martin, is a *Herpestes*. The type specimen which he described, now in the British Museum, has a small but distinct internal hind toe.

### 1. CYNICTIS PENICILLATA.

B.M.

The under fur short, soft, and black.

*Mangusta penicillata*, Cuvier, Règ. Anim. (ed. 2); De Blainv. Ostéogr. Viverra, t. 12 (teeth).

*Ichneumia albescens*, I. Geoff. *Mag. Zool.* 1839, t. 12 (not descrip.).

*Mangusta levaillantii*, A. Smith, *Zool. Journ.*

*Cynictis typicus*, A. Smith, *South Afr. Quart. Journ.* i. 53.

*C. steedmanii*, Ogilby, *P. Z. S.* 1833, p. 49; *Trans. Zool. Soc.* 1835, i. 34, t. 3 (a skull); Schinz, *Syn. Mamm.* i. 377.

*C. levaillantii*, Gray, *Cat. Mamm. B. M.* 53; Gerrard, *Cat. Ost. B. M.* 77.

*Meeskal*, Barrow, *Trav.*; Swains. *Lard. Ency.* 159. f. 71.

*Mangusta (Cynictes) penicillata*, De Blainv. *Ost.* t. 5.

Var. redder. *Ichneumia ruber*, Geoff.

*Herpestes ruber*, Licht. *Mus. Berlin.*

*Hab.* South Africa (*Steedman*).

The skull short and curved; the forehead convex; brain-cavity rather swollen; upper false grinders 3/3, the first very small, the third trigonal; the flesh-tooth rather longer than broad; the tubercular grinders transverse, very short and broad, the last small.

Skull broad, the width about two-thirds the entire length; the brain-case half the entire length; orbit complete behind; forehead convex, especially between and in front of the eyes. The two front upper false grinders compressed; the third subtrigonal, with a small central internal lobe; the flesh-tooth longer than broad on the front margin; the false grinder transverse, short, and very broad, subtrigonal, widest on the outer edge, the hinder much smaller.

The skull of a younger animal very similar, but larger, and the forehead not so convex and swollen before and between the eyes.

*Ichneumon rubra* (Geoff. *l. c.* 139), “Very splendid ferruginous red, especially the head,” is said to be *Cynictis steedmanii*, Licht.

### 2. CYNICTIS OGILBII.

B.M.

Yellow, black-and-white pencilled; beneath whitish; chin, throat, and tip of tail white; ears reddish brown.

*Cynictis ogilbii*, A. Smith, *S. Afr. Quart. Journ.* i. 53; *Illust. Z. S. Africa, Mamm.* t. 16, ♂; Schinz, *Syn. Mamm.* i. 375.

*Hab.* South Africa: barren plains, north part of Graaff Reynet district and Bushman Flat (passes a great part of its time underground) (*A. Smith*).

Skull very like that of *C. levaillantii* (803 c); but the forehead not so convex, and the skull, though longer, is rather narrower at the zygomatic arch; the brain-cavity of the two of the same width; in the most swollen part more like 803 a. The flesh-tooth is similar to that of *C. levaillantii*.



## 3. CYNICTIS? FIMBRIATA.

Fur very pale, whitish; hairs white at the base, silky, with black and white bands and a white tip; below dirty white. The black and white rings on the silky hair of the tail are broader; the lateral hairs and the tuft at the tip are tipped by an isabella band. The feet pale brown, dotted with white.

Length of body and head 11 inches, tail inches.

*Herpestes fimbriatus*, Temm. Esq. Zool. 112.

*Hab.* India (? Temm., *Mus. Leyden*).

The account of the tail would lead one to believe that this is a *Cynictis*: but the under fur of that animal, even in the very young state, is black.

## 4. CYNICTIS LEPTURA.

B.M.

Pale foxy brown, brown-pencilled; lips, chin, and tip of the tail white; tail fulvous, grizzled, with chestnut-brown hair, with a broad central chestnut-brown ring; under side yellowish white.

*Cynictis lepturus*, A. Smith, *Illust. Zool. S. African Mamm.* t. 17; Schinz, *Syn. Mamm.* i. 376.

*C. levaillantii*, var., Gerrard, *Cat. Ost. B. M.* 77.

*Hab.* South Africa, in barren places.

The skull of *Cynictis leptura* (803 e, A. Smith) is very like that of *C. penicillata* (803 c); the forehead is convex before and between the eyes, and the teeth are very similar; but the flesh-tooth is much shorter compared with the width of the front margin, more equally triangular, as the front lobe on the inner edge is longer compared with the rest of the tooth; the hinder tubercular is rather wider and more like the front one.

*B. Nose produced; under side convex, covered with short adpressed hairs, without any bald central longitudinal groove. The fur grizzled. Tail not rigid. Soles bald and slightly covered with hair. Rhinogaleacea.*

Daubenton, in the description of the Suricate (*Hist. Nat.* xiii. 75), observes, "Les narines ressemblent à celles du chien; mais le nez n'avait pas, comme celui du chien, un sillon qui s'étendit depuis l'entre-deux des narines jusqu'à la lèvre; cet espace était convexe." The character here described does not seem to have been remarked, since, indeed, I only accidentally discovered that Daubenton had observed it, long after I had seen its importance as a characteristic in a group of Viverridæ. The same character is found in the Mangouste figured by M. Daubenton (t. 19); but he does not notice it in his short description of a living female of that animal.

## Tribe 12. RHINO GALINA.

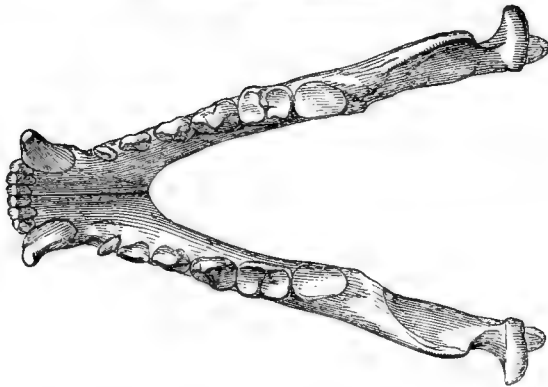
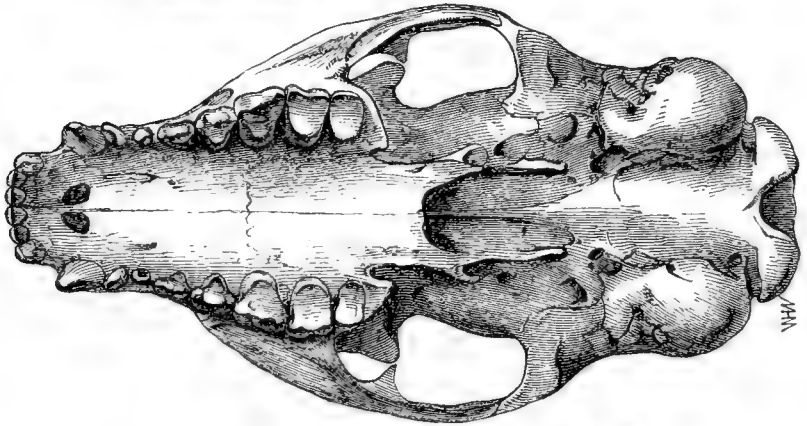
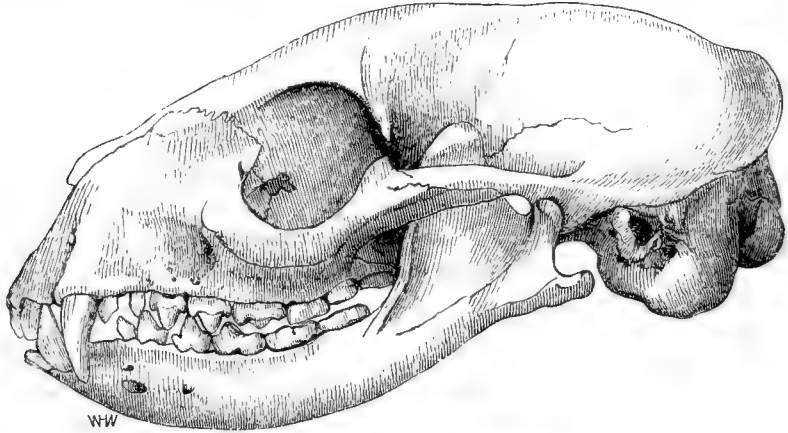
*Nose short; teeth 40; tubercular grinders 2/2.*

## 32. RHINO GALE.

Head ovate. Nose shortly produced, convex beneath. Body elongate. Toes 5—5. Claws short, compressed, acute. Tail conical,

covered with elongated hair. Skull elongate, ventricose. The orbit incomplete on the hinder edge. Teeth 40. False grinders  $3/4$ ,  $3/4$ . Flesh-tooth triangular, broad, angle rounded; inner tubercle broad, near the middle, and occupying the greater part of the inner side. Tubercular grinders  $2/1$ ,  $2/1$ ; upper broad, transverse, rounded on the side, only half as long as wide.

This genus, in the prolongation of the nose, has some affinity to *Crossarchus* and *Ryzæna*, but the elongation is much less developed.



Skull of *Rhinogale melleri*.

## RHINOGALE MELLERI.

B.M.

Grey-brown, very minutely and closely white-speckled; the middle of the hinder part of the back with an obscure, broad, darker longitudinal streak; tail (all but the base) black; nose and feet rather brown; under fur brown.

*Hab.* East Africa (*Dr. Meller*).

The skull is narrow, more especially the hinder portion. The face is short and rather narrow. The forehead and crown of the head form a gradually arched line from the end of the nose to the occiput. The cavities for the temporal muscles are moderate; they meet on the crown, just over the hinder edge of the zygomatic arch, leaving a large lozenge-shaped convex forehead between the orbits. The orbits are rather small; the hinder edge incomplete. The hinder part of the palate between the temporal muscles moderately broad and short, the hinder opening being in a line with the middle of the temporal fossæ. The grinders are short, broad, and solid; the carnassier being triangular, the sides very nearly equal, the inner side being broad and rounded and placed nearly in the middle of the inner side. The tubercular grinders are oblong, transverse, with the inner side rounded and nearly as broad as the outer one; they are much worn, showing that the animal was fully adult.

## 33. MUNGOS.

*Mungos* (partly), Ogilby, MS. (see Proc. Zool. Soc. iii. 103, 1835).

Head elongate. Nose slightly produced; underside convex, with close-pressed hairs, without any central groove. Body slender. Fur rather harsh. Tail subcylindrical, covered with harsh hairs. Toes 5—5; front inner toe strong, hinder smaller. Claws strong, acute; front rather elongate, compressed, arched. Teeth 40; false grinders  $\frac{3}{4}$ ,  $\frac{3}{4}$ ; flesh-tooth triangular, as broad as long; tubercular grinders  $\frac{2-2}{1-1}$ , upper transverse.

Ogilby separated the genus, because in the two African species he examined there were only  $\frac{2}{4}$  false molars.

M. Temminck, with his usual want of attention to organic peculiarities, unites these animals and *Herpestes vitticollis* as a single species (see Esq. Zool. 111).

\* *Back and tail grizzled.*

## 1. MUNGOS GAMBIANUS.

B.M.

Grey, grizzled with black and grey, hair rigid, with a broad pale ring and large black tip; streak on side of neck, feet, and end of the tail black; lips, chin, and throat white; belly reddish; hair of hind limbs elongate, reddish.

Young greyer; the black tips of the hairs shorter.

*Herpestes (Mungos) gambianus*, Ogilby, P. Z. S. 1835, p. 102; Schinz, Syn. Mamm. i. 374; Temm. Esq. Zool. 111.

*Mungos gambianus*, Gray, Cat. Mamm. B. M. 50.

*Hab.* W. Africa; Gambia (*Rendall*).

\*\* *Back cross-banded; tail obscurely ringed.*

2. MUNGOS FASCIATUS.

B.M.

Blackish, minutely grizzled with ashy; back and rump washed with reddish, with many blackish and white cross bands; nose, feet, and ends of tail blackish.

Young paler, obscurely cross-banded.

*Mungos fasciatus*, Gray, Cat. Mamm. B. M.; Gerrard, Cat. Ost. B. M. 72.

*Viverra ichneumon*, Schreb. Säugeth. t. 116 (from Buff.).

*Herpestes fasciatus*, Desm. Dict. S. N. xxix. 58.

*H. mungo*, Desm. Mamm. 211.

*H. zebra*, Rüppell, Fauna Abyss. t. 9. f. 2; Schinz, Syn. Mamm. i. 371.

*Ryzena suricata*, Children, Clapperton's Trav. Append.

*Herpestes (Mungos) fasciatus*, Ogilby, P. Z. S. 1835, p. 102.

*Mangusta mungo*, Fisch. Syn. Mamm. 163.

*Hab.* Africa: Cape of Good Hope (*A. Smith*); Lake Tschad (*Clapperton*); Gambia (*Rendall*); Abyssinia (called "Gottoni") (*Rüppell*).

The not quite adult skull is rather elongate, ventricose behind, the contraction of the brain-case being in a line with the hinder part of the orbit. The orbit imperfect behind. The zygomatic arch moderately bowed out, the more convex part being nearer the hinder end. The nose tapering on the side and above, making a shelving forehead and a slightly arched crown-line. The false molars are only two on each side, there being a short space between them and the base of the canine; the second false grinder triangular, with a good-sized lobe on the inner part of the hinder edge, and with only a very rudimentary point on the hinder outer margin. The flesh-tooth triangular, the front edge being as broad as the outer one, with a large, thick, rounded inner lobe. The first tubercular grinder transverse, short, narrowed on the inner edge; the second similar, but smaller.

Length of the skull  $2\frac{7}{12}$  inches; width of the brain-case 1 inch, of the zygomatic arch  $1\frac{1}{2}$  inch.

Lower jaw rather slender, with a rounded angle under the condyle. The false grinders  $\frac{3}{3}$ ; the first compressed, sharp-edged. Tubercular grinders rather large, with two high lateral anterior and one large posterior rather high prominence.

3. MUNGOS ADAILENSIS.

*Cinereo-flavicans, pilis nigro-fusco annulatis, vertice cerviceque nigro-schistaceis, dorso fasciis transversis obsolete nigricantibus; abdomine dilutiore, in flavidum vergente; antepedibus obscurioribus; cauda corpore parum longiore, apice attenuata haud penicillata, dorso concolore, in ultimo triente nigra, plantis denudatis; oculis pupilla, vertico-elliptica, iride fusca.*

Long. tota  $22\frac{1}{2}$ , caudæ 15 poll.

*Herpestes adailensis*, Heuglin, Peterm. Mittheil. 1861, p. 17; Nova Act. Acad. Leop. xxviii. p. 5, t. 2. f. 4 (skull).

*Hab.* Adail coast (*Heuglin*).

I do not see how this differs from *H. fasciatus*; but Herr Heuglin has them both in his list.

### Tribe 13. CROSSARCHINA.

*Nose elongate; teeth 36; tubercular grinders 2/1.*

#### 34. CROSSARCHUS.

*Crossarchus*, F. Cuv. Mamm. Lithog. iii. 47, 1825.

Head roundish. Nose elongate, much produced; the underside convex, hairy, without any central longitudinal groove; hair rigid, short, shorter on the head and throat; muffle large, callous. Pupil round. Ears rounded. Body slender. Fur harsh, with longer and more rigid hairs. Tail slightly compressed, tapering, covered with shorter hair. Toes 5—5, free; two middle toes longest; front inner toe large, hinder smaller. Soles naked. Claws rather elongated, compressed, hooked, acute, sometimes very much so. Teeth 36; false grinders 2/3, 2/3; flesh-teeth 1/1, 1/1; tubercular grinders 2/1, 2/1.

#### CROSSARCHUS OBSCURUS.

B.M.

Uniform deep brown; head rather paler; hairs brown, with yellow tips.

Length of body and head 12 inches, of tail 7 inches.

*Crossarchus obscurus*, Cuv. R. A. i. 158; Martin, P. Z. S. 1834, p. 114 (anat.); Fischer, Syn. Mamm. 166; Schinz, Syn. Mamm. i. 379; Gerrard, Cat. Ost. B. M. 77; Temm. Esq. Zool. 117; De Blainv. Ostéogr. 49, 99, t. 12.

*C. typicus*, A. Smith, S. African Quart. Journ. ii. 135.

"*C. dubius*, F. Cuv.," A. Smith.

*La Mangue*, F. Cuvier, Mamm. Lithogr. ii. pl. 199.

*Hab.* Western Africa—Guinea (called "Aevisa"), living in deep holes with many openings (*Temm.*). Eastern Africa?

*Crossarchus rubiginosus*, Wagner, Suppl. Schreb. ii. 329. Bay brown; feet and tip of the tail black. Length 16½ inches, of tail 12 inches.

*Hab.* East Indies (*Wagner*).

#### 35. EUPLERES.

*Eupleres*, Doyère, Ann. Sci. Nat. 1835, iv. 281; De Blainv. Ostéogr. Viverra, t. 8.

Skull ventricose, very much produced, slender, compressed; lower jaw compressed and produced in front. Nose elongate, slender, acute, proboscidiform; underside — ?, with a small muffle. Eyes large. Ears large and triangular. Body vermiform. Legs moderate. Tarsi elongate, hairy beneath; a very slender bald streak to the heel, like *Genetta*, but not so distinct. Toes 5—5, apparently

united, with scattered hairs above; thumb very short; great toe short and high up. Claws acute, semiretractile. Fur thick, formed of silky hairs, with a short close under fur. Tail elongate, cylindrical, rather tapering, covered with hair. Cutting teeth 6/6; canines small, compressed; false grinders 3, very small, compressed, far apart, the hinder with a small central internal lobe; the flesh-tooth triangular, about as long as wide, the inner lobe central; tubercular grinder trigonal, somewhat like the flesh-tooth (see De Blainv. Ostéogr. Viverra, t. 8. f. 1-4, from a young animal).

According to M. de Blainville's figure of the skull, this genus (which I have never been able to examine) is properly referred to the Viverridæ.

M. Doyère referred it to the Insectivora (see Ann. Sci. Nat. iv. 278); but, to make this alliance, he considers the front double-rooted tooth in the lower jaw a canine.

M. de Blainville, in his essay on "Mamm. Insectivores," in 'Annales Fr. et Etrang. d'Anat. et de Physiol.' ii. p. 1, justly observes, "the *Eupleres*, which has been referred to the Insectivora, on examination has proved to be allied to *Mangusta*, or to the section *Genetta* of the *Viverridæ*" (l. c. 37).

#### EUPLERES GOUDOTII.

Fur very dark brown; under fur fulvous, with black transverse streaks over the shoulder; throat and beneath whitish.

*Eupleres goudotii*, Doyère, Ann. Sci. Nat. 1835, iv. 281, t. 18 (animal and skull); De Blainv. Ostéogr. Viverra, t. 8 (skull); Gerrard, Cat. Ost. B. M. 71; Schinz, Syn. Mamm. i. 259.

*Falanoue*, Harcourt, Madagascar.

Length 12 inches, of tail 5 inches.

*Hab.* Madagascar, at Tamatave, in burrows (called "Falanove") (*Goudot*) (*Mus. Paris*).

#### 36. SURICATA.

*Suricata*, Desm. N. Dict. H. N. xxiv. 16, 1804.

*Ryzæna*, Illiger, Prodr. Mamm. 1812.

Head spherical. Nose elongate, produced; underside hairy, convex, without any central groove; muffle callous; nostril long, opening on the sides. Ears rounded, nakedish internally. Body elongate; hair soft, annulated. Legs moderate. Toes 4-4; hind soles hairy. Claws long; front very long, slender, compressed, arched; anal glands two. Tail tapering, slender, covered with short hair, and rather pencilled at the tip. Teeth 36; false grinders 2/3, 2/3; flesh-teeth 1/1, 1/1; tubercular grinders 2/1, 2/1.

#### SURICATA ZENICK.

B.M.

Grey; orbit and tip of the tail black; hinder part of the back with dark cross bands; chin, throat, and vent whitish; tail rather redder, underside lighter, under fur reddish.





$\frac{1}{2}$

J. Wolfner sculp.

M. & N. Hanhart imp.

CARPODECTES NITIDUS.







*Suricata zenick*, Gray, Cat. Mamm. B. M. 53.

*Viverra suricata*, Erxl. Syst. 488.

*V. tetradactyla*, Pallas; Schreb. Säugeth. t. 117 (from Buffon).

*Suricata viverrina*, Desm. N. Dict. H. N. xxxii. 297.

*S. capensis*, Desm. Mamm. 214.

*Viverra zenick*, Gmel. S. N. i. 92 (from Sonn.).

*Mangusta (Suricata) tetradactyla*, De Blainv. Ostéogr. 28, t. 5. f. 12.

*Ryzæna typicus*, A. Smith, S. A. Q. Journ. i. 53.

*R. capensis*, Lesson, Mamm. 178.

*R. tetradactyla*, Schinz, Syn. Mamm. i. 380.

*R. suricata*, Fischer, Syn. Mamm. 167.

*Surikate*, Buffon, H. N. xiii. t. 8.

*Zenic*, Sonnerat, Voy. t. 92; Miller, Cim. Phys. t. 2.

*Hab.* South Africa (called "Meer Kat" at the Cape).

Skull short and broad, the width three-fourths the length; the brain-case broad, half the length of the skull; orbit complete behind; forehead shelving, arched; crown convex. The first upper false grinder compressed; the second subtrigonal, with a lobe on the middle of the inner side. The flesh-tooth subtrigonal, broader than long in front. The tubercular grinders transverse; the front with the inner nearly twice as broad as the outer edge; the hinder similar, but much smaller. Hinder palate-opening contracted.

#### 14. DESCRIPTIONS OF SEVENTEEN NEW SPECIES OF BIRDS FROM COSTA RICA. BY OSBERT SALVIN, M.A.

(Plates XXXV., XXXVI.)

The following seventeen birds I have selected, as apparently undescribed, from a collection lately sent to Mr. Godman and myself from Costa Rica, where it was made by a former collector of ours in Guatemala, Enrique Arcé, a native of the latter country. Early in the present year, with the kind assistance of Capt. J. M. Dow, Arcé left Guatemala, and, after forwarding a small collection from the Pacific slope, crossed over to the valleys of the eastern coast; and it is from this latter district that the following birds have been principally selected. The remainder of the collection comprises many of the rare types described a few years back by Cabanis, and also several Humming-birds, M. Warszewicz's discoveries in Veragua. I am now acquainted with about 304 species (mostly *Passeres*) from this country, no less than about 65 of which have been described by various authors as new, and which have not as yet been found beyond the limits of Costa Rica or the immediately adjoining province of Veragua. Arcé is continuing his labours; and I hope ere long that through him and Dr. von Franzius, from whom Prof. Baird of Washington is receiving collections, that this most interesting country will be thoroughly explored. In determining these species, I acknowledge the kind aid of Mr. Sclater and Mr. Gould, and the advantage of free access to their collections.

1. *CATHARUS GRACILIROSTRIS*, sp. n.

*C. supra dorso, uropygio, alis et cauda extus cinnamomeo-brunneis concoloribus; pectore etiam concolore, sed pallidiore: capite toto cum gula cinereis, pileo obscuriore: ventre et corporis lateribus cinereis, illo medialiter albidiore, crisso brunnescentiore: alis intus et rectricibus fuscis: rostro nigerrimo, pedibus pallide fuscis.*

Long. tota 5·6 poll., alæ 3·1, caudæ 2·7, tarsi 1·2, rostri a rictu ·75.

*Hab.* Costa Rica (Volcan de Cartago).

Affinis *C. frantzii*, Cab., eadem ex patria, sed gula et pileo cinereis facile dignoscendus.

A well-marked species, making the sixth inhabiting Central America.

2. *THRYOTHORUS ATROGULARIS*, sp. n.

*T. castaneus: pectore, gula et capitis lateribus nigris, his cum superciliis obscure albo maculatis: alis et cauda fuscis, illis extus castaneis, hac aliquando septem fasciis pallidis cancellata; tectricibus subcaudalibus et campterio nigris, albido transfasciatis: rostro et pedibus nigris.*

Long. tota 5·3, alæ 2·9, caudæ 2·4, tarsi 1; rostri a rictu ·85.

*Hab.* Costa Rica (Tucurrique).

In having the Wren-like markings of the ear-coverts and bands of the tail almost (in some specimens entirely), and the cross markings of the wings quite obsolete, this species resembles *T. coraya* (Buff. Pl. Enl. 701. f. 1); but there the likeness ends, the long strong bill of the present bird and its black throat rendering it easily distinguishable. Its place appears to be with *T. coraya* in the group *Pheugopedius*, Sclater.

3. *THRYOTHORUS THORACICUS*, sp. n.

*T. supra cinnamomeo-brunneus, pileo cinerascentiore, uropygio rufescentiore: capitis collique lateribus cum gula et pectore albis, plumis undique nigro marginatis: alis extus, cauda et crisso brunneis, nigro transfasciatis: ventre brunneo, lateribus rufescentioribus: rostro plumbeo, mandibulæ inferioris basi albida.*

Long. tota 4·6, alæ 2·4, caudæ 1·7, tarsi ·8; rostri a rictu ·85.

*Hab.* Costa Rica (Tucurrique).

This Wren is unlike any member of the genus with which I am acquainted. At first sight it appears to resemble *T. maculipectus*, Lafr. (Rev. Zool. 1845, p. 338), but differs most essentially from that species, not only in having barred wings, but in the distinct character of the chest- and throat-markings; the bill too is much stronger. Its place, however, seems to be in the neighbourhood of that species, and near *T. pleurostictus*, Sclater (Ibis, ii. p. 30), in the group *Pheugopedius*, Scl. (vide Baird's Review of American Birds, p. 121).

4. *MYIADESTES MELANOPS*, sp. n. (Pl. XXXV.)

*M. schistaceus unicolor, subtus dilutior: fronte, loris, ciliis et mento*

*nigris* : *alis nigris, harum autem (nisi quinque extimarum) basibus extus, partim tectricibus celatis, cum marginibus ipsarum et secundariorum apicem versus schistaceis, in pogonio interno omnium parte basali alba, sicut in M. unicolore; tectricibus minoribus et majoribus schistaceo marginatis: cauda nigra, remigum duorum externorum parte apicali cinerea gradata, apicibus ipsis albis: rostro aurantiaco, pedibus flavis.*

Long. tota 6·3, alæ 3·4, caudæ 3, tarsi ·75, rostri a rictu ·65.

*Hab.* Costa Rica (Tucurrique).

Affinis *M. unicolori*, sed fronte et mento nigris, rostro aurantiaco, etc., primo visu distinguendus.

This is a very marked and typical species of this interesting genus, the range of which is confined to the approximate parts of the two continents, the long isthmus connecting them, and some of the Antilles. It has no very near affines, being quite distinct from *M. unicolor*, Scl. (P. Z. S. 1856, p. 299), its closest ally.

##### 5. LANIO LEUCOTHORAX, sp. n.

*L. flavissimus, capite toto cum mento et alis caudaque nigris: gula tota albida vix ochraceo tincta: tectricibus subalaribus et alarum minoribus albis: rostro nigro, pedibus nigris.*

♀ *supra ochracescenti-brunnea, uropygio paulo dilutiore: capite toto cum gula brunnescentioribus: abdomine flavo-ochraceo, crisso et lateribus brunnescentioribus: rostro nigro, pedibus fuscis.*

Long. tota 7·8, alæ 4·2, caudæ 3·8, tarsi ·75, rostri a rictu ·9.

*Hab.* Costa Rica (Tucurrique).

Affinis *L. aurantio*, Lafr. (R. Z. 1846, p. 204), sed gula albida, non nigra, facile distinguendus; foemina etiam brunnescentiore.

This makes the fourth species of the genus *Lanio* at present known, viz., *L. aurantius*, Lafr., of Central America, having a black throat; *L. leucothorax*, of Costa Rica, with the throat white; *L. versicolor*, D'Orbigny (Voy. p. 262, pl. 19. f. 1), of Bolivia, having the whole of the wing-coverts white; and *L. atricapillus*, Gm. (S. N. p. 898), of New Granada and Cayenne, in which the yellow parts are much more ferruginous.

##### 6. CHLOROSPINGUS PILEATUS, sp. n.

*C. olivaceus: capite et nucha nigris, hujus et pilei postici lateribus cum stria postoculari concurrentibus albis; superciliis ipsis et loris nigris: gula, macula longa rictali et abdomine albis: pectore et corporis lateribus olivaceis, illo flavescentiore: alis et cauda fuscis, olivaceo marginatis: campterio flavo, tectricibus subalaribus albidis: rostro obscure plumbeo, pedibus fuscis.*

Long. tota 5·4, alæ 2·75, caudæ 2·6, tarsi 1, rostri a rictu ·6.

*Hab.* Costa Rica (Volcan de Cartago).

Vix alicui sui generis similis. A *C. flavipectore* Lafr. capite nigro et striis albis capitis utrinque, a *C. superciliari* Lafr. rostro robustiore et corporis colore subtus differt.

A well-marked and distinct species, combining characters of both groups of this genus.

7. *EMBERNAGRA SUPERCILIOSA*, sp. n.

*E. supra olivaceo-cinereascens, capite cinereo: striis longis per oculos et pilei lateribus a rostro ad nucham transeuntibus obscure brunneis, distinctis: subtus cinerascenti-albida, pectore et corporis lateribus saturatioribus: campterio flavissimo, rostro superiore fusco, inferiore albido, pedibus pallide fuscis.*

Long. tota 5, alæ 2·35, caudæ 2, tarsi ·9, rostri a rictu ·55.

*Hab.* Costa Rica (Nicoya).

*E. chloronotæ*, Salv. (P. Z. S. 1861, p. 202), et affinis suis similis, sed capitis striis conspicuis et statura minore distinguenda.

In Dr. Sclater's and my paper on the 'Birds of Panama,' P. Z. S. 1864, p. 352, reference will be found to the distinctions between the Central American and New Granadian forms of this genus, viz. *E. chloronota*, Salv., *E. striaticeps*, Lafr., *E. conirostris*, Bp. The pectoral band is hardly shown in the present bird, which, with the paler colour of the occipital and superciliary stripes, renders it recognizable from any of the above *primo visu*.

8. *MYRMECIZA LÆMOSTICTA*, sp. n.

*M. badia: capite toto et corpore subtus a gula ad medium ventrem nigricanti-plumbeis, hoc dilutiore: mento et gula nigris, albo vittatis; alarum tectricibus minoribus et campteriis nigris, apicibus albo terminatis, tectricibus reliquis ferrugineo terminatis: plumis interscapularibus in parte basali albis, media nigris, macula tota badio celata: rostro nigro, mandibula inferiore medialiter cornea, pedibus obscure fuscis.*

Long. tota 5·25, alæ 2·5, caudæ 1·8, tarsi 1·05, rostri a rictu ·85.

*Hab.* Costa Rica (Tucurrique).

9. *GRALLARIA DIVES*, sp. n.

*G. supra pileo et dorso cinereis, plumis omnibus nigro marginatis: uropygio obscure olivaceo: remigibus extus rufis: gula et ventre medio albis: loris pallide ochraceis: pectore, corporis lateribus, crisso et tectricibus subalaribus saturate fulvis, pectoris plumis nigro marginatis: ungue postico longo et gracili: rostri mandibula superiore brunnea; inferiore albida, apice brunnea: pedibus pallide fuscis.*

Long. tota 5·5, alæ 3·1, caudæ 1·4, tarsi 1·5, rostri a rictu 1.

*Hab.* Costa Rica (Tucurrique).

Affinis *G. fulviventri*, Scl. (P. Z. S. 1858, p. 282), et *G. maculariæ*, Temm. (Scl. l. c.); sed ab illa remigibus extus rufis et ungue postico rectiore, ab hac regione oculari vestita non nudiuscula et ungue postico longiore et rectiore differt.

This species appears to have the hind claw straighter and weaker than is usual in *Grallaria*. In general coloration it is closely allied to the above.

## 10. MYIOBIUS CAPITALIS, sp. n.

*M. supra olivaceus, pileo obscure fusco-cinereo, loris albidis : alis fuscis, secundariis et alarum tectricibus late fulvo marginatis : subtus gula albida, pectore late fulvo, ventre flavo : cauda fusca, rectricibus olivaceo extus marginatis : rostro nigro, pedibus fuscis.*

Long. tota 5, alæ 2·4, caudæ 2·2, tarsi ·6, rostri a rictu ·6.

*Hab.* Costa Rica (Tucurrique).

## 11. PIPRITES GRISEICEPS, sp. n.

*P. læte olivaceus, subtus dilutior, gula et abdomine flavis : pileo et capitis lateribus cinereis, illo versus nucham olivaceo mixto : macula utrinque oculorum et ciliis albis : alis et cauda nigris, olivaceo anguste marginatis ; illarum pogoniis internis ad basin primariorum et secundariorum flavis : tectricibus subalaribus flavis : rostro et pedibus plumbeis.*

Long. tota 4, alæ 2·5, caudæ 1·8, tarsi ·65, rostri a rictu ·55.

*Hab.* Costa Rica (Tucurrique).

*P. chlorioni* Cab. affinis ; sed capite cinereo, non olivaceo, differt : frons flava etiam abest.

## 12. CARPODECTES NITIDUS, gen. et sp. n. (Pl. XXXVI.)

*Carpodectes* genus novum ex familia *Cotingidarum*, affinis generi *Ampelioni* ex America meridionali.

*Rostrum robustum, altum, paulo brevius quam dimidium capitis, culmine alto, versus apicem mandibulæ superioris a fronte gradatim decurvante : nares patulæ, depressæ : alæ longæ, rotundatæ, remigibus tertio, quarto et quinto fere æqualibus, sexto brevioribus quam secundus, primo longiore quam reliqui : cauda brevis : tarsi et pedes robusti, illorum phalangibus primis externe paulo conjunctis.*

## Typus CARPODECTES NITIDUS, sp. n. et spec. unicum !

*Albus, corpore supra cum pileo pallidissime griseo lavatis, hoc paulo saturatiore : loris et regione oculari albis : subtus omnino albus : alis et cauda albis vix griseo tinctis : rostro plumbeo, pedibus plumbeo-nigris.*

Long. tota ·8, alæ 5·5, caudæ 2·8, tarsi 1, rostri a rictu 1.

*Hab.* Costa Rica (Tucurrique).

A very distinct and remarkable bird, differing considerably from its nearest allies in the genus *Ampelion*, the most obvious distinctions being the strong beak and long wings of *Carpodectes*. The family *Cotingidæ* would seem to embrace more varied forms than any other American group, the *Trochilidæ* not excepted. The most marked forms will readily present themselves, such as *Machæropterus*, with its curious development of the quills of the wing-feathers ; *Rupicola*, *Xipholena*, *Chasmorhynchus*, *Cephalopterus*, all possessing marked and peculiar characters. The development of white, so remarkable in the plumage of the present bird, is not unusual in other members

of the family; we find it in *Chasmorhynchus*, in the wings and tail of *Xipholena lamellipennis*, and in the wings of *X. atropurpurea* and *X. pompadora*.

13. *OREOPYRA HEMILEUCA*, sp. n.

♂. *O. dorso, lateribus et tectricibus alaribus minoribus viridescentibus: pileo, capitis lateribus et mento coruscanti-viridescentibus nitidissimis: stria postoculari alba longa ad nucham transeunte: nucha nigricanti-viridescente: gula amethystina, pectore et abdomine toto albis, crisso paulo cinerascentiore: alis obscure purpurascenti-nigris: cauda cinerascenti-viridi, recticibus duabus mediis viridescentibus, reliquis fascia subapicali æneo-viridi, apicibus ipsis albidis: rostro nigro, pedibus fuscis.*

♀. *Capite et gula inornatis; macula apicali reetricum extimarum majore.*

Long. tota 4, alæ 2·6, caudæ max. 1·55, min. 1·45, rostri a rictu ·95.

*Hab.* Costa Rica (Turrialba, Tucurrique).

14. *OREOPYRA CALOLÆMA*, sp. n.

*O. dorso viridescente: pileo cum pectore cærulescenti-viridescentibus, nitidissimis, hoc viridescentiore: gula tota et mento violaceo-rubidis coruscantibus: tectricibus auricularibus et nuchæ lateribus nigris: stria longa postoculari alba, ad nucham extendente: ventre obscure cinereo, vix viridi lavato: crisso concolore, plumis albido marginatis: alis purpurascenti-nigris, tectricibus alaribus viridescentibus: cauda chalybeo-cæruleo.*

Long. tota 4, alæ 2·6, caudæ max. 1·5, min. 1·4, rostri a rictu 1.

*Hab.* Costa Rica (Volcan de Cartago).

It is just possible that Mr. Gould's *Anthocephala castaneiventris* may be the female of this species; and the presence of a specimen of that species agreeing with Mr. Gould's examples from Chiriqui, shot in the same locality as the bird now described, lends some colour to the supposition. In Mr. Gould's collection are three specimens of his *A. castaneiventris*, which, through his kindness, I have had an opportunity of examining; one of these has the shining crown so characteristic of the males of the genus *Oreopyra*, to which I refer the present bird. Mr. Gould's figure represents both male and female (vol. iii. pl. cciii), and I am inclined to think he has judged rightly. Observing the sexes of *O. hemileuca*, analogy would suggest that the female of *O. calolæma* is without the shining head, and that the under surface is a dull brownish grey. I have not hesitated to describe this bird as above; for, should the surmise prove correct, the name *castaneiventris* is totally inapplicable.

All hitherto known of the genus *Oreopyra* was the existence of a single specimen, in Mr. Gould's collection, of *O. leucaspis*, upon which the genus was founded. It was one of Warszewicz's discoveries in the Volcano of Chiriqui. The present collection makes known two additional species of the same form; and I have no hesitation in placing in the group the bird, from the same locality, doubtfully



referred to the genus *Anthocephala*, and described by Mr. Gould as *Trochilus castaneiventris*, P. Z. S. 1850, p. 163.

We thus have four species comprised in the genus, which may thus be shortly characterized.

- O. leucaspis*. White gorget.
- O. calolæma*. Purple-red gorget.
- O. hemileuca*. Violet-blue gorget.
- O. castaneiventris*. Under surface chestnut.

All have a brilliant green head, and in two, viz. *O. leucaspis* and *O. calolæma*, the chest is brilliant green also. All four have the postocular spot of white so generally found amongst the *Trochilidæ* elongated into a stripe running down each side of the neck.

The place of *Oreopyra* in the family *Trochilidæ* is evidently next to *Delattria*, and near to *Cæligena*, *Lamprolæma*, and *Heliopædica*.

Comparing *Oreopyra* with the first-named genus, in both we find the rounded gorget, the slightly depressed beak, the moderately forked tail, and the elongated postocular stripe. In *Delattria* the crown is unadorned, or nearly so; in *Oreopyra* it is brilliant green. Without, then, discussing the validity of the genus, which seems doubtful, and which would raise a long and intricate question, I would suggest that *Oreopyra* should be removed from the neighbourhood of *Heliomaster* and *Eustephanus*, where it has been placed by Mr. Gould, to next *Delattria* and near *Lamprolæma*, *Cæligena*, and *Heliopædica*, its Central American allies\*.

#### 15. CHALYBURA MELANORRHOA, sp. n.

*C. viridescens, gula et pectore toto coruscantioribus, obscuris: uropygio æneo-purpurascente, caudæ tectricibus superioribus purpurascenti-nigris; ventre fuliginoso, vix viridi lavato: crisso nigro, vix purpurascente tincto: alis purpurascenti-fuliginosis; cauda fere nigra, æneo-purpurascente lavata: rostro nigro, mandibulæ inferioris parte basali carnea, pedibus carneis.*

Long. tota 4·5, alæ 2·6, caudæ 1·75, rostri a rictu 1·05.

*Hab.* Costa Rica (Tucurrique).

Affinis *Chalyburæ isauræ*, Gould (P. Z. S. 1861, p. 198), ex Boca del Toro, Veragua, sed crisso nigro, non albo, valde distinguenda.

This species with *C. isauræ* forms a somewhat abnormal section of the genus *Chalybura*, Reich.; but the differences as seen from our present materials are hardly of sufficient importance to warrant a generic separation. They may be briefly stated as follows:—The plumage in the *Chalybura* is generally more brilliant; the uropygium is nearly the same colour as the back, in the Costa Rica birds it is clearly defined. The plumed feathers of the crissum in the former are much more developed (see Mr. Gould's remarks, *l. c.*).

\* Since the above was in type, I have received a paper by Mr. Lawrence, published in the 'Annals of the Lyceum of Nat. Hist. of New York,' in which he describes a supposed female of *Panterpe insignis*, Cab., in the Smithsonian Collection. From the description, I have no doubt the bird referred to is a female of *Oreopyra castaneiventris*—a very different bird.

This is the first species of this genus having the crissum black : in all others, including its close ally, that part is pure white.

16. SELASPHORUS FLAMMULA, sp. n.

*S. supra aureo-viridescens : subtus gula tota cum mento rosaceo-rubidis, coruscantibus : pectore sub gula picta, et ventre medio albis : lateribus cinnamomeo viridi mixto lavatis : alis obscure purpurascenti-nigris : caudæ reatricibus (duabus mediis exceptis) nigris, harum duarum utrinque extimarum sordide albo terminatis, poyonio interno cinnamomeo medialiter marginato, extima angustiore ; tertiæ utrinque pogonii ambobus fere ad apicem cinnamomeo marginatis ; quarta similiter ornata, pogonio interno angustiore ; duabus mediis viridescensibus cinnamomeo fere ad apicem marginatis, harum et proximarum utrinque apicibus cuneatim excisis : rostro et pedibus nigris.*

Long. tota 2·9, alæ 1·6, caudæ 1·1, rostri a rictu ·7.

*Selasphoro platycerco*, Sw., ex Mexico et Guatemala nonnihil similis, sed statura minore et reatricum coloribus distinguendus.

*Hab.* Costa Rica (Volcan de Cartago).

The single specimen in the collection has the throat somewhat faded. In a freshly moulted bird it would approach *S. platycercus* in brilliancy.

17. ODONTOPHORUS MELANOTIS, sp. n.

*O. supra obscure castaneus, lentiginibus nigris minute maculatus : regione interscapulari, alarum tertiariis et tectricibus majoribus terminum versus plumarum nigro distincte fasciatis, tectricibus omnibus macula albida terminatis, alarum remigibus in pogonio externo nigro et castaneo æqualiter vittatis : pileo toto et corpore subtus a gula ad medium ventrem castaneis, illo fronte et superciliis dilutioribus, pileo versus nucham saturatiore : gula tota cum tectricibus auricularibus nigris : cauda lentiginosa : ventre imo cum crisso et tibiis nigro et castaneo fasciatis : rostro nigro, pedibus obscure fuscis.*

Long. tota 8, alæ 5·75, caudæ 2·5, tarsi 1·75, rostri a rictu ·8.

*Hab.* Costa Rica (Tucurrique).

Similis *O. erythropi*, Gould (P. Z. S. 1859, p. 99), sed regione suboculari nigra, non rufa, distinguendus.

A close ally of the bird described by Mr. Gould from Ecuador ; but the entire absence of the conspicuous markings of the side of the head in that bird seems to warrant its separation.

Professor Huxley read a memoir "On the Structure of the Skull of Man, the Gorilla, the Chimpanzee, and the Orang-Utan, during the period of the first dentition." Professor Huxley's deductions were based upon materials contained in the British Museum, the Royal College of Surgeons, and in particular upon the original specimen of Tyson's "Pigmy," which had been submitted to his examination by the directors of the museum at Leeds.

This paper will be published entire in the Society's 'Transactions.'

November 22, 1864.

Prof. Huxley, F.R.S., V.P., in the Chair.

The Secretary called the attention of the Meeting to some recent additions to the Society's Menagerie :—

1. A young Saiga Antelope (*Saiga tatarica*), received in exchange from the Zoological Gardens, Moscow; believed to be the first instance of the arrival of this scarce animal in this country.

2. Two males and a female of the Maned Goose of Australia (*Bernicla jubata*), forming an interesting addition to the Society's large series of Waterfowl.

3. A young female Chimpanzee (*Troglodytes niger*), which had been placed in the new monkey-house, along with the young Orang (*Simia satyrus*), thus affording opportunities of comparing together the living outlines and habits of these two Anthropoid Apes.

The following papers were read :—

1. NOTICE OF THE ATLAS AND OTHER CERVICAL VERTEBRÆ OF A RIGHT WHALE IN THE MUSEUM OF SYDNEY, NEW SOUTH WALES. BY DR. J. E. GRAY, F.R.S.

Mr. Krefft has most kindly sent to me photographs of some of the bones of Cetacea which are contained in the Museum at Sydney, which is under his direction. They consist of—

1 and 2. Two views of the skeleton of *Euphysetes grayii*, which was described by Mr. William Sharp Macleay, and published in a work which some time ago appeared under the name of Mr. Wall, who I am informed was then employed to prepare skeletons in the Sydney Museum.

3. The atlas vertebra of the Australian Sperm Whale (*Catodon australis* of Macleay), described in the same work. This bone differs rather in shape from the atlas vertebra of the Sperm Whale figured by Cuvier (Oss. Foss. v. t. 24. f. 12), especially in the lower outer angle of the bone not being so acute and produced.

4 and 5. The atlas and other cervical vertebræ, seen in front, and the cervical vertebræ without the atlas, seen obliquely, of a Whale.

These latter bones seem to me to clearly indicate a species of Whale which has not yet been described. On a comparison of these with the figures of the cervical vertebræ of the *Balæna mysticetus* (Cuv. Oss. Foss. v. t. 26. f. 18) and of *Eubalæna australis* (Cuv. Oss. Foss. v. t. 26. f. 13), they appear to be more nearly allied to the genus *Eubalæna* than to *Balæna*, but are very distinct from either.

These bones differ from those of both these genera in the atlas being separate and free from the other cervical vertebræ, instead of being all united together into a single mass. In this respect they agree with the cervical vertebræ of the Sperm Whale (*Catodon*); but they cannot belong to that genus, on account of the general form

Fig. 1.

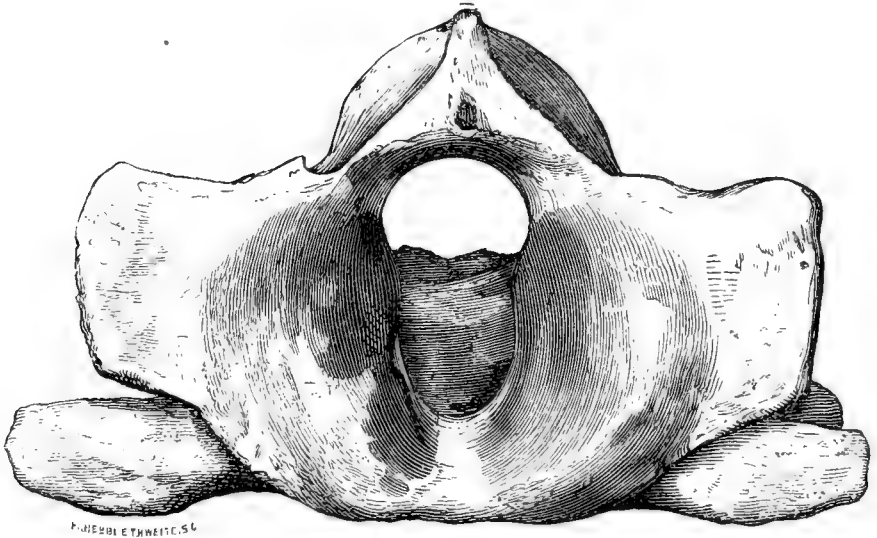
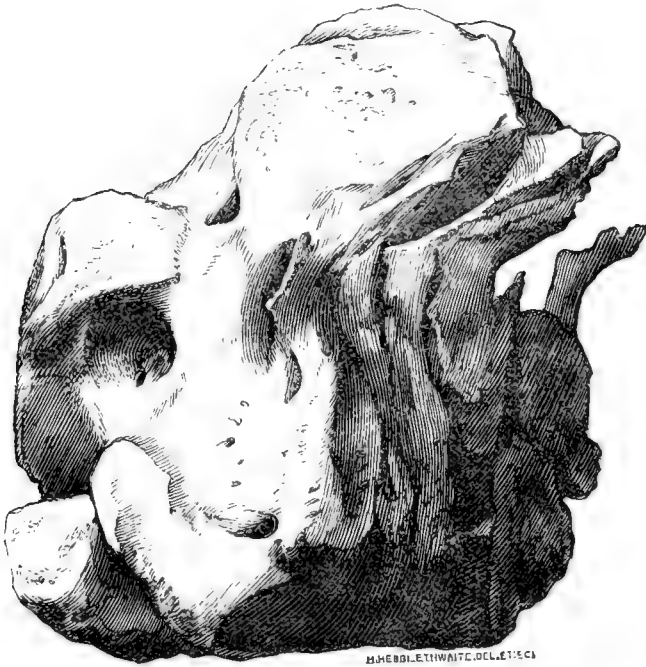


Fig. 2.

*Macleayius australiensis.*

- Fig. 1. Front view of atlas and cervical vertebrae.  
 2. Oblique view of the second to the seventh cervical vertebrae.

of the vertebræ, and especially the form of the neural arch. In both these particulars they much more nearly resemble the genera *Balæna* and *Eubalæna*. Under these circumstances I am induced provisionally to form for these bones a special genus, which I propose to call

**MACLEAYIUS.** It may be thus characterized:—The atlas-vertebræ distinct, separate, with short, broad, truncated lateral processes occupying the upper two-thirds of the side of the body of the vertebra, the lower side of the body forming a section of a circle; the neural arch strong, with a high central ridge forming a distinct keel.

The second, third, fourth, fifth, sixth, and seventh cervical vertebræ united into a single mass by their bodies and neural apophyses; the upper lateral process rudimentary, more or less anchylosed; the lower processes of the second and third cervical vertebræ large, thick, short, truncated; the neural arches very broad and strong, united together, the anterior one forming a large broad, convex, hood-like body over those of the other cervical vertebræ.

I have named this genus after Mr. Macleay, the former Secretary of the Linnean Society, and his son William Sharp Macleay, two naturalists who have done so much for science. To the latter every student of Whales must be indebted for his work on the South-Sea Sperm Whale and the very extraordinary *Euphysetes grayii*.

I have ventured to make these fragments of an animal (as they may be called) into a genus; for I think we can only study the gigantic Whales as we study fossils, from the parts which are preserved to us. It is to be hoped that at some future time more perfect skeletons will be collected and preserved; and then the description of the genus will be filled up.

The form of the atlas at once distinguishes this genus from *Catodon*, or the Sperm Whale. In that genus the atlas is oblong, transverse; the lateral processes occupy the entire side of the body of the bone, and are truncated at the end; the lower edge is gradually curved from the centre to the end of the lateral processes; the upper edge is rather shorter, the middle part over the neural arch being only slightly raised and keeled, and scarcely higher than the upper outer edge of the lateral processes.

The genera of large Whales may be thus arranged, according to the form of the cervical vertebræ:—

- A. *The atlas and other cervical vertebræ united by the body and neural arches into one mass.*

  - a. *The lateral processes of the atlas conical, on the upper part of the sides (see Cuvier, Oss. Foss. v. t. 26. f. 18). Balæna.*
  - b. *The lateral process of the atlas rather broad, rounded, shorter below (see Cuvier, Oss. Foss. v. t. 26. f. 13). Eubalæna.*
  - c. *Lateral processes of the atlas and other cervical vertebræ on lower edge of body. Hyperodon, Lagenocetus.*

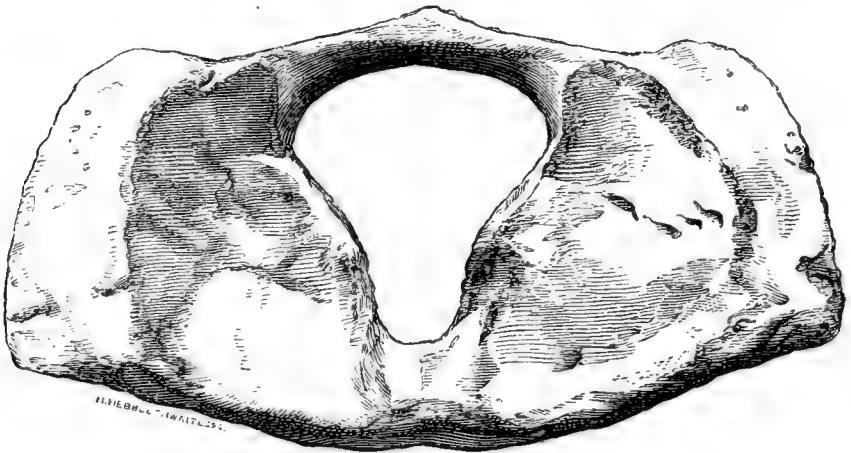
B. *The atlas separate, free; the other cervical vertebræ united into a single mass by the coalescing of the body and neural arches.*

a. *The atlas with a large, high keel over the neural arch.*  
Macleayius.

b. *The atlas with a very slightly elevated keel over the neural arch.* Catodon.

The fact of the atlas being free and separate, as in the Sperm Whales, makes it possible that this genus may be a Toothed Whale allied to the Sperm Whales. But the form of the neural arch, and especially of the lateral processes, induces me to believe that it is most probably a Whalebone Whale allied to *Balæna*, and probably belonging to the family *Balænidæ*.

Fig. 3.



Axis of *Catodon australis*.

In that case the most natural way of arranging the genera which have the cervical vertebræ united into one or two masses will be as follows:—

A. *The neural arch with a strong well-developed ridge on its upper edge, forming a keeled crest.*

a. *The lateral processes of the atlas on the upper part of the side.*  
Balænidæ.

\* *The atlas-vertebra united with the other cervical vertebræ into a single body.* Balæna. Eubalæna.

\*\* *The atlas-vertebra free from, and separate from, the other cervical vertebræ.* Macleayius.

b. *The lateral process of the atlas and other cervical vertebræ on the lower part of the side of the body.* Hyperodon and Lagenocetus.

B. *The neural arch low, scarcely raised, keeled on the upper edge; the lateral processes very wide, occupying nearly the whole side-edge of the body of the vertebra.* Catodontidæ. Catodon.

In *Balæna* the atlas is united to the other cervical vertebræ. The atlas has a nearly circular body, with the lateral process on the upper part of the lateral edge; the process has a straight upper edge and a slanting lower one, gradually shelving down towards the lower part of the side of the body of the vertebra, where it is confluent with the upper part of the base of the large, thick, lower lateral process of the second cervical vertebra.

The upper lateral process of the second vertebra is large and well developed, bent forwards at the end, coherent with the outer end of the upper part of the lateral process of the atlas.

The upper lateral processes of the third and succeeding vertebræ are similar, but smaller, and united at the end to the upper process of the preceding cervical vertebræ. The lower lateral processes are less developed, and they are unfortunately imperfect in the specimen.

The atlas and other cervical vertebræ of the *Lagenocetus latifrons* are all united into a single mass. The body of the vertebræ is nearly circular, with a very large superior conical process formed of the united neural arches; and on the lower part of each side, on a level with the lower edge, are two large, thick, conical processes, formed of the lateral process of the atlas united to the lower lateral processes of some of the other cervical vertebræ.

The upper lateral processes seem to be scarcely developed, as the mass shelves down above towards the lower edge, and has on its upper part a series of perforations on each side, showing the axes of the nerves and vessels between the united vertebræ.

The cervical vertebræ of a *Balæna* in the British Museum, that was dredged up at Lyme Regis, are united together not only by the bodies of the vertebræ, but by the neural arches, which form a large vaulted arch, and by the lateral processes.

The lateral processes of the atlas are large, they arise from the exterior side of the articular cavity, the edge of the upper side being on a level with the top of the concavity, and the blunt end is rather curved up; the underside gradually shelves from the blunt outer end to the lower margin of the articular cavity.

The upper lateral processes of the second, third, fourth, fifth, sixth, and seventh cervicals are all united together at the ends, the process of the second vertebra being the thickest, largest, and bent; it is united to the hinder surface of the end of the lateral process of the atlas by a thick osseous band. The upper lateral processes of the third, fourth, fifth, sixth, and seventh are thinner and smaller, diminishing in size as they proceed backwards; the process of the third is directed backwards to meet the end of the fourth—which, like those of the fifth, sixth, and seventh, is directed rather forwards, towards the head.

The lower lateral process of the second vertebra is very large, thick, confluent with the lower part of the lateral process of the first ver-

tebra or atlas, but produced far beyond it ; and it is thickened below and at the end, which is considerably dilated. The lower process of the third vertebra is much smaller, or rather compressed, than that of the preceding one ; and the lower processes of the fourth vertebra are similar, but much smaller still, and also shorter. They are confluent together at their base, and with the base of the process of the second vertebra. The other vertebræ are without any lower lateral processes. The neural canal is very large, nearly circular in front, being nearly as high as wide ; at the hinder end it is transverse, trigonal, nearly four-fifths as wide as the width of the articulating surface of the first dorsal vertebra, and about two-thirds as high as broad. The outer surface of the united arches is very convex and broad, with a broad triangular disk in front, marked with a central keel ; and the upper surface is keeled, with convex sides, behind.

This mass is so unlike the mass of the cervical vertebræ of the Greenland specimen of *Balæna mysticetus* in the College of Surgeons (which, through the kindness of the Council of that Society, I have been able to examine and figure), that I am inclined to think that it may belong to another species, and is probably the cervical vertebra of the Whale which Eschricht has described under the name of *Balæna biscayensis*. They differ in the form of the lateral processes of the atlas and other vertebræ, and in the manner in which they are soldered together, and especially in the external form of the neural arch.

The cervical vertebræ of *Lagenocetus latifrons*, as of *Hyperodon*, are united into a single mass by the union of the bodies of the vertebræ, the neural arches, and the lateral processes.

The united neural arches of the first cervicals are produced, and form a large cone (nearly as high as the height of the body of the vertebra), which shelves down before and behind to the upper part of the neural canal, and on the side to the base of the mass, or the end of the large lateral processes of the second vertebra, the upper part of the sides being marked with the long, deep grooves through which the nerves come out.

The atlas appears to have no distinct lateral processes ; or what there are are so united to the very large, high, broad, single lateral process of the second vertebra as not to be distinguished from it, except by the existence of the first groove for the exit of the nerves in the upper part of the body. The lateral process of the second vertebra is massive, conical, and much produced below, on a level with the lower edge of the articular cavity, giving the mass, when viewed in front, an irregular triangular shape.

The third cervical has a broad, short upper lateral process, which is only free from the mass at the end ; and this projection is the first appearance of a distinct upper lateral process. The lower process is like, but smaller than, the lower process of the second vertebra, and united to the back part of it, making part of the large inferior lateral prominence.

The fourth and fifth have a similar upper lateral process to the third, but of a much smaller size, the three last being very small—



only small bony plates. These vertebræ have no distinct or marked inferior lateral process.

Fig. 4.

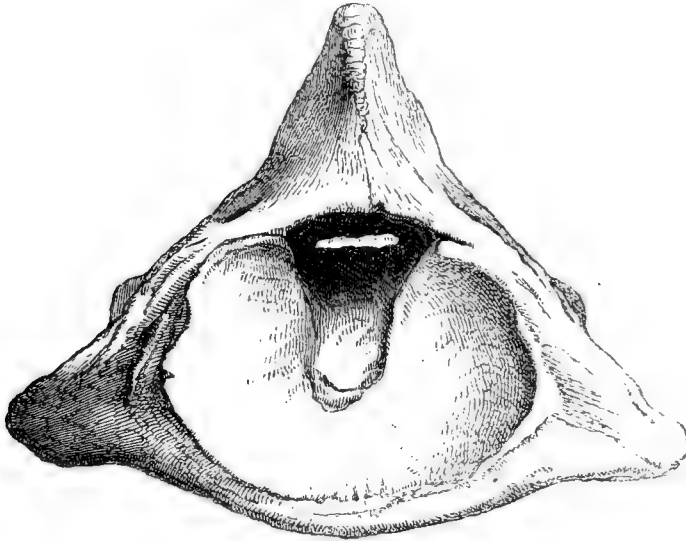


Fig. 5.

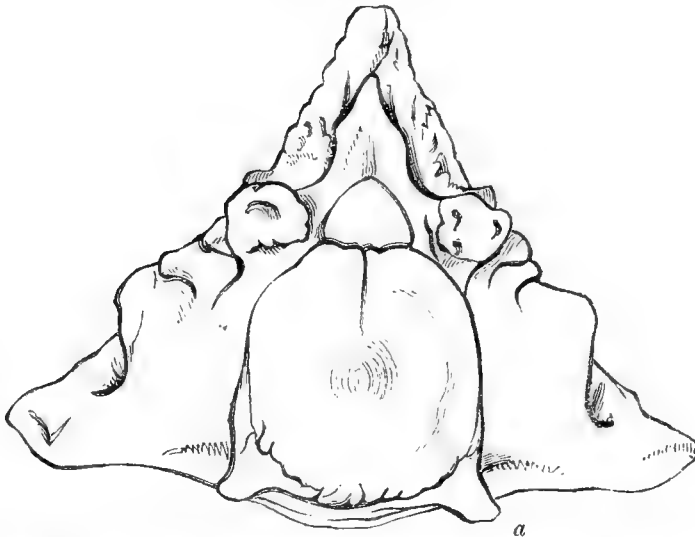


Fig. 4. Front view of the cervical vertebræ of *Lagenocetus latifrons*.  
5. Back view of ditto. *a*. The seventh vertebra.

The seventh cervical, though united to the general mass by the body of the vertebra, is yet well defined from the rest of the mass, and retains the usual form of the separate vertebræ of these animals.

The neural arch is of the same form as those of the other cervical vertebræ, but much smaller, and not so high; it is separate from the large conical mass which they constitute, forming a pointed, rather projecting arch at the hinder side of the mass. The upper lateral process is similar in form to the upper lateral processes of the two or three cervical vertebræ that precede it; but it is much larger than these, and bent forwards at the end to unite with the ends of them.

The lower lateral process is very thick and large, forming a large short tuberosity on the lower part of the mass, but quite separate from it. The articulating surface of this vertebra is oblong, erect, rather higher than wide, with a deep suture from the centre to the middle of the upper margin.

The front of the canal of the spinal marrow is triangular, with the angle rounded, the upper side being transverse and the lower ones converging, and about as high as wide. The hinder part of the canal, on the contrary, is trigonal, with the upper sides converging—the lower side being rather wider than the height of the canal, and about two-fifths of the width of the body of the seventh cervical vertebra.

In the British Museum there is the mass of the cervical vertebræ of a young *Hyperodon butzkopf*. It is, unfortunately, not in a good condition, the edge being worn, and the upper lateral processes of the hinder cervical vertebræ being broken off. It agrees in general shape with the cervical vertebræ of *Lagenocetus* above described; but the upper cone formed by the united neural arches is not so high, nor keeled in front. The greatest difference is in the seventh cervical vertebra, its lateral processes and neural arch being as completely united to the other vertebræ as any of the rest, the whole seven forming a single bony mass.

The canal of the spinal marrow is very large, but otherwise like that of *Lagenocetus*; but the hinder part of the canal is higher, being as high as wide above, and its width rather greater than half the width of the body of the seventh cervical vertebra.

## 2. DESCRIPTIONS OF FOUR NEW SPECIES OF AUSTRALIAN LAND SHELLS. BY JAMES C. COX, M.D., F.R.C.S. EDINB.

### 1. *HELIX MARIÆ*. = *Leucostreptus*, Cox

II. *testa subample et profunde umbilicata, lenticulari, depressa, crassiuscula, pellucida, parum nitente, obsolete radiato-striata, sub lente utrinque minute granulata, colore variante inter sordide luteum et pallide castaneum, fascia spirali rufescente aut castanea supra carinam, alteraque secus suturam, annuloque lato castaneo circa umbilicum, intus pallidum; spira convexiuscula; anfractibus quinque planulatis, ultimo obtuse carinato; apertura subquadrato-ovata; peristomate expanso, reflexo, albo; margine externo recto, columellari leviter bisinuato, basi expansiusculo.*

Var.  $\beta$ . *Rufo-castanea, sine fasciis.*

Diam. maj. 0·65, min. 0·57, alt. 0·30 unc.

*Hab.* Clarence River, under bark of stumps on stony forest-ridges ; apparently rare (*Macgillivray*).

Animal bluish grey, with darker interstices ; tentacles reddish brown.

## 2. HELIX ASSIMILANS.

*H. testa aperte et perspective umbilicata, depresso-globosa, tenui, nitidissima, pellucida, supra (et intus umbilicum) oblique creberrime costulata et epidermide rufo-flavescente induta, infra lævi, pallide viridi-cornea ; spira angusta, convexa ; anfractibus quatuor et dimidio, convexiusculis, ultimo rotundato, ad os leviter, plano antice vix descendente ; apertura obliqua, fere rotundata ; peristomate simplici, superne et antice recto ; margine columellari subreflexo.*

Diam. maj. 0·75, min. 0·60, alt. 0·40 unc.

*Hab.* Clarence River, under logs in forest-land (*Macgillivray*).

Very closely allied to *H. strangei*, from which, however, it may readily be distinguished by being smaller, less brightly coloured, and much more prominently ribbed, with fewer striæ, also by the absence of the numerous faint decussating lines of the upper surface of its near ally, which, moreover, is confined strictly to the brushes, where *H. assimilans* is never found.

## 3. HELIX WILCOXI.

*H. testa minute umbilicata, globoso-conica, tenuissima, nitida, hyalina, fulvo-cornea, sub lente obsolete radiato-striata ; spira conica, acutiuscula ; anfractibus sex, convexiusculis, ultimo rotundato ceteros altitudine æquante ; apertura paulo obliqua, lunari ; peristomate recto, simplici, tenui ; margine columellari basi breviter expanso, reflexo, umbilicum semitegente.*

Diam. maj. 0·18, min. 0·16, alt. 0·20 unc.

*Hab.* Clarence River, on leaves of trees in the brushes (*Macgillivray*).

Animal (as seen through the shell) yellowish green ; exposed part of body pale bluish white ; upper tentacles and a line behind each dusky bluish.

## 4. HELIX CLARENCENSIS.

*H. testa modice umbilicata, lenticulari, depressa, carinata, tenuissima, pallide succineo-cornea, superne sub epidermide irregulariter radiatim curvato-striata, nitente, inferne convexa, lævissima, nitidissima, vitrea ; spira late conoidea, convexiuscula ; anfractibus quinque et dimidio, planatis, ultimo obtuse carinato ; apertura obliqua ; margine externo angulato, inferiore arcuato, columellari basi breviter expanso umbilicum leviter obtegente.*

Diam. maj. 0·48, min. 0·42, alt. 0·28 unc.

*Hab.* Clarence River, on the ground, also on leaves of plants and trunks of trees in the brushes (*Macgillivray*).

Animal (as seen through the shell) olive-grey, usually with a reddish tinge about the spire, mottled with dull stone-colour and a few black streaky blotches, and about the keel a black marking bordered above with silvery grey; exposed part of body pale greenish white, with silvery markings; upper tentacles, and a line extending backwards from each, black; lower tentacles dusky.

### 3. CONTRIBUTIONS TOWARDS A MONOGRAPH OF THE PANDORIDÆ. BY PHILIP P. CARPENTER, B.A., PH.D.

It is remarkable that, notwithstanding the zeal with which most of the old genera have been divided, to meet the wants of modern malacology, the genus *Pandora*, Lam., has been left untouched by Dr. Gray, Messrs. Adams, and their follower, Chenu. Yet the species known to the elder Sowerby present three distinct types of hinge, which were well figured by him in his 'Conchological Illustrations.' Specimens and even species of *Pandora* (except of the well-known N. Atlantic forms) being very rarely seen in collections, it is presumed that naturalists have had but few opportunities of studying them. Mr. Cuming having most kindly allowed me to examine the hinge of all the species in his collection, it has appeared desirable to propose two new genera, and also to group part of the typical species under a subgenus.

It was at one time thought that the presence of an ossicle in the cartilage was a family mark of *Anatinidæ*, to which *Myadora* from *Pandoridæ*, and *Tellinmya* from *Kelliadæ*, were consequently removed. One of the new genera of Pandorids, however, possesses a well-developed ossicle; and a small one is seen even in some species of the normal genus.

The most highly organized structure in the family is found in the North American genus *Clidiophora*, which has both clavicle\* and ossicle; the next is the East-Indian group *Cælodon*, which wants both clavicle and ossicle, but possesses a tent-shaped dentition in the left valve. The simplest form is the well-known *Pandora*, which has neither clavicle, tent, nor ossicle; but in the subgenus *Kennerlia* the ossicle is present. The genus *Myadora* is quite distinct, but connected with *Pandora* through *Kennerlia*.

#### Genus CLIDIOPHORA †.

*Testa Pandoriformis, ventraliter expansa; valva dextra tridentata, dente postico elongato; valva sinistra sæpius bidentata, dente antico simplici; cartilagine ossiculo firmata; sinu pallii nullo.*

1. *Type*, CLIDIOPHORA CLAVICULATA, Cpr. (*Pandora cl.*) P.Z.S. 1855, p. 228.

\* The word "clavicle" is used (in default of a better) to denote a linear dental process running into the body of the shell, often serving as a support to the cardinal plate, as in *Anatina* and some species of *Placunomia*.

† Th. κλειδίον, a clavicle; φέρω.

In the dentition of the right valve this genus resembles *Cœlodon*, except that the posterior lamina is greatly developed, resembling a clavicle. The left valve wants the central tooth and chamber of that genus. This structural deficiency, however, is compensated by the development of an ossicle in the long cartilage. As far as is known, all the species are from North and Central America, and are swollen ventrally.

## 2. CLIDIOPHORA CRISTATA.

*C. t. securiformi, minus transversa, tenui, subplanata; umbonibus ad  $\frac{2}{5}$  longitudinis sitis; ventraliter maxime excurvata; marginibus dorsalibus, post. maxime incurvato, ant. hic et illic alulis triangularibus cristato: intus marginibus posticis utraque in valva erectis: v. dextr. dente postico satis longo, cicatrice adductoris tenuis haud porrecto; dente centrali extante; dente antico a margine separato, usque ad cic. anticam porrecto, haud extante: v. sinistr. dente post. bifido, haud extante, alterum recipiente, fossa cartilaginea contigua; d. centr. nullo; d. ant. satis extante, usque ad cicatr. anticam porrecto; linea pallidri a margine valde remota, regulariter in puncta divisa; radiis ab umbonibus usque ad puncta conspicuis, æqualibus; ossiculo tenui, elongato.*

Long. 1·0, lat. ·6, alt. ·1 poll.

*Hab.* in sinu Californiensi; legit Conway Shipley diligentissimus; sp. un. in Museo Cumingiano.

This species is known from *C. claviculata* by the much greater posterior curvature of the beaks, and anteriorly by the beautiful triangular wing-like serrations of the margin, in which it resembles *Tellidora burneti*. The inside has elegant rays from the umbo to the dotted pallial line.

## 3. CLIDIOPHORA TABACEA, Meusch. (Mus. Gron.).

Specimens under this specific name are preserved in the Cumingian collection.

3 a. *CLIDIOPHORA TRILINEATA*, Say (*Pandora tr.*), Hanl. Rec. Shells, p. 49.

3 b. *CLIDIOPHORA NASUTA*, Sby. (*Pandora n.*), Sp. Conch. f. 18, 19.

It is probable that these are simply varietal forms of the well-known New England species. Say's name and Sowerby's excellent figure prove that the peculiar hinge of the genus was observed by both authors. Mr. Cuming gives "Philippines" as the habitat of his specimens of *C. nasuta*, probably in error. Mr. Hanley quotes it as a synonym of *C. trilineata*. An examination of a large series from Staten Island proves that the outline varies considerably. The tablet in the Nuttallian collection at the British Museum, marked *Pandora punctata*, belongs to this species. Young shells, when quite perfect,

display faint radiating grooves on the prismatic layer of the flat valve, as in *Kennerlia*.

#### 4. CLIDIOPHORA PUNCTATA, CONR.

This very rare species was only known in England by worn left valves in the British Museum, and in Mr. Cuming's and Mr. Hanley's collections. The first perfect specimens were dredged by Dr. J. G. Cooper (Zoologist to the Californian State Survey) at San Pedro. A young shell, sent by him to the Smithsonian Institution, displays a dentition agreeing in the main with *C. trilineata*. In the flat valve, the central and anterior teeth are close together and nearly parallel; the anterior short, nearly obsolete; the middle long and sharp, corresponding with the long, sharp tooth in the convex valve, which points to the outside of the anterior scar, instead of to the middle, as in *C. trilineata*. The (posterior) clavicle-tooth in the flat valve is longer than in the Eastern species, with the cartilage on it for two-fifths of the length. In *C. trilineata* it lies by the side, nearly the whole way. The posterior margin of the convex valve fits between the clavicle and the margin of the flat valve. The ossicle is remarkably long and thin. The punctures are extremely conspicuous even in this young, transparent, and papyraceous specimen; and, what is more peculiar, the dried remains of the animal are covered with minute pearl-shaped grains of shelly matter corresponding with them.

4 a. CLIDIOPHORA DEPRESSA, Sby., = *Pandora d.*, Sp. Conch. f. 11, 12; Hanl. Rec. Shells, p. 49.

The "posterior" dilated side of Sowerby is the "anterior" of Hanley. The species was constituted from a "very few specimens, all of them much worn down, as if they had been used as ornaments." The hinge therefore may not have been accurately observed. They were part of the Humphrey collection, and perhaps from the Californian region. Judging from the shape (for no type has been discovered), it may be identical with *C. punctata*, Conr.

#### 5. CLIDIOPHORA ACUTEDENTATA (vice C. B. Ad.).

*C. t. parum* "elongata, ovata; parte postica" haud rostrata, latiore, obtusa; "margine dorsali" postico "subrecto; margine ventrali rotundato," haud tumente; parte antica curtiores; "umbonibus subæqualiter subconvexis, umbone dextro postice angulato": intus, v. convexa dente antico magno, acutissimo, medio parvo, postico valido, maxime elongato; v. planata dentibus antico et postico acutis; ligamento juxta dentem posticum sito.

"Long. .7, lat. .42, alt. .11 poll."

*Hab.* in Panama: sp. unicum, postice fractum, legit C. B. Adams deploratus: Museo Coll. Amherstianæ: = *Pandora cornuta* (Gld.), C. B. Ad. Pan. Shells, no. 498, P.Z.S. 1863, p. 368.

Prof. Adams's "appropriate name suggested by Dr. Gould" being calculated to mislead, I have thought it necessary to change it.

Most of the original diagnosis must also be dropped, the parts above quoted being all that it is desirable to retain. The present description is written from notes and drawings made on a careful examination of the broken type. The lines of growth show that, so far from being "cornute," the species is remarkable for the absence of beak, —the margins being more equally rounded even than in *P. obtusa*, which in shape it somewhat resembles. The hinge is almost exactly like that of *C. claviculata*, jun., but differs in the somewhat greater proportionate length of the clavicle, and in the unwonted size and sharp pointing of the anterior tooth. The new name has been chosen to record this peculiarity, rather than follow the modern custom of naming from the author of the mistake. The best naturalists occasionally err; but corrections can be made without affixing a false compliment in perpetuity.

6. ? *CLIDIOPHORA DISCORS*, Sby. (*Pandora d.*), P. Z. S. 1835, p. 99; Sp. Conch. f. 29, 30.

The type has not been discovered; the figure and diagnosis only relate to the outside; and the habitat is not stated. The genus is therefore doubtful; but in shape it resembles the young of *C. claviculata*.

7. ? *CLIDIOPHORA ARCUATA*, Sby. (*Pandora a.*), Sp. Conch. f. 27, 28; P. Z. S. 1835, p. 93; Hanl. Rec. Shells, p. 49.

The worn valves in the Cumingsian collection do not allow of a confident determination of the genus.

#### Genus CÆLONDON\*.

*Testa Pandoriformis*: *valva sinistra dentibus duobus, cicatricem adductoris anticam versus radiantibus, lamina infra cavernosa junctis*: *ossiculo nullo*: *sinu pallii nullo*.

The shells of this group vary considerably in shape and dentition in the different species; but agree in this, that in the left valve there is a kind of tent, formed by a thin laminated roof lying on the top of two diverging teeth. It is hard even to guess what is the use of this (perhaps unique) structure; especially as its opening is not towards the body of the shell, but directly facing the anterior adductor. It is seen at once on opening the typical species, which was well figured by Sowerby, Sp. Conch. f. 22. In the aberrant forms it might easily be overlooked, and a glass is needed to detect it in small specimens; but if it exists, the shell can be supported on a pin thrust into the "hollow tooth." When more species are known, the group may require subdivision, the *C. flexuosus* especially presenting a marked transition to *Clidiophora*. In that genus the posterior part excels in development; in *Cæledon*, the anterior. All the known species are from the Eastern seas, but are very seldom seen in collections. An enlarged diagnosis of the type species is offered.

\* Th. κοῖλος, hollow; ὀδόν, tooth.

## 1. CÆLODON CEYLANICUS.

*Pandora ceylanica*, Sby. P. Z. S. 1835, p. 94; Sp. Conch. f. 20, 21, 22, = *P. ceylonica*, Hanl. Rec. Shells, p. 50, = *P. indica*, Chenu, Man. Conch. ii. p. 54. f. 214.

*C. t. planata, rostrata, securiformi; ventraliter maxime, antice satis excurvata; margine postico dorsali valde incurvato: intus, valva dextra, margine postico rectangulatim superstante, dentibus anticis ii. prælongis, satis extantibus, usque ad cicatricem adductoris continuis, dentem cavernosum valvæ alterius amplectantibus; dente postico curtiore, extante, fossam cartilagineam per totam longitudinem gerente: valva sinistra, margine postico subrectangulatim superstante; sulco postico dentem v. alt. recipiente; dentibus anticis usque ad cicatricem adductoris continuis, centrali longiore, plus quam dimidio interstitii lamina tenui tecto, ventraliter arcuato.*

Under this species, of which the correct locality appears in the name, Mr. Sowerby quotes "a single specimen obtained at Island Muerte, W. Columbia, 11 fm., by Mr. Cuming." The hinge may not have been examined. The shell quoted does not now appear in the Cumingian collection, and probably belonged to *Clidiophora claviculata*, which in shape resembles the typical *Cæloдон*.

1a. CÆLODON CUMINGII, Hanl. (*Pandora c.*), P. Z. S. 1861, p. 272.

This agrees with the last species in shape and dentition, and is probably only a variety.

*Hab.* Philippines (*Cuming*).

2. CÆLODON DELICATULUS, A. Ad. (*Pandora d.*) P. Z. S. (diagn. auct.).

*... marginibus dorsalibus ad angulum circ. 160° divergentibus: cardine v. dextr. dente postico satis elongato; centrali curto, ad umbonem valde calloso; antico longissimo, cicatricem ant. superante, margini contiguo: v. sinistr. dente centrali curto, supra cavernam evecto, in anticum prælongum continuo.*

In this species, the shape of which is not unlike *P. obtusa*, though less transverse, the anterior teeth are enormously developed at the expense of the central. These are short, but prominent; in the left valve bent over, along the whole length, to form the roof of the chamber, and then drawn on into the anterior tooth.

## 3. CÆLODON ELONGATUS, n. s.

*C. t. parva, tenuissima, maxime planata; parte antica minore, excurvata; ventraliter valde excurvata, postice maxime elongata, rostro angustiore; dorsaliter valde incurvata: intus, v. dextr. dente post. satis longo; d. centrali prælongo, postice flecto, cicatricem adductoris parum superante; d. antico minore: v. sinistr. cartilagine valde elongata, postice sita; d.*



*centrali prælongo, postice flecto; d. antico minore a margine remoto, lamina totius longitudinis ad centralem juncto.*

Long. .65, lat. .3, alt. .05 poll.

*Hab.* in China et Borneo (*Mus. Cuming.*).

This species is the Eastern representative of *P. rostrata*, as is *C. delicatulus* of *P. obtusa*. It has the reverse dentition, the central tooth being very long, and the anterior short, bridged over to meet it at the whole length. In the Borneo shell, which is larger, the anterior tooth is rather longer, with the front margin of the ceiling more incurved; but the differences are probably due to increased age only.

4. CÆLONDON FLEXUOSUS, Sby. (*Pandora f.*), Sp. Conch. f. 13, 14, 15; Hanl. Rec. Shells, p. 49 (diagn. auct.).

*... cardine v. dextra dente postico prælongo, a margine separato, usque ad cicatr. adduct. porrecto; fossa cartilaginea curta, inter dentes post. et centr. sita; d. centr. curtissimo, maxime extante, retrorsum deflecto; d. ant. minimo, pene obsoleto: v. sinistr. sulco prælongo postico; fossa cartilaginea separata, curtioire; d. centr. extante, curtissimo, supra cavernam pyriformem, in dentem anticum usque ad cicatr. adduct. prolongatum, porrecto.*

This long-known but rare Red Sea species is to *Pandora* what *Trisis* (Gray) is to *Arca*. It is swollen and twisted, and, by its long clavicle, forms an interesting transition to *Clidiophora*.

4 a. ? CÆLONDON UNGUICULUS, Sby. (*Pandora u.*), Sp. Conch. f. 16, 17; Hanl. Rec. Shells, p. 49.

The type has not been found of this species, which was described from a convex valve only. It clearly belongs to the same section as *C. flexuosus*, and, though the shape is somewhat different, perhaps it is only a variety.

#### Genus PANDORA, Lam.

It is proposed to limit this genus according to the diagnosis of Sowerby, founded on Lamarck's. Succeeding naturalists have adopted the diagnosis, while they have included in it species to which it did not apply\*. It presents a very simple type of hinge, as though the Pandorid idea were gradually fading away towards *Myodora*. The *P. wardiana* is the finest species in the group; but it is scarcely typical, having the radiating grooves of the section *Kennerlia*. The Lamarckian type is the *Tellina inæqualis* of Linnæus.

1. PANDORA ROSTRATA, Lam., Forbes & Hanl. et auct. plur. = *P. inæqualis*, Linn., Gray, Add.

\* Chenu, however (Man. Conch. ii. p. 51), gives an original and extended diagnosis, in which he accredits to the whole genus "une dent triangulaire, aplatie, bifurquée, dont la portion antérieure, plus longue, se prolonge jusqu'à l'impression musculaire antérieure"—a character which only belongs to the section *Cæledon*.

2. PANDORA OBTUSA, Lam., auct.

3. PANDORA BREVIFRONS, Sby., Sp. Conch. f. 25, 26; P. Z. S. 1835, p. 93.

4. PANDORA CISTULA, Gld. Otia, p. 77.

This species is not quoted in the index to the E. E. Moll., but appears in the text (p. 396) and in the Atlas (f. 500). In shape, but not in texture, it resembles *P. oblonga*.

5. PANDORA OBLONGA, Sby., Sp. Conch. f. 10; Hanl. Rec. Shells, p. 49.

The unique type of this species, from Humphrey's collection, has not been found; it was not described in the P. Z. S., and very closely resembles *P. rostrata*.

6. PANDORA RADIATA, Sby., P. Z. S. 1835, p. 24; Sp. Conch. f. 23, 24.

7. PANDORA WARDIANA, A. Ad. P. Z. S. 1859, p. 487.

No ossicle has been observed in any of the above species. If it be found hereafter in living specimens of the grooved *P. radiata* and *P. wardiana*, they should be removed to the subgenus. The group is not local, as appears to be the case with *Coclodon* and *Clidiophora*, being found in both hemispheres and on both sides of the equator.

#### Subgenus KENNERLIA\*.

*Pandora cartilagine ossiculo tenuiore instructa; lamina exteriore prismatica valvæ planatæ radiis plerumque insculpta.*

The typical species have radiating grooves in the exterior prismatic layer of the right valve. These have not been observed in *K. glacialis*, but perhaps the specimens are somewhat decorticated. The essential character is the possession of an ossicle. This is well developed in *K. glacialis*, but so thin in the other species that it is often hidden in dried shells by the contraction of the cartilage. The first species in which it was observed (Dr. Kennerley having sent several fresh specimens, preserved in alcohol, to the Smithsonian Institution) was

1. KENNERLIA FILOSA, n. s.

*K. t. tenui, planoconvexa, maxime rostrata; marginibus dorsalibus rectis, ad angulum circ. 160°; ventrali regulariter et modice excurvato, postice vix sinuato; epidermide olivacea, plerumque erosa, postice corrugata; lamina externa prismatica spongiosa; valva planata radiatim sulcata (quasi filosa), sulcis distantibus; valva convexa, costa obtusissima postice decurrente;*

\* Named in grateful remembrance of the services rendered to science by the late Dr. Kennerley, the naturalist to the American N. Pacific Boundary Survey; whose premature death has interrupted, almost at the onset, our knowledge of the dredging-fauna of Puget Sound.

*lineis seu undis incrementi conspicuis : intus dente cardinali uno, parvo, extante ; callositate claviculoidea antica, margini contigua ; fossa cartilaginea postice sita ; cicatricibus adductorum rotundatis, margini dorsali contiguis ; linea pallii simplicis.*

Long. .8, lat. .4, alt. .12 poll.

*Hab.* in sinu Pugetiano (*Kennerley*).

2. *KENNERLIA BICARINATA*, n. s.

*K. t.* "*K. filosa*" simili, sed haud rostrata ; postice latiore ; carinis in valva convexa duabus, in valva planata una, ex umbo-nibus postice decurrentibus ; lamina prismatica radiatim sulcata, haud spongiosa ; valva convexa tenuiter indentata ; ligamento elongato, tenuissimo.

Long. .5, lat. .25, alt. .06 poll.

*Hab.* in insula Catalina, Californiae ; 40-60 uln., rara (*Dr. J. G. Cooper*. State Geological Survey Coll. no. 1063 ; Mus. Smithsonian Inst.).

The shape and keels at once distinguish this beautiful little species from its Northern ally, with which, in the hinge and threading of the outer layer, it exactly agrees. The ligament in both species is extremely thin, holding the valves together from the umbo to the posterior end. The fossil *Pandora bilirata*, Conr., may prove identical with this recent species ; but the diagnosis, figure, and type specimen are so imperfect that it would be too hazardous to affiliate them.

3. *KENNERLIA GLACIALIS*, Leach (*Pandora gl.*), Sby. Sp. Conch. f. 4, 5, 6 ; Hanl. Rec. Shells, p. 49 (diagn. auct.).

*. . . valva dextra callo conspicuo fossam cartilagineam firmante ; ossiculo fortiore.*

The known species of *Kennerlia* are thus confined to the North Pacific and the Arctic seas. The diagnosis of No. 1 belongs to a paper on Dr. Kennerley's new species in the Journ. Ac. N. S. Philad. ; and that of No. 2 to a series of papers on Dr. Cooper's new species in the Proc. Calif. Ac. N. S. They are inserted here to complete the monograph, as far as known to the writer. The "*Pandora striata*, Quoy" (Add. Gen. ii. p. 371), is a *Myodora*. The latter genus is so well defined that no alteration is proposed in it.

4. DESCRIPTIONS OF SEVEN NEW SPECIES OF LAND SHELLS, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

1. *HELIX PEASEANA*, Pfr. (172 c). *T. perforata, turbinata, solidula, irregulariter striata, et striolis antrorsum descendentibus confertissimis sculpta, vix nitidula, fusculo-carnea, maculis et punctis corneis irregulariter notata et fascia unica supra-*

*peripherica obsoleta ornata; spira regulariter conoidea, apice obtusula; anfr. fere 6, vix convexiusculi, sensim accrescentes, ultimus subangulatus, non descendens, subtus convexior; apertura fere diagonalis, subangulato-lunaris, intus submargaritacea; perist. simplex, rectum, marginibus vix conniventibus, columellari juxta perforationem breviter fornicato-reflexo.*

Diam. maj. 37, min. 32, alt. 23 mill.

*Hab.* in insula Timor.

2. *HELIX ZONELLA*, Pfr. (1106 a). *T. subanguste umbilicata, depressa, solidula, conferte ruguloso-striata, pallide fuscula, zona mediana albida (sæpe rufo marginata) cincta; spira convexa, parum elata; anfr. 5½, convexiusculi, ultimus rotundatus, antice vix descendens; apertura obliqua, lunato-rotundata, intus margaritacea; perist. simplex, marginibus convergentibus, supero recto, basali breviter reflexo, ad insertionem dilatato.*

Diam. maj. 15, min. 13, alt. 8 mill.

*Hab.* in White Mountains, 6500', insulæ Cretæ (Capt. Spratt).

3. *CLAUSILIA GLABELLA*, Pfr. (82 a). *T. arcuato-rimata, fusiformis, gracilis, interdum ventrosior, solida, sublævigata, irregulariter striatula, nitidula, alba, locis detritis cornea; spira elongata, apice luteo-cornea, acuta; anfr. 13-14, vix convexiusculi, ultimus subsolutus, antice rugoso-costatus, basi obtuse bicristatus; apertura parum obliqua, piriformis, intus carnea; lamella supera minuta, infera subverticaliter ascendens; lunella et plica columellaris inconspicuæ; plica palatalis 1, supera, mediocris; perist. continuum, subæqualiter expansum et reflexiusculum.*

Long. (formæ typicæ) 20, diam. 4 mill.

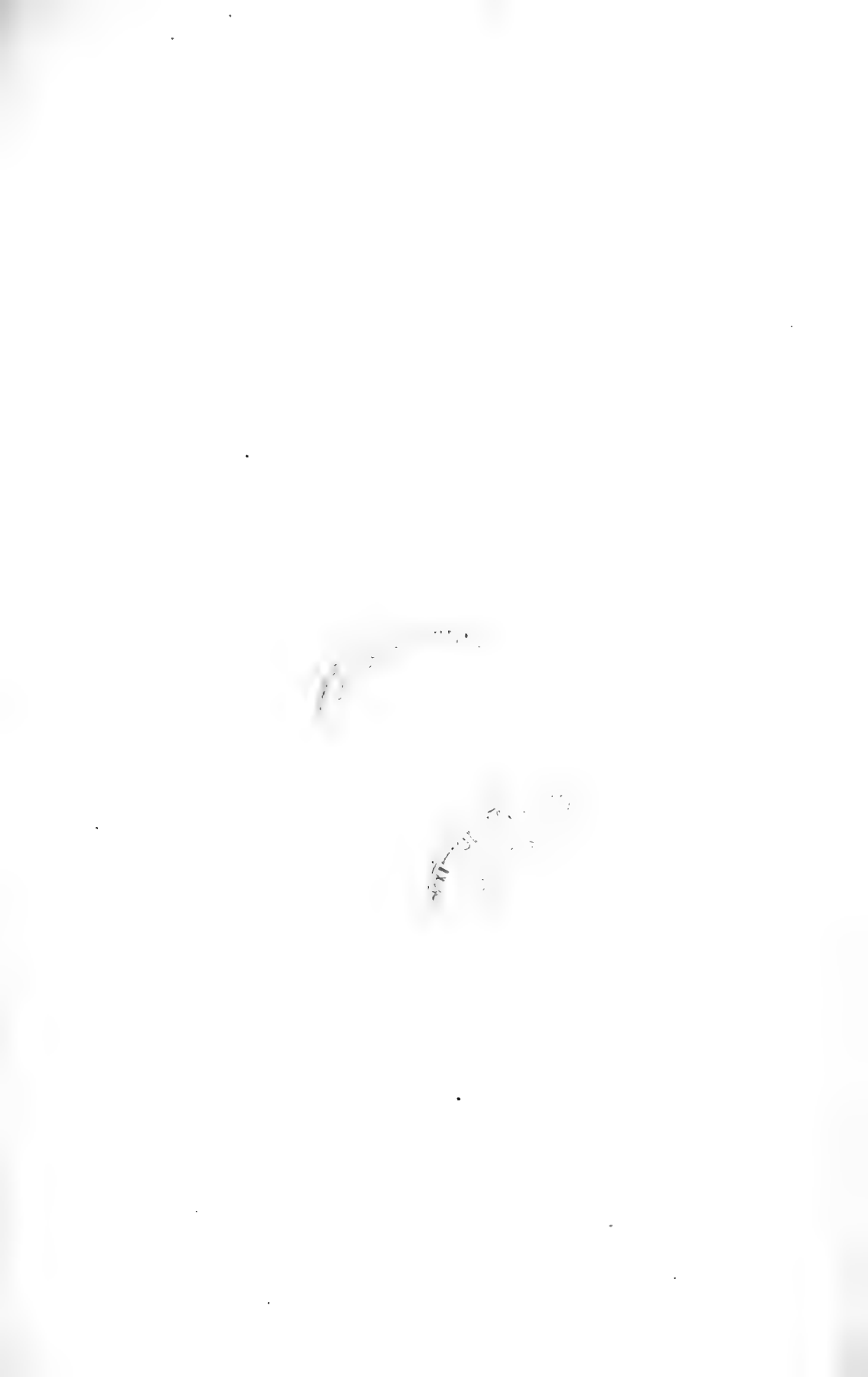
*Hab.* in White Mountains, 5000', insulæ Cretæ (Spratt).

4. *CLAUSILIA EXTENSA*, Pfr. (94 a). *T. subarcuato-rimata, fusiformi-subulata, solida, cretacea, opaca, costulis subrectis confertis munita; spira perelongata, apice acutiuscula, nigra; sutura levissima, costulis subcrenulata; anfr. 15-16, apicales convexi, reliqui planiusculi, ultimus breviter solutus, antice costis validioribus, distantioribus, hinc inde confluentibus, basi crista brevi munitus; apertura parum obliqua, oblonga; lamellæ tenues, approximatae; lunella et plica subcolumellaris inconspicuæ; plica palatalis unica; perist. continuum, album, undique expansum et reflexiusculum.*

Long. 28, diam. 4½ mill.

*Hab.* in Sitra insulæ Cretæ (Spratt).

5. *CLAUSILIA TENUICOSTATA*, Pfr. (100 b). *T. arcuato-rimata, fusiformis, solidula, costis tenuibus subarcuatis sculpta, cretacea; spira a medio attenuata, apice cornea, acutiuscula; anfr. 11-12, subplani, ultimus vix solutus, antice validius costatus, basi subbicristatus; apertura vix obliqua, piriformi-oblonga, intus fuscula; lamella supera filaris, infera fortior,*





J. Jennens. lith.

M. & N. Hanhart, imp.

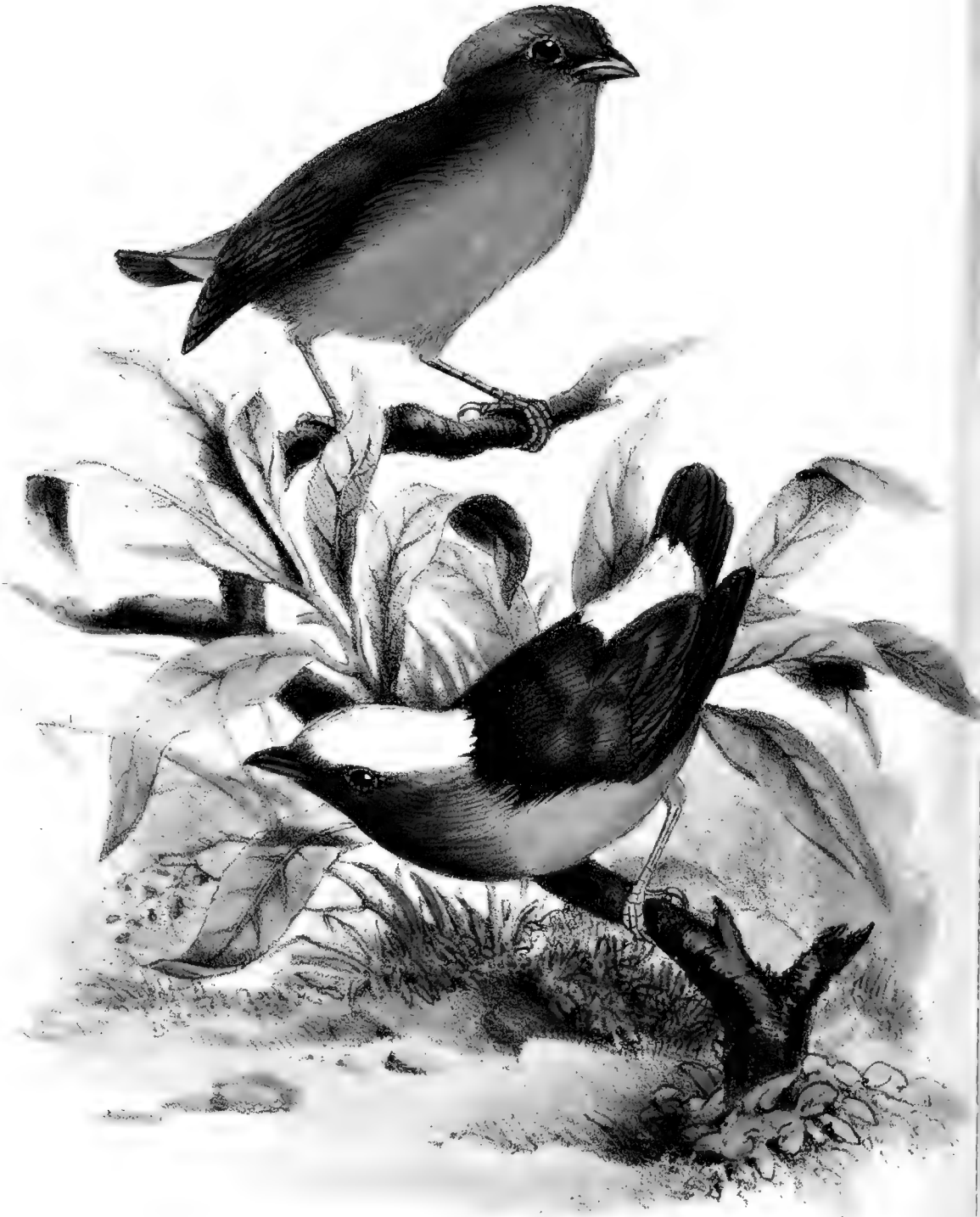
GRANATELUS P. MELLI











J. Jennens lith.

M. & N. Hanhart, imp.

PIPERA HATTBERGII

*oblique ascendens; lunella et plica subcolumellaris inconspicua; plica palatalis 1, profunda; perist. continuum, tenue, undique breviter expansum.*

Long. 15, diam.  $3\frac{2}{3}$  mill.

*Hab.* in Mirabello et Selino insulæ Cretæ, necnon in insula Gardos prope Cretam (*Spratt*).

6. *CLAUSILIA RUDIS*, Pfr. (108 a). *T. arcuato-rimata, ventroso-fusiformis, solida, costulis subconfertis lamellaribus munita, opaca, sordide albida; spira infra medium turgida, sursum valde attenuata, apice acutiuscula; anfr. 11, convexi, ultimus vix solutus, costis validis, distantibus, irregularibus sculptus; apertura vix obliqua, piriformi-ovalis; lamellæ subæquales, convergentes; lunella et plica subcolumellaris inconspicua; plica palatalis 1, supera, mediocris; perist. continuum, album, sublate expansum.*

Long. 17, diam. max. fere 5 mill.

*Hab.* Zakro in parte orientali insulæ Cretæ (*Spratt*).

7. *CLAUSILIA DISTANS*, Pfr. (113 a). *T. rimata, elongato-fusiformis, solidula, costis lamellaribus subdistantibus sculpta, in interstitiis sub lente confertissime striata, cretacea; spira perelongata, gracilis, apice acuta, cornea; anfr. 13-15, vix convexiusculi, ultimus breviter solutus, costis validioribus basi in cristam indistinctam confluentibus munitus; apertura vix obliqua, oblonga, intus alba; lamellæ approximate; lunella et plica subcolumellaris inconspicua; plicæ palatales 2, supera longa, infera brevis, profunda; perist. album, latiuscule expansum.*

Long. 20-24, diam.  $3\frac{3}{4}$ -4 mill.

*Hab.* Sudsuro in parte meridionali insulæ Cretæ (*Spratt*).

5. DESCRIPTIONS OF SEVEN NEW SPECIES OF BIRDS DISCOVERED BY THE LATE DR. JOHN NATTERER IN BRAZIL. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plates XXXVII., XXXVIII., XXXIX.)

During a recent visit to Vienna I had the pleasure of spending a few days in examining the collections of birds and other animals belonging to the Imperial Zoological Cabinet in that city, wherein I may state that I received the utmost facilities from Dr. Redtenbacher (the Director), Herr August von Pelzeln (who has charge of the collection of birds), and the other authorities of that establishment.

The Director of the Imperial Cabinet, moreover, was so obliging as to allow me to acquire in exchange a certain number of duplicate bird-skins from the Imperial Collection, belonging principally to spe-

cies collected by the late Dr. Johann Natterer during his lengthened sojourn in various parts of the Brazilian empire. Since my return to this country I have carefully compared these with the tolerably full series of skins of American birds in my own collection. The result has been that I have found amongst them several new and very interesting species, which I now propose to describe under the names attached to them (where such have been given) by the late Dr. Johann Natterer in his catalogue.

In order to make my notices of these undescribed species more complete, Herr v. Pelzeln has kindly supplied me with extracts from Natterer's MS. Journal, giving the particulars concerning each specimen, noted at the time it was obtained, as to locality, habits, and the coloration of the soft parts.

1. GRANATELLUS PELZELNI, sp. nov. (Pl. XXXVII. fig. 1.)

"*Tanagra*, sp. no. 793," Natt. MS.

*Supra plumbeus, pileo et capitis lateribus nigris: vitta post-oculari utrinque lata et corpore subtus albis: pectore toto, ventre medio et crisso rosaceo-rubris: alis et cauda nigricantifuscis, immaculatis: rostro plumbeo, tomis pallescentibus: pedibus corylinis.*

Long. tota 4·5 poll., alæ 2·0, caudæ 2·0.

*Hab.* in ripis fl. Madeira in imp. Brasil.

*Mus.* Vindob. et P. L. S.

This pretty little bird makes a third species of the genus *Granatellus* (Bp. Consp. p. 312), which thus has its area extended into South America—the only two previously known species being from Mexico. It has the same general coloration as the two older species, but may easily be distinguished from *G. venustus* (which it most nearly resembles) by the want of the narrow black breast-band and the outer rectrices not being tipped with white, and from *G. sallæi* by its white throat.

Examples of this *Granatellus* were obtained by the late Johann Natterer at Destaramento do Ribeirão, on the river Madeira, in Sept. 1829.

The following extracts are from Natterer's notes on this bird, which bears the no. 793 in his Catalogue.

"Destaramento do Ribeirão, am Flusse Madeira, 17 Sept. 1829, im Walde; Einzeln: Iris dunkelbraun, Rücken und Spitze des Oberschnabels schwarz, der übrige Theil und der Unterschnabel so wie die Füße schön blaugrau, Zehen dunkelgrau. Die Nasenlöcher sind frei, unbedeckt und rund."

"Destaramento do Ribeirão, 19 Sept. 1829, aus dem nahen Wald, auf niederen Bäumen; es war ein Paar. Weibchen in der Mause. Iris dunkelbraun, Schnabel und Füße wie am Männchen."

As Natterer has left this species unnamed, I propose to call it after my friend Herr August von Pelzeln, Assistant in the Imperial Zoological Collection of Vienna, who has done so much towards unveiling to naturalists the long-hidden treasures of that remarkable collection.

The males of the three known species of *Granatellus* may be diagnosed as follows:—

(1.) GRANATELLUS VENUSTUS, DuBus, MS.; Bp. Consp. p. 312: *gula alba; reatricum externarum apicibus albis.* Ex Mexico.

(2.) GRANATELLUS PELZELNI, mihi: *gula alba; pileo nigro; reatricibus concoloribus.* Ex Amazonia.

(3.) GRANATELLUS SALLÆI, Sclater, P. Z. S. 1856, p. 292, pl. 120, et 1859, p. 374: *gula ardesiaca; pileo dorso concolore; reatricibus concoloribus.* Ex Mexico merid.

The figure of *G. venustus* (Pl. XXXVII. fig. 2) is an exact copy of the figure of this species given by the Vicomte DuBus in the unpublished plate (pl. 34) of his 'Esquisses Ornithologiques,' a copy of which (as I have already mentioned in these Proceedings\*) has been obligingly sent to me by the author.

I have never yet met with an example of this species, as I believe that the imperfect specimen in the British Museum spoken of by me (P. Z. S. 1859, p. 375) belongs probably to *G. pelzelni*.

## 2. TANAGRA OLIVINA, Natt. MS., no. 657.

*Cinerascenti-olivacea, alis caudaque fuscis, dorsi colore marginatis, subtus dilutior; loris, oculorum ambitu, gutture et abdomine medio flavido indutis: rostro plumbeo, ad basin pallidiore: pedibus fuscis. Sexus similes.*

Long. tota 6·5, alæ 3·2, caudæ 3·0.

*Hab.* in prov. Brasiliana Cuyaba.

*Mus.* Vindob. et P. L. S.

*Obs.* Affinis *T. striatæ* quoad formam, et hujus specimini juniore coloribus haud dissimilis, attamen sane diversa, et species optima, sexuum simili pictura, et colore gulæ et abdominis flavescente distinguenda.

Herr von Pelzeln furnishes the following extract concerning this new and interesting species of true *Tanagra*, which was obtained by Natterer, in 1824, in Cuyaba, and named by him *Tanagra olivina*.

“Cúyaba 1 Juli 1824, Männchen, scheint alt, nicht in der Mause. Iris dunkelbraun; Schnabel ziemlich gewölbt, bläulich aschgrau, die Spitze bis gegen die Hälfte schwarzgrau. Nasenloch linienförmig, horizontal, an beiden Enden aufwärts gebogen, mit häutigem Deckel. Füße graulichschwarz.”

## 3. SPERMOPHILA PILEATA.

*Pyrrhula pileata*, Natt. MS., no. 666.

*Lacteo-alba, subtus pura, supra cineraceo adumbrata; pileo, alis et cauda nigris: speculo alari albo: secundariorum externorum marginibus angustis dorso concoloribus: rostro nigro: pedibus obscure carneis.*

\* P. Z. S. 1859, p. 375.

Long. tota 4·2, alæ 2·5, caudæ 1·75.

*Hab.* Borda do Matto, in imp. Brasil.

*Mus.* Vindob. et P. L. S.

*Obs.* Affinis *S. aurantiæ*, sed corporis colore sane diversa.

Dr. Natterer met with this distinct species of *Spermophila* at Borda do Matto, in November 1822. He remarks in his MS. that it is like his no. 282 (*S. aurantia*) in form, but decidedly different, although he at first confounded them together. He met with the first examples near San Paolo, upon the water-plants of the morass of the Tamandataky.

Natterer obtained specimens of at least eight species of this group of Finches, namely,

1. *S. cinerea*, Lafr. et d'Orb., no. 465, Natt. MS., Ytcorare.
2. *S. mysia* (Vieill.), no. 763.
3. *S. castaneiventris*, Cab., no. 883, Borba.
4. *S. minuta* (Linn.), no. 469, Curytiba.
5. *S. cinnamomea*, Lafr., no. 1206, Enganho di Gama & Matogrosso.
6. *S. pileata*, no. 666, Borda do Matto.
7. *S. aurantia* (Gm.), no. 282, Thaubaté.
8. *S. nigro-rufa* (Lafr. et d'Orb.), no. 759, Pornte.

#### 4. POOSPIZA OXYRHYNCHA.

*Emberiza oxyrhyncha*, Natt. MS., no. 457.

*Supra pallide fusca, capite cinerascentiore, superciliis angustis pallide fulvis; interscapulio nigricante brunneo striato; alis caudaque fuscis, marginibus externis pallidioribus: subtus pallide ochracea, pectore summo in cinnamomeum trahente: rostro nigro; pedibus carneis.*

Long. tota 5·3, alæ 2·5, caudæ 2·6.

*Hab.* in prov. Brasiliana Curytiba.

*Mus.* Vindob. et P. L. S.

This is a typical *Poospiza*, allied to *P. thoracica*, *P. nigro-rufa*, *P. cinerea*\*, but distinct in colouring from any species with which I am acquainted. The tail is much rounded, the outer rectrices being 0·8 in. shorter than the medial. The tail-feathers are much worn at the points in my specimen. Dr. Natterer's MS. Journal contains the following particulars relative to the species, which bears his number 457:—

“Curytiba,  $\frac{3}{4}$  October 1820, in Campo, in niederem Gesträuche, altes Männchen. Iris dunkelbraun, Schnabel schwarz, Füße dunkelbraungrau, die Tarsen mit Röthlich überzogen.” . . . “Altes Männchen, Curytiba, 28 Nov. 1820, halt sich am Rande der Wälder auch an Morästen auf niederem Gebüsch auf, setzt sich auch auf etwas höhere Bäume; singt laut, nicht angenehm. Iris dunkelbraun, Schnabel schwarz. Nasenlöcher länglich, aber mit einem häutigen Deckel. Zunge knorpelig, an der Spitze zweitheilig, Füße dunkelgraubraun.”

\* Bp. Consp. p. 472.

5. *HYPOCNEMIS FLAVESCENS*, sp. nov.

*Formicivora flavescens*, Natt., no. 857.

*Supra cinerea, capite nigro, loris, superciliis et stria mediali albis; cervicis lateribus et interscapulio albo nigroque variegatis: macula interscapulari celata, alba: subtus alba, pectore sulphureo, hypochondriis et ventre imo cum crisso rubiginoso-rufis: alarum tectricibus nigricantibus, omnibus macula apicali fulvescenti-alba ornatis: remigibus et rectricibus fuscis, his macula apicali vix conspicua terminatis: rostro superiore nigro, inferiore albo; pedibus pallidis.*

Long. tota 4·5, alæ 2·2, caudæ 1·7.

*Hab.* in reg. Amazonicâ, Marabitanas.

*Obs.* Affinis *H. cantator* (Bodd.), sed pectore flavo facile distinguenda.

This Ant-thrush, which is of the same form as, and nearly allied to, *H. cantator* (Pl. Enl. 700), was obtained by Natterer at Marabitanas, on the Rio Negro. The sexes are coloured alike.

6. *PTEROPTOCHUS THORACICUS*, sp. nov. (Pl. XXXVIII.)

*Supra fulvo-brunneus, dorso saturatiore; et hujus postici plumis laxis elongatis, pallido fulvo et nigro vix conspicue transvittatis: alarum tectricibus albo maculatis, fascia submarginali nigricante: subtus albus; pectore sulphurascente, plumis mediis pallido-rufis terminatis, plagam pectoralem formantibus: loris, superciliis et lateribus cervicis albo nigroque variegatis; pectore laterali cum ventre toto brunneis, albo nigroque squamulatis: remigibus et rectricibus fere unicoloribus fuscis; secundariorum externorum marginibus dorso concoloribus: rostro superiore nigro, inferiore albo; pedibus corylinis.*

Long. tota 6·6, alæ 3·0, caudæ 3·0, tarsi 1·1, rostri a rictu 0·8.

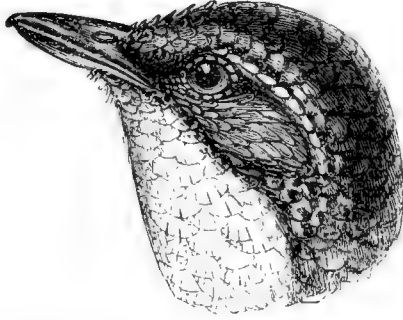
*Hab.* Amazoniam in ripis fl. Madeira.

*Mus.* Vindob. et P. L. S.

*Obs.* Species affinis *P. albicollis*, sed crassitie minore, rostro breviori, culmine recto, gonyde ascendente et macula pectorali conspicue distincta.

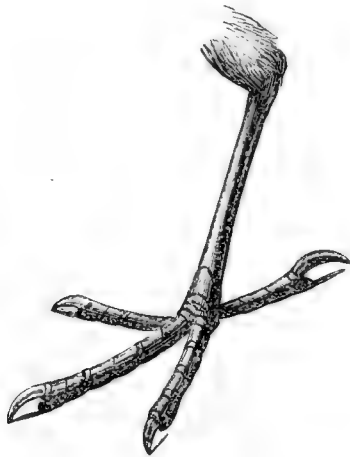
This bird forms a most interesting addition to the family *Pteroptochidæ*, and is, I believe, the first species of the genus found within the limits of the Brazilian Empire. In general colours it approaches nearly to *P. albicollis* of Chili, but is readily known by the pure-white breast and mid-belly and the curious pectoral spot. It is also considerably smaller in size, and rather smaller than *P. rubecula*—hitherto the smallest known species of the genus. The bill is differently shaped from that of *P. albicollis* or any of its allies: it is short and straight, the culmen being straight nearly to the extremity, and the gonyes curved upwards rather rapidly towards the point. It is compressed much as in *P. albicollis*. The tarsi are rather shorter and by no means so strong as in *P. albicollis*, and their anterior surface, as far as I can judge from my single specimen (the feet of which are not in very good order), nearly smooth, the divisions of

the scutella being obsolete, if not imperceptible. The claws are short and curved, as in other members of the genus. The wings are short and rounded, the fifth, sixth, seventh, eighth, and ninth primaries being nearly equal and longest. On the whole, the form is subgenerically (if not generically) distinct, and may stand as a separate section (for which I propose the name *Liosceles*\*) to connect *Pteroptochus* with *Agathopus*.



The late Dr. J. Natterer obtained his specimens of this bird at Salto do Girao, on the left bank of the Rio Madeira, in Oct. 1829. They were found on the ground in the forest. The following are his notes, as kindly communicated to me by Herr von Pelzeln:—

“Die Nasenlöcher haben einen stark erhabenen, ovalen, häutigen Deckel. Keine Barthaare. Iris dunkelbraun, die Augendeckel



graulichweiss. Der Schnabel ist schwarz, die Mundwinkel und die unterste Hälfte des Unterschnabels (der Länge nach) sind graulichweiss. Füße dunkelbraun, die innere Seite der Tarsen samt der oberen Seite der mittel- und inneren Zehen hautfarben, die Zehen aber ins Dunkelbraune übergehend, Klauen dunkelbraungrau. Der Schwanz sehr keilförmig.”

\* λείος, lævis, et σκέλος, crus.



7. *PIPRA NATTERERI*, sp. nov. (Pl. XXXIX.)

♂. *Læte viridis, pileo et uropygio niveis: subtus flava, gutture in viridem transeunte.*

♀. *Viridis, pileo vix cyanescente; uropygio corpore concolore: subtus flavescenti-viridis; ventre medio flavo.*

Long. tota 3·0, alæ 2·0, caudæ 1·0.

*Hab.* in imp. Brasiliensi, Borba et Enganho do Gama (*Natt.*).

*Mus.* Vindobonensi et P. L. S.

Natterer collected four examples of this beautiful species of Manakin (which is no. 737 of his MS. Catalogue) at Borba in January 1830—one male and four females. A skin previously obtained at Enganho do Gama, in August 1826, may probably be referable to the female of the same species, but differs slightly in having the crown less bluish.

*Pipra nattereri*, as I propose to call this bird, with Herr von Pelzeln's approbation (since its indefatigable discoverer left it unnamed), may be placed near *Pipra isidori* and *P. serena*. It is easily known, however, by its green body-colour and pure-white cap and rump. Herr von Pelzeln has kindly allowed me to acquire one of the females from Natterer's series, while a coloured sketch of the male kindly forwarded to me by the same obliging friend enables me to have the other sex represented in the accompanying plate.

The following extracts are from Natterer's MS. Journal, and relate to this species:—

“Weibchen, Enganho do Cap Gama, 10 August 1826, im hohen Wald, auf niederen Bäumen. Iris schmutzigweiss, Oberschnabel schwarzgrau, der Rand desselben (die Schneide) samt dem Unterschnabel hellgrau, Füße hellgelblichbraun, Klauen etwas dunkler. Dieses Weibchen unterscheidet sich von jenem von Borba durch den Mangel des bläulichen Scheitels und könnte vielleicht zu einer anderen Art gehören.

“Männchen (nicht in der Mause), Borba, Jänner 1830, aus dem Urwald. Iris schmutzigweiss. Der Rücken des Oberschnabels graulich schwarz, der Rand desselben und der Unterschnabel hellbläulichgrau. Die Füße sind hellgelblichbraun, Klauen grau. Der ganze Scheitel und Unterrücken blendend Weiss mit Seidenglanz, röthlich opalisirend.

“Weibchen alt, Borba, 9 Februar 1830, aus dem Urwald, einzeln. Iris schmutzigweiss. Oberschnabel graulichschwarz, der Rand desselben und der Unterschnabel blaugrau. Füße hellgelblichgrau. Die Klauen viel blässer, fast hautfarben.”

## 6. NOTES ON THE CRANIA AND DENTITION OF THE LEMURIDÆ.

By ST. GEORGE MIVART, F.L.S., LECTURER ON COMPARATIVE ANATOMY AT ST. MARY'S HOSPITAL.

Dr. Peters, in his ‘Reise nach Mossambique,’ has given a careful description, accompanied by excellent illustrations, of three small species of this family. Dr. Gray, in an interesting paper (revising

the species of Lemuroid animals and describing some new species) which was read before the Zoological Society in April 1863, has called attention to various details connected with the dentition and cranial structure of many species of *Lemuridæ*. Finally, Professor Huxley, in June last, in his careful and elaborate description of a great part of the anatomy of *Arctocebus calabarensis* (also read before the Zoological Society), noticed incidentally several very significant details regarding the dentition of the larger part of the family.

But much confusion still hangs over the definition and arrangement of the smaller forms of *Lemuridæ*—so much so, that any contribution tending towards the elucidation of these obscurities may perhaps be considered not altogether useless.

The genus *Hapalemur* (established by M. Isidore Geoffroy St.-Hilaire\*) is one about which, fortunately, there can be no doubt or ambiguity whatever.

It is represented in the national collection by two fine skins which were described by Dr. Sclater† under the name *Hapalolemur griseus*. A skull, extracted from one of them, is also preserved in the British Museum. The *Lemur griseus* of Geoffroy St.-Hilaire undoubtedly belongs to this genus (as Dr. Gray has determined), and also the *Cheirogaleus griseus* of Van der Hoeven, who has given an admirable representation of the skull and dentition‡. M. Gervais has also figured the dentition and external form§.

Dr. Gray gives as characters of this genus:—"Feet short and broad; cutting teeth  $\frac{2-2}{6}$ , the upper ones behind the other on each side, crowded on the inside of the canine. Ears short and hairy. Tail elongate, hairy. Hinder limbs much longer than the front ones."

In addition to these characteristics, however, other points of structure separate this form, in a very marked manner, both from the *Lemur milii* of M. de Blainville (with which it is associated by Van der Hoeven) and from De Blainville's *Lemur furcifer* (which is placed in the same genus with it by Dr. J. A. Wagner||), and indeed from every other genus¶ of the family to which it belongs.

The skull has the facial portion short, the cranium rounded and, as in *Lemur*, widest between the posterior roots of the zygomata.

There is on each side a small but distinct paroccipital process, which is laterally compressed and pointed at its extremity. In the only skull I have had the opportunity of examining, that at the British Museum, the sutures were remarkably obliterated, the nasal and the naso-maxillary sutures being all but undistinguishable. The præmaxilla, however, appears to be exceedingly small, so much so as

\* Catalogue Méthodique, Primates, 1851, p. 74.

† Proc. Zool. Soc. 1863, p. 161.

‡ Tijdschrift voor Natuurlijke Geschiedenis, 1844, pl. 1. fig. 1 a, b, c, d, & e.

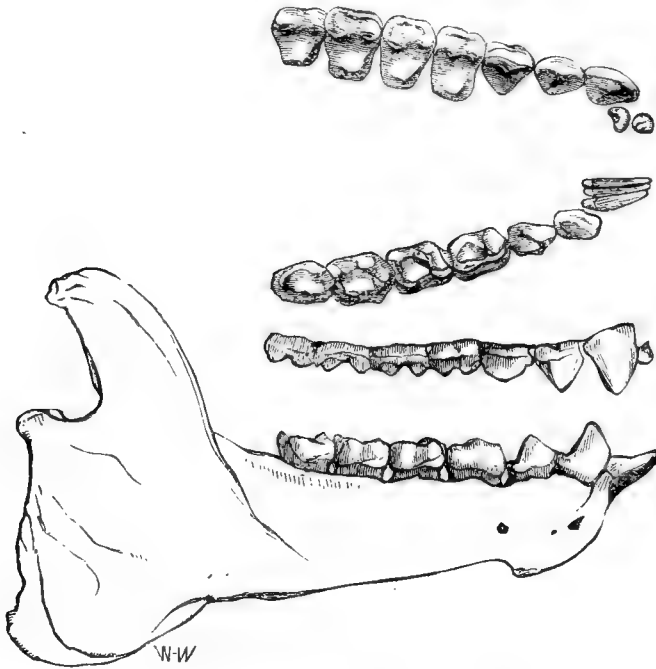
§ Hist. Nat. des Mammifères, 1854, vol. i. p. 169.

|| Säugethiere, Supplementband, 5te Abtheilung, 1855, p. 148.

¶ Dr. Dahlbom makes it only a subgenus of *Lemur*. (Vide 'Studia Zoologica,' p. 220.)

to be almost completely hidden by the canine when the skull is viewed laterally\*.

The bony palate is not produced backwards, the middle or most anterior point of its hinder margin being in a line with the middle of the last molar. The pterygoid-fossa is large. There is no conspicuous foramen for the internal carotid on the *basis cranii*, as there is in *Galago*, *Perodicticus*, and others. Beneath the outer part of the inferior margin of the orbit there is a large malar foramen.



*Hapalemur*. Scale,  $1\frac{1}{2}$  nat. size.

The mandible is perhaps the most characteristic † part of the bony framework of the head of *Hapalemur*. The angle is produced downwards, backwards, and somewhat inwards, as much as, or even more than, in the genus *Indris*.

The symphysis is very convex from above downwards, and the coronoid process is exceedingly produced.

The dentition of *Hapalemur* is quite peculiar. From the small size of the canine above and of the first premolar below, and the pretty equal vertical development of the premolars and molars, the whole series of teeth on each side of each jaw appears, when viewed laterally, remarkably uniform and equal—more so than in any other

\* This is not quite so in Van der Hoeven's figure, but in it the skull is not represented exactly in profile.

† M. Isid. G. St.-Hilaire, in his 'Catalogue des Primates,' p. 75, says that the mandible of his *H. olivaceus* is "d'une forme notablement différente dans sa partie postérieure." Unfortunately he does not add *how* it differs.

genus of the family, except perhaps *Microrhynchus*, with which it also agrees in presenting no diastema posterior to the two teeth above mentioned\*. When the grinding-surfaces of the upper teeth are looked at, the equality in size, from before backwards, of each dental series is absolutely greater than in any other genus of *Lemuridæ*.

The upper incisors are subequal and very small, and are, as Dr. Gray has pointed out, placed one before the other on each side, so that the hinder one is quite hidden by the canine when the teeth are viewed laterally †.

The upper canines are small; the first upper premolar on each side has but one cusp, but is more vertically extended than is the second premolar—a character by which *Hapallemur* differs from *Lemur* and agrees with the Galagos, Slow Lemurs, and others.

The third premolar is exceedingly developed, being the largest tooth in the upper jaw, slightly exceeding the first and second molars in size. It quite resembles these in shape, both when viewed laterally and from below. Each of these teeth has two pretty equally developed external cusps, and an internal one which represents the antero-internal cusp of a quadricuspidate molar. The postero-internal cusp is almost obsolete, as also the oblique ridge. The cingulum is very marked externally, but internally it is quite rudimentary. The last upper molar is also tricuspid, and intermediate in size between the second true molar and the second premolar, but very nearly equal to the former; so that the three true molars and the third premolar are more equal one to another than even in *Galago alleni* ‡, and the greatest difference between any two contiguous grinding-teeth in the upper jaw is between the second and the third premolars.

The lower incisors and canines, which are much as in *Lemur*, are rather short, and not by any means as long as is the mandibular symphysis.

The first lower premolar is but little developed vertically; and the second has but one external cusp.

The third premolar § has two well-developed external cusps, and in size and form resembles the first inferior molar, which is quadricuspidate, as are the two teeth posterior to it—the four hindermost grinding-teeth below being subequal in size, like those above. As in the upper jaw, so also in the lower, the greatest difference between any two contiguous grinding-teeth is between the second and third premolars.

Another well-marked and distinct generic form is that which Dr. Peters has described and figured under the name *Microcebus myoxi-*

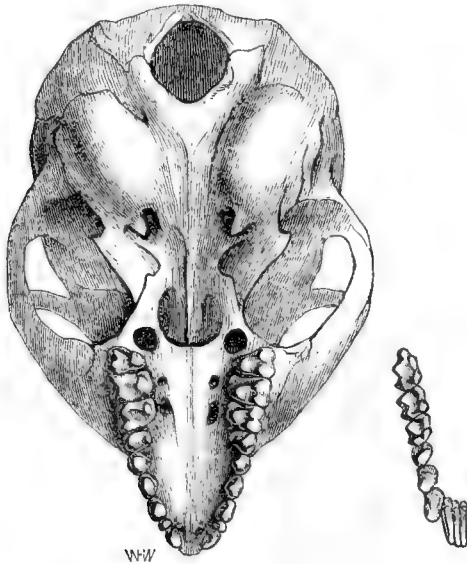
\* See De Blainville's 'Ostéographie,' *Lemur*, pl. 8.

† In Van der Hoeven's figure the hinder upper incisor is visible; but, as before remarked, in his plate the skull is not represented exactly in profile. In M. Gervais's two figures (*Hist. Nat. des Mamm.* p. 169), however, the second incisor on each side is represented as placed quite internally to the canine.

‡ Noticed by Prof. Huxley, see *ante*, p. 324.

§ In M. Gervais's figure (p. 169) the antero-external part of the second and third premolars appears to be prolonged forwards outside the postero-external part of the tooth next in front. This is not the case in the British Museum skull.

*nus*\*. A skull in the British Museum (which came from the Zoological Society's collection, and which is noticed and figured in Dr. Gray's memoir above quoted, under the name *Lepilemur murinus*)



*Microcebus minor* (*Lepilemur murinus* of Gray). Scale, twice nat. size.

certainly, as Dr. Gray remarks, "agrees well" with Dr. Peters's figure. It is in fact most undoubtedly of the same genus. The skin from which it was extracted, unfortunately, does not appear to be in the national collection; but there are two others considered by Dr. Gray to belong to the same species (though labelled *Galago minor*), and the dentition, in the only one of them in which the teeth are visible, agrees well, as far as it can be observed, with that of the skull just alluded to. Another small Lemur preserved in spirits in the British Museum (which also came from the Zoological Society's collection, and was named by Mr. Waterhouse† *Microcebus pusillus*, but which is labelled *Cheirogaleus smithii*, and described by Dr. Gray under that name‡) also closely resembles Dr. Peters's *Microcebus*, the only difference in dentition which could be observed depending, perhaps, on the animal not having reached maturity.

In this form the ears are large and the tarsus rather elongated. Unfortunately I have had no opportunity of ascertaining, myself, the proportions of the tarsal § bones; but this section of the foot appears to equal about one-third the length of the tibia.

With regard to the skull, Dr. Peters notices the absence of any inflation of the mastoidal region of the *periotic*, the prolongation of

\* Reise nach Mossambique, p. 13, and plates 3 & 4, figs. 6-9.

† Cat. of Mus. of Z. S., 2nd edit. p. 12, no. 89.

‡ Proc. Zool. Soc. 1863, p. 143.

§ "Die Länge des Fersenbeins ist gleich einem Drittel des Unterschenkels."  
—Reise nach Mossambique, p. 17.

the bony palate back somewhat beyond the last molar teeth, and the very large size of the posterior palatine foramen,—also a defect of ossification in the palate on each side anterior to the palatine foramen (the openings being closed by membrane), the presence of an interparietal bone, and the great size of the premaxillæ, which join the nasals for one-third of the latter's external margin.

He also calls attention to the pointed and hooked character of the angle of the mandible, and to its very long and backwardly inclined coronoid process. In all these characters the British Museum skull agrees with the figure and description given by Dr. Peters, except that the palate is not quite so prolonged (the most anterior point of the hinder margin being on a line with the posterior edge of the last molars), and that there are two defects of ossification, instead of one, on each side of the palate; moreover, the condition of the sutures does not admit of perfect certainty as to the extent of the line of union between the *nasals* and *præmaxillæ*, which nevertheless appears to be about such as Dr. Peters describes. I may add that it agrees with Dr. Peters's figure in the absence of a malar foramen, in the sharp production of the angle of the mandible backwards but not downwards, and in the small extent of the projection of the *præmaxillæ* forwards beyond the incisors, or of the nasals above the anterior *nares*, so that the outline of the lateral boundary of this opening is not deeply concave when the skull is viewed laterally.

The *sphenoidal fissure* and the *foramen rotundum* are represented by a single and very large opening.

The anterior end of the inferior surface of the *periotic* develops a very marked process.

As to the dentition, Dr. Peters's remarks and delineations quite agree with the characters offered by the teeth of Dr. Gray's *Lepilemur murinus*. For the anterior and internal pair of upper incisors are nearly double the size of the posterior and external pair, and both of one side are plainly visible when the skull is viewed laterally. The upper premolars have each but one large external cusp, and are about equal in vertical extent, the first premolar being at least equal, in this respect, to the second. The three upper molars have each two pretty equally developed external cusps, and a large antero-internal cusp, which is connected by an oblique ridge with the postero-external one\*, and bounded internally, except in the last molar, by a cingulum. The postero-internal cusp is very rudimentary or absent. The greatest difference between any two contiguous upper grinding teeth is between the third premolar and the first molar, which is the largest. The last molar, which is the smallest of the three, is considerably larger than the last premolar.

In the mandible the three premolars have also but one large external cusp each, the molars having each two such. The lower premolars slightly exceed in vertical extent the three molars, the first two of which (about equal in size) are quadricuspidate, while the fifth (the largest of the lower series of grinders) is distinctly quincuspid.

\* As noticed by Professor Huxley in *Arctocebus*: see *antea*, p. 322.

According to Dr. Peters, there are 13 dorsal, 7 lumbar, and 3 sacral vertebræ\*.

To this well-marked form Dr. Peters, as has been said, has applied the generic name *Microcebus*, and justly so if it belongs to the same genus as does the *Microcebus rufus* of M. Isid. G. St.-Hilaire (the *Lemur pusillus* of Geoffroy and *Rat de Madagascar* of Buffon), which is the type of that genus.

The skull and tarsus of Geoffroy's *Lemur pusillus* have been figured by M. de Blainville under the name *Lemur murinus*†, and the external form and dentition by M. Gervais.

Dr. Peters notices as distinctive characters of the *Lemur pusillus* of Geoffroy, as compared with his (Dr. Peters's) *Microcebus myoxinus*, "much shorter ears, not half the length of the head; longer fingers and toes; a longer and more pointed snout, also noticeable in the skull; the greater production forwards of the *præmaxillæ*; the very much smaller size of the openings in the palate‡, and the shorter symphysis of the mandible."

I may add that, judging from M. de Blainville's and M. Gervais's figures, the *præmaxillæ* and *nasals* in *M. pusillus* are so much produced above and below the anterior *nares*, that the outline of the lateral border of this opening is (when the skull is viewed laterally) very deeply concave.

The upper incisors are also much more distant from the anterior margin of the *præmaxillæ*, though as much anterior to the canines as in *M. myoxinus*. Also the first premolar is less vertically extended than the second; but this is perhaps owing to the individual not being quite mature.

The two pairs of upper incisors are represented in M. Gervais's figure as equal; they are nearly so in M. de Blainville's figure, and they are described by him as "*sub-égales et très-petites*" §; but as those of his *Lemur milii* are also spoken of in the same phrase (although in the plate representing the skull of that species the anterior incisor is represented as decidedly larger than the posterior), I am inclined to believe that the anterior pair are really larger than the posterior in *Lemur pusillus* as well as in *Microcebus myoxinus*, the more so as it is almost impossible that so careful and accurate a naturalist as Dr. Peters should have omitted to notice such a striking difference between his *M. myoxinus* and the *L. pusillus* of Geoffroy as would have been the equality of the upper incisor teeth of the latter.

The formation of the *tarsus* also may, I think, for the same reason, be safely assumed to be similar in these two species.

The *L. pusillus* of Geoffroy has very often been associated with the Galagos on account of the structure of its foot—amongst others,

\* Reise nach Mossambique, p. 17.

† I assume that the *Lemur murinus* of De Blainville is the *Lemur pusillus* of Geoffroy. Both Dr. Peters and Dr. Wagner are satisfied on this point.

‡ The posterior palatine foramina, however, are still very large: see Gervais's 'Mammifères,' p. 173.

§ Ostéographie, *Lemur*, p. 35, pl. 11.

even by M. Isid. G. St.-Hilaire, who has placed it beside *Galago* in his group *Galagina*\*, and last of all by Dr. Gray†, who has made it a species of the genus *Galago*, under the name of *G. madagascariensis*, calling attention, however, to the shortness of the foot as represented in Buffon's figure. But, according to Dr. Peters, so far from approaching the Galagos more than does his *M. myoxinus*, the tarsus of Geoffroy's *L. pusillus* is proportionally shorter, the total length from the point of the snout to the root of the tail being 140 millimetres in the former, 145 in the latter, while the length of the foot in each, subtracting that of the fourth toe, is  $20\frac{1}{2}$  millimetres in *M. myoxinus*, but only 17 in *L. pusillus*.

None of the differences hitherto recorded appear to me to warrant the location of these two forms in separate genera‡ or even subgenera; unless therefore the upper incisor teeth, the first upper pre-molar, the structure of the tarsus, or some other part of the organization of the *L. pusillus* of Geoffroy should, on further examination, present differences in structure which have escaped Dr. Peters's observation§, both forms must rank as species of the genus *Microcebus*, as also the *Lepilemur murinus* of Dr. Gray; and the three species may be termed, respectively, *Microcebus pusillus*, *M. myoxinus*, and *M. minor* (the *Lepilemur murinus*|| of Dr. Gray). But, on the other hand, should hitherto unnoticed but important differences be found to exist between *M. pusillus* and the other two, then a new generic name will be required for *M. myoxinus*, *M. minor*, and their allies, as *M. pusillus* is the species to which the term *Microcebus* appertains.

Of the three forms classed by Dr. Gray in his genus *Cheirogaleus*, two only are represented in the national collection, there being one stuffed specimen, with the skull inside it, of *C. typicus*, and another similar one of *C. smithii*, also the specimen in spirits before spoken of as closely resembling Dr. Peters's *Microcebus*.

The two stuffed specimens (which are the types of the two species respectively) differ from *M. myoxinus* and *M. minor* in the much smaller size of the ears; but, as Dr. Gray justly remarks, "The ears are very apt to be unnaturally stretched in the stuffing, or the converse and allowed to shrink in the drying"¶. Moreover it should be remembered that, in some species at least of the family, the ears are exceedingly contractile\*\*.

\* Catalogue des Primates, p. 79.

† Proc. Zool Soc. 1863, p. 149.

‡ M. de Blainville notices that it has seven lumbar vertebræ, thus agreeing in this also with *M. myoxinus* ('Ostéographie,' *Lemur*, p. 12).

§ According to M. Gervais (Mammifères, p. 173), the *L. pusillus* of Geoffroy has three pairs of mammæ; according to Dr. Peters, in *M. myoxinus* there are but two pairs!

|| To prevent confusion (as this species is not the *L. murinus* of M. de Blainville), I think it better to restore the specific name originally given to it by Dr. Gray in the Ann. & Mag. of Nat. Hist. 1842.

¶ Proc. Zool. Soc. 1863, p. 144.

\*\* This peculiarity was, as far as I know, first noticed in a large species of *Galago* described by Mr. A. D. Bartlett, and named by him *G. monteiri*. It had "the power of turning its ears back, and folding them up when at rest. When moving about, or in search of food, they spread out and stood upward and forward."—Proc. Zool. Soc. 1863, p. 231.



Of these two forms of so-called *Cheirogalei*, the *C. smithii* of Dr. Gray is, as he truly observes, "very like" *M. myoxinus*, but for the smallness of the ears (relatively larger than those of *C. typicus*), the length of the feet agreeing.

The dentition unfortunately cannot be well seen, but it agrees with that of *M. myoxinus* and *M. minor* in the preponderance of the inner upper incisors over the outer pair, in the three premolars having but one large external cusp, and in the great difference in size between the last premolar and the first molar; but Dr. Gray's *C. smithii* differs from them, and agrees with *M. pusillus*, in having the first upper premolar rather less vertically extended than the second; and should this arise from immaturity, which (for reasons which will appear in speaking of the genus *Lemur*) I suspect to be the case, then there will probably be a considerable distinction in absolute size between the adult *C. smithii* and the species *M. minor*, two skins of which (labelled *Galago minor*) are, as before stated, in the national collection.

The other and considerably larger form, named *C. typicus* by Dr. Gray, is, in spite of its greater size, immature, the third lower grinding-tooth, on one side, being a deciduous one. The first upper premolar is remarkable, being, as Dr. Gray observes, "large, conical, erect, like a small canine." In this species also the tarsus seems to be relatively shorter. The upper incisors resemble those of *M. myoxinus* and *M. minor*.

I think it better to leave this form, provisionally, where Dr. Gray has placed it, namely, side by side with his *C. smithii*, and (as this last cannot, as far as I have yet had opportunity of observing its characters, be generically separated from *M. myoxinus*, *M. minor*, and *M. pusillus*) to designate it *Microcebus typicus*, at the same time calling attention to the uncertainty of its position until its osteology and dentition are better known.

The third form included by Dr. Gray in his genus *Cheirogaleus* is the *Cheirogaleus milii* of Geoffroy. This is the true type of that puzzling and troublesome genus, but unfortunately it is not represented by either skin or skull in the British Museum. M. de Blainville has figured a side view of the cranium, showing the dentition\*, as also has Dr. Dahlbom†. Judging from these illustrations, *Cheirogaleus* appears to have considerable resemblance to *Microcebus*; and should the alleged characters separating these two genera prove on examination to be worthless, and *C. milii* incapable of generic separation from *M. pusillus*, then the name *Microcebus* will have to disappear altogether in favour of the more ancient designation *Cheirogaleus*.

In the preponderance of the inner over the outer upper incisors, *C. milii* agrees with *Microcebus*; but it differs, apparently, from *M.*

\* Ostéographie, *Lemur*, pl. 7.

† Studia Zoologica, vol. i. tab. viii. figs. 32 & 32 a. Dr. Dahlbom's figures are not very faithful: in fig. 32 the outer upper incisor is represented as larger than the inner, while in fig. 32 a the inner pair of upper incisors greatly exceeds the outer pair.

*myoxinus*, *M. minor*, and *M. pusillus* in the existence of a considerable diastema between the upper canine and the first premolar, and between the latter and the second premolar, and in the broader angle to the mandible. The third upper premolar also appears to approach in size the first true molar more nearly than in *M. myoxinus*, *M. minor*, and *M. pusillus*, and to be less vertically extended than in them; but it is difficult even to judge from M. de Blainville's plate, as one cannot tell what to attribute to abrasion of the teeth. In the considerable vertical extension of the first as compared to the second premolar, *C. milii* approaches *M. typicus*. Unfortunately I have at present no means of knowing the structure of the palate, the form of the grinding-surfaces of the molars, or whether there is an interparietal bone—points I am also unable to ascertain as regards *M. typicus* and *M. smithii*. The principal reason, however, which would appear to me to justify the separation generically of *C. milii* from *M. myoxinus*, *M. minor*, *M. smithii*, and *M. pusillus*\*, is the alleged different and peculiar structure of the tarsus in the first named. That of *M. pusillus*, as figured (under the name *Lemur murinus*) by M. de Blainville†, shows an elongated calcaneum and naviculare, similar to that of the Galagos, though considerably less in degree, also an elongated cuboid; but the astragalus is normal. In *M. myoxinus*, as I have already stated, Dr. Peters's measurements show a somewhat greater length of tarsus. That it is similarly constructed, however, is to be inferred from his silence as to any difference in this respect between his *M. myoxinus* and *M. pusillus* (De Blainville's *L. murinus*), and the more so as he expressly asserts that in his *M. myoxinus* the calcaneum is one-third the length of the tibia, compares its tarsal structure with that of *Galago* and *Lemur*, and declares it intermediate between them. As far as I could ascertain in the specimen preserved in spirits in the British Museum (labelled *C. smithii* and so resembling *M. myoxinus*), the os calcis barely attains one-third the length of the tibia. The proportions of the naviculare and cuboid could not be ascertained, but I have no doubt that they are the same as in *M. myoxinus* and *M. pusillus*.

Now in *C. milii*, according to M. de Blainville‡, the tarsal bones are long; but here "c'est l'astragale, et non le scaphoïde seul, qui suit l'allongement assez prononcé du calcaneum, ce qui donne à chaque os du tarse de ce petit animal quelque chose d'assez particulier"; and this is said immediately after describing the tarsus of *M. pusillus* (De Blainville's *L. murinus*) with which it is contrasted. Now, if on examination the difference here indicated should prove to be considerable, it would be an important character, and, I think, justify a generic distinction between *Cheirogaleus* and *Microcebus*. But the two genera would still have many points of affinity; and, according

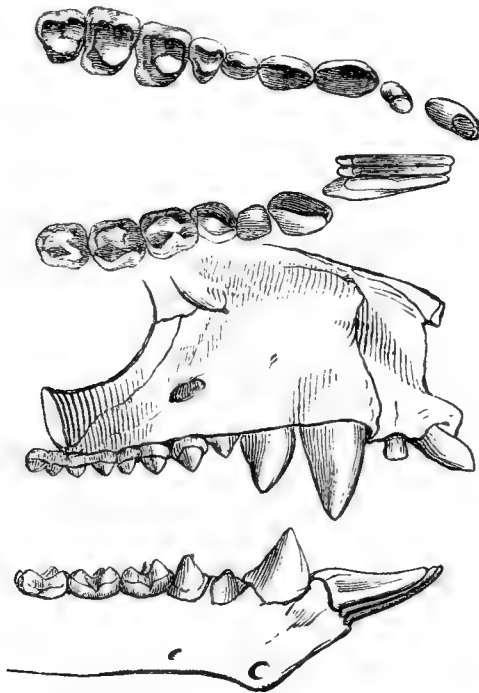
\* I do not add *M. typicus*, because I have, unfortunately, no means of ascertaining the structure of the tarsus in that species, and because, judging from the skin, that part appears to be relatively shorter than in the above-mentioned forms, as I have before remarked.

† Ostéographie, *Lemur*, pl. 10.

‡ Ibid. p. 12.

to M. de Blainville, *C. milii* agrees with *M. myoxinus* and *M. pusillus* (as doubtless with the other *Microcebi*) in the number of lumbar vertebræ.

Another well-marked and easily distinguished species (placed in the genus *Cheirogaleus* by Dr. J. A. Wagner and by M. Isid. G. St.-Hilaire\*) is the *Lemur furcifer* of M. de Blainville, the *Lepilemur furcifer* of Dr. Gray†. It is represented in the British Museum by a fine skin of an almost adult individual. The skull has been extracted, and is preserved in the osteological collection; unfortunately,



*Microcebus furcifer*. Scale, twice nat. size.

however, the posterior part of the cranium and the back walls of the orbits, together with the angles of the mandible, are wanting.

This species has large, long ears, and is readily distinguished by its black dorsal stripe bifurcating on the occiput. It is represented (not very well, however) in M. Gervais's 'Mammifères,' and also (under the name 'Cheirogale de Madagascar') in Dr. Chenu's 'Encyclopédie d'Histoire Naturelle.' The skull and dentition are figured by M. de Blainville‡.

Unfortunately I am again unable to give particulars as to the conformation of the tarsal bones in this Lemur; but the foot is certainly rather elongated, and the whole of the tarsus appears to exceed one-third the length of the tibia. The skull and dentition, however,

\* Catalogue des Primates, p. 77.

‡ Ostéographie, *Lemur*, pl. 7.

† Proc. Zool. Soc. 1863, p. 145.

differ both from *C. milii* and from *M. myoxinus*, *M. minor*, and *M. pusillus*; so that I have been almost inclined to propose for it a new generic name.

The skull has the facial part prolonged, the distance from the anterior end of the præmaxilla to the hinder border of the orbit very much exceeding the distance from that hinder border to the posterior extremity of the cranium—instead of being about equal to it, as in *C. milii*. The upper surface of the muzzle presents a marked antero-posterior convexity; and the mandible, when viewed laterally, has its inferior margin very strongly concave. Its angle is produced backwards, but not downwards; it is sharper than in *Cheirogaleus*, but not so sharp as in *Microcebus*. The malar foramen is absent or minute. The palate is slightly prolonged backwards, the most anterior point of its hinder margin being posterior to the hinder edge of the last molar. The posterior palatine foramina are large, as are also the præmaxillæ, which join the nasals for more than a quarter of their (the nasals') length. The upper incisors are much in advance of the canines, and the preponderance of the anterior over the posterior pair is very great, in which respect, as also in the four preceding points, this species resembles the *Microcebi*.

The upper canines are large; but the first upper premolar is a very characteristic tooth, being produced and elongated like a second canine; indeed it exceeds in vertical extent the second and third upper premolars more than the true canine exceeds them in *Hapalemur*, and is longer in proportion to the second upper premolar than in any other species of the family, although, as has been stated, *M. typicus* has a canine-like first upper premolar approaching in development that of this species.

The second and third upper premolars have each but one large external cusp, and are about equal in vertical extent (judging from M. de Blainville's figure, the second upper premolar not having come into place in the British Museum skull), though the third has a larger talon internally.

The first upper molar greatly exceeds the third premolar in size, and differs from it in having two nearly equally developed external cusps. It has also a large antero-internal cusp connected with the postero-external one by an oblique ridge. The postero-internal cusp is exceedingly minute and rudimentary. The second upper molar quite resembles the first in size and form; but the third is smaller than the two preceding, and its postero-internal cusp is quite obsolete. It exceeds, however, the third premolar in size; and the difference between the latter and the first molar in this respect is great, thus agreeing with the *Microcebi*, and differing from *Hapalemur* and, as we shall see, from the Galagos. Indeed in all the above-mentioned points the molars of De Blainville's *L. furcifer* resemble those of *Microcebus*; but there is a more strongly developed cingulum outside all the upper molars.

In the lower jaw the incisors and canines (which have the similarity in form and position common in the *Lemuridæ*) are extremely long, so much so as quite to equal in length the mandibular symphysis.

The first lower premolar is very produced and canine-like, much exceeding in vertical extent the second and third premolars, which, judging from M. de Blainville's figure (the second lower premolar, in the British Museum skull, not yet being in place), are about equal in this respect, and have but one large external cusp each. The three lower molars are subequal in size, and greatly exceed the third premolar, there being again a great difference in dimension between the latter and the first molar. The last lower molar has only a trace of a fifth tubercle, instead of being plainly quinquecuspid as in *M. myoxinus*, *M. minor*, and *M. pusillus*.

On the whole I think it better, for the present at least, to associate the *L. furcifer* of De Blainville with the species just mentioned, with which it has so many points in common that I feel persuaded its tarsal structure will, on investigation, prove essentially similar. In the development of the first upper premolar it resembles *M. typicus*, from which, however, it appears to differ in its much longer ears and somewhat longer tarsus. I call it then provisionally *Microcebus furcifer*.

The next form, the *Lepilemur mustelinus* of M. Isid. G. St.-Hilaire\*, is quite unknown to me, except from his notice and the short description and the figures of the external form and dentition given by M. Gervais†. Dr. Gray places it in the same genus with *M. furcifer*, quoting Dr. Dahlbom to the effect that, but for the upper cutting-teeth, the latter would be a *Lepilemur*. If, however, M. Gervais's representation and account of the dentition are correct, there are other differences besides the total absence, in the adult condition at least, of upper incisors; for, in the first place, it differs from *M. furcifer* in that the anterior upper premolar is not caniniform, and "ses molaires ont de l'analogie avec celles du Maki gris (*Hapalemur*) et des Indris"—certainly different enough not only from *M. furcifer*, but from any *Microcebus*! In the lower jaw there is an exceedingly large fifth tubercle to the last molar (differing in this from *M. furcifer*, though not from the other *Microcebi*); and the anterior portion of every lower grinder is produced forwards, overlapping the postero-external part of the tooth next in front in quite a remarkable manner. The palate also (judging from M. Gervais's figure) differs from that of *Microcebus*, in having the most anterior point of its hinder margin on a line with the anterior part of the last upper molar, and in having the posterior palatine foramina inconspicuous. Finally, the shortness of the tail in this species, when considered in connexion with the other differences, is a very marked and exceptional character; so that, I think, *Lepilemur mustelinus* must be considered to constitute a distinct genus, at all events until details as to its dentition and the structure of its tarsus are made known.

The genera which have been reviewed hitherto are all from Madagascar only. The next group is composed of African species; and the geographical distinction is accompanied by marked structural differences, to which the genus *Lemur* (also exclusively from Madagascar) offers no exception. It would therefore have been exceed-

\* Catalogue des Primates, p. 75.

† Hist. Nat. des Mammifères, p. 170.

ingly remarkable had *M. pusillus* really had that affinity to the Galagos which has been so often assumed.

This next type of structure is presented by various species which have been arranged in several distinct groups, but which, I believe, constitute only one natural genus, though a large and somewhat varied one, admitting perhaps of subdivision into more or less doubtful subgenera. This large genus, *Galago*, contains, as I apprehend, *Otogale*, *Callotus*, and *Galago* of Dr. Gray, together with *Otolemur* of Dr. Coquerel, and *Hemigalago* of Dr. Dahlbom. It is well represented in the British Museum by a number of skins, skulls, and two complete skeletons, besides several specimens in spirits. As far as I have been able to observe, the whole of the species included in the genera above enumerated agree in the possession of the following common characters:—The ears are largely developed and more or less naked; and the tail is long. The foot is always long also; and this elongation is produced by the great length of the calcaneum and naviculare only\*, not, as in *Cheirogaleus*, by the prolongation of the astragalus, nor by having a cuboid almost as long as the naviculare, as is the case in *Microcebus*.

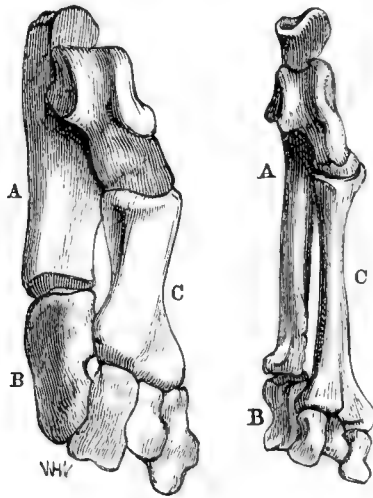


Fig. 1.

Fig. 2.

Fig. 1. Tarsus of *Microcebus*; Fig. 2. Tarsus of *Galago*. From De Blainville's 'Ostéographie,' but represented with the calcaneum (A) and cuboid (B) together of the same total length in each figure, the better to show the relative extent of the naviculare (C).

The length of these two bones (the calcaneum and naviculare) when in their natural position, and measured from the distal extremity of the second to the proximal end of the first, always exceeds four times the breadth of both bones measured at their narrowest parts, and when in their natural position also. The calcaneum is always more than one-third the length of the tibia.

In the skull the mastoidal region of the periotic is enlarged and

\* This is still more markedly the case in *Tarsius*.

inflated, differing in this respect from *Microcebus*, as Dr. Peters has pointed out. The foramen for the entrance into the skull of the internal carotid is very conspicuous on the basis cranii, being almost on the same transverse line as the foramen ovale, at the junction of the basi- and ali-sphenoids with the anterior end of the petrotic. The posterior palatine foramina are small, and the bony palate (completely ossified) has the most anterior point of its posterior margin on a line with the middle or even with the anterior end of the last molar\*.

The optic foramen is, as might be anticipated, very large. One opening takes the place of both the sphenoidal fissure and the foramen rotundum. There is no malar foramen, nor any interparietal, and the præmaxillæ do not join the nasals for so much as one quarter of the length of the latter.

As regards the dentition, the upper incisors are always very small and subequal; the first premolar always exceeds the second in vertical extent, but, like it, has only one large external cusp.

The third upper premolar, however (like the corresponding tooth in *Hapalemur*), has two large and pretty equally developed external cusps, as have also the molars; so that the four posterior grinding-teeth have a similar form, when viewed externally, and are also pretty equal in size, what inequality there is in this respect arising from the inferior size of the last molar. Viewed from within (*i. e.* looking at the grinding-surfaces), these four teeth are also seen to be more or less equal†, the last premolar and the first two molars having very nearly the same dimensions; for each of these three teeth has two internal cusps, as well as two external ones, and the postero-external one is connected with the antero-internal one by an oblique ridge; but the cingulum within is quite rudimentary or absent.

The last upper molar is in some forms quadricuspidate, in others tricuspid, the postero-internal cusp disappearing. The oblique ridge, however, persists, and the tooth is generally intermediate in size between the third premolar and the first two molars, which are the largest grinders in the upper jaw. The greatest difference between any two contiguous upper grinders is between the second and the third premolars, and not, as in *Microcebus*, between the third premolar and the first molar.

In the lower jaw there is the same equality as in the upper, between the third premolar and the first molar; and the last four teeth are nearly equal in size, except that the last molar is in most species quinquecuspid.

There appear to be constantly thirteen dorsal and six lumbar vertebræ; and, according to Dr. Peters‡, the base of the gall-bladder is not (as in *Microcebus* and *Lemur*) turned towards the back.

\* In M. Gervais's figure (p. 159) the palate is represented as rather elongated posteriorly: I have never seen such a condition in any *Galago*.

† The great similarity between the last upper premolar and the first molar above, in *Galago sennaarensis*, *G. maholi*, *G. allenii*, *G. garnettii*, *G. crassicaudatus*, and *G. pallida*, was first pointed out by Professor Huxley: see *ante*, p. 324.

‡ Reise nach Mossambique, p. 14.

The many forms to which the above characters apply may perhaps admit of being grouped together in certain subgenera, which may be distinguished as (1) *Galago* (*Otogale*), (2) *Galago* (*Otolemur*), (3) *Galago* (*Otolicnus*), and (4) *Galago* (*Hemigalago*).

The species which has been named by Dr. Gray\* *Otogale pallida*, and of which he has figured the skull and external form, is represented in the British Museum by two skins (types of the species), the extracted skulls of which are in the osteological collection. There is also a skin, with the skull inside it, which is the *Otolicnus apicalis* of M. Du Chaillu, and closely resembles *O. pallida*†.

These species or this species has a somewhat different aspect to that of the rest of the Galagos. The tarsus may perhaps be rather shorter in proportion to the tibia than in the species forming the subgenus *Galago* (*Otolicnus*) (with which subgenus *O. pallida* has much affinity as regards its cranial characters), but I have only been able to observe skins.

The skull is exceedingly like that of *Galago* (*Otolicnus*) *sen-naarensis*; but it differs from that, and from all other species of the genus, in the greater relative production and more canine-like form of the first upper premolar. The mandible is very low at the symphysis, and has its angle produced downwards as well as backwards. The last upper molar is quadricuspidate; but the last inferior molar is distinctly quincuspid in one individual, while in the other there can hardly be said to be more than four cusps, on one side at least‡. The next subgenus will include the *Otolicnus garnettii* of Ogilby (*Otogale garnettii* of Dr. Gray), the *Galago crassicaudatus* of Geoffroy (*Otogale crassicaudata* of Dr. Gray); also a new species or variety

\* Proc. Zool. Soc. 1863, p. 140, pl. xix.

† Dr. Gray considers it to be probably the same species: see note, l. c. p. 141.

‡ Not much reliance can, I think, be placed on the presence or absence of a fifth cusp on the last lower molar as a distinguishing character. Forms exceedingly alike in other respects differ in this, as in *Galago* (*Otolemur*). Not only may the same species vary (Professor Huxley noticed this to be the case in *Nycticebus*), but the very same individual offer a different structure on the two sides of the same jaw, as in the above-mentioned *Galago* (*Otogale*) *pallida*. The same variation also obtains in quite other forms of the order Primates. Thus in *Semnopithecus*, characterized by having five tubercles to the last lower molar, I have observed that the species *S. mitratus*, *S. cinereus*, and *S. nigrimanus* (in the osteological collection at the British Museum) have only four tubercles to that tooth. M. Isid. G. St.-Hilaire has also noticed a similar condition in some species of that genus (Archives du Museum, t. ii.), and I have in my own collection a skull of a species of the same genus which has six distinct tubercles to the last inferior molar. Again, the Talapoin differs from the other species of *Cercopithecus* in having only three tubercles to the last inferior grinder, that being one of the characters on which M. Isid. G. St.-Hilaire founded his genus *Miopithecus* (Arch. du Mus. t. ii. p. 549, 1843).

But not only is the last grinder thus variable in form, but an additional grinding-tooth is not unfrequently developed. Thus the last-named author noticed a fourth true molar on each side of the lower jaw of a Malbrouck (see article "Cercopithèque," Dict. Universel d'Hist. Nat. t. iii. p. 306), and a *Cebus* with a supernumerary molar on each side of the upper jaw. Dr. Peters also has described and figured (Reise nach Mossambique, pl. 4. fig. 3) a *Galago* (his *Otolicnus crassicaudatus*) with a distinct, though small, fourth true molar on each side of the upper jaw.



as yet unnamed, which has been recently acquired by the British Museum from Dr. Kirk, and which came from the Zambesi, not only skins, but a skull of each of these three species being preserved in the Museum. It will also include the *Otolemur agisymbanus* of Dr. Coquerel\* (which, if distinct from the before-named species, is unrepresented in the national collection), and, finally, it must also include the *Galago monteiri* of Mr. Bartlett† (the *Callotus monteiri* of Dr. Gray‡). The skin of the type specimen of this species is in the possession of Mr. Monteiro, but he has presented the skull to the Museum of the Royal College of Surgeons.

These species agree well together, and, if they merit a distinct sub-generic name, the term *Otolemur* (proposed by Dr. Coquerel in 1859 for his *O. agisymbanus*) has, I believe, the claim of priority. Dr. Coquerel's species agrees with the others in all those points which the immature condition of the individual described allowed to be ascertained, and differs from them only as a young specimen might be expected to differ.

The species composing the subgenus *Galago* (*Otolemur*) differ from the rest of the Galagos by their larger size and in having the muzzle more produced, so that the length from the front margin of the orbit to a line drawn at right angles to the long axis of the cranium, and passing through the anterior extremity of the præmaxilla, exceeds the distance between two parallel lines (also drawn at right angles to the long axis of the cranium), one passing through the most anterior and the other through the most posterior part of the brim of the orbit. In all the other Galagos this proportion is reversed, and (when the skull is viewed laterally) the antero-posterior extent of the opening of the orbit exceeds that of the muzzle.

The angle of the mandible is produced downwards § as well as backwards, in a marked manner. The last upper molar has mostly three, but sometimes four tubercles; the last inferior molar is either quadricuspidate or quinqucuspid. Probably the tarsus is not so long in proportion to the tibia as in the smaller Galagos, but I have not been able to observe any part of the osteology of these species except the skull. A representation, however, of the tarsus and tibia of this subgenus is given by M. de Blainville by mistake for that of the Aye-Aye ||. The skull and external form of the same species, *G. (Otolemur) crassicaudatus*, are represented by Dr. Peters ¶, *G. (O.) agisymbanus* by Dr. Coquerel \*\*. The skull of *G. (O.) garnettii*

\* Revue et Magasin de Zoologie, vol. xi. p. 457, plates 17 & 18 (1859). I think it probable that Dr. Kirk's Zambesi specimen may be specifically identical with this, and that both are but varieties of *Galago (Otolemur) crassicaudatus*.

† Proc. Zool. Soc. 1863, p. 231, pl. xxviii.

‡ Ibid. p. 145.

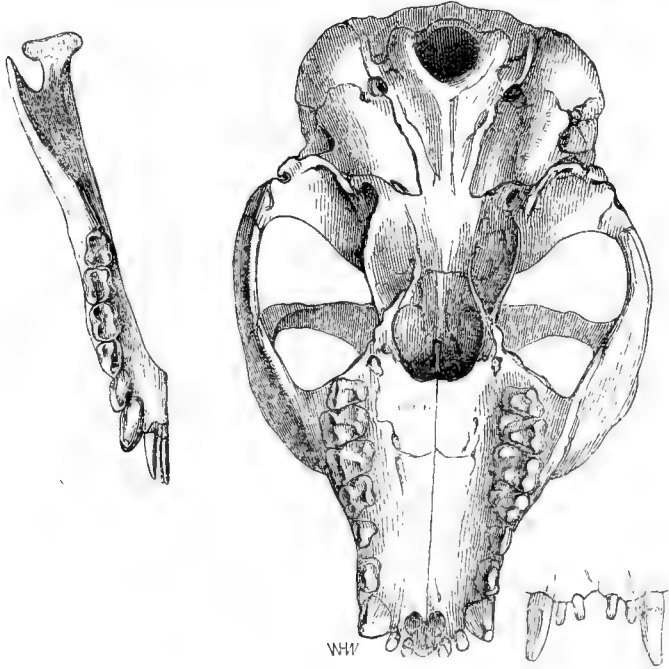
§ Least so in *Galago (Otolemur) monteiri*.

|| Ostéographie, *Lemur*, pl. 5. This mistake was first suspected by Professor Owen, and finally, on his suggestion, ascertained by M. Gervais (see Professor Owen's Memoir on the Aye-Aye, Trans. Zool. Soc. vol. v. p. 83). The tarsus is reproduced in pl. 21. fig. 23.

¶ Reise nach Mossambique, pls. 2 & 4.

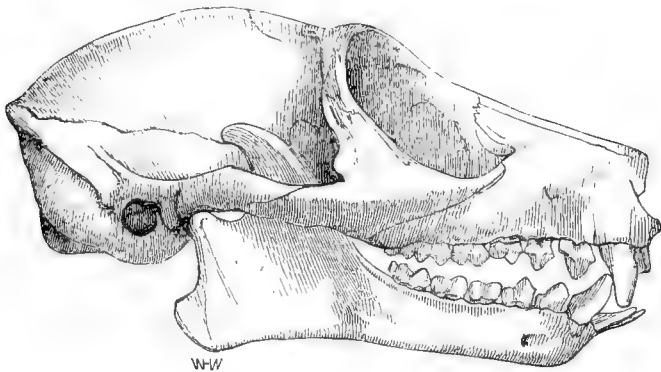
\*\* *Loc. cit.*

and the external form of *G. (O.) monteiri* are figured in the 'Proceedings of the Zoological Society'\* . Finally, by the kind permis-



*Galago (Otolemur) monteiri*, nat. size.

sion of the authorities of the Royal College of Surgeons, I am enabled to give a representation of the skull of the typical specimen of the last-named species.



*Galago (Otolemur) monteiri*, nat. size.

The next form which may admit of separation from the rest of the Galagos, and perhaps rank as a subgenus, is the *G. demidoffi*, of

\* *Loc. cit.*

which there are skins in the British Museum, also two specimens in spirits, an imperfect skull, and a complete skeleton. The skull and the external form are well represented in the 'Proceedings of the Zoological Society' \*.

This is the genus *Hemigalago* of Dr. Dahlbom, who gives for distinctive characters:—"Cranium spherical; ears large, oval, membranous, transparent; general form like that of *Galago*, but smaller; eyes large, projecting, separated by a distance of six or seven millimetres. Nose projecting, small, conically compressed, elongated anteriorly, projecting above the upper lip. Teeth as in *Galago*. Body short, rather thick, cylindrical. Members with the same proportions as those of *Galago*, except that the fingers are much more slender" †. These characters do not appear to me very distinctive, and I am convinced that this species cannot be separated generically from the other Galagos, and I have doubts as to the propriety of separating it from them even subgenerically. But the præmaxilla projects forwards and upwards in a peculiar way beyond the upper incisors, reminding one somewhat of *Loris gracilis*, and presenting an appearance, when the basis cranii is observed, similar to that seen in *Microcebus pusillus* as represented by M. Gervais‡. The angle of the mandible is produced a little downwards as well as backwards. There is considerable difference in size between the second and third upper premolars. The last upper molar has only three tubercles, but the last lower one is quinquecuspid.

This species, as has been shown by Dr. Peters§, is undoubtedly the *Otolicnus peli* of M. Temminck.

The rest of the Galagos may be considered to constitute the subgenus *Galago (Otolicnus)* ||. In all of them, as has been said, the muzzle is shorter than the orbit when the skull is viewed laterally. The angle of the mandible is produced backwards, but scarcely downwards. The last upper molar has sometimes three tubercles, sometimes four; but the last inferior molar is always quinquecuspid. *G. (Otolicnus) allenii*, as Professor Huxley has pointed out¶, differs from the other species in the great development of the "talon" in the second upper premolar; and as the last upper molar is quadricuspidate, this species is remarkable for the uniformity in size of its upper dental series. There is a skin of this species in the British Museum, which came from Fernando Po. It is marked 64. 4. 4. 17, and the skull extracted from it is no. 68 *a*. Another skin, very like the preceding, but from the Gaboon, is marked 64. 2. 18. 1, and the extracted skull is no. 68 *d*. There is also the skin and complete

\* 1863, page 148 and pl. xxxv.

† Dahlbom's 'Studia Zoologica,' p. 230, from the French translation by Dr. Coquerel, *loc. cit.*

‡ Hist. Nat. des Mammifères, p. 173.

§ Proc. Zool. Soc. 1863, p. 381.

|| First used by Illiger in his 'Prodromus,' p. 74 (1811), and applied by him to the *Lemur galago* of Schreber, which is considered by his continuator, J. A. Wagner, as identical with his (Wagner's) *Otolicnus senegalensis* (a species of my subgenus *Otolicnus*): see Wagner's Supp. i. p. 292.

¶ See *ante*, p. 324.

skeleton of an individual which lived in the Society's Gardens\*. It came from the Cameroons river, and agrees with the specimen from Fernando Po.



*Galago (Otolicnus) allenii*. Scale,  $1\frac{1}{2}$  nat. size.  
Right dental series of upper jaw.

Dr. Gray, in his paper so often alluded to †, remarks on these forms, distinguishing one as “var. *gabonensis*.” I think the two forms are decidedly distinct species. The first, *G. (O.) allenii*, from Fernando Po, has the ears very large, the last upper molar quadricuspidate, the second upper premolar with so large a talon as to approach nearly the third premolar in size, and the incisors placed much in front of a transverse line connecting the two upper canines; while the second, *G. (O.) gabonensis* (from the Gaboon and the Cameroons), has the ears considerably smaller, the last upper molar tricuspid, the second upper premolar differing rather more from the third in size, and the incisors placed so little in front of the canines that they are more or less hidden by the latter when seen laterally.

Of the other species of *G. (Otolicnus)* I may observe that *G. (O.) sennaarensis* ‡ (of which there is a skull in the British Museum and another beautiful one in the Museum of the Royal College of Surgeons) has the first upper premolar a little more canine-like than have the other species. There is also a very great difference between the size of the second and third upper premolars; so that, as the last upper molar is but tricuspidate, this species differs from the other species of *Galago (Otolicnus)* in exactly the opposite direction from that in which *G. (O.) allenii* differs from them—namely, in having its upper grinding-series less equal than is theirs, instead of more so, though the third upper premolar is very large.

The Slow Lemurs, by which I mean the genera *Loris*, *Nycticebus*, *Perodicticus*, and *Arctocebus*, with much general agreement, nevertheless differ as to their dentition, as has been pointed out by Professor Huxley § in his memoir on the last-named genus. However, they all agree in having the mastoidal region of the periotic enlarged (as in the Galagos), and in having the foramen for the entrance into the cranium of the internal carotid plainly visible || in the basis cranii, at the junction of the basi- and ali-sphenoids with the anterior end of

\* This is the specimen noticed by Dr. Selater in Proc. Zool. Soc. 1863, p. 375, and figured in pl. xxxii.

† *Loo. cit.*, p. 146.

‡ The dentition is represented in Prof. Huxley's article on *Arctocebus*; see *ante*, p. 325.

§ See *ante*, p. 323, &c.

|| This is particularly large and conspicuous in *Arctocebus*.

the periotic. In all of them also, a single opening represents both the sphenoidal fissure and the foramen rotundum.

As regards the dentition, in all four genera the first upper premolar is longer\* than the second. The third upper premolar has only one large external cusp, while the first and second molars have each two well-developed subequal external ones; these two teeth, moreover, have always the oblique ridge running from the postero-external to the antero-internal cusp. There is a difference also between the third lower premolar and the first lower molar similar to that existing between the same teeth of the upper jaw.

In the Slow Lemurs also the gall-bladder has not its fundus directed towards the back, and the dorsal and lumbar vertebræ are both very numerous, the former being never less than fourteen, nor the latter less than seven in number,—twenty-one being thus the lowest number of both dorsal and lumbar vertebræ, taken together, which is found in any Slow Lemur.

It is an interesting fact, that, as far as concerns the skull and dentition, the Asiatic *Nycticebus* far more resembles the African *Perodicticus* than it does its oriental neighbour, *Loris*. It does so in the breadth between the orbits, in the non-prolongation forwards of the præmaxilla, in the length of the first upper premolar, in the smaller size of the last molar, both above and below, in the large size of the upper incisors, and in the shortness of the bony palate.

*Loris.**Nycticebus.**Perodicticus.* Nat. size.

On the other hand, the African *Arctocebus* differs more as regards its dentition (as Professor Huxley has pointed out) from its geographical fellow, *Perodicticus*, than it does from *Nycticebus*; while it has a certain resemblance to the Asiatic *Loris*. Thus it agrees with the latter in the large size of the last molar, both above and below, in the smallness of the upper incisors, and in a certain prolongation forwards of the nasal spine of the præmaxilla. *Arctocebus*, however, agrees with *Perodicticus* in having a smaller number of dorsal and lumbar vertebræ than *Loris* and *Nycticebus*; and it differs from all the other Slow Lemurs in the small vertical extent of its first upper premolar.

In the typical genus *Lemur* the mastoidal region of the periotic is not enlarged and inflated, thus differing from that of the Galagos and Slow Lemurs. The length of the muzzle, from the anterior extremity of the præmaxilla to the front margin of the orbit, exceeds the antero-posterior extent of the anterior opening of the latter. The præmaxilla is plainly visible when the skull is viewed laterally. The most anterior point of the hinder margin of the palate reaches, or nearly so, to the anterior end of the last molar. A malar foramen is

\* This is very slightly so in *Arctocebus*: see *ante*, p. 321, fig. 3.

mostly present, but sometimes absent. There is no conspicuous foramen for the internal carotid (as there is in the Galagos and Slow Lemurs) plainly visible in the basis cranii. The foramen rotundum is very close to the sphenoidal fissure, but is normally distinct from it. The Vidian foramen\* is obvious at the back of the orbit. The angle of the mandible is not produced downwards as well as backwards.

The upper incisors are always subequal, and the three upper premolars have each only one large external cusp; moreover the vertical extent of the first upper premolar falls more or less short of that of the second. This is the case in even aged skulls, and consequently is certainly *not* the effect of immaturity, as was suspected to be the case in *Microcebus smithii* and *M. pusillus*, the only forms of those we have yet reviewed in which the first upper premolar is shorter than the second. The three upper molars have each two pretty equally developed external cusps, one large antero-internal one, and a very large internal cingulum, which is most developed at the anterior part of the inner side of each tooth. Of the three molars, the third† is the smallest (the first and second being subequal), but it exceeds the third upper premolar in size. There is a great difference between this latter tooth and the first upper molar; but this difference is most marked when the teeth are viewed from without, when the third premolar, though, as has been said, it has but one external cusp, is seen (*Lemur* in this differing from *Galago*) to surpass the first molar in vertical extent.

In the lower jaw the incisors never equal in length the mandibular symphysis. The three premolars have each only one large external cusp (the molars, again, having two); and the second premolar is not quite equal in height to the third, which surpasses in this respect the first lower molar. The last inferior molar is always smaller than the two preceding ones.

I have been quite unable to detect any cranial or dental characters which would justify a subdivision of the genus *Lemur*. The dorsal vertebræ are either twelve or thirteen in number; in the first case there are seven lumbar vertebræ, in the other there are six‡. According to Dr. Peters, the gall-bladder has its base turned towards the back.

The order of succession in which the permanent teeth come into place in this family appears to be subject to some variation. Unfor-

\* The existence of the "Vidian canal" in Apes and other Mammals, and its distinctness from the so-called Vidian canal of Cuvier (mentioned in 'Leçons d'Anat. Comp.'), was pointed out by my lamented friend Mr. H. N. Turner, Jun., in the Proceedings of the Zoological Society, 1848, p. 72. I have noticed it, amongst the *Lemuridæ*, in *Loris*, *Nycticebus*, *Perodicticus*, and *Galago*, as well as in *Lemur*.

† This, together with the proportions of the cingulum, tells against the Lemurine affinity of the fossil described and figured by Rüttimeyer, in his 'Eocäne Säugethiere,' under the name *Cænopithecus lemuroides*. I know no species of the *Lemuridæ* in which the last upper molar is the largest. In *Tarsius* the last upper molar is very much the same size as the second.

‡ In the second edition (1835) of the 'Leçons d'Anat. Comp.,' tome i. p. 178, a *Lemur* (*autre Maki*) is mentioned as having 12 dorsal, 8 lumbar, and 3 sacral vertebræ.

tunately I have been able to obtain but scanty materials from which to form a judgment. There are two skulls of the genus *Lemur* in the British Museum, one in the Museum of the Royal College of Surgeons, and another in my own collection, all of which retain more or less of the milk-dentition. The skull of *Microcebus furcifer* in the national collection is also immature.

M. de Blainville has given representations of an immature condition of the teeth in *Indris*, *Propithecus*, *Microrhynchus*, and *Loris*\*. M. Gervais has done the same for *Hapalemur*†, and Prof. Van der Hoeven for *Perodicticus*‡.

Of the incisors, I may remark that the condition noticed by Sundevall in a young *Galago teng* (namely, the presence of three incisors on each side above §) has not come under my observation.

Of the deciduous grinders, the first upper one nearly resembles its vertical successor, the second has also much resemblance to the tooth which replaces it; but the third upper deciduous molar (as might be anticipated) is very unlike its vertical successor, and very like the first upper molar. It has, indeed, two well-developed and pretty equal external cusps, one large antero-internal one, and a marked internal cingulum, not, however, extending so far forwards as in the first molar.

In the lower jaw the first deciduous molar resembles the first premolar: but the second deciduous grinder is like the third deciduous one; and *both* differ from their respective vertical successors, and resemble the first inferior molar ||. As I have said, the order in which the permanent teeth appear does not seem to be constant. For example, in a *Lemur catta* in the British Museum, the second upper premolar is coming into place while the third deciduous molar still remains; in a *L. macaco*, on the other hand, the second upper premolar is also coming into place, but here the third deciduous molar is already shed, and the third premolar established in its place. In *Microcebus furcifer* the second premolar is evidently the last to appear both in the upper and in the lower jaw. In *M. typicus* the canines ¶ are in place, but not the third inferior premolars. In *Loris gracilis* (as represented by M. de Blainville) both the upper and lower canines, the large canine-like first lower premolar, and the whole of the molars, both above and below, appear to be in place, and yet the third inferior deciduous molar is retained. Altogether it is certain that very frequently (and, I am inclined to believe, almost, if not quite always) the whole of the molars, both above and below, and the canines come into place before some one or other of the premolars,

\* *Ostéographie, Lemur*, pl. 11.

† *Hist. Nat. des Mammifères*, p. 169.

‡ *Tijdschrift voor Natuurlijke Geschiedenis*, 1844, pl. 1. fig. 3.

§ *Kongl. Vetensk. Akad. Handling.* 1842, p. 203. May not this condition have arisen from the coexistence of certain deciduous and permanent upper incisors?

|| In Mr. Murray's plate of *G. demidoffii* (in the *Edinb. New Phil. Journal*, 1859) the second deciduous inferior molar, as well as the third, is represented with two large, subequal, external cusps, thus agreeing with *Lemur*.

¶ I was unable to observe the hinder molars.

in the genera *Lemur*\*, *Microcebus*, and *Galago*, as well as in the Slow Lemurs. In those genera in which the number of teeth is less (viz. *Indris*, *Propithecus*, and *Microrhynchus*), the two upper and lower premolars appear† to come into place before the last molars or the canines; but I believe that, in all the genera that have thirty-six teeth, it is a premolar which is the last tooth to take its place in the permanent dentition‡, and that in all without exception the first molar, both above and below, is always in place before the hindermost premolar. This fact establishes the dentition of *Propithecus* (and therefore doubtless of *Indris* and *Microrhynchus* also) as consisting of two premolars and three molars on each side of each jaw, and not (as, from the analogy of the difference between the Marmosets and the other American Monkeys, might have been considered not improbable) of three premolars and two molars. For M. de Blainville has figured an immature *Propithecus* cutting the last three grinders in each jaw, and the most anterior of the three is the most advanced. It is therefore undoubtedly a true molar, as, had it been a third premolar, the tooth behind it would have come into place long before it, instead of, as it does, after it.

With respect to the remaining forms of *Lemuridæ*, I have it in my power to say but little, not having had the opportunity of seeing a skull either of *Propithecus* or of *Microrhynchus*.

The dentition of *Indris* has been recently described by Professor Huxley§, who has noticed how the teeth differ in form, as well as in number, from those of the preceding genera.

The skeleton of *Indris* is in many ways remarkable; and it would be interesting to know if the other two genera with the same number of teeth agree with it in the largely developed paroccipital process, the short bony palate, and the very large mandibular angle, or in the remarkable antero-posterior elongation of the cervical vertebræ, the large number of lumbar vertebræ||, or in the peculiar ilium with its remarkable process¶ (apparently answering to the anterior inferior spinous process) projecting above the acetabulum.

The skull and dentition of *Microrhynchus* are both figured by M. de Blainville\*\*, also by Van der Hoeven††. A representation of the skull is also given by Vrolik‡‡.

\* In *Hapalemur* the last molar, both above and below, appears to come into place after the canines and premolars (see Gervais, *Hist. Nat. des Mamm.* p. 169); but as in this species the third premolar resembles the first molar, the apparently third premolars may be deciduous teeth.

† I have seen no skulls of these species, and can only judge from M. de Blainville's representations.

‡ It is on this account that I think it probable that the skull of *M. pusillus* (represented by De Blainville) and the specimens (before spoken of) of *M. smithii* are immature, the shortness of the first upper premolar being probably due to its not having yet fully descended.

§ *Ante*, p. 326.

|| A point of resemblance to the Slow Lemurs.

¶ Noticed by Professor Owen in the 'Osteological Catalogue' of the Museum of the Royal College of Surgeons, vol. ii. p. 718.

\*\* *Ostéographie, Lemur*, pls. 8 & 11.

†† *Tijdschrift*, pl. 1. fig. 6.

‡‡ Todd's *Cyclopædia of Anatomy and Physiology*, vol. iv. p. 215.



According to these representations, the dental series appear remarkably uniform in vertical extent when the skull is viewed laterally, the canines being moderately produced, and the premolars very evenly developed, recalling the condition presented by *Hapalemur*.

When the grinding-surfaces of the teeth are surveyed, a great resemblance to *Indris* is evident, and, excepting the small size of the upper incisors, the structure of the teeth appears to be much as in that genus; and, as far as can be ascertained from the representation of the immature dentition given by M. de Blainville, *Propithecus* also exhibits a great similarity. But on these genera, on account of want of materials, it is not my present intention to comment.

And now having thus reviewed some of the cranial and dental characters of the various genera of *Lemuridæ*, it remains to endeavour by the help of these characters to define and arrange the component groups.

But before doing so I may remark that the more carefully the whole of the Primates are studied, the more do the differences in structure become manifest between the Lemur-like\* animals and all the higher members of the order.

Professor Huxley, in his last Hunterian Course of Lectures, called attention to the great differences between these groups, and to the much wider interval between the *Simiadæ* and the *Lemuridæ*, than between the former and the *Anthropodidæ*, enumerating at the same time the many marked characters separating those groups. Professor Van der Hoeven †, at the Meeting of the British Association in 1860, had before noticed many of these distinctive characters.

I have long entertained the conviction, which recent researches, especially those of Professor Huxley, have strongly confirmed and strengthened, that these two groups constitute two very natural suborders.

Wonderful as is the chasm separating Man, physiologically considered, from the highest Apes, I am yet unable to see how it can possibly be denied that, as regards form and structure (attention being especially paid to essential, as distinguished from adaptive characters), he is more nearly related even to the Marmoset, than is the Marmoset to any Lemur-like animal whatever. I propose, then, to divide the Primates into two suborders—the first to include Man and all the Apes, Monkeys, and Baboons, as well as the Marmosets; and for this first suborder I venture to suggest the name *Anthropoidea*; the second to contain the Lemurs, Slow Lemurs, Galagos, the Tarsier, and the Aye-Aye, and to be called *Lemuroidea*.

To the remarkable characters above referred to, as enumerated by Professor Huxley in his recent course, I have to add that, as far as I

\* It would be exceedingly convenient to have a *vernacular* general name to designate these creatures, and another for the higher Primates, exclusive of Man,—if, for example, we were to call all the latter (from the Gorilla to the Marmoset inclusive) “Apes,” and for the Lemur-like Primates to employ the convenient Germanism “Half-apes.”

† *Vide* Report of the 30th Meeting of the British Association (1860), London, 1861, Trans. Sect. pp. 134–136.

have yet had opportunity to observe, in all the *Anthropoidea* the posterior cornua of the os hyoides exceed in length the anterior cornua; in all the *Lemuroidea* this proportion is reversed. Also that in all the *Anthropoidea* the internal carotid enters the cranium after traversing a canal passing through the bony periotic mass, which it enters at its posterior part; in all the *Lemuroidea*\*, on the other hand, the internal carotid enters the cranium without traversing such a canal†, and mostly at the junction of the basi- and ali-sphenoids with the anterior end of the periotic. Finally, in all the *Anthropoidea* the foramen rotundum is normally distinct from the sphenoidal fissure‡; in all the *Lemuroidea* the two are very slightly separated, and in most species but one opening represents both these apertures.

The suborder *Lemuroidea* appears to be naturally divisible into the three families *Lemuridæ*, *Tarsidæ*, and *Cheiromyidæ*—*Galeopithecus*, as I believe, forming no part of the order Primates. To the already well-known distinctions between these three groups I may add that in the *Tarsidæ* the third digit of the hand is the longest, while the second and fourth digits are nearly equal—a combination which, I believe, occurs in no other species of the suborder. Again in *Tarsius* alone, of all the *Lemuroidea*, is the orbit closed behind by a union of the malar with the alisphenoid§. This reappearance of a marked and exceptional character amongst Mammals (one otherwise quite peculiar to the *Anthropoidea*) is most interesting, as, if *Tarsius* is thus demonstrated to have a near connexion with the higher Primates, then, *à fortiori*, the higher *Lemuroidea* must have such also, and thus we have a strong argument against the complete separation, as a distinct order, of the last-named group, and a reason for their merely *subordinal* distinction.

In defining and grouping together the genera of *Lemuridæ*, it is particularly desirable to obtain precise and definite distinctions. As Dr. Peters justly observes||, mere external characters are of little

\* Having some doubts as to *Cheiromys*, Professor Owen very courteously furnished me at once with the information I required, and which his notes could alone supply.

† Unfortunately I have not had an opportunity of injecting and dissecting a specimen of the genus *Lemur*, and am therefore unable to speak of the course of the internal carotid in that form, except in the above negative way.

‡ There are two skulls of Gibbons in the Museum of the Royal College of Surgeons in which one opening appears to represent both the *foramen rotundum* and the *sphenoidal fissure*; in other skulls of that genus, however, the two openings are very distinct. In *Hapale* the *foramen rotundum* is not readily seen when the skull is viewed anteriorly, being hidden by the ingrowth of the alisphenoid; and when visible, it is so small and distant from the sphenoidal fissure as to look like a very large *Vidian foramen*.

§ In examining a skull in the British Museum I felt strongly persuaded that such a union existed, but doubted the accuracy of my observation on account of Professor Van der Hoeven's direct assertion to the contrary, given in the Report of the British Association at Oxford, 1860, Tr. Sec. p. 134. But, as Burmeister represents this union most distinctly in several views of two distinct skulls (see 'Beiträge zur n. Kenntniss d. G. *Tarsius*,' tab. 7. figs. 1, 2, 8, & 9), I think it possible that Prof. Van der Hoeven may have formed his opinion on a skull presenting some individual variation, or perhaps even have overlooked the true line of union.

|| Reise nach Mossambique, p. 18.

value ; and Dr. Gray has called attention\* to the errors likely to arise from placing reliance on such characters as the apparent size and form of the ears in stuffed specimens, as also† to the undecided nature of such distinctions as “hind legs, ears, and eyes very developed,” and “hind legs, ears, and eyes extremely developed,” employed by M. Isid. G. St.-Hilaire in his Catalogue of Primates.

But the unsatisfactory results arising from the employment of external characters alone become manifest when they lead a naturalist of such vast experience and acuteness of observation as Dr. Gray to separate widely his “*Callotus*”‡ from his *Otogale*. Nor can I regard as any more tenable the dissociation by him of *Microrhynchus* from *Indris* and *Propithecus*, and its approximation to *Galago*, on similar grounds. So far from the shortness of the snout and small size of the face, as compared to the cranium proper, in *Microrhynchus* being an important distinction between it and *Indris* and *Propithecus*, it is just such a difference as we might expect to find between closely allied species of Primates of very different size,—the relative size of the brain varying inversely with the absolute size of the entire body.

I doubt whether we have as yet materials sufficient to construct a strictly natural arrangement of the genera of *Lemuridæ*, but, as far as I have the means of judging, think they may best be grouped together in the four subfamilies *Indrisinæ*, *Lemurinæ*, *Nycticebinæ*, and *Galagininaæ* ; and the genera may I think be thus arranged :—

LEMUROIDEA.

	{	INDRISINÆ . . . . .	{	<i>Indris.</i>
				<i>Propithecus.</i>
				<i>Microrhynchus.</i>
				<i>Lemur.</i>
LEMURIDÆ . . . . .	{	{	LEMURINÆ . . . . .	<i>Hapalemur.</i>
				<i>Microcebus.</i>
				<i>Cheirogaleus?</i>
				<i>Lepilemur.</i>
	{	NYCTICEBINÆ . . . . .	{	<i>Nycticebus.</i>
		<i>Loris.</i>		
		<i>Perodicticus.</i>		
		<i>Arctocebus.</i>		
	{	GALAGININÆ . . . . .	{	<i>Galago.</i>
TARSIDÆ . . . . .		<i>Tarsius.</i>		
CHEIROMYIDÆ . . . . .				<i>Cheiromys.</i>

Owing to this scarcity of materials, I have not attempted to work out the species ; I therefore by no means intend to imply that I consider all the forms separately enumerated in the following list as,

\* Proc. Zool. Soc. 1863, p. 131.

† Ibid. p. 129.

‡ In justice to Dr. Gray I must add that he had no means of observing other than external characters of *Galago monteiri* (his *Callotus*) when his paper was written, the type of the species being then alive, and extremely unwilling to allow any examination of his dental structure.

without doubt, specifically distinct. I have provisionally adopted some of them on the authority of others, but in all cases doing the best I could to elucidate their synonymy. Except in a few genera, I have not thought it necessary to mention the species.

### Suborder LEMUROIDEA.

#### Family 1. LEMURIDÆ.

##### Subfamily 1. INDRISINÆ.

*Characters.*—I.  $\frac{2-2}{2}$ . C.  $\frac{1-1}{1-1}$ . P.M.  $\frac{2-2}{2-2}$ . M.  $\frac{3-3}{3-3}$ . = 30.

#### Genus 1. INDRIS, Geoff. St.-Hilaire (1796).

*Indris*, Geoff. St.-Hilaire, Mém. sur les Makis, 1796; Tabl. des Quad. 1812; Desmarest, Mamm. p. 96; A. Smith, S. Afr. Jour. ii. p. 27, 1835; Isid. G. St.-Hilaire, Cat. des Prim. 1851, p. 67; Gray, P. Z. S. 1863, p. 132; Vinson, Compt. Rend. lv. p. 829; Dahlbom, Studia Zool. p. 200.

*Lichanotus*, Illiger, Prod. (1811) p. 72; Van der Hoeven, Tijds. p. 43; Wagner, Schreb. Supp. i. p. 256, v. p. 140.

*Pithelemur*, Lesson, Species des Mam. (1840) p. 208.

*Indri*, Fischer, Syn. (1829) p. 72; Anat. der Maki (1804) p. 15.

#### Genus 2. PROPITHECUS, Bennett (1832).

*Propithecus*, Bennett, P. Z. S. 1832, p. 20; Less. Spec. p. 219; Isid. G. St.-Hilaire, Cat. Prim. p. 68 (1851); Dahlb. Stud. Zool. p. 203.

*Habrocebus*, Wagn. Schreb. Supp. i. p. 260, v. (1855) p. 141.

*Macromerus*, A. Smith, S. Afr. Quart. Journ. 2nd ser. ii. p. 49 (1833).

#### Genus 3. MICRORHYNCHUS, Jourdan (1834).

*Microrhynchus*, Jourdan, Thèse inaug. à la Fac. des Sc. de Grenoble (1834); Gray, P. Z. S. 1863, p. 141.

*Lichanotus*, Illiger, Prod. (1811) p. 72; Van der Hoeven, Tijds. p. 44.

*Avahis*, I. G. St.-Hil. Leçons de Mamm. 1835; Cat. Prim. (1851) p. 68.

*Habrocebus*, Wagner, Schreber, Supp. i. p. 257, v. (1855) p. 140.

*Indris*, A. Smith, S. Afr. Journ. (1835) ii. p. 27; Geoff. *l. c.* (1796 & 1812); Desm. Mamm. p. 97.

*Indri*, Fischer, Syn. p. 73; Anat. der Maki (1804) p. 16.

*Semnocebus*, Less. Species (1840) p. 209.

##### Subfamily 2. LEMURINÆ.

*Characters.*—I.  $\frac{2-2}{4}$ \*. C.  $\frac{1-1}{1-1}$ . P.M.  $\frac{3-3}{3-3}$ . M.  $\frac{3-3}{3-3}$ . Tarsus short, or with the cuboid and naviculare subequal in length; hind

\* I.  $\frac{0}{4}$  in *Lepilemur*.

limbs considerably longer than the fore limbs ; tail at least equalling two-thirds the length of the body ; mastoidal region of the periotic not inflated ; dorsal and lumbar vertebræ together never exceeding twenty ; gall-bladder with its base turned towards the back\*.

*Hab.* Madagascar.

Genus 1. LEMUR, Geoff. St.-Hil. (1796).

*Lemur*, Linn. Syst. Nat. ed. 10. p. 30 ; Geoff. St.-Hilaire, Mém. sur les Makis (1796) ; Illiger, Prod. p. 73 (1811) ; Fischer, Syn. p. 73 ; Anat. der Maki, p. 17 ; Desm. Mamm. p. 97 ; Van der Hoeven, Tijds. p. 32 ; Wagner, Schreber, Supp. i. p. 262, v. p. 141 ; Gray, P. Z. S. (1863) p. 136 ; I. G. St.-Hilaire, Cat. des Prim. p. 70 ; Dahlb. Studia Zool. p. 211.

*Prosimia*, Briss. Règ. Anim. p. 220 (1756) ; Less. Species des Mamm. p. 220 ; Smith, S. Afr. Journ. ii. p. 28 (1835) ; Gray, P. Z. S. (1863) p. 137.

*Varecia*, Gray, P. Z. S. (1863) p. 135.

*Characters*.—Muzzle elongated ; tarsus short ; upper incisors subequal, both pairs anterior to the canines ; upper molars with very large internal cingulum ; first upper premolar shorter than the second ; all upper premolars with only one large external cusp ; first upper molar considerably exceeding the third premolar in size ; upper canines very large ; sphenoidal fissure and foramen rotundum normally distinct ; generally a large malar foramen ; carotid foramen not obvious on the basis cranii ; angle of mandible not produced downwards.

Genus 2. HAPALEMUR, I. Geoff. St.-Hil. (1851).

*Hapalemur*, I. Geoff. St.-Hil. Cat. des Prim. p. 74 ; Gray, P. Z. S. (1863) p. 141.

*Hapalolemur*, Giebel (1859), Säug. p. 1018 ; Sclater, P. Z. S. (1863) p. 161.

*Lemur* (subgenus *Hapalemur*), Dahlb. Studia Zool. p. 220.

*Lemur* (*griseus*), Fischer, Anat. der Maki, p. 24 (1804).

*Lemur* (*cinereus*), Fischer, Syn. p. 77 (1829) ; Geoff. Mag. Encycl. i. p. 20 ; Desm. Mamm. p. 101.

*Chirogaleus*, Van der Hoeven, Tijds. pp. 30–38, t. 1. f. 1 ; Wagner, Schreb. Supp. i. p. 276, v. p. 148.

*Semnocebus* (jeune âge), Less. Species des Mam. p. 212.

*Maki gris*, Buff. Supp. vii. t. 34.

*Characters*.—Muzzle short ; tarsus short ; upper incisors sub-

\* This distinction is given by Dr. Peters (Reise nach Mossambique, p. 14, and Proc. Zool. Soc. 1863, p. 382), but he does not refer to *Hapalemur* ; its condition in that genus is unrecorded, and, I believe, unknown. Other characters, above enumerated, such as the structure of the tarsus, the number of dorsal and lumbar vertebræ, are, as well as the position of the gall-bladder, unknown to me in certain species, as *Microcebus furcifer*, *M. smithii*, *M. typicus*, *Chirogaleus milii*, and *Lepilemur murinus*, as also the condition of the mastoidal region of the periotic in the last.

equal, but the posterior one on each side quite internal to the canine, which is small. First premolar above longer than the second, but the dental series on each side very nearly equal; third premolar above shaped like the upper molars, which it exceeds in size. The molars and third premolars above with a well-marked external cingulum, but with the internal cingulum quite rudimentary. A paroccipital process. A large malar foramen; carotid foramen not obvious in the basis cranii; angle of mandible exceedingly large, and produced downwards and inwards, as well as backwards.

The type specimen is in the Museum at Paris.

### Genus 3. MICROCEBUS, Geoff. St.-Hil. (1828).

*Microcebus*, Geoff. St.-Hil. Cours sur les Mamm. (1828) leç. vi. p. 26; Wagner, Schreber, Supp. i. (1840) p. 277, v. (1855) p. 153; Dahlb. Studia Zool. p. 231; Isid. Geoff. St.-Hil. Cat. des Primates, p. 79; Peters, Reise nach Mossamb. p. 13.

*Chirogaleus*, Wagner, Schreb. Supp. v. p. 147; Dahlb. Studia Zool. p. 223.

*Cheirogaleus*, Isid. G. St.-Hil. Cat. des Prim. p. 77.

*Lepilemur*, Gray, P. Z. S. (1863) p. 143.

*Myscebus*, Lesson, Species (1840), p. 214.

*Gliscebus*, Lesson, Species (1840), p. 216.

*Myocebus*, Schinz, Syst. Verz. i. p. 105 (1844).

*Otolicnus*, Van der Hoeven, Tijds. (1844) p. 43.

*Galago*, Gray, Ann. & Mag. Nat. Hist. (1842); Geoff. Ann. du Mus. xix. (1812) p. 166; Desm. Mamm. p. 103; Kuhl, Beitr. p. 47; A. Smith, S. Afr. Journ. (1835) ii. p. 31.

*Characters*.—Tarsus elongated, but astragalus normal; calcaneum about one-third the length of the tibia; upper incisors unequal, the anterior pair much the larger; third upper premolar very much smaller than the first molar, and with only one large external cusp; upper molars with an oblique ridge from the postero-external to the large internal cusp, the postero-internal cusp being rudimentary or absent. Palate more or less prolonged beyond last molars; posterior palatine foramina very large; præmaxillæ largely developed, joining the nasals for more than a quarter of their (the nasals') length; an interparietal bone; malar foramen minute or absent; angle of mandible not produced downwards; seven lumbar vertebræ.

#### 1. MICROCEBUS MYOXINUS.

*M. myoxinus*, Peters, Mittheilung zu der Gesells. Natur. Freunde, Berlin (1850); Reise nach Mossamb. p. 14; Wagner, Schreber, Supp. v. (1855) p. 154.

*Lepilemur myoxinus*, Gray, P. Z. S. (1863) p. 144.

The type of the species is in Berlin.

#### 2. MICROCEBUS MINOR.

*Galago minor*, Gray, Ann. & Mag. N. H. (1842) x. p. 257.

*Lepilemur murinus*, Gray, P. Z. S. 1863, p. 143 (skull).

*Otolicnus minor*, Wagner, Schreb. Suppl. v. p. 159.

Type of the species in the British Museum.

### 3. MICROCEBUS SMITHII.

*Cheirogaleus smithii*, Gray, Ann. & Mag. N. H. 1842, x. p. 257 ; P. Z. S. 1863, p. 143.

*Chirogaleus smithii*, Wagner, Schreber, Suppl. v. p. 150.

*Microcebus pusillus*, Waterhouse, Cat. of Mus. of Z. S. 2nd ed. p. 12, no. 89.

Type of the species in the British Museum.

### 4. MICROCEBUS PUSILLUS.

*Le Rat de Madagascar*, Buffon, Suppl. iii. table 20, p. 149 (1776).

*Lemur pusillus* (*Le Maki nain*), Geoff. St.-Hil. Mag. Ency. (1796) i. p. 48 ; Bullet. Philom. 1<sup>re</sup> partie (1795) p. 89 ; Fischer, Anat. der Maki, p. 24.

*Lemur murinus*, De Blainv. Ostéogr. Lemur, pls. 10, 11, p. 12.

*L. ? murinus*, Fischer, Syn. p. 77.

*Microcebus rufus*, Geoff. St.-Hil. Cours de l'Hist. Nat. des Mamm. leçon vi. p. 26 (1828) ; Isid. G. St.-Hil. Cat. des Prim. p. 80 ; Schinz, p. 107 (1841).

*M. murinus*, Wagner, Schreber, Suppl. i. (1840) p. 278 ; v. (1855) p. 154.

*M. pusillus*, Peters, Reise nach Mossamb. p. 18.

*Myscebus palmarum*, Lesson, Species, p. 214.

*Gliscebus murinus*, Lesson, Species, p. 216.

*Galago madagascariensis*, Geoff. Ann. du Mus. xix. p. 166 ; Desm. Mamm. p. 103 ; Kuhl, Beitr. p. 47, t. 6. f. 1 ; A. Smith, S. African Journ. ii. (1835) p. 31 ; Gray, P. Z. S. 1863, p. 149.

*Otolicnus madagascariensis*, Van der Hoeven, Tijds. (1844) p. 43.

Type of the species in the Paris Museum.

This species (according to De Blainville's figure) differs from all the other *Microcebi*, except *M. smithii*, in having the first upper premolar less vertically extended than is the second, and in the greater forward production of the præmaxillæ and nasals. According to M. Gervais's figure (Mammifères, p. 173), it also differs in the greater equality of the upper incisors.

### 5. MICROCEBUS TYPICUS.

*Cheirogaleus typicus*, A. Smith, S. Afr. Journ. ii. p. 50 ; Gray, Cat. Brit. Mus. 17 ; P. Z. S. 1863, p. 142.

*Chirogaleus typicus*, Wagner, Schreber, Suppl. v. p. 150.

Type of the species in the British Museum.

I have no knowledge of the cranial or tarsal structure of this species, or of the position of its gall-bladder. The first upper premolar is canine-like.

## 6. MICROCEBUS FURCIFER.

*Lemur furcifer*, De Blainv. Ostéogr. Lemur, pl. 7, & p. 35.

*Cheirogaleus furcifer*, Isid. G. St.-Hilaire, Cat. des Prim. p. 77 ;  
Compt. Rend. (1850) xxxi. p. 876.

*Chirogaleus furcifer*, Wagner, Schreber, Suppl. v. p. 149 ; Dahlb.  
Studia Zool. p. 223.

*Lepilemur furcifer*, Gray, P. Z. S. 1863, p. 145.

Type of the species in the Paris Museum.

This species is larger than the other *Microcebi*. Its skull differs from those of *M. myoxinus* and *M. minor* by not having the defects of ossification in the palate, and by the upper molars having a more marked external cingulum ; also the fifth cusp of the last inferior molar is quite rudimentary. It differs also from all the other *Microcebi* in the great length of the inferior incisors, and from all but *M. typicus* in the long and canine-like first upper premolar. This is longer, however, than even in *M. typicus*.

## Genus 4. CHEIROGALEUS, Geoff. St.-Hil. (1812).

*Cheirogaleus*, Geoff. St.-Hil. Ann. du Mus. d'Hist. Nat. t. 19.  
p. 171 (1812) ; Cours de l'Hist. Nat. leçon xi. (1828) ; Isid. G.  
St.-Hil. Cat. des Prim. p. 76.

*Chirogaleus*, Fischer, Syn. p. 69 ; Van der Hoeven, Tijds. p. 38 ;  
Wagner, Schreber, Suppl. i. p. 273, v. p. 147 ; Dahlb. Studia Zool.  
p. 221.

*Myspithecus*, F. Cuvier, Hist. Nat. des Mamm. 2nd ed. (1833)  
p. 228.

*Cebogale*, Lesson, Species (1840) p. 213.

*Mioxicebus*, Lesson, Species (1840) p. 218.

*Characters*.—Tarsus elongated by means of the production of the astragalus and calcaneum ; upper incisors unequal, the anterior pair the larger ; third upper premolar with only one large external cusp ; angle of mandible not produced downwards ; seven lumbar vertebræ.

## CHEIROGALEUS MILII.

*Cheirogaleus milii*, 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.

*Chirogaleus milii*, Wagner, Schreber, Suppl. i. p. 275, v. p. 149 ;  
Dahlb. Studia Zool. p. 223.

*Lemur (Chirogaleus) milii*, Van der Hoeven, Tijds. p. 38.

*Lemur milii*, De Blainv. Ostéogr. Lemur, table 7. pp. 12, 35.

*Le Maki nain*, F. Cuv. Hist. Nat. des Mamm. 1st ed. (1821).

Type of the species in the Paris Museum.

## Genus 5. LEPILEMUR, I. Geoff. St.-Hil. (1851).

*Lepilemur*, Isid. G. St.-Hil. Cat. des Prim. p. 75 ; Dahlb. Studia  
Zool. p. 220 ; Gray, P. Z. S. 1863, p. 144.

*Galeocebus*, Wagner, Schreber, Suppl. v. p. 147.



*Characters.*—Tail shorter than the body; no upper incisors; upper molars with three large tubercles, as in *Microcebus*; anterior part of each lower grinder produced forwards outside the posterior part of the tooth next in front; palate not prolonged beyond the last molar; posterior palatine foramina inconspicuous.

**LEPILEMUR MUSTELINUS.**

Type of the species in the Paris Museum.

The cranial and tarsal structure of this form and the position of the gall-bladder are quite unknown to me.

Subfamily 3. NYCTICEBINÆ.

*Characters.*—I.  $\frac{2-2}{4}$ . C.  $\frac{1-1}{1-1}$ . P.M.  $\frac{3-3}{3-3}$ . M.  $\frac{3-3}{3-3}$ . Fore and hind limbs subequal in length; tail short (always shorter than half the length of the body), rudimentary, or absent; tarsus short; third upper premolar with only one large external cusp, and considerably smaller than the first upper molar; an oblique ridge to the upper molars; first upper premolar more or less exceeding the second in vertical extent; mastoidal region of periotic inflated; one opening representing both the sphenoidal fissure and the foramen rotundum; carotid foramen conspicuous; dorsal vertebræ always fourteen or more; lumbar vertebræ always seven or more; gall-bladder with its fundus not turned towards the back.

*Hab.* Africa and Asia (not Madagascar).

Genus 1. NYCTICEBUS, Geoff. St.-Hil. (1812).

*Nycticebus*, Geoff. St.-Hil. Tabl. des Quad. (1812); Desm. Mamm. (1820) p. 102; Fischer, Syn. p. 70; Isid. G. St.-Hil. Cat. des Prim. p. 78; Dahlb. Studia Zool. p. 208; Gray, P. Z. S. 1863, p. 149.

*Stenops*, Van der Hoeven, Tijdsch. p. 39; Illiger, Prodr. p. 73; Wagner, Schreber, Suppl. i. p. 279, v. p. 150.

*Loris*, Fischer, Anat. der Maki, p. 30.

*Bradicebus*, Cuvier et Geoff. St.-Hil. Mém. sur la Cl. des Mamm. (1795).

*Bradylemur*, De Blainv. Ostéogr. Lemur (1840) p. 12; Lesson, Species (1840) p. 239.

*Characters.*—Body and limbs stout; index finger short; tail absent; upper incisors large and unequal; first upper premolar very long; last upper molar tricuspoid; palate not produced; præmaxillæ not projecting much forwards; dorsal vertebræ sixteen; lumbar vertebræ seven or eight.

*Hab.* Borneo; Sumatra; Java.

Genus 2. LORIS, Geoff. St.-Hil. (1796).

*Loris*, Geoff. St.-Hil. Mém. sur les Makis (1796); Desm. Mamm. (1820) p. 101; Fischer, Anat. der Maki, p. 26; Isid. Geoff. St.-Hil.

Cat. des Prim. p. 78; Dahlb. *Studia Zool.* p. 210; Buffon, xiii. p. 210, pl. 30 (1765).

*Prosimia*, Cuv. et Geoff. *Mém. sur la Cl. des Mamm.* (1795).

*Stenops*, Kuhl, *Beitr.* p. 47, t. 6. f. 2-6; Wagner, Schreber, *Suppl.* i. p. 287, v. 151; Van der Hoeven, *Tijds.* p. 39.

*Nycticebus*, Fischer, *Syn.* p. 70.

*Bradylemur*, De Blainv. *Osteogr. Lemur*, pp. 12, 16.

*Arachnocebus*, Lesson, *Species* (1840) p. 243.

*Characters*.—Body and limbs slender; index finger short; tail absent; upper incisors very small and equal; first upper premolar elongated; last upper molar quadricuspid; last lower molar quinquecuspid; palate prolonged a little beyond the last molar; præmaxillæ projecting greatly forwards; orbits closely approximated; dorsal vertebræ fourteen or fifteen; lumbar vertebræ nine.

*Hab.* Ceylon: Pondicherry.

### Genus 3. PERODICTICUS, Bennett (1830).

*Perodicticus*, Bennett, *P. Z. S.* 1830, p. 109; Van der Hoeven, *Tijds.* pp. 20, 40; Wagner, Schreber, *Suppl.* i. p. 288, v. p. 152; Dahlb. *Studia Zool.* p. 207; A. Smith, *S. Afr. Journ.* (1835) ii. p. 30; Murray, *Proc. R. Phys. Soc. Edinb.* 1860, p. 191; Gray, *P. Z. S.* 1863, p. 150; Huxley, *P. Z. S.* 1864, p. 335.

*Characters*.—Index finger rudimentary and nailless; tail rudimentary, but distinct; upper incisors large, subequal; first upper premolar very long; last upper molar bicuspid; last lower molar quadricuspid; palate not produced\*; præmaxillæ not projecting much forwards; dorsal vertebræ fourteen or fifteen; lumbar vertebræ seven or eight.

*Hab.* West Africa: Sierra Leone.

### Genus 4. ARCTOCEBUS, Gray (1863).

*Arctocebus*, Gray, *P. Z. S.* 1863, p. 150; Huxley, *P. Z. S.* 1864, p. 335.

*Perodicticus*, Smith, *Proc. R. Phys. Soc. Edinb.* (1860) p. 172.

*Characters*.—Index finger rudimentary and nailless; tail rudimentary; upper incisors small and subequal; first upper premolar short, very little exceeding the second in vertical extent; last upper molar tricuspid; last lower molar quinquecuspid; palate scarcely produced beyond the last molar; dorsal vertebræ fifteen; lumbar vertebræ seven.

*Hab.* West Africa: Old Calabar.

The skeleton of the type of the genus is preserved in the Museum of the Royal College of Surgeons.

\* In pl. 1. fig. 2 of F. A. W. Van Campen's "Monograph on the Anatomy of the Potto" (*Verhand. der Koninkl. Akad. van Wetenschappen*, 1859, deel vii.) the palate appears, as I have found it, unprolonged. However, in Van der Hoeven's 'Bijdrage tot de Kennis van den Potto,' 1851, pl. 2. fig. 3, the palate is represented as prolonged considerably beyond the last molar.

## Subfamily 4. GALAGININÆ.

*Characters.*—I.  $\frac{2-2}{4}$ . C.  $\frac{1-1}{1-1}$ . P.M.  $\frac{3-3}{3-3}$ . M.  $\frac{3-3}{3-3}$ . Upper incisors subequal: first upper premolar longer than the second; third upper premolar with two large external cusps, and about equalling the first molar in size; upper molars with the oblique ridge; postero-internal cusp of second and third molars well developed; hind limbs much longer than the fore; tarsus very long; calcaneum more than one-third the length of the tibia; naviculare much longer than the cuboid; ears very large; tail longer than body; mastoidal region of periotic inflated; no interparietal; carotid foramen conspicuous in the basis cranii; one opening representing both foramen rotundum and sphenoidal fissure; dorsal vertebræ thirteen; lumbar vertebræ six; gall-bladder with its base not turned towards the back.

*Hab.* Africa (not Madagascar).

## Genus GALAGO, Cuv. et Geoff. (1795).

*Galago*, Cuv. et Geoff. St.-Hil. (1795) Mém. sur la Cl. des Mamm.; Fischer, Anat. der Maki (1804) p. 41; Syn. (1829) p. 67; Desm. Mamm. p. 103; Lesson, Species (1840) p. 245; Isid. G. St.-Hil. Cat. des Prim. p. 80; Dahlb. Studia Zool. p. 226; Gray, P. Z. S. 1863, p. 145.

*Otolicnus*, Illiger, Prodr. (1811) p. 74; Van der Hoeven, Tijds. p. 41; Wagner, Schreb. Suppl. i. p. 290; v. p. 156.

*Otolemur*, Coquerel, Rev. et Mag. de Zool. (1859) xi. p. 457.

*Otogale*, Gray, P. Z. S. 1863, p. 139.

*Callotus*, Gray, P. Z. S. 1863, p. 145.

*Galagoides*, A. Smith, S. Afr. Journ. ii. p. 32.

*Hemigalago*, Dahlb. Studia Zool. (1856) p. 230.

*Characters.*—The same as those of the subfamily.

## Subgenus 1. OTOLEMUR, Coquerel (1859).

*Characters.*—Size large; skull, when viewed laterally, with the part anterior to the orbit longer than the anterior opening of the latter; first upper premolar not canine-like; angle of mandible produced downwards\*; tarsus relatively shorter than in the subgenus *Otolicnus*.

## 1. GALAGO (OTOLEMUR) AGISYMBANUS.

*O. agisymbanus*, Coquerel, Rev. et Mag. de Zool. (1859) xi. p. 457, pls. 17 & 18.

*Hab.* Zanzibar. Not improbably a variety of the next species. Type of the species in the Paris Museum.

## 2. GALAGO (OTOLEMUR) CRASSICAUDATUS.

*Lemur crassicaudatus*, De Blainville, Ostéogr. Lemur, (skull) t. 7, tarsus (by error) pl. 5.

*Galago crassicaudatus*, Geoff. St.-Hil. Tabl. des Quad. (1812);

\* Only slightly so in *Galago (Otolemur) monteiri*.

Fischer, Syn. p. 67 ; Desm. Mamm. p. 103 ; Lesson, Species, p. 245 ; Isid. G. St.-Hil. Cat. des Prim. p. 82 ; Dahlb. Studia Zool. p. 227.

*Otolicnus crassicaudatus*, Peters, Reise nach Mossamb. p. 5, t. 2 & 4 ; Van der Hoeven, Tijds. p. 42.

*Otogale crassicaudata*, Gray, P. Z. S. 1863, p. 140.

*Hab.* West Africa ; Mossambique ; Port Natal.

The type of the species is in the Museum at Paris. Dr. Peters remarks (page 8) that the clitoris in this species is quite short. It would be interesting to know if it is so in other species of the subgenus *Otolemur*, as it is certainly very long in some of the subgenus *Otolicnus*.

There is in the British Museum another species or variety, obtained by Dr. Kirk from the Zambesi, which very much resembles this species, and may be the *O. agisymbanus* of Dr. Coquerel.

### 3. GALAGO (OTOLEMUR) GARNETTII.

*Otolicnus garnettii*, Ogilby, P. Z. S. 1838, p. 6 ; Van der Hoeven, Tijds. p. 42 ; Wagner, Schreb. Suppl. v. p. 157.

*Otogale garnettii*, Gray, P. Z. S. 1863, p. 140 (skull).

*Hab.* Port Natal.

### 4. GALAGO (OTOLEMUR) MONTEIRI.

*Galago monteiri*, Bartlett, P. Z. S. 1863, p. 231, pl. xxviii.

*Callotus monteiri*, Gray, P. Z. S. 1863, p. 145.

*Hab.* Angola.

This, though undoubtedly belonging to the same subgenus as do the preceding forms, is nevertheless, I am inclined to believe, a distinct species. The palate is very wide, wider than in any other skull I have yet seen belonging to a species of this genus. The two upper incisors of each side are more separated, so that the whole four are more scattered. The most striking character is the great breadth of the malar beneath the outer part of the orbit. It is wider than the horizontal ramus of the mandible is deep. The zygoma also is much extended vertically, more so than in any other species of the genus. The relative length of the tarsus and tibia is the same as in *Galago (Otolemur) garnettii*.

The skull of the type of the species is in the Museum of the Royal College of Surgeons.

### Subgenus 2. OTOGALE, Gray (1863).

*Characters.*—First upper premolar canine-like ; skull, when viewed laterally, with the part anterior to the orbit shorter than the anterior opening of the latter ; angle of mandible produced downwards ; tarsus shorter in proportion to tibia than in *Otolicnus*?

#### 1. GALAGO (OTOGALE) PALLIDUS.

*Otogale pallida*, Gray, P. Z. S. 1863, p. 140 (skull), pl. xix.

*Hab.* Fernando Po.

The type of the species is in the British Museum.

## 2. GALAGO (OTOGALE) ELEGANTULUS.

*Microcebus elegantulus*, Leconte, Proc. Acad. Soc. Philad. 1857, p. 10.

*Otolicnus apicalis*, Du Chaillu, Appendix to 'Travels,' p. 471.

*Hab.* Western Africa, Gaboon.

## Subgenus 3. OTOLICNUS, Illiger (1811).

*Characters.*—Size small; muzzle shorter than orbital opening; first upper premolar not canine-like; angle of mandible not or scarcely produced downwards; tarsus very long.

## 1. GALAGO (OTOLICNUS) ALLENII.

*Galago allenii*, Waterhouse, P. Z. S. 1837, p. 87; Gray, P. Z. S. 1863, p. 146; Sclater, P. Z. S. 1863, p. 375, pl. xxxii.

*Otolicnus allenii*, Van der Hoeven, Tijds. p. 42; Wagner, Schreb. Suppl. i. p. 294, v. p. 159.

*Hab.* Fernando Po and Cameroons River.

Type of the species in the British Museum.

## 2. GALAGO (OTOLICNUS) GABONENSIS.

*Galago allenii*, var. *gabonensis*, Gray, P. Z. S. 1863, p. 146.

*Hab.* The Gaboon.

The skin and skull of the type of the species are in the British Museum.

## 3. GALAGO (OTOLICNUS) SENEGALENSIS.

*Lemur galago*, Schreb. Säugeth. t. 38 B.

*Galago senegalensis*, Geoffroy Saint-Hilaire, Mém. sur les Rapports naturels des Makis (1796); Fischer, Anat. der Maki, p. 42; Syn. p. 68; Isid. G. St.-Hil. Cat. des Prim. p. 81; Gray, P. Z. S. 1863, p. 147.

*Otolicnus galago*, Illiger, Prodr. p. 74; Van der Hoeven, Tijds. p. 41; Wagner, Schreb. Suppl. i. p. 292, v. p. 158.

*Galagoïdes senegalensis*, A. Smith, S. Afr. Journ. ii. p. 32.

*Hab.* Western Africa: Senegal; Gambia.

The type of the species is in the Museum at Paris.

## 4. GALAGO (OTOLICNUS) SENNAARENSIS.

*Galago sennariensis*, Kotschy, MS.; Gray, P. Z. S. 1863, p. 147 (skull).

*Hab.* Sennaar.

## 5. GALAGO (OTOLICNUS) MAHOLI.

*Galago maholi*, A. Smith, Illust. of S. Afr. Zool. pls. 8 & 8 bis; Gray, P. Z. S. 1863, p. 146.

*Otolicnus galago*, var. *australis*, Wagner, Schreb. Suppl. v. p. 158.

*Hab.* South Africa.

Type of the species in the British Museum.

## 6. GALAGO (OTOLICNUS) TENG.

*Galago teng*, Sundevall, Kongl. Vetensk. Akad. Handling. 1842, p. 201.

*Otolicnus galago*, var. *sennariensis*, Wagner, Schreb. Suppl. v. p. 158.

## Subgenus 4. HEMIGALAGO, Dahlbom (1856).

*Characters*.—Size very small; muzzle shorter than orbital opening; first upper premolar not canine-like; angle of mandible produced downwards as well as backwards; tarsus very long; præmaxillæ produced strongly forwards in front of incisors.

## GALAGO (HEMIGALAGO) DEMIDOFFII.

*Hemigalago demidoffii*, Dahlb. Studia Zool. p. 230; Coquerel, Rev. et Mag. de Zool. (1859) xi. p. 457.

*Galago demidoffii*, Fischer, in Act. de la Soc. des Natur. de Mosc. i. p. 24. f. 1 (1806); Syn. p. 68; Desm. Mamm. p. 104, sp. 128; Isid. G. St.-Hil. Cat. des Prim. p. 81; Gray, P. Z. S. 1863, p. 148 (skull); Peters, P. Z. S. 1863, p. 380, pl. xxxv.

*Otolicnus demidoffii*, Wagner, Schreb. Suppl. v. p. 160.

*O. peli*, Temm. Esquis. Zool. Leyden (1853), 1<sup>ère</sup> partie, Mamm. p. 42.

*Galagoides demidoffii*, A. Smith, S. Afr. Journ. ii. p. 32 (1835).

*Galago murinus*, Murray, Edinb. Phil. Journ. (with plates) new ser. x. (1859) p. 243; xi. (1860) p. 99.

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December 13, 1864.

John Gould, Esq., F.R.S., in the Chair.

Prof. Owen, F.R.S., read a further memoir on *Dinornis*, being the ninth of a series of contributions to the Society's 'Transactions' on this subject. The present section contained the description of the skull, atlas, and scapulo-coracoid bone of *Dinornis robustus*, Owen, and was founded partly on materials submitted to his examination by Dr. D. S. Price, consisting of a mutilated cranium and other bones which had been obtained from the bottom of a crevice about 50 feet deep in a limestone rock, situated a few miles south of Timaru, in the Middle Island of New Zealand, and partly on a skull found with a skeleton almost entire in the valley of Manuherikia, Otago. The skeleton last referred to had been disinterred by some gold-miners from one of the large basins of ancient tertiary date which characterize the auriferous region of the interior of the province of Otago, and had been transmitted to the Museum of the Yorkshire Philoso-

phical Society at York, the Council of which had placed it at Prof. Owen's disposal for the purpose of description.

Mr. Bartlett exhibited a curious variety of the Common Partridge (*Perdix cinerea*) from the collection of Mr. J. Gatcombe. The specimen was stated to be one of three similar individuals lately obtained in a wild state in the neighbourhood of Paris.

The following papers were read :—

1. LIST OF MAMMALIA MET WITH IN ZAMBESIA, EAST TROPICAL AFRICA. BY JOHN KIRK, M.D., F.L.S.

In arranging the following enumeration of Mammals, with localities where observed, I have availed myself of the published work of Dr. Peters, and in general followed his classification.

The collection of mammals was very small, and seems to include only two undescribed species, of which one is a Bat, of the genus *Nycticejus*, very distinct from either of those figured by Dr. Peters, the other, more doubtful, being the Antelope mentioned by Dr. Peters under the name of *Antilope moschata*, but which seems to me to differ from that animal specifically.

I have no hesitation in recognizing *Tragelaphus spekii*, Sclater, as identical with the long-known "Nakong," of which full accounts have been given by various travellers, and specimens brought to England. Notwithstanding this, it had not been described scientifically until Dr. Sclater lately characterized it from specimens met with by Capt. Speke in the swampy regions where the Nile takes its rise. These resemble in physical features the country south, from which this Antelope was first obtained.

It is interesting to find the same animals appear as explorers advance from north and south, suggesting a tolerably level continuous marshy region embracing the sources of the main African rivers.

SIMILÆ.

1. CERCOPITHECUS ERYTHRARCHUS, Peters.

Quilimane ; Luabo.

2. CERCOPITHECUS PYGERYTHRUS (F. Cuvier).

Sena ; Tete ; Batoka. Native name, "Pusi."

On the western shore of Lake Nyassa, on a rocky headland which ran out into the lake, we saw a number of Black Monkeys, quite distinct from any met with elsewhere. No specimens were obtained, as the boat was moving on quickly, and a heavy sea running at the time.

3. CYNOCEPHALUS BABOUIN (Desmarest).

Tete ; Sena ; Batoka ; Rovuma. In some parts a sacred animal, and preserved by the people. Native name, "Nyani," Manganja ; "Mabonque," Bororo.

## LEMURIDÆ.

## 4. GALAGO CRASSICAUDATUS (Geoffroy).

Mozambique ; Quilimane ; Luabo.

Frequents the mangrove-forests and wooded country outside. In captivity it eats flesh, vegetables, fruits, and insects ; in its native state it is fond of palm wine, robbing the pots used by the natives to collect it. This often leads to its capture when it drinks to excess.

During the day it remains quiet in some shaded tree-top. At night it is very active, leaping from frond to frond, or crossing from one cocconut-palm to another.

Dr. Peters obtained specimens of this animal, not only on the sea-coast and maritime region to which I had imagined it was limited, but also from the interior. He has, after a careful investigation, identified it with the *Galago crassicaudatus* of Geoffroy. Between the skull of a specimen I obtained and that named *G. crassicaudatus* in the British Museum no difference is observable, although in the colour of the hair there is some variation. Yet I should consider them as one, and identical also with the specimen presented by Dr. Waghorn, now in the Gardens alive, which probably came originally from the same Portuguese gentleman who gave me my specimens.

## 5. GALAGO MAHOLI (Smith).

Kebrabassa ; Batoka ; Nyassa.

Common among the wooded hills of Kebrabassa. By day it rests in the bush. After sunset it becomes active, and on several occasions came about the camp-fires. Its powers of leaping are extraordinary ; in the dim light it more resembles a Bat in its movements, crossing from side to side, at single leaps, distances of 6 feet. Occurs singly or in pairs.

## CHIROPTERA.

## 6. EPOMOPHORUS CRYPTURUS, Peters.

Shupanga, S. lat. 18° 2'.

These animals appear about sunset, and continue flying about for a few hours. They were abundant at the time when the Great Fig-tree was covered with fruit ; this they carried off to the neighbouring *Bombax* trees, and ate at leisure. A much larger Bat, compared by the natives to *Pteropus edwardsii*, is said to inhabit the mountainous district of Gorongozo, south-west from Sena.

## 7. PHYLLORHINA GRACILIS, Peters.

Shupanga, in the house.

## 8. PHYLLORHINA CAFFRA, Peters.

Shupanga, in the house.

## 9. RHINOLOPHUS LOBATUS, Peters.

Shupanga, in the house.



10. *NYCTERIS FULIGINOSA*, Peters.

Shupanga, in the house.

11. *VESPERTILIO NANUS*, Peters.

Mozambique, in the house.

12. *NYCTICEJUS NIDICOLA*, sp. nov.

Fur brown; the base of the hairs blackish, beneath yellowish. Ears ovate, acute, with a well-developed rounded process at the front part of the outer or lower edge. Tongue linear lanceolate, acute, rather more than half the length of the ear. Face depressed, bristly. Wings elongate, thin, bald, rather hairy above and below, close to the body; forearm-bone nearly  $1\frac{1}{2}$  inch long; the thumb compressed, rather elongate, slender, of a single joint. Tail as long as the body. The interfemoral membrane very large, broad, with nearly regular, almost parallel, transverse muscular bands, which are hairy on the upper and lower surface. The spur elongate, strong, nearly as long as the foreleg and foot; the spur and the end of the membrane fringed with short, rather rigid hairs. The legs rather elongate; the lower part of the thigh slender; the shank slender, not quite half the length of the arm-bone; the toes moderate, slender, compressed, covered with short adpressed hairs.

Expanse of wings 10 inches, of forearm-bone 1.5 inch, of fore-leg 8 inches, of foot 3 inches, of spur  $9\frac{1}{2}$  lines.

Shupanga, near the Zambesi.

Four specimens were obtained; they had taken possession of the nests of Weaver-birds (*Euplectes*). Having accidentally found a pair in one of these hanging nests; others were soon discovered in similar positions near by.

## INSECTIVORA.

13. *CROCIDURA CANESCENS*, Peters.

Tette.

14. *MACROSCELIDES INTUFI*?

I believe this to be the species seen on the river Rovuma, in lat.  $11^{\circ}$  South; it lived in sandy soil, among bushes.

15. *PETRODROMUS TETRADACTYLUS*, Peters.

Cabaceira, Mozambique. Very common.

## CARNIVORA.

16. *MELLIVORA CAPENSIS*, F. Cuvier.

Near Sena; Manganja country.

When wounded, it makes for the tendo Achillis, which it cuts; it is considered in that way a dangerous animal.

17. *RHABDOGALE MUSTELINA*, Wagner.

Specimens were got at Mozambique; it is there very abundant on the sandy and gravel soils of Cabaceira; also on the Zambesi.

18. *LUTRA INUNGUIS*, Cuvier.

Native name, on the Lower Zambesi, "M'biti."

Common in all the rivers and lakes, from the Victoria Falls to the sea-coast.

19. *VIVERRA CIVETTA*, Cuvier.

Near Shupanga, on the Lower Zambesi. In bushy country between Sena and Tete.

20. *VIVERRA GENETTA*, Linnæus.

Very common, especially near the coast. Many variations in colour and marking are due to age.

21. *HERPESTES FASCIATUS*, Desmarest.

Quilimane; Shupanga; Sena.

Easily tamed. Very fond of eggs, which it breaks by throwing them backwards against a stone.

22. *HERPESTES ORNATUS*, Peters.

Tete. Only one specimen of this Mangouste was seen.

23. *HERPESTES PALUDINOSUS*, Cuvier.

Native name, "Moko."

Quilimane. Very easily domesticated. Eats flesh and fish, but not eggs.

✕ 24. *OTOCYON LALANDII*, Smith.

Zambesi, near confluence of Kafue, and north of Sena.

These animals hunt in packs. Although inferior in speed to the Antelope, they will run him down, and at last wear him out; even the Buffalo they are said sometimes to kill.

25. *HYÆNA CROCUTA*.

Native name, at Shupanga, "Tika;" by the Bechuanas called "Setloñkane."

One of the many scavengers of the country, abounding where game or dead bodies are found. It is a cowardly animal, and will never attack until the other runs off; yet it often bites men asleep. The white secretion deposited by it is commonly found on stones or in the field.

The Laughing Hyæna is more rare, and no specimen was killed.

26. *FELIS LEO*.

"Tao" of the Bechuanas; "Pondoro" of Tete; "Nkaramba" of the Manganja.

Frequents grass-plains and open forest-country. In parts where the doctrine of transmigration of souls forms part of the native belief it is very common, also where game is plentiful. It will only attack man when pressed by hunger, or when wounded, and is a cowardly animal.

27. *FELIS PARDUS*.

“Ngwe” of the Bechuanas; “Nyarugwe,” on the Lower Zambesi.

Occurs in plains and mountains. A more dangerous animal than the Lion.

28. *FELIS JUBATA*.

In the Makalolo country, but not common.

29. *FELIS SERVAL*.

Native name, in Lower Zambesi, “Njuzi.” Very widely spread in the plains, valleys, and hills of East Tropical Africa.

30. *FELIS CALIGATA*, Temminck.

Tete, Sena, and Manganja country. Native name, “Bonga.”

## GLIRES.

31. *SCIURUS MUTABILIS*, Peters.

Common in forests near the Murchison Rapids, River Shiré, and in the Zambesi valley, near Sena. Very frequent in “Mopane” forests.

32. *SCIURUS FLAVIVITTIS*, Peters.

Cabaceira; Mozambique: in mango-plantations. Very common.

33. *SCIURUS CEPAPI*, Smith.

Near Tete.

34. *AULACODUS SWINDERIANUS*, Temminck.

By the natives of the Lower Zambesi this is named “Senze.” It inhabits sand-islands and grassy plains near the mouth of the Zambesi. It is caught by burning the reeds and grass. Produces four young. Specimens of the fœtus are in the British Museum.

35. *MUS ALEXANDRINUS*, Geoffroy.

Near Tete.

36. *MUS (PELOMYS) FALLAX*, Peters.

Shupanga. The common water-rat of the country.

37. *HYSTRIX AFRICÆ-AUSTRALIS*, Peters.

Native name on the Lower Zambesi, “Nuñgo.”

The only example seen alive of this animal was at Zanzibar; it had been brought across from the mainland. All throughout the Zambesi countries the spines were constantly found, although no specimen of the animal was killed.

38. *LEPUS SAXATILIS*, F. Cuvier.

“Sena”; Shupanga; Murchison Rapids.

Nowhere very common, yet scattered over a wide area. Its habits are like the Hare; its haunts are rocky ground and underwood.

## EDENTATA.

39. *MANIS TEMMINCKII*, Smuts.

By the Portuguese called “Bicho vergonhoso.”

The scales of this animal are much valued by the natives, and worn as “fetish.” It occurs “near Sena.”

40. *ORYCTEROPUS CAPENSIS*?

Native name, “Simba.” Common near Shupanga; said also to be frequent at Mozambique.

No specimen was obtained; yet I have little doubt of its being the same animal as is found in the colony. It burrows very fast, and, for that reason, cannot be dug up.

## SOLIDUNGULA.

41. *EQUUS ZEBRA*.

Native name in Sechuana, “Pitse”; at Sena, “M’bizi”; among the Manganja, “M’bidzi.” Found at the foot of Moramballa hills, opposite Sena; hills south of Lake Nyassa; Kebrabassa, Batoka country. Not so common as Burchell’s Zebra.

42. *EQUUS BURCHELLII*.

Native name on Lower Zambesi, “Bidzi-kiti.” Inhabits the neighbourhood of Shupanga and Sena, and readily known from the other species by the yellowish colour between the stripes.

The Quagga is unknown on the Zambesi.

## PACHYDERMATA.

43. *ELEPHAS AFRICANUS*.

By Bechuanas named, “Ylo”; at Tete and Sena, “Dzo”; by the Manganja, “N’jovo” or “Njobvo.” On the Nyassa, ivory is named “dembo”; by the Bechuanas, “manaka a tlo,” or horns of the Elephant—those of Sena also naming the tusks “M’nyanga,” or horns. In different regions the Elephant varies in size. On the Zambesi the animal is smaller than it is further south, but the ivory is rather larger; that which comes to Zanzibar is still heavier. Of the ivory which comes to Quilimane, some is from mountainous and rocky country; this is heavier, in proportion to its apparent size, and harder than that from the flat, damp plains.

The Elephant goes commonly in herds; solitary animals are always dangerous, and will occasionally attack without provocation. The herds of males and females go separate, and are never known to mix with each other; the calves follow the cows. Where hunters with

guns have not penetrated, the Elephant is still found in large numbers: as many as 800 were seen by us at one time, nor did they move off as we approached: yet that day's experience was sufficient; they never again allowed us such a chance. The food of the Elephant consists of leaves and bark of trees, palm-fruits, both *Borassus* and *Hyphæne*, and all sweet fruits, as *Sideroxyylon*, *Parinarium*, *Cordyle*, and *Sclerocarya*. On one occasion only have I known the Elephant eat grass.

Measurements of male Elephant killed on Lake Nyassa, 9th of September, 1861:—

	ft.	in.
Height at withers . . . . .	10	3
Circumference of fore foot . . . . .	5	1
From tip of trunk to crown of head . . . . .	9	0
From crown of head to insertion of tail . . . . .	12	0
Length of tail . . . . .	4	2
Horizontal diameter of ear . . . . .	3	0
Perpendicular diameter of ear . . . . .	5	9
Semicircumference of belly . . . . .	9	0
Semicircumference of chest . . . . .	7	10
Each tusk weighed about 30 lb.		

Measurements of young cow with foetus *in utero* (on the chest there still remained a good deal of hair), shot in Elephant Marsh, River Shiré:—

	ft.	in.
Height at withers . . . . .	6	9
Circumference of fore foot . . . . .	3	5
Perpendicular diameter of external ear . . . . .	4	4½
The tusks weighed 8 lbs each.		

#### 44. RHINOCEROS AFRICANUS.

In Sechuana named "Borile," or, more fully, "Chukuri e borile," "the sour Rhinoceros"; at Sena, "Phuete;" at Tete, "Shi-pembere." Seen on the Zambesi at Sena, in the Batoka country, and in the forest near the Kafue; on the Shiré, at Moramballa.

Its food consists of leaves and twigs of trees. It frequents forest and bush country, avoiding grass plains. Without questioning the justice of separating the Keitloa of Smith from the common Black Rhinoceros, I am not prepared to say which species it was we met with.

The White Rhinoceros is unknown on the Zambesi. The food of the Rhinoceros consists of twigs and leaves of trees.

#### 45. HIPPOPOTAMUS AMPHIBIUS.

In Sechuana named "Kubu"; at Tete and Sena, "Mvu"; at Quilimane and amongst the Achawa, "Tomondo." Common to all lakes and rivers. On the coast it goes to sea, and plays among the surf. On Nyassa a full-grown male measured 14 feet from snout to tip of tail, and stood 3 feet 6 inches at the withers. On the Zam-

besi a tusk weighing 8 lbs. is considered good, and they very seldom equal 12 lbs.; the females bring forth one fœtus at a time.

In a school of Hippopotami seen in the Zambesi, above the Kafue, one was white—quite an albino. In a school further down we noticed several piebald individuals; and, still further off, the Hippopotami had white feet only.

Before fire-arms the White Rhinoceros is the first animal to disappear; but the Hippopotamus also must soon give way.

#### 46. PHACOCÆRUS AFRICANUS.

Native name, "Jiri" or "Njiri" at Tete; in Sechuana, "Kolobe;" Sena and Tete; Batoka country.

#### 47. POTAMOCHÆRUS AFRICANUS.

Zambesi delta. Native name, "Ngulve."

The name of "N'kumba," given to a pig, means an animal that burrows or digs.

#### 48. HYRAX ARBOREUS, Smith.

Common in rocky hill-sides; Manganja hills; Kebrabassa.

They live in colonies; the natives catch them in spring-traps: their flesh is good.

#### 49. HYRAX, sp.?

Alongside of the Murchison Rapids a *Hyrax* was killed by one of the natives; it differed from the common Cape species, being less in size and of a lighter colour. It was one of a colony living among rocks. The specimen was lost, and I cannot identify it as any described species.

### RUMINANTIA.

#### 50. CAMELOPARDALIS GIRAFFA.

Sechuana name, "Tutlwa."

Quite unknown on the Zambesi; it was never seen by any of our party, unless crossing from Sesheke to Linyanti, in the Makololo country.

#### 51. ÆPYCEROS MELAMPUS (Licht.).

"Pallah" of the Bechuanas.

Frequent in hilly ground or in plains at the foot of hills, to which it always runs when disturbed or wounded. Absent from damp grassy plains. Observed in the hills which form the Murchison Rapids of the Shiré; in the plains above Victoria Falls, near the Batoka Hills. Abundant on the rocky island of "Imparira," at junction of "Chobe" with Zambesi; commonly in herds of fifteen to thirty.

#### 52. CEPHALOPHUS OCULARIS, Peters.

Native name in Sena, "Nyassa." By Bechuanas the Duyker Antelopes are named "Puti."

Two specimens killed above Lupata. Once started, the members of this group of Antelopes have the habit of never stopping until out of sight.

53. *NESOTRAGUS LIVINGSTONIANUS*, n. sp.

Shupanga and Lupata, where it is named "Rumsa" or "Lumdsa."

This small Antelope is very nearly allied to *N. moschatus* of the island of Zanzibar, under which name it is probably mentioned in Dr. Peters's 'Mammalia.' Yet it seems to me different from that of Zanzibar, of which I have seen three recently killed specimens in that island. The size of the two animals is nearly the same; the colour of that on the Zambesi lighter, and the hair softer, the ears larger and broader, horns more closely ringed, and nostrils more narrowed.

The habits of this Antelope resemble those of the Zanzibar animal; it frequents dense underwood jungle; lives in pairs. On being started, it runs quickly, not unlike a hare, turning quickly, and concealing itself in some tuft of grass or small bush.

It seems to me that between the specimen in the British Museum from Zanzibar and the head from the Zambesi there are specific differences, sufficient to justify the latter being at present regarded as a distinct species. Better specimens of both are much needed.

54. *OREOTRAGUS SALTATOR*.

The "Klippspringer" of Cape colonists.

Found singly or in pairs in rocky ground and among mountains; seen in Kebrabassa, and on the hills at the Murchison Rapids, River Shiré. Only two specimens were killed, both females.

55. *HELEOTRAGUS ARUNDINACEUS*.

Named "N'Sengo" at Sena and Tete. Very widely distributed on open grass-plains, both at the coast and in the interior.

Zambesi delta; Shupanga; Sena; Batoka.

Commonly found feeding in small herds; in the heat of the day it rests in long grass, and may be approached within fifty yards before starting. It seldom runs far without stopping to look round. Before again making off, it gives a shrill whistle, as it does often when first started.

Should the female have young, unable to run far, and danger near, she places her foot on the shoulder and presses it to the ground; after which it never moves until almost trodden upon, and is expected to remain in the same spot until the return of the mother.

The curvature and amount of divergence of the horns varies in this Antelope more than in some other species.

56. *HELEOTRAGUS VARDONII*.

*Antelope vardonii*, Livingstone, Missionary Travels.

Native name, "Poku."

This is one of the three water-antelopes common to the marshes

about the Chobe and Zambesi, in the centre of the continent, but elsewhere as yet unknown. With the *H. lechè* it often mixes, the habits of the two being very similar, the "Poku" being less aquatic and found more often on dry ground. It is known by its smaller size, its more erect carriage, and plumpness of neck. The horns are less turned backwards, and partake more of the aspect of the "Reit-bock." Our specimen of the horns was lost while travelling to the coast.

#### 57. HELEOTRAGUS LECHÈ.

*Adenota lechè*, Gray.

This Antelope has not been found near either coast in the line of the Zambesi; it is limited to the central valley above the Victoria Falls, to the marsh-banks of that river and its tributaries, especially the Chobe. It is a water-antelope, frequenting damp marshy places, and taking to impassable swamps, among reeds and papyrus. It goes in considerable herds, accompanied by several males, mingling often with the "Poku," another Antelope peculiar to that region. In the distance the *H. lechè* may be known by the peculiar way in which it allows its horns to recline back, almost touching the withers.

This Antelope was found by Mr. Petherick in the marshy region on the Nile, near the Bahr-el-gazal.

#### 58. HELEOTRAGUS ELLIPSIPRYMNUS (Ogilby),

"Water-buck"; "Tumoha" of the Bechuanas; "Nyakobswe" of the Lower Zambesi.

Very common on the sea-coast at the mouth of the Zambesi and Rovuma, and in all damp plains crossed by rivers or near lakes; but absent from mountains. When wounded, it makes for the water or for the dense shade of reeds. Goes in herds of about five to fifteen females followed by one or two males. In the rutting-season severe fights take place between rival males. Near the sea-coast the flesh is well-flavoured and juicy, in the interior dry and worthless. Like all water-antelopes, the Waterbuck is very tenacious of life. Shot through the lungs, they will make off for some distance; shot in the belly, they are seldom seen again; and with a Jacob's shell burst behind the heart, they have been known to run twenty paces.

The three genera *Heleotragus*, *Adenota*, and *Kobus* are most intimately related, forming together a single tolerably well-defined and natural genus, the subdivision of which is quite artificial and very inconvenient.

#### 59. ÆGOCEROS NIGER (Harris).

Named at Sena "Para-para."

One was found killed by lions on the banks of the Zambesi, at the head of its delta; they are found inland from Shupanga, near Moramballa, on Lake Nyassa, on the Batoka Hills, and in the plains between Linyanti and Sesheke. This is the "Tahetse" of the Bechuanas; the "Qualata e enchu" of the Makololo, who distinguish two species—the "Qualata e tsetla," or yellow Qualata, and the other, which means the black one. One shot on the Batoka Hills was the



“Qualata e enchu,” yet did not seem at all like the *Ægoceros leucophæus*, the Bastard Gemsbock of Cape colonists. Its colour was quite tawny, marked like the Sable Antelope on the face; but in the whole herd there was not a single one with the dark-coloured hair. I suspect this species will be found to combine two distinct animals; else this Antelope is most variable in its colour.

60. *TRAGELAPHUS SYLVATICUS* (Sparrm.).

“M’pabala” of the Bechuanas; “M’bawala” of the regions on the Lower Zambesi and Shiré; Quilimane; Luabo; Tete; Batoka Valley.

Occurs either singly, in pairs, or accompanied by its young; frequents damp plains and thick jungle near water; when disturbed, it makes off to the thickest cover or to some marshy place. In the mud-regions of the Zambesi delta its hoofs become lengthened to enable it easily to pass in soft wet places. In colour and spotting this Antelope varies much.

61. *TRAGELAPHUS SPEKII*, Sclater, P. Z. S. 1864, p. 103, Pl. XII.

Native name, “Nakong.” Among papyrus and rushes on the Chobe. A skin, with horns and hoofs attached, was given me when in that part, although the Antelope was not seen alive.

62. *STREPSICEROS KUDU*, Gray.

Sechuana name, “Tolo;” Lower Zambesi, “Goma.”

A hill Antelope, never found in the plains common to all mountain-ranges; Lupata; Tete; Kebrabassa; Nyassa; Batoka.

63. *OREAS CANNA*, Gray.

“Impofu” of the Bechuanas; “Nyakaso” of Sena; “Tuka” of Shupanga; “Shefu” or “Jefu” of the Manganja.

South of the Zambesi it is uniform in colour, or, at least, not distinctly banded; the colour varies considerably. It is not uncommon in the country behind Shupanga and opposite Mazzaro. Feeds on branches and leaves of shrubs. A much finer animal in its wild state than in captivity in England.

64. *OREAS LIVINGSTONII*, Sclater.

This species differs, so far as is known, in nothing but the banding on the body. It has not yet been found anywhere south of the Zambesi. No specimen of Eland was seen in the Manganja country, although the natives had the horns of one. On the plains at the foot of the hills, near the junction of the Kafue, but east of that river, one showing the striped markings very distinctly was killed by us; the same variety was noticed by Capt. Speke in the country traversed by him.

As a species this can hardly be regarded as distinct from the former until some better difference has been pointed out: faint marking is usual in the Elands of the south, and in the young this is

always well seen. The habits of both are identical, and their horns not to be distinguished.

65. *BOSELAPHUS LICHTENSTEINII*, Peters.

Native name on Zambesi, "Godoñko."

Very common during the dry season in the forests of Shupanga and Inhamunha, in small herds. Near the south end of the Nyassa the same species was shot. Like the South-African species, it is remarkably swift, notwithstanding its heavy, awkward paces.

66. *CATOBLEPAS GORGON*, H. Smith.

This is the "Kokōng" of the Bechuanas; the "Nyumbo" of the Manganja and Zambesi people.

Very abundant and in considerable herds in the Batoka country, also near Lake Shirwa and at Shupanga on the Zambesi. The tail of this animal is supposed to possess magic powers, and is taken by expeditions engaged in war. The flesh is very worthless, the fat hard and unpleasant.

The Brindled Gnu often mixes with herds of other animals, such as the Zebra.

67. *BOS CAFFER*.

Sechuana, "Nari"; Lower Zambesi, "Nyati" or "Njati."

A water-loving animal, met with everywhere in the Zambesi region, unless exterminated by the natives. One of the animals on which the "Tsetse" depends, but does not kill. When wounded, the Buffalo is cunning and dangerous.

*Domestic Animals.*

Before East Africa was discovered by Vasco da Gama, and trade with Europe established, the natives had but few domestic animals, viz. the Sheep, Goat, Ox, and Dog. The Portuguese have introduced the Cat, the Pig, the Horse, and Ass.

Of Dogs there are two sorts, one the common pariah of native villages: this among the Manganja is sold and eaten; it is called by them "Garu." A smaller sort is used by a tribe, the Achers, in hunting the Elephant: while a number of these keep the animal engaged, the hunter runs in, and with a long-bladed axe severs one of the main tendons, thereby rendering him powerless.

The Sheep are the fat-tailed sort, with short hair instead of wool.

Of Goats there are two well-marked varieties—the common one having short hair, and that of the higher mountains, much more rare, with long hair hanging down almost to the ground.

The Oxen are long-horned, those of the lakes being remarkable in this respect.

Another small breed of cattle is (or rather was, for now it is rare) found in the Batoka country.

## 2. DESCRIPTION OF THE EGG OF *PARRA GALLINACEA*.

BY JOHN GOULD, F.R.S. &c.

The ground-colour of the egg of this species is of a dark shining raw-sienna tint, over which are traced in various directions a series of broad and fine hair-like contorted lines of brownish black, which, by occasionally uniting laterally and crossing each other, form here and there large blotches. Although these markings are of the same character on each egg, they are somewhat differently distributed: thus, on one of the two I possess, they are more numerous at the larger end, and absent at the smaller; while, on the other, they are more abundant at the smaller, and less so at the larger extremity. The eggs are one inch and an eighth in length by seven eighths of an inch in breadth. They are, moreover, rendered remarkably conspicuous by the singularly pointed form of the smaller end, and by their small size as compared with that of the bird, but above all by the form and disposition of the markings, which are as if traced by the hand of a person who had amused himself by attempting to cover the surface with fantastic streaks, blotches, and contorted curves from end to end.

The two examples above described were most kindly sent to me from Eastern Australia, by Mr. Hills, through the instrumentality of his relative, Sir Daniel Cooper, Bart.

## 3. CHARACTERS OF NEW SPECIES OF CRUSTACEANS DISCOVERED BY J. K. LORD ON THE COAST OF VANCOUVER ISLAND. BY C. SPENCE BATE, F.R.S.

[The following new species of Crustaceans, collected on the east side of Vancouver Island, were kindly named, described, and figured for me by Mr. Spence Bate. Some of them were dredged in from 8 to 10 fathoms of water; the rest were collected between tide-marks.

Mr. Spence Bate says, in speaking of the collection generally, "The extremely opposite and varied localities in which many of the species here represented have hitherto been found, suggest the idea that Vancouver Island corresponds with the extreme limit between a northern and a tropical fauna." "It is only in this way I can account for finding the representatives of tropical species, with others that are found only (on the eastern coast of Asia) in the Arctic and, perhaps, North Atlantic Oceans." That he is quite correct in this assumption I think there can be little, if any, doubt; for not only does it apply to the Crustaceans, but with equal force to the Molluscous groups. Several new species of shells, collected at the same time and in the same localities as the Crustaceans, which were named and described by Dr. Baird, with appended notes by myself, and published in the Society's 'Proceedings' of last year, are identical in some cases, in others closely allied to known species from Japan, Australia, and the north shores of our own island.

The tidal irregularities of this coast are perfectly inexplicable. In

May, June, and July, during the twenty-four hours there is but one high and one low water. At the change and full of the moon, high tide happens near midnight, and varies but little as to time during the three months. In August, September, and October there are two high and two low tides in the twenty-four hours. Then in the winter months, November, December, and January, the regular twelve-hour tides recur; but high water is at twelve in the day, instead of twelve at night. The spring tides range from 10 to 12 feet, the neaps from 5 to 8.

The temperature of the sea taken during the summer months near the surface ranges from 52° to 56° F. The sea-water seldom, I may say never, looks clear, but always presents a turbid muddy appearance, as if a large quantity of sand was mixed with it. This may in some measure be accounted for by assuming that strong undercurrents flow from north to south, and, sweeping past the island and being (from their low specific gravity) close to the bottom, stir up the sand and mud. The sea-bottom in and adjacent to the numerous bays, harbours, and long canals which, like the fiords of Norway and Sweden, everywhere intersect the mainland and island coasts, varies in accordance with the character of the bounding rocks: where trap, soft clay-slates, or felspathic rocks form the coast-line, a thick blue clay is the usual bottom; where grits and sandstones, there it is sandy.

Little, if indeed anything, is as yet known of the deep-sea productions from the west side of the island, which will afford a rich harvest to future explorers.—J. K. LORD.]

#### PUGETTIA LORDII, n. s.

Carapace quadrate behind the orbits; the anterior portion abruptly narrowing and produced into a double rostrum, the horns of which divaricate. The anterior extremity of the orbital margin is produced to a sharp point—that is, elevated slightly above the beak; the posterior extremity is defined by a distinct fissure. The anterior hepatic region is produced by a tooth immediately posterior to the postorbital fossa, laterally extended to an obtuse tooth or point, and posteriorly separated from the branchial regions by a decided fossa or lateral constriction. The branchial region is laterally produced to a strong anteriorly-curved point. The dorsal surface is tolerably smooth, exhibiting but faintly the marking of the internal viscera. The eyes are small, and reach but little beyond the orbital margin. The external antennæ have the first joint fused with the carapace, the second and third compressed and arcuate, and terminate in a smooth flagellum. The first pair of pereopoda are moderately long, having the meros triangulate, the upper angle forming a prominent carina that extends along, but terminates abruptly a little short of, both extremities of the joint; the carpus is tricarinated; the propodos is laterally compressed, and forms about half the length of the limb, and is about one-third its breadth. The dactylos is slightly curved and slightly serrated on the inner margin, and antagonizes at the extremity with the produced propodos. The second pair

of pereopoda are nearly as long as the first, but much more slender, having the meros and propodos subcarinated. The three posterior pairs are shorter. The pleon is small and narrow, the second and third segments being the broadest, while the seventh is abruptly narrower than the sixth, and forms a triangular plate. The female differs from the male in being more protuberant over the stomachal region, and consequently the rostrum is more depressed; anteriorly, there is less development of the lateral branchial teeth, and there is a relatively greater distance between the fifth pair of pereopoda. The pleon is almost circular, and covers the entire surface of the ventral region.

The colour of the animal is of a reddish brown, which increases in brightness as it approaches towards the extremity of the chelæ. In one or two young females the carapace was smooth and glabrous.

Found in tolerable abundance in Esquimalt and Victoria Harbours, and, indeed, in all the sheltered inlets along the mainland coasts from the mouth of the Fraser to San Francisco. Dredged in about eight fathoms of water, but easily obtained in pools at extremely low tides. Its favourite haunt is under a large flat stone, or hid under the seaweed that fringes the margin of a pool. The specimen from which the drawing was made was taken in Esquimalt Harbour.

#### OREGONIA LONGIMANA, n. s.

Carapace coarsely granulated or minutely tuberculated, free from hairs, except upon the rostrum, which is slender and twice the length of the interorbital space. Pleon, in the male, narrow, concave upon each side, corresponding with the fourth, fifth, and sixth segments. Telson rather broader than the preceding segment, and emarginate at the terminal extremity. The first pair of pereopoda are very long, being twice the length of the carapace, and much longer than in either of the species described by Dana and Stimpson; the meros reaches quite to the extremity of the rostrum, and is furnished with two or more longitudinal rows of small granulated tubercles; the propodos is rather longer than the meros, and its breadth is equal to about one-third of its length; the dactylos is about one-third the length of the propodos, slightly curved and minutely serrated on the inner margin, which impinges throughout its entire length upon the produced extremity of the propodos. The three succeeding pairs of pereopoda are imperfect in the only specimen procured; but the last pair are long, cylindrical, slender, and terminated in a powerful dactylos.

This specimen was obtained in Esquimalt Harbour, and in its habits and general distribution it is very similar to the preceding.

#### PLATYCARCINUS RECURVIDENS, n. s.

This very pretty species may easily be distinguished by the sharp points of the inner lateral teeth, granulated or minutely baccated along the margin, and having the apex recurved. The intraorbital margin is three-lobed and granulated, the central lobe being the smallest. The dorsal surface of the carapace is granulated on the

prominent lobes in the larger specimens, but almost smooth in the young. The first pair of pereiopoda have also lines of granulations along the outer surface of the propodos and carpus.

Dana has merged this genus into that of *Cancer*; but the greater length of the animal in relation to its breadth is a very convenient generic diagnosis, and one that appears to correspond with Milne-Edwards's description relative to the more longitudinal position of the two pairs of antennæ.

The specimens were obtained in Esquimalt Harbour. It frequents pools between tide-marks; but Mr. Lord thinks it is common everywhere along the Oregon coast.

#### CHLORODIUS IMBRICATUS, n. s.

Carapace having the posterior portion smooth, the anterior being rough with flattened prominences that form an irregularly imbricated surface. Anterior margin slightly baccated. Antero-lateral margin five-toothed, the central tooth being the largest, the posterior the most prominent. A small secondary tooth stands upon the anterior surface of the fourth and fifth teeth. The first pair of pereiopoda are short and robust; they have the carpus deeply corrugated upon the external surface, so also the propodos; the dactylos is ribbed upon the upper surface; a slight rib is also present upon the carpus of each of the four succeeding pairs of pereiopoda.

Only a single specimen of this pretty little species was obtained. It was dredged in about eight fathoms of water in Esquimalt Harbour.

#### CRYPTOLITHODES TYPICUS.

*Cryptolithodes typicus*, Brandt, Bull. de l'Acad. de St. Pétersbourg, 1849, vii. 175; Stimpson, Crust. et Echin. of Pacific North America, Journal of the Boston Soc. of Nat. Hist. vol. vi. p. 472, pl. 20.

A specimen of this species, which was first described by Brandt, and afterwards more fully, as well as figured, by Stimpson, was taken in Rosario Strait, Vancouver Island, as well as in Upper California.

The male, which has not hitherto been described, differs from the female in being less produced posteriorly. The posterior margin, instead of being projected in an arch inversely corresponding with that of the anterior margin, traverses a line that is nearly direct from side to side, slightly posterior to the points of the broadest diameter in the carapace. The pleon is triangular, and smaller and narrower than in the female, having the lateral margins more straight and symmetrical.

The only male specimen in the collection is smaller than the female, and the surface generally more tuberculated. The right propodos of the first pair of pereiopoda is larger than the left, and is so well developed as scarcely to be capable of being folded within the limits of the carapace. The length of the male animal, from the extremity of the rostrum to the centre of the posterior margin of the carapace, is about  $\frac{3}{4}$ ths of an inch; its breadth, from the point of one lateral extremity to the other, is about  $1\frac{1}{4}$  inch.

The size of the largest female in the collection is in length about  $1\frac{1}{4}$  inch, and breadth about 2 inches.

*CRYPTOLITHODES ALTA-FISSURA*, n. s.

Female.

This species may readily be detected from the two previously known by the smoothness of the carapace, propodi, and pleon, and more distinctly by the deep orbital notch on each side of the rostrum.

The carapace is nearly as broad again as long, and produced considerably posteriorly to the cardiac elevation—a feature that appears to belong to the female. The rostrum is broad, flat, and rectangular. The antero-lateral margins are produced so far anteriorly as to be nearly in a line with the extremity of the rostrum; a deep notch, in which the eyes are situated, exists on each side of the rostrum. The anterior margin is slightly marked with distant small points. The posterior margin is quite smooth and even. The dorsal surface is quite smooth, and pencilled in light red upon a yellowish ground, the red pencilling being fine and delicate, following the contour of the margin and surface of the carapace.

The pleon is subsymmetrical and very smooth, and planted considerably within the posterior margin of the carapace. The second segment (first visible) has the marginal plates fused with the central. The sixth segment is without lateral plates; and the telson is situated beneath, and anterior to, the posterior extremity of the sixth segment.

The eyes are small, and placed upon peduncles that gradually taper from the base to the extremity. The first pair of antennæ are short, and developed upon the type of those of the *Brachyura*; but the first joint is reduced to a size that is only about twice the diameter of the second. The second pair of antennæ are but little longer than the first, and are furnished with a broad round scale at the third joint, and a terminal flagellum that is about the length of the fifth joint of the peduncle. The squamiform appendage is circular and disk-like; the inner margin is straight or somewhat excavated.

The second pair of gnathopoda have the third joint much broader than the fourth (the secondary appendage reaches not to the extremity of the third), and have the terminal joints small and rudimentary. The first pair of pereopoda are subequal in the female, the propodos upon the right side being somewhat larger than that on the left; the surface is smooth and even, and the dactylos is furnished with a prominent carina that terminates abruptly near the basal articulation, and loses itself gradually towards the apex. The fifth pair of pereopoda are completely hid from view; the three basal joints are short; the two terminal ones subequally long, and furnished with a copious brush of strong cilia. These appendages are folded together and enclosed within the branchial chambers, where they, no doubt, fulfil the office of the flabella of the highest forms of Crustacea—affording an interesting illustration of an organ being converted, by the force of circumstances, from its original purpose to the fulfilment of another, for which it was apparently most unsuited.

**PETALOCERUS BICORNIS, n. s.**

Carapace triangular, anteriorly produced into two horizontal horn-like processes; tuberculated with nodulated prominences all over the surface, but furnished with a series of large tubercles corresponding in line with the external margin of the carapace; the anterolateral margin constricted between the branchial and hepatic regions, furnished posteriorly to the orbit with two strong, blunt processes, and, posteriorly to the central constriction, armed laterally with two distant narrow processes, and posteriorly with six closely situated large, round tubercles.

The pleon is nearly symmetrical, being rather larger on the left than the right side. Each segment is defined by a marginal prominence; that upon the left side is continued from near the middle to a process that terminates in a point or tooth at the side, but that on the right becomes confluent with a posterior ridge, and forms an irregular circle, the centre of which is deeply depressed.

The eyes are small, of a green colour, and surmounted on denticulated peduncles. The first pair of antennæ consist of three equal-lengthed joints (of which the first is the more robust), together with a short, stout, pilose flagellum and a slender secondary appendage. The second pair of antennæ have a compound scale, consisting of two large and two short compressed processes, and the third joint is furnished with two or three sharp, strong processes.

The first pair of pereopoda are chelate and strong, echinated with blunt-pointed spines, and terminate in fingers that are flattened at the extremity, and furnished upon the outer surface with numerous tufts of hair, that spring from the summits of the numerous tubercles that are found there. The second, third, and fourth pairs of pereopoda are more slender than the first, resemble one another very considerably, and are furnished with short, sharp, and slightly curved dactyli. The fifth pair of pereopoda are rudimentary appendages; they consist of but five joints, the last of which terminates in a blunt extremity that is furnished with a considerable brush of hair, and is probably used for the purpose of cleansing the branchial appendages.

The pleopoda are present in the female, with the exception of the first pair (which are small) only upon the left side of the pleon, as exemplified in our specimen.

This species differs from White's *P. bellianus* in having a horizontal bifurcate rostrum to the carapace, being more distinctly tuberculated, and in the pereopoda being more strongly spinated.

This handsome species is of a yellow colour, picked out with purple between the tubercles.

It was dredged in Esquimalt Harbour, in ten fathoms of water.

**HIPPOLYTE ESQUIMALTIANA, n. s.**

Rostrum as long as the carapace, armed with four teeth at the base, the posterior being just behind the orbits, and the anterior being near the centre of the rostrum, the anterior half of the rostrum being straight and smooth. The inferior margin is excavate at the



base, and furnished with seven small teeth, the four posterior being near together and posterior to the centre of the rostrum, the three others being further apart, the most anterior being subapical.

The third segment of the pleon is dorsally produced posteriorly to a point. The eyes are small; the superior antennæ have the primary ramus of the flagellum tolerably robust, and reaching to about two-thirds the length of the rostrum, the secondary slender and longer than the primary. The inferior antennæ have the scale reaching to about three-fourths of the length of the rostrum, rounded at the apex, subapically furnished with a small tooth upon the external margin; the flagellum (wanting).

First pair of pereiopoda short, robust, chelate; second pair long, slender, and chelate; the posterior terminating in a robust dactylos.

Taken in Esquimalt Harbour.

#### MCERA FUSCA, n. s.

The body is long and slender; the superior antennæ are about half the length of the animal, the peduncle being scarcely longer than the flagellum, the secondary appendage being half the length of the primary, the second joint of the peduncle being about the same length as the first. Second pair of gnathopoda having the propodos large; palm without teeth, and defined by a small pointed process. Posterior pair of pereiopoda having the posterior margin of the base smooth.

In its general appearance this species bears a near affinity to *Mcera grossimana*, as well as to *M. tenella*, from the Feejee Islands, the only appreciable distinctions being in the shorter length of the second joint of the antennæ, the absence of teeth from the palm of the hand in the second pair of gnathopoda, and in the even margin of the last (the only remaining) pair of pereiopoda, and perhaps also in the shortness of the peduncle of the ultimate pair of pleopoda.

Only one specimen of this species is in the collection; and that was taken from a sponge dredged in about ten fathoms of water in Esquimalt Harbour. It is of a brownish colour.

#### JCERA WAKISHIANA, n. s.

Anterior margin of the cephalon nearly straight; pereion having the sides subparallel, the greatest width being at the sixth segment. Pleon having a double excavation on the posterior margin, the central point not extending beyond the extremity of the sides. Superior antennæ reaching to the extremity of the fourth segment of the inferior. Inferior antennæ nearly two-thirds the length of the animal. Posterior pair of pleopoda as long as the posterior margin of the pleon, terminating in two styliform rami, each of which is tipped with a few short hairs.

This species was taken from a sponge dredged in about eight fathoms of water in Esquimalt Harbour.

The specific name is derived from the circumstance of the animal having been found on the territory of the tribe of Wakish Indians.

**TANAIS LORICATUS, n. s.**

The only specimen in the collection is imperfect. The first segment of the pereion appears to be imperfectly fused with the cephalon. Inferior antennæ scarcely half the length of the superior. First pair of gnathopoda having the propodos ovate; dactylos short and tumid, shorter and less pointed than the digital process of the propodos. Pereiopoda having the first three joints short and broad, being affixed to the side of the pereion like plates of mail (hence the specific name); they terminate in short pointed dactyli, and have the propodi armed with two lateral rows of strong, black, pointed teeth.

This species was taken from the hollow of a sponge dredged in Esquimalt Harbour, at the depth of about ten fathoms.

**IONE CORNUTA, n. s., Bate.**

The male differs from the description of the European species chiefly in having the caudal extremity terminating obtusely, and in having shorter antennæ.

The female has the antero-lateral hornlike process of the cephalon curved posteriorly. The pereion is not quite equilaterally developed. The coxæ of the four anterior pairs of pereiopoda are round, and all attached to the antero-lateral margin of the segments of the pereion. The coxæ of the three posterior are the larger, and produced posteriorly to a point. The pleopoda are long, and fringed with arborescent branchiæ.

This is the only species known, besides that taken by Colonel Montagu on the southern coast of England.

Length, male  $\frac{1}{4}$ , female  $\frac{3}{4}$  of an inch.

Taken attached to the branchia of *Callianassa longimana*.

**4. DESCRIPTIONS OF NEW SPECIES OF LAND SHELLS FROM THE ISLANDS OF THE CENTRAL PACIFIC. BY W. HARPER PEASE, ESQ., OF HONOLULU. (COMMUNICATED BY DR. P. P. CARPENTER.)**

[Mr. Pease having sent to me specimens of most of those land shells of the Central Pacific Islands which he regards as new, they have been carefully compared with the species of Pfeiffer, Reeve, Gould, and other authors in the Cumingian Collection. Those which Mr. Cuming regards as new are here described: a list of the remainder, with the synonyms as determined by Messrs. Cuming and H. Adams, is given for the sake of the many naturalists in this and other countries who have received them under Mr. Pease's MS. names. It must be remembered that Mr. Pease may have reasons for regarding them as distinct, which do not appear on the face of the specimens. Of the shells placed at my disposal by Mr. Pease, the first has been presented to the Cumingian Collection, the second to that of the Smithsonian Institution.—P. P. C.]

1. *HELIX OBCONICA*, Pse.

*H. t. depresso-conoidali, orbiculari, tenui, subpellucida, nitidula, cornea, anguste umbilicata, sub lente tenuissime et dense oblique striata; subtus regulariter convexa; anfr. vi., planiusculis, leviter marginatis, ultimo ad peripheriam acute carinato; apertura depressae semilunari, superne angulata; labro acuto, juxta umbilicum vix reflexo.*

Diam. 7, alt.  $4\frac{1}{2}$  mill.

2. *HELIX NORMALIS*, Pse.

*H. t. subconoidea, subtus convexa, imperforata, tenui, fragili, nitidula, rufa vel pallide cornea; anfr. v.-vi., rotundato-convexis, vix oblique dense et confertim striolatis, marginatis, ultimo carinato, regione umbilicali impressa; labro tenui, acuto, supra axim reflexo.*

Diam. 4, alt. 3 mill.

3. *HELIX SIMILLIMA*, Pse.

*H. t. orbiculari, tenui, fragili, subpellucida, glabra, nitida, levigata, supra planulata, vix elevata, subtus plano-convexa, imperforata, in foveam centralem deversa, ad peripheriam late rotundata; anfr. iv., sutura distincta; apertura lata, lunari.*

Diam. 9, alt. 4 mill.

4. *HELIX FABREFACTA* \*, Pse.

*H. t. lenticulari, solidiore, late et profunde umbilicata, acetabuliformi, albicante, cretacea, sordida, inæqualiter et irregulariter radiatim fusco-castaneo strigata vel maculata; apice elevato; spira concava; anfr. vii., juxta margines depressis seu sulcatis, ultimo acute carinato, deinde planulato, ad umbilicum acute carinato; apertura rhomboidea; labro simplici, acuto.*

5. *HELIX FICTA*, Pse.

*H. t. lenticulari, depressa, solidiuscula, late et profunde umbilicata, albicante, subcretacea, sordida, fusco-castaneo radiatim strigata vel tessellata; anfr. viii.; spira vix elevata, plano-convexa, supra depressa; anfr. exterioribus plerumque prope margines sulcatis; anfr. ultimo ad peripheriam acute carinato, deinde planulato, circa umbilicum acute carinato; apertura rhomboidea, lamella unica volvente instructa; labro simplici, acuto.*

Diam. 7, alt.  $2\frac{1}{2}$  mill.

6. *HELIX SCULPTILIS*, Pse.

*H. t. conoidali, solidiuscula, flavicante, umbilicata; spira obtusa, depressa, vix oblique confertim rugoso-costulata; anfr. vii., medio excavatis, ultimo ad peripheriam acute carinato; basi plano-convexa, radiatim conferte tenuissime costulata; umbilico cavernoso,*

[\* This species and the next appear to me identical; but Mr. Cuming's better judgment confirms that of the author.—P. P. C.]

*ad januam constricto; margine acuto, una cum labio continuo; apertura subrhomboidea; fauce lamellis duabus volventibus instructa; labro simplici, acuto.*

Diam. 6, alt. 3 mill.

Hab. Ins. Mangier.

7. *HELIX RETUNSA*, Pse.

*H. t. conica; spira obtusa, depressa, retunsa, rotundata; supra fusco et albido tessellata, subtus flammulis fuscis flexuosis radiata; anfr. vii., rotundato-convexis, oblique radiatim costulatis, costellis subdistantibus flexuosis, concentricè striatis; anfr. ultimo ad peripheriam rotundato, subtus radiatim striato et striis elevatis concentricis notato; apertura subrhomboidea; umbilico cavernoso, ad januam constricto; margine acuto; fauce lamellis duabus intus volventibus, una ad columellam, una ad anfr. penultimum, instructa.*

Diam. 4, alt. 3 mill.

8. *HELIX DEPRESSIFORMIS*, Pse.

*H. t. discoidea, planorboidea, supra planulata, subtus convexa, tenui, subpellucida, parum nitidula, fusco-cornea, late umbilicata, oblique confertim rugoso-striata; spira planulata, interdum parum elevata; anfr. iii. et dimidio, vix marginatis; ultimo acute carinato, ad marginem compresso, ad umbilicum rotundatim carinato.*

Diam. 7, alt. 2 mill.

9. *HELIX PROSTRATA*, Pse.

*H. t. tenui, depressa, profunde umbilicata, viridescenti-cornea, striis confertis subtilissimis decussata; anfr. iv., planis, celeriter accrescentibus; ultimo latiore, acute angulato, supra prope marginem sulcato, antice dilatato, subtus convexo; apice depresso; apertura late rotundato-lunari; perist. simplici, acuto.*

Diam. 6, alt.  $2\frac{1}{4}$  mill.

10. *BULIMUS TURGIDUS*, Pse.

*B. t. globoso-ovata, tenuissima, pellucida, nitida, imperforata, interdum obsolete transversim crebristriata; anfr. iv., convexis, ultimo turgido, ventricosò, trientes duos longitudinis testæ superante; spira brevi, apice obtuso; apertura ampla, abbreviatim ovata; labro tenui, reflexo; pallide flavido-cornea, interdum rosaceo tincta.*

Long. 15, diam. 11 mill.

11. *BULIMUS ARGUTUS\**, Pse.

*B. t. ovata, tenuissima, pellucida, membranacea, nitida, anguste umbilicata; anfr. iv., convexis, ultimo ventricosò, suturis impressis; apertura ampla, ovata; labro simplici, reflexo; pallide straminea.*

Long. 13, diam.  $8\frac{1}{2}$  mill.

[\* This species is regarded as a *Partula* by Mr. Cuming.]

12. *BULIMUS ANNECTENS*, Pse.

*B. t. oblongo-ovata, tenui, pellucida, nitida, transversim conferte et regulariter striata, striis incrementi obsolete notata, anguste umbilicata; anfr. iv., convexis; apertura oblongo-ovali; labro simplici, reflexo; viridescente.*

Long. 13, diam.  $6\frac{1}{2}$  mill.

The above three delicate species appear to connect the *Partula* with certain *Bulimi* inhabiting the west coast of South America. The first two are decidedly Bulimoid; the last approaches so near the young of *Partula* in form that it may be mistaken for one. They are very rare, and very limited in their distribution.

13. *PARTULA PRODUCTA*, Pse.

*P. t. elongato-ovata, dextrorsa, solida, compresse umbilicata, tenuiter et irregulariter longitudinaliter striata; anfr. v., plano-convexis, sutura impressa; apertura oblongo-ovata, labro anguste rotundato; fusca vel flavicanter fusca, nigro-fusco trifasciata.*

Long. 22, diam. 12 mill.

The above species is wholly terrestrial in its habits; the lip on mature or old specimens is united over the body-whorl by a callosity.

14. *PARTULA LIGNARIA*, Pse.

*P. t. ovata, solidiuscula, dextrorsa, anguste umbilicata, sub lente minutissime transversim striata, irregulariter longitudinaliter striata; anfr. v., plano-convexis, sutura impressa; apertura rotundato-ovata, edentata, labro rotundatim incrassato; castaneo-fusco irregulariter longitudinaliter strigata, interdum omnino rufo-fusca.*

Long. 18, diam. 10 mill.

Var. *Fascia unica nigro-fusca cingulata, seu omnino flavide fusca.*

The tubercular tooth on the wall of the aperture is seldom wanting, and there is generally a slight angle in the outer lip at its junction with the body-whorl. It is allied to *P. tahitiana*; the latter, however, is more elongate, and both dextral and sinistral; it is more varied in its colours, and the lip is usually rosaceous.

15. *PARTULA CLARA* \*, Pse.

*P. t. ovata, subelongata, tenui, subpellucida, vix nitida, anguste umbilicata; anfr. iv., tenuiter et regulariter transversim striatis, plano-convexis; apertura ovata, subobliqua, edentata, labro plane incrassato; flavide cornea vel pallide castanea, strigis longitudinaliter variegata.*

Long. 16, diam. 10 mill.

Var. *Linea unica, vel lineis duabus tribusve cingulata.*

The above is allied to *P. hyalina*. That species is callous on the

[\* This shell appears to me a variety of the form returned by Mr. Cuming as *P. hyalina*, Brod.]

columella, is more oblique, and also more constant in its colours, never being banded\*.

16. *PARTULA ATTENUATA*, Pse.

*P. t. elongato-ovata, producta, tenuiore, transversim minutissime corrugatim striata; anfr. v., convexis, suturis impressis; apertura elongato-ovata, edentata, labro convexe incrassato, labio juxta suturam tenuiter calloso; pallide flavido-cornea.*

Long. 16, diam. 7 mill.

This elongate shell can only be compared with *P. amabilis*, Pfr.; it differs in the shape of its lip, and is also thicker. The localities are remote from each other.

17. *PARTULA PLANILABRUM*, Pse.

*P. t. elongato-ovata, solida, umbilicata; anfr. v., plano-convexis; apertura oblongo-ovali, subauriculata, dentata; labro oblique et late planato, intus incrassato, extus prominente; callositate denticulata; columella recta, ad basin angulata; castanea, ad suturas pallida, interdum fascia lata flavido-fuscescente cingulata.*

Long. 22, diam. 12 mill.

18. *PARTULA* (? var.) *LUGUBRIS*†, Pse.

*P. t. oblongo-ovata, solidiuscula, sordida, umbilicata; anfr. v., convexis; apertura subovata, edentata; labro vix calloso, oblique planato; castaneo-fusca, interdum linea vel fascia flavide cornea cingulata; labro purpureo-fusco tincto.*

Long. 19, diam. 10 mill.

This species is terrestrial in its habits.

19. *PARTULA GARRETTII*, Pse.

*P. t. oblongo-ovata, solidiuscula, transversim tenuiter striata; anfr. v., plano-convexis; apertura ovali, edentata, labro angulatim incrassato, marginibus callo tenuiore conjunctis; columella supra contorta, callosa; flavide cornea seu pallide castaneo-fusca, interdum fascia lata flavicante cingulata.*

Long. 16, diam. 9 mill.

20. *LAMELLINA LÆVIS*‡, Pse.

*L. t. elongato-ovata, tenui, lævi, nitida, pellucida, fusco-cornea, imperforata; spira conica, acuta; anfr. v., rotundato-convexis, ultimo dimidium longitudinis subæquante; apertura subauriformi, lamellis internis iii.-iv., albis, marginibus lævibus; perist. acuto, simplici, margine columellari reflexo; lamella parietali compressa, prominente, longe intus producta; lamella columellari acuta.*

Long. 3, diam.  $1\frac{1}{4}$  mill.

[\* The shells sent by Mr. Pease as *P. hyalina* appear to me more nearly related to *P. simulans*, Pse. = *tenuata*, var. — P. P. C.]

[† This species is regarded by Mr. Cuming as probably a variety of *P. pacifica*, Pfr.]

[‡ Mr. Cuming regards this as the same with *L. serrata*, Pse.]

We are gratified in being able to confirm the above genus by a second species, in which the arrangement of the internal lamellæ is the same, their edges, however, being smooth.

21. *TORNATELLINA APERTA*, Pse.

*T. t. globoso-ovata, imperforata, tenui, pellucidu, nitida, fusco-cornea; spira obtusa, sutura impressa; anfr. iv., rotundato-convexis, ultimo subgloboso, duos trientes longitudinis subæquante; apertura ovata, subauriformi, magna, dimidium longitudinis testæ subæquante; labro tenui, acuto; columella compressa, bidentata, oblique truncata; lamella parietali haud prominente; basi rotundata.*

Long.  $3\frac{1}{2}$ , diam.  $2\frac{1}{2}$  mill.

22. *TORNATELLINA OBLONGA*, Pse.

*T. t. oblongo-conica seu oblonga, tenui, fusco-cornea, imperforata; anfr. vi., convexis, ultimo in medio depresso, quartam partem longitudinis subæquante; apertura ovata, subauriformi; lamella parietali compressa; columella callo contorto subcoarctata.*

Long.  $4\frac{1}{2}$ , diam.  $1\frac{3}{4}$  mill.

23. *TORNATELLINA SIMPLEX*, Pse.

*T. t. conico-ovata, late umbilicata, tenui, pellucida, nitida, fusco-cornea; spira conica, acuta; anfr. v., convexis, ultimo dimidium longitudinis testæ haud æquante; sutura impressa; apertura subauriformi; labro tenui, acuto; columella supra late reflexa; basi rotundata.*

Long. 3, diam.  $1\frac{1}{2}$  mill.

24. *HELICINA SOLIDA*, Pse.

*H. t. lenticulari, solida, supra depresso-convexa, subtus convexa, oblique tenuiter striata, carinata; rufescente, fascia albicante ad suturam et basim, seu omnino rufa, seu cinerea, seu straminea; anfr. iv.-v., planulatis, sutura vix impressa; apertura late lunari, regione umbilicali callo copioso albido (rarius rubro aut stramineo) induta.*

Diam. 7, alt.  $3\frac{1}{2}$  mill.

25. *HELICINA CORRUGATA*, Pse.

*H. t. depressa, lenticulari, acute carinata, infra plano-convexa, spira vix elevata; anfr. v., subplano-convexis, suturis impressis; apertura late semilunari; perist. vix recurvo, ad basim angulato; columella callum inflatum circumscribentem emittente, callo externe profunde sulcato; rufescente vel pallide straminea.*

Diam. 5, alt. 2 mill.

26. *REALIA PRODUCTA*, Pse.

*R. t. oblonga, solida, imperforata, sordide flavida seu corneo-fulva; anfr. vii., planiusculis, transversim obsolete striatis, struis incrementi obsolete insculptis, ultimo infra medium angulato; spira*

*plano-convexa, sutura impressa, interdum ad margines angulata et infra marginata; apertura parum obliqua, angulato-ovali; perist. vix reflexo, continuo, simplici; margine columellari subappresso.*

Long.  $7\frac{1}{2}$ , diam. 3 mill.

27. REALIA ABBREVIATA, Pse.

*R. t. ovata, solidiuscula, epidermide brunnea induta; anguste umbilicata; longitudinaliter minutissime striata; anfr. v.-vi., rotundato-convexis, ultimo subventricosus, sutura bene impressa; apertura rotundato-ovata, intus aurantiaca; perist. continuo, anfr. penultimo late adnato.*

Long. 6, diam. 3 mill.

28. HYDROCENA NITIDA\*, Pse.

*H. t. ovata, pyramidali, nitida, levi, solidiuscula; anfr. v., convexis, ultimo magno, dimidium longitudinis subæquante; rima umbilicali perforata; suturis impressis, interdum tenuiter marginatis; apertura ovata; perist. simplici, non continuo.*

Long.  $2\frac{1}{2}$ , diam. 2 mill.

29. HYDROCENA OVATA, Pse.

*H. t. conico-ovata, solidiuscula, fusco-cornea, perforata, lævigata; anfr. v., rotundo-convexis, ultimo duas inter quinque partes longitudinis subæquante, subangulato; suturis bene impressis, vix angulatis; apertura ovata, supra angulata; perist. simplici, continuo, margine columellari adnato, juxta perforationem rugose sulcato et carinato.*

Long. 5, diam. 3 mill.

*Hab.* Mangiers.

30. CYCLOSTOMA BIANGULATUM, Pse.

*C. t. parva, ovato-conica, solidiuscula, fusca, anguste umbilicata, costulis granulosis et striis subtilissimis cincta; anfr. ultimo carinis duabus biangulato, ad angulos granulose costato; perist. continuo, ad anfr. penultimum vix adnato; regione umbilicali late sulcata et distincte carinata, costa granulosa marginata; apertura circulari, intus albida.*

Long. 3, diam.  $2\frac{1}{2}$  mill.

This species appears to be of the same type as *C. obligatum* (Gld.), from Metia Island.

31. CYCLOSTOMA PARVUM†, Pse.

*C. t. abbreviato-ovata, turbinata, lævigata, imperforata, fulvo-cornea; anfr. iv., rotundatis, ultimo dimidium longitudinis subæquante; basi rotundata; sutura bene impressa; apertura rotundo-ovata; labro simplici, tenui; columella vix arcuata, callo albo induta.*

Long.  $2\frac{3}{4}$ , diam. 2 mill.

[\* Mr. H. Adams thinks that this species will prove to be an *Assimineæ*.]

[† Mr. H. Adams thinks that this shell will prove to be a young *Realia*.]



The following list of supposed synonyms will be useful to the many naturalists, in this and other countries, who have received the shells with Mr. Pease's MS. names:—

- Helix fuscata*, Pse.=*nigritella*, var., teste H. Cuming.  
 — *nigritella*, Pse.=*trochiformis*, eod.  
 — *lenta*, Pse. } =*swainsoni*, var., eod.  
 — *scuta*, Pse. }  
 — *consimilis*, Pse.=*radiella*, Pfr., eod.  
 — *verticillata*, Pse.=*branea*, Ant., eod.  
*Vitrina depressiformis*, Pse.=*Helix alata*, Pfr., eod.  
*Succinea rutella*, Pse.=*semiserica*, Gld., eod.  
 — *ovata*, Pse. } =*papillata*, Pfr., eod.  
 — *labiata*, Pse. }  
*Partula gracilis*, Pse.=*amabilis*, Pfr., eod.  
 — *fasciata*, Pse.=*ganymedis*, Pfr., eod.  
 — *megastoma*, Pse.=*callifera*, Pfr., eod.  
 — *stolida*, Pse.=*vanikorensis*, Qy., eod.  
 — *lineolata*, Pse.=*filosa*, Pfr., eod.  
 — *striolata*, Pse.=*decussatula*, Pfr., eod.  
 — *vexillum*, Pse.=*lineata*, Less., eod.  
 — *affinis*, Pse.=*rufa*, Less., eod.  
 — —, var. *dubia*, Pse.=*varia*, var., eod.  
 — *crassa*, Pse. (= *perversa*, Pse., nom. præoc.) = *otaheitana*, Brug. (reversed), eod.  
 — *sinistrorsa*, Pse. } =*rubescens*, Rve., eod.  
 — *turricula*, Pse. }  
 — *radiata*, Pse.=*compressa*, Pfr., eod.  
 — *crassilabris*, Pse. } =*hebe*, Pfr., var., eod.  
 — *globosa*, Pse. }  
 — *suturalis*, Pse. (nom. præoc.) = *planilabrum*, Pse.  
 — *virginea*, Pse.=*solidula*, var., Pse., teste H. Cuming.  
 — *variabilis*, Pse. } =*navigatoria*, Pfr., eod.  
 — *fusca*, Pse. }  
 — *cognata*, Pse.=*rosea*, var., eod.  
 — *labiata*, Pse. }  
 — *imperforata*, Pse. } =*dentifera*, Pfr., eod.  
 — *ovalis*, Pse. }  
 — *protea*, Pse. } =*faba*, varr., eod.  
 — *citrina*, Pse. }  
 — *vittata*, Pse. }  
 — *robusta*, Pse. }  
 — *abbreviata*, Pse. }  
 — *umbilicata*, Pse. } =*auriculata*, varr., eod.  
 — *compacta*, Pse. }  
 — *bilineata*, Pse. }  
 — *recta*, Pse. }  
 — *rustica*, Pse. }  
 — *trilineata*, Pse. } =*nodosa*, Pfr., eod.  
 — *alternata*, Pse. }  
 — *simulans*, Pse.=*tæniata*, Mörch, var., eod.

*Partula elongata*, Pse.=*lineata*, var., eod. [Closely resembles a large *gracilis*.—P. P. C.]

*Melampus cinctus*, Pse.=*zonatus*, Mühl., eod.

— "*fuscus*, Phil.," Pse.=*philippii*, Küst., eod.

*Cyclostoma viridans*, Pse., is a *blanfordia*.

*Hydrocœna robusta*, Pse.=*Realia huaheinensis*, Pfr., teste H. Cuming.

— *elongata*, Pse.=*Realia scitula*, Gld., eod.

— *costata*, Pse.=*Realia taheitensis*, eod.

*Truncatella cylindrica*, Pse.=*Taheitia scalaris*, Mich., eod.

*Helicina cincta*, Pse. }

— *rubicunda*, Pse. } =*maugeræ*, Gray, eod.

— *bella*, Pse. }

— *rufescens*, Pse.=*rolvii*, Pfr., eod.

— *lenticulina*, Pse.=*solidula*, eod.

— *straminea*, Pse.=*pisum*, Phil., eod.

— *picta*, Pse.=*articulata*, Pfr., eod.

— *faba*, Pse. }

— *discoidea*, Pse. } =*albolabris*, Jacq., eod.

— *tenuiuscula*, Pse. }

— *turbinella*, Pse. }

— *subrufa*, Pse. }

— "? *multicolor*," Pse. } =*minuta*, Sby., eod.

— "? *inconspicua*," Pse. }

— "? *vescoi*, Dohrn," Pse.=*haulieinensis*, eod.

##### 5. REMARKS ON THE SPECIES OF SUCCINEA INHABITING THE TAHITIAN ARCHIPELAGO, WITH DESCRIPTION OF A NEW SPECIES. BY W. HARPER PEASE.

Nine species of the above genus have been described from the islands of Tahiti and Eimeo, viz. *S. procera*, Gld., *S. infundibuliformis*, Gld., *S. humerosa*, Gld., *S. pudorina*, Gld., *S. modesta*, Gld., *S. tahitensis*, Pfr., *S. pallida*, Pfr., *S. gouldiana*, Pfr., *S. papillata*, Pfr.

Having had the opportunity of examining a large collection from every part of the several islands, we learn that the same general type prevails over all, and extends even to the groups west. There are, however, characters peculiar to the species on the several islands which serve to distinguish them. Of the described species we consider *S. humerosa*, Gld., the same as *S. tahitensis*, Pfr. It is the most common species at Tahiti, and abounds on all parts of that island. From its wide distribution, it varies much in colour and shape. It is, however, the only species perceptibly angulated. The transverse furrows noticed by Dr. Gould occur on about one specimen in five; the angulation the same. *S. humerosa* should be considered the type, as the paler variety, *S. tahitensis*, is rarely met with. Another variety, quite white, which is rare, has not as yet been noticed. The *S. pallida*, Pfr., is evidently not from Tahiti. The "*perist. margine incrassato*" would place it among the species

inhabiting the island of Raiatea. *S. pudorina*, Gld., we also consider a doubtful species. The markings and colours of the animal, as described by Dr. Gould, are somewhat similar to those of *S. humerosa*; and we can select specimens, which are undoubtedly the *S. humerosa*, which correspond with the shell. We add a description of the following new species:—

**SUCCINEA COSTULOSA, Pse.**

*T. ovata, tenui, flavide cornea, longitudinaliter irregulariter costulosa; anfr. iii., anfractu ultimo interdum superne obsolete rotundatim angulato; apertura ovata, columella arcuata, subplicata.*

Long. 7, diam. 5 mill.

**6. A REVISION OF THE GENERA AND SPECIES OF URSINE ANIMALS (URSIDÆ), FOUNDED ON THE COLLECTION IN THE BRITISH MUSEUM. BY DR. J. E. GRAY, F.R.S.**

The family of Bears (*Ursidæ*) are characterized among the Carnivora by having the three hinder upper grinders (that is to say, the hinder false grinder, the flesh-tooth, and the tubercular tooth) very similar in form; they are broad and strongly tubercular. The three hinder teeth in the lower jaw are similar, but they are narrower and more elongate.

They form a very natural group, consisting only of a limited number of species. The species require particular study, as they are very similar externally; and the skull and teeth, which are very similar in many of the specimens, appear to be liable to a considerable amount of variation in specimens from the same locality, and with the same habits.

The examination of the bones and especially the skulls of the *Ursidæ* shows still further than the study of the bones of the *Viverridæ* the necessity of great caution in depending on the study of osteological specimens for the distinction of species. The fact that M. de Blainville considers the Californian Grisly Bear, after a very careful study and comparison of its bones, to be only a variety of the common European Bear, shows how a most experienced and accurate osteologist may be misled by placing too much confidence in a single branch of study. If such a naturalist may be so misled by the study of the bones of recent animals, how much more caution is required in giving any opinion or forming any theory on the study of fossil specimens of bones, where the determination of the osteologist cannot be verified by the examination of other parts of the animal in its perfect state!

The species of *Ursidæ* are distributed over Europe, Asia, Africa, and America, and they are generally inhabitants of the mountainous regions of these countries. One species is marine, and common to the Arctic parts of Europe, Asia, and America.

## Section I. BRACHYPODA. Toes straight; claws exerted.

A. *Tail very short; body massive; limbs short; nose short; teeth 42.*  
Ursina.

a. Sea-Bears. *Soles of the feet hairy, with a few bald pads. The tubercular grinder longer than the flesh-tooth. Lips slightly extensile. Cutting-teeth 6/6. Ears rounded, hairy.*

1. THALASSARCTOS. *Nose of skull produced, longer than broad. Front false grinders small, far apart; upper tubercular moderate.*

b. Land-Bears. *Soles of the feet bald, callous. Cutting-teeth 6/6. Lips slightly extensile. Cover of nostrils moderate. Ears rounded, hairy. Underside of the base of the toes hairy.*

2. URSUS. *Nose of skull produced, longer than broad, rounded above. Forehead convex, separated from the nose by a cross line. False grinders far apart, small. Palate flat. Brain-case swollen. Lower jaw moderate.*

3. MYRMARCTOS. *Nose of the skull produced, much longer than broad, flat above. Nose, forehead, and front of crown all on one line. False grinders far apart, small. Palate concave. Brain-case compressed. Lower jaw large, elongate.*

4. HELARCTOS. *Nose of skull very short, as broad as long, forming a line with the forehead. False grinders crowded, large. Palate broad, flat.*

c. Honey-Bears. *Soles of the feet bald, callous. Cutting-teeth 4/6. Lips very extensile. Nostrils large, with a large cover. Front of palate bent up. Ears tufted. Underside of base of toes bald.*

5. MELURSUS. *Nose of the skull produced, longer than broad, rounded above. False grinders far apart; upper hinder tubercular short.*

B. *Tail elongate; body and limbs moderate; teeth 40.*

\* *Head elongate; nose produced, mobile; underside convex, rather bald, without any longitudinal central groove. Nasuina.*

6. NASUA.

\*\* *Head ovate; nose short; underside flat, hairy, with a central longitudinal groove. Procyonina.*

7. PROCYON.

Section II. DENDROPODA. Toes short, arched; claws retractile.

A. *Tail prehensile; soles bald.* Cercoleptina.

8. CERCOLEPTES.

B. *Tail bushy; soles hairy.* Ailurin.

9. AILURUS.

#### Section I. BRACHYPODA.

The broad-footed Bears. *The feet broad and short, generally bald and callous below; toes straight; the claws exerted, more or less curved, blunt.*

*Brachypoda*, Gray, Proc. Zool. Soc. 1864, p. 506.

#### Tribe 1. URSINA.

*Tail short or none; body massive; limbs short.*

*Ursina*, Gray, Cat. Mamm. B. M. 72.

They sometimes climb trees, but usually descend backwards. When running, they carry their young on their back.

In the 'Annals of Philosophy' for 1825, I divided the Bears into groups, according to the characters of their feet and claws, and into the genera *Ursus*, *Danis*, *Prochilus*, and *Thalassarctos*.

The examination of the series of skulls of Bears in the Museum, like the examination of the series of bones of the Viverridæ, has strongly impressed me with the uncertainty that must always attend the determination of fossil bones, or indeed of bones of all animals when we have only the skulls or other bones of the body to compare with one another. There can be no doubt that the study and comparison of the bones of the different species is very important—that the skull and teeth afford some of the best characters for the distinction of the genera and species; but few zoologists and palæontologists have made sufficient allowance for the variations that the bones of the same species assume. In the Bears I have observed that there is often more difference between the skulls of Bears of the same species from the same locality than between the skulls of two undoubted species from very different habitats and with very different habits. Thus I have the skulls of some Bears, the habitat of which is not certainly known, which I have doubts whether they should be referred to the Thibet Bear (*U. torquatus*) or to the North American species (*U. americanus*); but I have referred them to the latter with doubt, as they were said to come from the latter country. It is the same with regard to the skull of a Bear that lived in the Zoological Gardens for years, which has the general form of the skull and the wide palate of the European Bear, but the long last grinder and some other characters of the *Ursus ferox*.

This similarity of the skull is more remarkable, as no two Bears

can be more distinct from each other than the species above named which have such similar skulls, showing that similar skulls do not always imply very nearly allied or doubtfully distinct species.

The Bears may be arranged, by the size of the tubercular grinders, thus:—

Very large, more than half as long again as the flesh-tooth. (The number gives the medium measurement of the flesh-tooth, in inches and twelfths.) 1" 4"', *Ursus isabellinus*. 1" 5"', *U. cinereus*. 1" 4"', *U. grandis*. 1" 3"', *U. torquatus*.

Moderate above, half as long again as the flesh-tooth. *Thalassarctos maritimus*. 1" 2"', *Ursus arctos*. 1", *U. arboreus*. 1", *U. americanus*. 1" 6"', *Myrmarctos*.

Small, only rather larger than the flesh-tooth. *Helarctos malayanus*, *Melursus libycus*.

A. Sea-Bears. *Soles of the feet covered with close-set hairs, with a few small bald pads. Head elongate; forehead scarcely raised above the line of the nose; cutting-teeth 6/6; lips slightly extensile; nostrils moderate.*

#### 1. THALASSARCTOS.

Head elongate; ears rounded, hairy; forehead scarcely raised above the line of the nose. Neck elongate. Feet broad, large; front claws elongate, curved. Fur soft, short, dense. Skull elongate. The upper tubercular grinder elongate. The palate broad, concave, rather contracted behind, and then suddenly contracted behind the last tooth. The hinder nasal aperture elongate, narrow, the sides much longer than the front edge, which is arched; the sides bent in towards the middle, contracting the aperture.

*Sea-Bears (Thalassarctos)*, Gray, Ann. of Philos. 1825.

*Thalassarctus*, Gloger, 1842.

*Hab.* Arctic Seas.

#### THALASSARCTOS MARITIMUS.

B.M.

White or yellowish white.

*Ursus maritimus*, Desm. Mamm. 165; Schreb. Säugeth. 513, t. 141\*; Fischer, Syn. Mamm. 145; Baird, Mamm. N. A. t. 44 (skull); Temm. Fauna Japon. 29; Schrenck, Amurland, i. 16.

*U. marinus*, Pallas, Reis. iii. 691; P. Z. S. 1859, p. 102.

*U. polaris*, Shaw, Mus. Lever. i. 7, t. 2.

*U. albus*, Brisson, Règne Anim. 260.

*Thalarectos polaris*, Gray, Ann. Philos. 1825, p. 62.

*Thalassarctos maritimus*, Gray, Cat. Mamm. B. M. 73; Bonap. Cat. Mamm. Eur. 11.

*Ours blanc (U. maritimus)*, De Blainv. Ostéogr. t. 1 (skeleton ♀), t. 4 (bones), t. 5 (skull ♀).

*Ours blanc*, Buffon, H. N. xv. 128 ; Suppl. iii. 200, t. 34.

*Ours polaire*, Cuv. Ménag. Mus. ; Oss. Foss. iv. t. 20. f. 4, t. 21. f. 4.

*Polar Bear*, Penn. Syn. 192, t. 20. f. 1 ; Shaw, Zool. i. 257, t. 105.

*Hab.* Arctic Seas of Europe, Asia, and America ; Japan (*Siebold*).

Skulls.	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
221 c. Adult.....	1	2	15	3	9	6	3	7	4	0	7	9	2	7	4	9	2	2
221 d. Young .....	1	0	12	6	8	0	2	9	3	0	6	6	2	0	3	11	1	9
221 h. Young .....	1	0	12	6	7	0	2	8	2	11	6	7	2	3	3	9	1	6

B. Land-Bears. *Soles of the feet bald, callous. Cutting-teeth* 6/6. *Ears rounded, hairy. Lips slightly extensile. Nostrils oval, with a moderate lid. Underside of the base of the toes hairy. The upper tubercular grinder elongate.*

## 2. URSUS. Carrion-Bear.

Head elongate. Ears rounded, hairy. Nose rather produced, compressed. Forehead rounded. Nostrils ovate, covered with a moderate lid. The underside of the base of the toes covered with hair, making an hairy band between the toe-pads and the soles of the feet. Nose of the skull produced, as wide or wider than the forehead between the orbits, rounded above, separated from the more or less convex forehead by a cross line, which is less distinct as the animal becomes aged. Front false grinders small, far apart ; hinder tubercular grinder large, elongate, larger than the flesh-tooth. Palate flat or slightly concave. The aperture of the hinder nostrils with the sides longer than the width of the front edge. The aperture for the blood-vessel to the palate is behind the front edge of the tubercular grinder.

Middendorf, in his 'Mammalia of North and East Siberia,' has a very long essay on the Bears. He regards the species found in Europe and Northern Asia and the Grizzly Bear of North America as varieties of *Ursus arctos*. He enters into a minute examination and comparison of the external and osteological characters, and gives most minute measurements, in elaborate tables, to support this conclusion ; but I think that his not having been able to distinguish the Ant- from the Carrion-Bear (and he figures a skull of each as a subvariety of *Ursus arctos*, var. *beringiana*) must make one cautious in accepting his theory without more examination.

Von Schrenck, in his 'Amurland,' says that the size of the tubercular grinder varies in the Bears of North Asia ; but I suspect he also has combined the Carrion-Bear and the Ant-Bear into one species.

- a. Old-World Bears. *The fur shaggy. The hind feet elongate. The claws moderate. The palate flat, rather broad.* URSUS.  
*European Bears*, Gray, Ann. Phil. 1825.

\* *Fur shaggy, brown, or grey, or whitish.*

1. URSUS ARCTOS.

Brown or blackish; fur shaggy; hair longer on the withers.  
 The palate broad. The upper tubercular grinder nearly half as long again as the flesh-tooth.

*Ursus fuscus*, Albert. Magn. de Anim. lib. xxii. p. 183.

*Ursus arctos*, Linn. S. N. 169; Pallas, Zoogr. Ross. Asiat. i. 64; De Blainv. Ostéogr. t. 6, t. 7 (adult skull).

*Ours brun d'Europe*, Cuvier, Oss. Foss. iv. 332.

*Ursus cadaverinus*, Eversm. Bull. Soc. Nat. Mosc. 1840, p. 8, pl. i. f. 1.

*Brown Bear*, Pennant, Arctic Zool. i. 61.

Var. 1. *normalis*. The upper tubercular grinder nearly half as long again as the flesh-tooth. Lower edge of lower jaw straight.

Subvariety a. *scandinavicus*.

B.M.

*Ursus arctos*, Linn. Faun. Suec.; Nilsson, Scand. Fauna, fig. t. 23 (ring-necked variety).

*Hab.* Sweden.

Nilsson describes six varieties found in Sweden:—1. Black; 2. Dark brown; 3. Brown, white-washed (the *Silfver bjorn*); 4. Red-brown; 5. Brown, with a white ring on the neck; 6. Variegated or Albino Bear (*l. c.* p. 193).

Subvar. b. *Ildgeesdjur*, Worm. Mus. 318.

*Hab.* Norway.

Subvar. c. *rossicus*. Russian Bear.

*Hab.* Russia.

Subvar. d. *sibiricus*.

*Hab.* Siberia.

Fur in all states and ages brown.

Subvar. e. *meridionalis*, Middendorf, Sibir. Reise, 74; Schrenck, Amurland, 13.

*Hab.* Caucasus.

Subvar. f. *polonicus*.

*Ours brun de Pologne* (première variété), Cuvier, Oss. Foss. iv. 332, t. 22. f. 3; De Blainville, Ostéogr. t. 7. f. (adult skull).

Crown of the skull very high over the condyles, and sloping down rapidly behind and before; canines very large, lower edge of lower slightly curved.



Subvar. g. *pyrenaicus*.

*Ours brun des Alpes*, Buffon, H. N. viii. 24, 86, 61; Cuvier, Oss. Foss. iv. t. 22. f. 1, 2.

*Ours brun des Pyrénées*, Cuv. Oss. Foss. iv. 332.

*Ours des Asturies*, fœm. (*U. arctos*), De Blainv. Ostéogr. Ursus, t. 3 (skeleton), t. 7 (skull ♂, adult).

*Ursus arctos*, Schreb. t., from Buffon.

*U. pyrenaicus*, F. Cuv. Mamm. Lithogr. xlv. t. (young); Fischer, Syn. Mamm. 142.

*Hab.* Pyrenees.

Fur of young yellowish; hairs brown, yellow-tipped; head deep yellowish; feet black.

Subvar. h. *niger*. Fur black-brown.

*Ursus niger*, Albert. Magn. de Anim. lib. xxii. 183.

*U. arctos niger*, Gmelin, Syst. Nat. i. 100.

*Ours noir d'Europe*, Daubenton; Cuvier, Oss. Foss. iv. 333, t. 20. f. 2-5, t. 21. f. 1, 2, 6-8.

*Ursus niger*, F. Cuvier; Fischer, Syn. Mamm. 143; Keys. & Blasius, Wirb. Eur. xix. 64.

*U. arctos*, var., Nilsson, Scand. Fauna.

*Hab.* Europe (*Daubenton* and *Cuvier*).

Skulls.	Length of tubercular grinder.		Length of skull.		Width of skull at condyle.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.		
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	
218 e. Nose above rounded	1	2	13	6	9	8	3	6	4	0	6	10	2	4	4	3	2	2	2
218 f. " " "	1	2½	13	0	8	3	3	0	3	0	7	0	2	1½	4	5	1	10	10
218 a. Nose flattened above	1	2½	13	4	9	9	3	2	3	5	7	3	2	5	4	10	1	11	11

Skull of adult from Sweden. Presented by the Earl of Selkirk. —Like former, 218 e, the palate is rather concave; but the hinder part in front of the inner nostril is flat, and the cavity of the inner nostril contracted, with a thick arched front edge, of nearly the same width, to the back one. The lower jaw with a long, regularly arched suture. Length of the skull, from the front teeth to the end of the condyle,  $13\frac{3}{4}$  inches; width at back of zygoma  $10\frac{1}{2}$  inches, of the nose  $3\frac{1}{4}$  inches; the hinder nostrils wide in front ( $1\frac{1}{2}$  inch) and behind ( $1\frac{1}{2}$  inch); the length of the suture of the lower jaw  $3\frac{1}{2}$  inches.

Skull of adult, of large size.—The nose very broad, swollen, evenly rounded above. The palate rather concave, deeply concave and rather contracted behind, in front of the large hinder openings of the nostrils, which contracts on the sides behind, and with a thin regularly rounded front edge. The front of the chin of the lower jaw rather short, keeled on the suture. Length of the skull, on the inner side, from front teeth to the end of the condyles,  $13\frac{1}{2}$  inches; width of the skull at the hinder edge of the zygoma, in a line with the

condyles of the lower jaw, 10 inches; width of the nose at the aperture of the vessel in front of the zygoma  $3\frac{3}{4}$  inches; width of the front part of the hinder opening of the nostrils  $1\frac{1}{2}$  inch, of hinder part 1 inch. Length of suture of lower jaw 3 inches.

Skull of a nearly adult, collected by Mr. Lloyd in Sweden.—The palate is rather concave in the middle in front, and is raised on a line with the false grinders; it is flat behind, with a thin edge to the broad internal nostril, which has a transverse front edge; the aperture is large, rather wider behind than in front. Lower suture of lower jaw long and regularly curved. Length of skull, from cutting-teeth to end of condyle, 13 inches; width of skull at back of zygoma 9 inches; width of nose 4 inches, of hinder nostrils  $1\frac{1}{4}$  inch; width of nose-aperture  $2\frac{1}{4}$  inches, rather wider than high. Length of suture of lower jaw 3 inches; length of grinder  $1\frac{1}{4}$  inch, of all three.

Cuvier, from the examination of two skulls in the Paris Museum, regards the Black Bear of Europe as a distinct species (see Oss. Foss. iv.). Keyserling and Blasius, in 'Die Wirbelthiere Europas,' 1840, separate it from the *U. arctos*, because it has the "last upper grinder shorter than the flesh-tooth," probably misled by Cuvier's figure (Oss. Foss. iv. t. 21. f. 6); but if they had looked at the other figures, they would have seen that the last grinder is represented long, like that of the other European Bears. Blasius, in his 'Naturg. der Säugethiere Deutschlands,' 1857, does not give the *U. niger* as a distinct species; and Nilsson (Scand. Daggdjur, 1847, p. 208) evidently considers it only a variety of *U. arctos*.

*Ursus falciger* of Reichenbach, which is said to have rather falcated claws, is probably from a specimen which had been long kept in confinement without exercise, when the claws lengthen and curve.

Var. 2. *grandis*.

B.M.

The upper tubercular grinder elongate, more than half as long again as the flesh-tooth; lower edge of lower jaw straight. Fur dark red-brown, of uniform length, smooth.

? *Græssdjur*, Worm. Mus. 328.

*U. arctos*, Fraser, Cat. Zool. Gard. (male).

*Hab.* North of Europe. A male, purchased at Hull, living in the Zoological Gardens from 1852 to 1863.

	Length of tubercular grinder.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.		
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	
218g. ....	1	4	11	6	7	2	9	2	8	1	6	3	1	11	1	3	10	3	7
	1	4	14	6	9	3	4	1	3	4	1	7	5	2	3	4	6	2	1

Skull of very old animal, with the crown-crests very high.—Nose broad, as broad as the width of the forehead between the orbits, rather flattened above. Forehead concave in the middle, in front

and between the orbits. The zygomatic arches very broad and convex. The orbit small, rather oblong, oblique. The palate nearly flat, broad. The tubercular grinders very large, elongate, full half as long again as the flesh-teeth.

This skull is full as large as that of *U. ferox*, but more ventricose; the palate is broad, as in *U. arctos*; but the tubercular grinder is longer, and as long as that of *U. ferox*. I am inclined to regard it as a good species, but wait for further specimens.

In a smaller skull of an adult Bear, sent from Sweden by Mr. Lloyd, the palate is even and rather concave. The hinder aperture of the nostrils is rather wide, scarcely contracted behind, and regularly arched in front, with a slight central tubercle. The length of the skull below, from front teeth to condyle,  $1\frac{3}{4}$  inch, of palate  $6\frac{1}{4}$  inches; width at condyles of lower jaw  $6\frac{1}{2}$  inches, of nose in front of orbit  $2\frac{2}{3}$  inches, of nose-aperture  $1\frac{3}{4}$  inch, higher than wide; length of suture of lower jaw  $2\frac{1}{2}$  inches; length of hinder upper grinder  $1\frac{1}{2}$  inch, rather longer than in the other larger skulls, and much longer than in the skulls of nearly the same size from Norway, where the tooth is only  $1\frac{1}{2}$  inch long; width between orbits  $2\frac{2}{3}$  inches, at back of orbit  $3\frac{2}{3}$  inches.

Var. 3. *collaris*.

Fur shaggy, hair long, with closer under-fur, black-grey; the legs and feet blacker; the head pale brown; the shoulders often marked with a white oblique streak, making a collar.

*Ursus collaris* (*Ours de Sibérie*), F. Cuvier, Mamm. Lithogr. xliii.

*Ursus arctos*, var. *beringiana* (partly), Middendorf, Sib. Reise, i. 53, 74, t. 1. f. 1-4 (skull); Von Schrenck, Reise nach Amurland, i. 11, 13, 16.

*Ursus ferox*, Temm. Fauna Japon. (not *Lewis* and *Clark*).

*A Brown Bear from Hakodadi*, Selater, P. Z. S. 1864, p. 374.

*Hab.* Kamtschatka and Amurland; Japan, Northern Island; Zool. Gardens.

The French naturalist of the 'Venus' obtained a Brown Bear at Kamtschatka, and carried it alive to Paris; and they considered it like the true *U. arctos* (Baird, Rep. p. 221).

This Bear is very unlike the *Ursus arctos* of Sweden, with which alone I have the opportunity of comparing it.

It is only necessary to compare the figures of the two skulls given in the plate of Middendorf, above referred to, to see the distinction between the skulls of the Carrion- and Ant-Bear of Northern Siberia. The Carrion-Bear (*U. collaris*) has a short, broad skull, with a short nose and small, short lower jaw; the Ant-Bear has an elongated, narrow skull, with an elongated nose and a large, strong lower jaw: the lower jaw in the first, three-fifths; in the second, five-sevenths the length of the skull.

Var. 4? *stenorostris*.

Nose of the skull produced, attenuated. Lower edge of lower jaw arched.

*Ours brun de Pologne* (seconde var.), Cuvier, Oss. Foss. iv. 332, t. 22. f. 4.

*Ours brun élané de Pologne*, De Blainv. Ostéogr. t. 7 (skull).

*Hab.* Europe, Poland.

Only known from a skull in the Paris Museum. It is very different from the other skull from Poland; the nose is much more produced; the crown more evenly convex; the forehead raised more suddenly from the nose; the lower edge of the lower jaw curved, much arched up behind. I have not seen it: it may be only an accidental variety.

## 2. *URSUS ISABELLINUS*. Indian White Bear.

B.M.

Fur dirty white or yellowish; hairs of the back and nape elongated, very soft, curled, of the sides rigid, adpressed; claws short, straight, and blunt; forehead of skull convex over the orbits, separated from the nose; palate flat, rather slender, narrow; the upper tubercular grinders long, considerably more than half as long again as the flesh-tooth.

*Ursus isabellinus*, Horsf. Linn. Trans. xv. 332; Fischer, Syn. Mamm. 143; Gray, Cat. Mamm. B. M. 72; Cat. Hodgson Coll. B. M. 15; Fraser, Cat. Mamm. Z. S. 2; Hodgson, J. A. S. B. i. 340, x. 910, xi. 282; P. Z. S. 1834, p. 96; Calcutta, J. N. H. iv. 288.

*U. arctos albus*, Gmelin, S. N. i. 100.

*Ours blanc terrestre*, Buffon, H. N. viii. 248, t. 32.

*Hab.* Nepal, Thibet (called "Ritek" by the Nepalese).

	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbits.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
1010 <i>d.</i> ♂ Cashmere, old ...	1	3½	12	6	7	3	2	8	2	6	6	9	2	0	4	3	2	0
1010 <i>c.</i> ♀ Cashmere .....	1	3½	10	6	6	8	2	6	2	7	5	8	1	9	3	7	1	9
1010 <i>e.</i> ♀ Cashmere, young.	1	4	9	9	5	6½	2	0	2	0	5	3½	1	6	3	3	1	6
1010 <i>f.</i> Cashmere .....	1	4	11	6	6	11	2	7	2	9	6	1	1	10½	3	11	1	9

The skull rather short. Nose narrowed, compressed, flat at the top, with a very large nasal aperture, not so wide as the forehead between the orbits. Forehead broad, flat, convex, on a line, at the back edge of the orbit, with a concavity in the middle in front of the orbit; the most convex part of the crown over the condyles. Orbit oblong, oblique, much higher than broad; zygomatic arches regularly convex, more prominent in the middle of their length. Cutting-teeth normal; the outer in both jaws larger, with a lobe; the two front upper false grinders small, first smallest; the hinder upper grinder very large, elongate, much larger than the flesh-tooth. The palate flat, moderately broad, suddenly contracted behind, on a line rather behind the hinder edge of the last tooth; inner nasal apertures moderate, truncated in front, the sides half as long again as the front edge. Lower jaw with a rather large chin and a flat lower edge.

The British Museum received, in 1853, three skulls (*c*, *d*, *e*) of the "White Bear of Cashmere" from Lieut. Abbot, belonging to a male and two females. They all have a rather convex forehead, which is well separated from the nose by a depression in front of the orbits. This depression is much more deep and decided in the females than in the males; in one it forms a deep concavity in the middle of the forehead between the orbits. In one female the crown behind the orbits is flat, short, rhombic, broad; and in the other it is much larger, more oval, and convex. In the male and one female the nose-hole is higher than broad, and in the other female broader and lower. They all have a large elongated upper tubercular grinder.

### 3. URSUS SYRIACUS. Syrian Bear.

B.M.

Fur dirty yellowish; the palate narrow, concave; the tubercular grinder very broad, strong, not half as long again as the flesh-tooth; the forehead flat, nearly on a line with the very broad nose; the aperture of the nose large, broad, as broad as high.

*Ursus syriacus*, Hempr. & Ehrenb. Symb. Physicæ, i. t. 1.

*Hab.* Syria, Mount Lebanon (*Ehrenb.*); Persia? (*Fraser*).

This Bear is very like *U. isabellinus* in external appearance; but the form of the skull is very different. The nose is broader, striated, and only separated from the forehead by a very slight depression. The upper tubercular grinder is shorter and thicker than in the generality of the skulls of the Indian White Bears.

The skulls of the adult and half-grown Bears from Syria are very like that from Cashmere of the same age; but the forehead is rather broader and more convex, and it extends further back between the temporal muscles. The nose is considerably broader at the end, being 3 inches and 1 line over the canines, and only separated from the forehead by a very slight depression; while in the male *U. isabellinus* it is only 2 inches and 9 lines wide. The outer maxillæ on the sides of the nasal broad. The lower jaw is stronger and higher, especially at the hinder part. The zygomatic arch is much wider and stronger, especially in the front part under the orbit. The upper tubercular grinder is thicker, but shorter than in the skulls from Cashmere.

	Length of tubercular grinder.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.		
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	
1010 <i>b</i> . Zool. Gardens; Syria	1	3	12	9	7	6	3	0	2	8	6	7	1	11	3	4	1	1	9
1010 <i>a</i> . .....	1	2½	10	9	6	2	2	4	2	4	5	8	1	9	3	9	1	8	

The skins of each of these animals are in the British Museum: *b* is a large whitish animal; *a* is a smaller pale-brown one.

They were both formerly living in the Zoological Gardens.

\*\* *Fur short, close, uniform, deep black.* Asia.

4. *URSUS TORQUATUS.* Indian Black Bear. B.M.

Fur black; chin white; a broad, forked, white mark on the chest, rather contracted behind; cheeks with prominent bushy hairs; face brownish; palate of skull narrow, concave; upper tubercular elongate, half as long again as the flesh-tooth.

*Ursus thibetanus*, F. Cuvier, Mamm. Lithogr. t.; Fischer, Syn. Mamm. 145; Owen, P. C. S. Z. S. i. 76, 1831 (anatomy); Radde, Mélanges Biologiques de St. Pétersbourg, iii. 677, 1861; Hodgson, J. A. S. B. i. 340, x. 910; P. Z. S. i. 96; Calcut. J. N. H. iv. 288.

*U. ferox*, Robinson, Assam, 69.

*Helarctos malayanus*, Hodgson, J. A. S. B. i. 340.

*H. tibetanus*, Gray, Cat. Mamm. B. M. 73; Hodgson, Cat. B. M. 15; Horsfield, Cat. Ind. House, 124.

*Ursus torquatus*, Schinz, Syn. Mamm. 302; Wagner, Suppl. Schreb. t. 141 D; Hügel, Kaschmir, iv. 570; Fraser, Cat. Mamm. Zool. Soc. Gard. 2.

*Hab.* India, Nepal, central hilly region (*Hodgson*); East Siberia (*Radde*). Not found in Thibet (*Hodgson*, J. A. S. B. xi. 282).

Skulls.	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbits.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
219 <i>b.</i> .....	1	3	11	3	6	6 $\frac{1}{2}$	2	6	2	9	5	8	1	5	3	6	1	6
219 <i>h.</i> .....	1	3	11	0	6	6	2	6	2	7	5	9	1	8	3	4	1	5 $\frac{1}{2}$

The specimen *h*, which has the wider palate, also has a much more convex forehead.

Var. 1. *arboreus*.

Upper tubercular and nose shorter.

*Ursus hindaicus arboreus*, Oldham, MS. B. M. (young skull).

*Hab.* Darjeeling (*Oldham*, *Hodgson*).

The skull has a broad short nose, rounded above; the nose-opening as high as wide; forehead convex, broad, rounded on the sides; nasal bones very broad, large, extending back to a line even with the middle of the orbits; lower edge of lower jaw straight; the last tubercular grinders broad, larger than the flesh-tooth, oblique, truncated on the outer hinder side, not wider than long; palate nearly flat, slightly concave in front, rather contracted behind, on a line with the last edge of the tubercular grinder; hinder opening of the nostrils elongate, scarcely contracted behind, sides longer than the width of the front edge.

Skulls.	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
219 <i>f.</i> Hodgson's.....	1	0½	10	9	6	9	2	6	2	11	5	7	1	7	3	4	1	6
219 <i>g.</i> .....	1	0	9	9	5	11	2	4	2	5	5	3	1	5	2	9	1	6
219 <i>c.</i> Oldham's (young) ...	1	0½	8	6	5	4	2	1	2	4	4	9	1	4	2	6	1	3

Two of these specimens (*g* and *c*) have a much shorter nose than the generality of the skulls of *U. torquatus*; but *f*, which has also a short tubercular grinder, like them has the nose of the skull of the usual length; they all have rather narrow palates. The forehead of *f* is convex and rounded.

Skull elongate. Nose broad, compressed, the sides shelving above, and flat over the nasals; nasals short, scarcely reaching to the front edge of the orbits. Orbits oblong, ovate, longitudinal. The forehead between the orbits convex, rounded, rather wider than the hinder part of the nose. The crown arched, the most convex part being in front of the condyles. The zygomatic arch narrow, elongate. The palate narrow, deeply concave in front, narrower between the tubercular teeth, narrower behind, with a large elongate opening to the hinder nostrils, which has an arched front edge, and the side more than twice the length of the width of the front edge. The tubercular grinder very large, wide, oblong, as wide and much longer than the flesh-tooth.

As in the other Bears, the skull varies in the width and form of the front edge of the opening of the hinder nostrils, and also a little in the surface of the palate. There is in the Museum a specimen of a young Bear, received from Mr. Oldham under the name of *Ursus hindaicus arboreus*, that has a wide front edge to the hinder nostrils; and the palate in front of the opening is concave, with a slight keel on each side; but we have a skull of a young *Ursus tibetanus*, from Mr. Hodgson, with a similar opening to the hinder nostrils.

##### 5. URSUS JAPONICUS.

Black; fur short, dense, polished; hair on sides of neck longer; face black, clothed with short hair; ears large; throat with a slight, undefined whitish line; head short, rounded; muzzle rather short.

*Ursus japonicus*, Scater, P. Z. S. 1862, p. 261, pl. xxxii.

*U. tibetanus*, Temm. Fauna Japon. 29.

*Hab.* Japan (*Vivar. Soc. Zool.*).

##### 6. URSUS FORMOSANUS.

B.M.

Black; hair short; chest with a large white crescentic mark.

*Sun-bear of Formosa (Ursus tibetanus?)*, Swinhoe, Proc. Zool. Soc. 1862, p. 351.

*Ursus formosanus*, Swinhoe, ibid. 1863, p. 380.

*Hab.* Formosa, highest mountains in the interior (*Swinhoe*)  
 PROC. ZOOL. SOC.—1864, No. XLIV.

(called "Tinheuny" by the Chinese). A flat skin in the British Museum.

This differs from the Japan Bear in the white marks on the chest being large and distinct.

Bears are often tamed by the Chinese, and taught to dance and play tricks, as in India and Europe.

#### 7. URSUS INORNATUS.

*Ursus inornatus*, Pucheran, Rev. Mag. Zool. viii. 392; Arch. für Naturg. 1856, p. 43.

*Hab.* Ceylon. A young specimen.

b. Long-clawed American Bears. *The fur shaggy. Front claws much longer than the hinder one, broadly depressed, whitish. The palate narrow and contracted behind. Ears small. Hind feet elongate.* North America. DANIS.

*Grizzly American Bears (Danis)*, Gray, Ann. of Philosophy, 1825.

The skull of these Bears more resembles that of the European Bears than that of the short-footed, smooth-haired American Bears; for De Blainville calls the Pacific Grizzly Bear only a variety of *Ursus arctos*.

#### 8. URSUS (DANIS) CINEREUS.

B.M.

Fur very long, very dense, longer on the neck and occiput, dark brown, with ashy tips.

*Ursus cinereus*, Desm. Mamm. 165.

*U. griseus*, Desm. N. Dict. H. N. xxiv. 266.

*U. horribilis*, Ord, in Isis, 1819, p. 107; Say, Long's Exped.; Baird, Mamm. N. A. t. 41, 42 (skull).

*U. ferox*, I. Geoff. Dict. Class. H. N. xii. 521; Lewis & Clerk, Travels, i.; Fischer, Syn. Mamm. 144; Prinz Max. von Wied. Acad. Nat. Cur. xxvi. 33, 1857.

*U. arctos*, var., Middendorf, Sibirische Reise, ii. 4. p. 54, 1853.

*Ours de Californie (Ursus arctos ferox)*, De Blainv. Ostéogr. Ursus, t. 2 (skull), t. 6 (skull, old and young).

*Danis ferox*, Gray, Ann. Philos. lv.

*U. candescens*, H. Smith.

*L'Ours noir d'Amérique*, Cuvier, Oss. Foss. iv. 332, t. 23. f. 1, 2.

*Hab.* North America, California (*Douglas*).

"Size very large. Tail shorter than ears. Hair coarse, darkest near the base, with light tips; an erect mane between the shoulders. Feet very large; fore claws twice as long as the hinder ones. A dark dorsal stripe from occiput to tail, and another on each side along the flanks, obscured and nearly concealed by the light tips; interval between the stripes lighter; all the hairs on the body brownish yellow or hoary at tips; region around ears dusky; legs nearly black; muzzle pale, with a dark dorsal stripe."—*Baird, Mamm. N. A., San Francisco.*



	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.		
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	
1137 a. ....	1	5 $\frac{1}{2}$	14	08	6	3	2	3	6 $\frac{1}{2}$	7	9	2	3 $\frac{1}{2}$	4	6	2	0		
1137 b. Douglas's .....	1	5 $\frac{1}{2}$	15	08	3	3	1	3	7	7	8	1	11 $\frac{3}{4}$	4	9	2	3		

The two skulls vary considerably: the first is much broader, the palate wider, the nose shorter, and the orbit smaller, rounder; the second, from the Rocky Mountains, is narrower, the nose longer, the palate much wider, and the orbit much higher and more oblong.

The lower jaw with a straight lower edge, very slightly bent up behind the chin, and scarcely bent up at the hinder end. The outer lower cutting-teeth larger, and lobed on the outer side. The outer upper cutting-teeth larger, with a lobe on the inner side. The two front upper false grinders very small, far apart; the third larger, three-lobed.

There are two skulls in the Museum collection; they both agree in being narrower than the skull of *U. arctos* of Europe, in having a much larger hinder tubercular grinder, and in having a narrow opening to the hinder nostrils, which are oval at the front edge; the size of the opening differs considerably in the two specimens, being smaller and narrower in the oldest one. Nasal bones elongate, nearly to a line in middle of orbit. Length of hinder grinder in all long, about 1 $\frac{1}{2}$  inch.

The skull collected by Mr. Douglas and sent to the Zoological Society is 14 $\frac{1}{2}$  inches long, from front teeth to end of condyle; palate 7 $\frac{1}{2}$  inches long; width at back of zygoma 8 $\frac{1}{2}$  inches; width of nose, at aperture of artery, 3 $\frac{1}{6}$  inches; length of last grinder 1 $\frac{1}{2}$  inch; length of suture of lower jaw 3 $\frac{1}{4}$ . The hinder nostrils wide, 1 $\frac{1}{4}$  inch in widest part, rather narrower behind; length 3 inches.

The skull of an old specimen that lived many years in the Tower and in the Zoological Gardens, with some of the grinders and the canines worn down.—The internal nostril is narrow, rather wider behind than in front; the front edge ovate. Length of the skull below, from front cutting-teeth to end of condyle, 14 inches, of palate 7 $\frac{1}{2}$  inches; width at back of zygoma 10 inches, of nose, at hole of artery, 3 $\frac{1}{3}$  inches; length of suture of lower jaw 3 $\frac{1}{2}$  inches; width of nose-aperture 2 inches, rather higher than wide.

#### 9. URSUS (DANIS) HORRIACEUS.

*Ursus arctos?* (*Barren-ground Bear*), Richardson, *Fauna Boreali-Americana* (see Baird, *Mamm. N. A.* 229).

*U. horribilis*, var. *horriaceus*, Baird, *N. A. Mamm.* t. 80 (skull); Rep. Mexican Boundary.

*Hab.* New Mexico, Sonora.

This Bear, according to Sir John Richardson, exhibits peculiarities not found in the Grizzly Bear of the Pacific Coast.

*Ursus horribilis*, var. *horriaceus*, Baird, *Mexican Mamm.* 24

(*Sonora Grizzly Bear*) is less than the Grizzly Bear of the Pacific coast. Head very broad. Ears and tail nearly equal. Fore claws twice as long as the hinder ones. General colour dark brownish, with the tips of the hairs much lighter, of a dirty amber-colour; no distinct indications of dark stripes on back and sides.

*Hab.* Los Nogales (*Dr. Kennerly*).

c. Short-clawed American Bears. *Fur short, uniform. Front claws moderate, not much longer than the hind ones. Hind feet short. Upper tubercular moderately long, narrowed behind.* EUARCTOS.

*American Bear*, Gray, Ann. Phil. 1825.

#### 10. URSUS (EUARCTOS) AMERICANUS.

B.M.

Fur entirely uniform throughout, either black or brownish; hair darkest towards the tips; nose brown; feet moderate; fore claws not twice as long as the hinder.

*Ursus americanus*, Pallas, Spic. Zool.; Schreb. Säugeth. t. 141. f. B.

*Ours (noir) d'Amérique (U. americanus)*, Cuvier, Ménag. Mus.; Ann. Mus. vii. 333, t. 18. f. 7, t. 21. f. 1-3; Oss. Foss. v. 318, t. 22. f. 5, 6, t. 23. f. 1; F. Cuvier, Mamm. Lithogr. t.; Fischer, Syn. Mamm. 145; Baird, Mamm. N. A. 225, t. 43. f. 10-13 (skull); Gray, Cat. Mamm. B. M. 72; De Blainv. Ostéogr. Ursus, 20. t. 5 (skull of adult and young), t. 11 (bones), t. 12 (teeth); P. Z. S. 1859, p. 477; 1860, p. 130, 180, 417.

*U. niger americanus*, Schinz, Syn. Mamm. 301.

*Ours gulaire*, I. Geoff. Mus. Paris.

*Black Bear*, Penn.

*Hab.* North America.

Mr. Bartlett notices the teats of two hybrids, believed to be from a male *Ursus americanus* and a female *U. arctos* (P. Z. S. 1860, p. 130).

The series of skulls of North-American Bears in the British Museum offers a very considerable amount of variation: in some the nose and forehead are nearly on the same plane; that is to say, there is very little depression in front of the orbits; but in others the depression is more decided; and in the skull of the Cinnamon Bear it is as great as in the usual form of the European Bears. The greater number of the skulls have the forehead and front of the crown more or less convex, sometimes decidedly so; but in a few the forehead is nearly flat.

	Length of upper tubercular grinder.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
217 c. ....	1	1	10	6	9	2	5	3	2	11	5	8	1	7	3	3	1	5
217 k. ....	0	11	10	6	6	5	2	3	3	7	5	6	1	8	3	3	7	1
217 l. ....	1	0	9	3	5	4	2	0	2	1	4	11	1	6	3	0	1	3

The specimens *k* and *l* have the opening of the vessel of the palate in front of the front edge of the upper tubercular tooth. In a skull (*i*) in the British Museum it is opposite the middle of the tubercular on one side, and opposite the front edge on the other. The specimen *k* is from the western slope of the Rocky Mountains (*Lord*).

The skull elongate. Nose rather produced, compressed on the sides, rounded above; nasal bones long, of the same length as the upper part of the maxillæ, and extending to a line level with the middle of the orbits. Forehead convex, rounded, rather shelving on the sides. The nose-aperture higher than broad, oblique. Orbits small, oblong, longer than high. The zygomatic arch moderately strong. The palate rather contracted at the line of the last tooth, and more so behind towards the inner nasal opening, which is rather narrow, with a transverse front edge, and with the sides considerably longer than the width of the front edge. The tubercular grinder large, broad, considerably longer than the flesh-tooth. The outer cutting-teeth largest, lobed. The front false grinders small, subequal, far apart.

There is an adult skull in the Museum, received from the Zoological Society as the skull of a Bear said to have come from North America. It is very like the other specimens of *U. americanus*; but the nasal bones are shorter, and do not extend so far up the nose as in the other specimens, stopping nearly a third of an inch short of the upper hinder angle of the maxillary bones. The palate also is rather more concave. The length of the skull is 11 inches, of the palate  $5\frac{3}{4}$  inches, of tubercular grinder  $1\frac{1}{2}$  inch; width of zygoma  $6\frac{1}{8}$ , of nose  $2\frac{1}{2}$ , of forehead between the orbits  $2\frac{5}{12}$ .

#### 11. URSUS (EUARCTOS) CINNAMOMEUS?

B.M.

*Ursus luteolus*, H. Smith, Griffith's, A. K.

*U. americanus cinnamomeus*?, Baird, Mamm. N. A. t. 79 (skull).

*Small Brown Bear from the copper-mines of New Mexico*, Baird, Mamm. N. A. 217, 228.

*U. cinnamomeus*, Baird, Mex. Mamm. 29.

*U. americanus cinnamomeus*, Bachm. N. A. Journ. ii. t. 127, 1853?

"Size equal to or less than that of the Black Bear. Colour varies in different shades of brown, very rarely black. Skull broader than in the common Black Bear" (*Baird*).

The skull of an adult Cinnamon Bear in the Museum agrees with the skulls of the other North-American Bears in most particulars; but the orbit is oblong, oblique, much narrower from before backwards than in the common *U. americanus*, and the tubercular grinders longer and broader. The palate is concave, and the hinder aperture of the nose with an arched front edge. The nasals are broad, extending up as far as the maxilla, and in a line with the middle of the orbits. The lower jaw is not so high. The length of the skull  $9\frac{3}{4}$  inches, of the palate  $5\frac{3}{12}$  inches, of the tubercular grinder  $\frac{1}{12}$  inch; width at zygoma  $6\frac{1}{2}$  inches, of nose  $2\frac{1}{2}$  inches, of forehead between the eyes  $2\frac{1}{2}$  inches.

*U. amblyceps*, Baird, MS.

“The skull shows conclusively a different species from the American Bear of the eastern States” (Baird, *l. c.* 217).

### 3. MYRMARCTOS. Ant-Bear.

Head elongate, narrow. Lips moderately extensile. The skull flat above, the nose, forehead, and front of the crown forming a regular shelving line; brain-case compressed. The nose moderate, flat above, compressed on the sides. The forehead narrow; the space between the orbits narrower than the nose. The last grinder moderate, longer than the flesh-tooth. Palate deeply concave; the hinder nasal aperture large, broad; the sides longer than the width of the front edge. Lower jaw large, elongate.

The Ant-Bears seem to have been long known, but somehow most unaccountably overlooked. They are evidently very distinct from the carrion or omnivorous Bears (*Ursus*).

Worm (Mus. 318) mentions three Bears as inhabiting Norway: 1. the Brown Bear, which is called *Græssdjur* (Herb-Bear), the largest and most dangerous, living principally on vegetables; 2. the Black Bear or *Ildgiesdjur*, the most carnivorous, attacking horses; 3. the Ant-Bear or *Myrebjorn*, the smallest, but still dangerous (see Cuvier, *Oss. Foss.* iv. 313).

Pallas, in ‘*Zoographia Rosso-Asiatica*,’ observes, “*Rossi distinctionem faciunt Ursorum inter formicarios (Muraveniki) et cadaverivoros (Sterveniki)*, sed nullo solido argumento: variant solummodo colore vel nigriore, vel e fusco magis rufescente; et magis minusve iracundi et crudeles fiunt anni tempore, ætate et alimenti copia vel inopia.”

Dr. Edward Eversmann, in the ‘*Bulletin de la Soc. Imp. des Nat. de Moscou*’ for 1840, p. 8, says that in the east of Moscow there are two kinds of Bear, one the *Aasbüren (Sterveniki)*, or Carrion-Bears, and the other the *Ameisenbüren (Muraveniki)*, or Ant-Bears; and he gives the characters which distinguish them, and figures the skulls of the two species. He states, “In the Ant-eating Bear the skull is more elegantly formed. The anterior level of the frontal bone forms a plane with the nasal bone; the forehead also does not stand forwards, and forms no depression, but is flat. The molar teeth are narrower and longer; the zygomatic arch is thinner and more slender; altogether the entire skull is proportionally longer, not so high, and not so robust as in the carrion-eater (*Ursus arctos*).”

He thus defines them:—

1. *U. cadaverinus* (= *U. arctos*, L.). Fronte supra oculos convexa, rostro abrupte attenuato brevi; vellere fusco, regione humerorum colloque pallidioribus; pedibus nigris (t. 1. f. 1, skull). Called “*Sterveniki*.”

2. *U. formicarius (U. longirostris)*. Fronte plana, modice in rostrum attenuata; vellere flavicanti-fusco, pilis apice flavidis ceterum fuscis; pedibus nigris (t. 1. f. 2, skull). Called “*Muraveniki*.”

## MYRMARCTOS EVERSMANNI.

B.M.

*Myrebiorn*, Worm, Mus. 308.*Muraveniki*, Pallas, Zoogr. Rosso-Asiat.*Ursus formicarius* (*U. longirostris*), Eversmann, Bull. Soc. Imp. Nat. Mosc. 1840, 8. t. 1. f. 2 (skull); Bonap. Mamm. Eur. 11.*Ursus arctos*, var. *beringiana* (partly), Middendorf, Sib. Reise, i. 53, t. 1. f. 5, 6 (skull).? Young. Var. white-collared. *Ursus norvegicus*, F. Cuv. Mamm. Lithogr. vii. t. ; Fischer, Syn. Mamm. 142.? *Ours brun de Norvège*, De Blainv. Ostéogr. t. 7 (skull of young).*Hab.* Norway (skeleton, B.M.).

	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
218c. Brandt .....	1	11½	11	36	1.	3	2	6	2	5	10	1	9	3	9	1	7	1

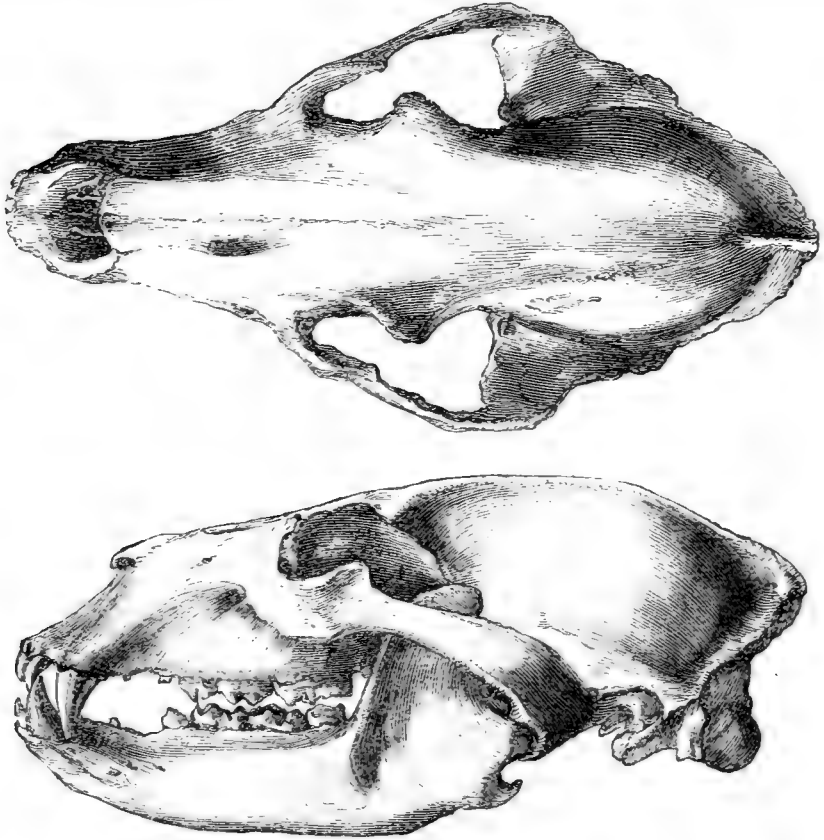
Skull of nearly adult Bear from Norway. The palate is very concave, especially in the middle of its length, in a line with the first large false molar; the hinder edge rather concave, and smoothed behind, near the front edge of the internal nostrils, which is thin and regularly arched; the aperture of the hinder nostril large, rather broader in front than behind. The hinder tubercular grinder rather short. Forehead quite flat, produced behind to a line over the ears, not convex above the orbits, narrow between the orbits. Nose broad, flat at tip; nasal bones only extending to rather behind the front edge of the orbit, not nearly so far as in *U. arctos* of Sweden. The aperture for the passage of the artery to the palate in a line with the front edge of the hinder grinder. Length of the skull below  $11\frac{1}{4}$  inches, of palate  $5\frac{3}{4}$  inches; width at condyle of lower jaw  $6\frac{1}{2}$  inches, of nose behind, at aperture  $2\frac{2}{3}$ , at canines  $2\frac{1}{3}$ , of nose-aperture  $1\frac{2}{3}$  inch, between orbits  $2\frac{1}{4}$  inch, at back of orbits  $3\frac{1}{2}$  inches.

I think that the skeleton which is in the British Museum, which was received from Mr. Brandt of Hamburg as that of a Bear from Norway, and named *U. norvegicus*, is the *Myrebiorn* or Ant-Bear of Worm.

I am not so sure that it is the Ant-Bear of Eastern Siberia, figured by Eversmann as *U. formicarius*, as the figure of the skull does not quite agree with the Museum specimen: the flat plane of the forehead is not carried so far back on the crown as in the skull here described. If it is not the same, the *U. formicarius* of Siberia must be, from the description, a nearly allied species of the same genus.

The figure of the skull of the young Brown Bear from Norway, figured by De Blainville (Ostéogr. t. 7), is probably a young skull of this species: it differs from the figures of the skull of the other European Bears in the same work, in the forehead not being separated

from the nose by any frontal cross line. De Blainville does not give an account of its origin, but, by mistake, says it is the same as the one figured by Cuvier (Oss. Foss. iv. t. 22); but no skull from Norway is figured in that work. It is probably the skull of the animal figured by M. F. Cuvier.



Skull of *Myrmarcos eversmanni*, from Norway.

#### 4. HELARCTOS.

Head short, subglobose. Nose short, forming with the forehead and crown an arched outline. Lips rather external, very mobile. Front claw very long, strongly arched. Fur short, rigid. Nose of skull very short, as broad as long, forming a line with the forehead. Nasal bones short. Front false grinders crowded, large. Upper hinder grinder broad, scarcely larger than the flesh-tooth; the outer upper cutting-teeth much the largest; the first false grinder large, second very small, third two-lobed.

*Hab.* Southern Asia, South America, and Europe.

*Asiatic Bears (Prochilus)* (partly), Gray, Ann. Phil. 1825.

*Helarctos*, Horsfield, Zool. Journ. ii. 221, 1825; Féruss. Bull. Sci. N. vi. 396, 1825; Isis, 1830, p. 1023.

a. *Australasian. Claws compressed, much curved.*

## 1. HELARCTOS MALAYANUS. The Bruang. B.M.

Black; nose ferruginous; chest with a semilunar or semioval yellow patch; claws very long.

*Ursus malayanus*, Raffles, Linn. Trans. xiii. 254; Horsf. Java, t. ; F. Cuvier, Mamm. Lithogr. t. ; Cuvier, Oss. Foss. iv. 322. t. 22. f. 3, 4; De Blainv. Ostéogr. Ursus, 25, t. 8 (skull), t. 12 (teeth); Fischer, Syn. Mamm. 144.

*Prochilus malayanus*, Gray, Ann. Phil. 1825, p. 61.

*Helarctos malayanus*, Horsf. Zool. Journ. ii. 221, t. 7; Gray, Cat. Mamm. B. M. 73.

*H. euryspilus*, Horsf. Zool. Journ. ii. 221, t. 7; Gray, Cat. Mamm. B. M. 73.

*Malay Bear*, Griffith, A. K. t. .

*Hab.* Malayan islands—Sumatra, Borneo, Java; Malay peninsula. Called '*Bruang*' by Malays.

Skulls.	Length of tubercular grinder.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
1140 a. <i>E. (H.) euryspilus</i> ...	0	10	8	3	5	2	4	2	5	4	6	1	10	2	7	1	3	
1140 b. Borneo (younger).....	0	9	7	6	6	3	2	4	2	0	4	0	1	6	2	3	1	0
959 a. <i>H. malayanus</i> (very old)	0	8	8	7	7	0	2	8	2	9	4	4	1	8	2	6	1	1

The skull of a very old animal, labelled *U. malayanus*, received from the Zoological Society's Museum, has a much shorter tubercular grinder than any of the others in the Museum, which are called *U. euryspilus*; but the teeth of the specimen rather differ in size, and the figure that Cuvier and De Blainville give of the skull of the specimen of *U. malayanus* which we sent to Paris by Dr. Leach, from the species that was first described, appears to be intermediate in size and form between the skulls in the British Museum. But perhaps the Bornean specimen may be found to have a rather larger tubercular grinder, which is more contracted behind than in the Javan specimens.

Skull short, swollen. Nose very short, broad; end as broad as the forehead between the orbits; nose-opening elongate, higher than broad. Orbits small, ovate. Forehead broad, convex, arched on the sides and extended far back between the temporal muscles. The palate broad, short, concave, with parallel sides, contracted behind; the opening of the hinder nostrils broad, equal, the sides about as long as the width of the front edge. The last tubercular grinder moderate, broad, as broad and rather longer than the flesh-tooth, obliquely truncated on the hinder half of the outer margin. The side cutting-teeth larger-lobed. False grinders close together, forming a crowded series: the first oblong, longer; the second small, on the outer side of the series; the third longer, three-lobed. The lower jaw

short, stout, with a rather long chin and straight lower edge. The nasals are short, and broad at the end, reaching to a line level with the middle of the orbit.

b. *European. Claws — ?*

2. HELARCTOS EURYRHINUS.

Fur dark brown.

*Ursus euryrhinus*, Nilsson, Scand. Däggdjur, 212.

*Hab.* Hungary (*Mus. Acad. Lund.*).

Professor Nilsson notices a species of Bear (which he saw in the Academical Museum at Lund, said to have come from Hungary; the fur is coloured like *U. arctos*) under the name of *U. euryrhinus* (Scand. Däggdjur, p. 212), which is thus characterized:—

“The length of the nose (reckoned from the foramen infraorbitale to the anterior margin of the intermaxillary bones at the suture) is equal to the breadth of the nose, taken either at the foramen infraorbitale or over the roots of the canine teeth.”

c. *African. Claws straight.*

3. HELARCTOS? CROWTHERI.

Fur long, shaggy, blackish brown, beneath orange-rufous; nose very short, acuminate, black; toes short; claws stout.

*Ursus arctos*, Shaw, Barbary.

*Ours en Afrique*, Cuvier, Oss. Foss. iv. 325.

*Bear of Mount Atlas*, Blyth, P. Z. S. 1841, p. 65.; Wieg. Arch. 1842, p. 27.

*Ursus crowtheri*, Schinz, Syn. Mamm. 302.

*Hab.* North-west Africa: on mountains, Morocco; Tetuan.

“Adult female, inferior in size to that of the American Black Bear; more robustly formed; the face much shorter and broader, though the muzzle is pointed; toes and claws remarkably short; the claws particularly stout. Hair black (rather, brownish black) and shaggy; the under parts of an orange-rufous colour; muzzle black. Feeds on roots, acorns, and fruit; does not climb with facility, and is stated to be very different-looking from any other Bear.”

d. *American. Front claws —.*

4. HELARCTOS ORNATUS.

B.M.

Fur black; the nose short, and a semicircle over each eye fulvous; jaws, cheeks, throat, and chest white. Length  $3\frac{1}{2}$  feet.

“Upper hinder grinder broad, not much longer than the flesh-tooth, suddenly contracted behind.”

*Bear*, Condamine, Voy. Pérou.

*Ursus ornatus*, F. Cuvier, Mamm. Lithogr. t.; Proc. Zool. Soc. 1833, p. 114; Fischer, Syn. Mamm. 143.



*Ours des Cordillères (U. ornatus)*, De Blainv. Ostéogr. Ursus, t. 4 (skeleton), t. 8 (skull), t. 12 (teeth) (of F. Cuvier's specimen).

*Hab.* South America, Cordilleras (*Cat. Mus. Zool. Soc.* ii. 184).

M. de Blainville describes the skull as being so like that of *H. malayanus* that at first he thought they were the same; but on more careful comparison, he found the bones of the nose rather broader proportionately, the mastoid processes rather unlike and nearer together, the pterygoid processes rather more rounded and recurved, the palatine edge less deeply cut in trefoil, the zygomatic arches broader and more arched, &c.

The other parts of the skeleton present more essential differences (De Blainv. Ostéogr. p. 26).

C. Honey-Bears. *Soles of the feet bald, callous; the underside of the base of the toes bald. Cutting-teeth 4/6. Nose subcylindrical, truncated; nostrils large, covered with a large upper flap. Lips very extensile. Front of the palate of the skull bent up.*

### 5. MELURUSUS.

Head elongate. Nose produced, subcylindrical, truncated. Lips very large, extensile, and mobile. Nostril large, with a larger upper lid. Forehead convex, arched. Ears tufted, exposed. Fur very long, flaccid, with a pendant cervical mane. Claws elongate.

Skull elongated. Nose longer than broad. Forehead rather convex, separated from the nose by a cross line. Palate broad, concave, flat, and bent up in front. Chin high, regularly produced below. Two central upper cutting-teeth abortive.

*Asiatic Bears (Prochilus)* (partly), Gray, Ann. Phil. 1825.

"They never have more than four incisors in the upper jaw. This is the case even in the crania which have the milk-teeth just giving way to the adult ones. They feed on the black ant, termites, beetles, fruits, and particularly the seeds of *Cassia fistula*, of the date-tree, and honey. When pursued, they carry their cubs on their backs, even when chased for nearly three miles. They are said to have lived in captivity for forty years."—*Elliot, Madr. Journ. of Literature and Science*, 1840, p. 9.

MELURUSUS LABIATUS. The Aswail.

B.M.

Fur very long, flaccid, nape maned; chest with a white cross band; ears very hairy, prominent.

*Ursus labiatus*, Desm. Mamm. 166; Fischer, Syn. Mamm. 144; Hodgson, J. A. S. B. i. 340, x. 910; P. Z. S. 1834, p. 9; Calcutta J. N. H. iv. 288; Tickell, Calc. Journ. N. H. ii. t. 7; De Blainv. Bull. Soc. Philom. 1817, p. 74; Ostéogr. Ursus, 23, t. 8 (skull), t. 11 (bones); Cuvier, Oss. Foss. iv. 320, t. 23. f. 6.

*U. longirostris*, Tiedem. Abhandl. 1820, p. 4 (not Eversmann); Reichenbach, Nov. Act. Nat. Cur. xiii. 323, t. 15.

*Bradypus ursinus*, Shaw, Zool. i. 159, t. 47.

*B. ursiformis*, Shaw, Nat. Misc. i. t. 58; Horsf. Cat. Mus. E. I. Comp. 124; Cat. Hodgson Coll. B. M. 13; Wolf, Abbild. ii. 18, t. 7.

*Melursus lybius*, Meyer; Gray, Cat. Mamm. B. M. 73.

*Prochilus ursinus*, Illiger, Prodr.

*P. labiatus*, Gray, Ann. Philos. 1825, p. 60.

*Slow Bear*, Hamilton, Mysore, ii. 197; Bewick, Quad.

*Ursiform Sloth*, Pennant, Quad. ii. 243, t. 92.

*Petre Bear*, Canton, Figures of Animals, t.

*Ours Jongleur*, F. Cuv. Mamm. Lithog. t.; Cuvier, Oss. Foss. iv. 320, t. 23. f. 6; Delam  therie, Journ. de Phys. 1792, t. 136. f. 1.

*Hab.* India, plains (*Sykes*); Southern Mahratta country (*Elliot*); Nepaul (*Hodgson*); Benares (*Pennant*); Dukhun.

	Length of upper tubercular.	Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
		in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
220 <i>h.</i> .....	0 8 $\frac{1}{2}$	11	6	7	3	2	6	2	6	6	4 $\frac{1}{2}$	2	5	3	6	1	8
220 <i>b.</i> .....	lost.	12	0	7	3	2	6	2	6	6	2	2	3	6	1	7	
220 <i>l.</i> Very old .	0 10	12	6	8	3	2	9	1	3	0	6	9	2	5	4	0	1
220 <i>c.</i> .....	lost.	12	0	7	10	2	8	2	9	1	6	6	2	4	3	8	10
220 <i>f.</i> .....	{ 0 9 r. 0 10 $\frac{1}{2}$ l. }	12	0	7	7	2	9	2	10	1	6	8	2	6	3	9	1
220 <i>c.</i> .....	0 10	11	0	7	3 $\frac{3}{4}$	2	6	2	7	6	3						
220 <i>d.</i> .....	0 9	11	0	6	10	2	6	1	2	6	3						
220 <i>k.</i> .....	0 8 $\frac{3}{4}$	12	0	7	0	2	9	3	2	7	6	7					

Skull:—Nose broad, rather flattened above, rather wider than the forehead between the orbits; nasal opening broader than high. Forehead rounded, regularly sloping down before and behind. Orbits oblong-ovate. The chin very long, sloping; the lower edge of lower jaw straight. The upper cutting-teeth four; the inner ones absorbed; the outer on each side larger. The last upper grinder oblong, almost as long as and narrower than the upper flesh-tooth. The palate broad, concave, bent up in front of the canine, broader behind, especially in the line of the hinder grinder, rather contracted behind towards the hinder aperture of the nostrils. The nose-aperture broad, with a thin transverse edge; the sides not quite as long as the width of the aperture. The zygomatic arches most prominent at the hinder end, rather in front of a line with the condyles.

*b.* Tail elongate, hairy, black-ringed. Body moderate. Limbs moderate. Teeth 40.

*Procyonina*, Gray, Cat. Mamm. B. M. 74.

## Tribe 2. NASUINA.

*Nose elongated, produced, truncated; the underside rounded, rather bald, without any central longitudinal groove*

## 6. NASUA.

*Nasua*, Storr.

*Coati*, Lacépède.

Head elongate, tapering. Nose elongate, produced; underside rounded, without any groove. Nostrils in front of the muffle, and reaching only halfway along its sides; upper surface of muffle twice as long as broad, and ending forwards in a cartilaginous snout (*Baird*). Ears short, rounded. Toes 5/5. Claws strong, acute. Tail elongate.

Skull elongate. Nose produced, compressed. Teeth 40. Cutting-teeth moderate; outer ones elongate, conical; four central upper in an arched line, rather in front of the lateral teeth; lower shelving out in front. Canines large; the lower strong, sharp-edged behind; the upper compressed, conical, and bent out at the ends. Grinders  $\frac{6-6}{6-6}$ ; the three front conical, compressed; the fourth like the flesh-tooth. The tubercular triangular, similar to the flesh-tooth. Lower jaw without any prominent angle behind.

## 1. NASUA RUFA.

B.M.

Fur fulvous; back darker; sides of nose and head ashy; tail fulvous and black-ringed.

*Viverra nasua*, Linn. S. N. i. 64; Schreb. Säugeth. t. 118.

*Ursus nasua*, Cuvier, Tab. Elém. 113, 1798.

*Nasua rufa*, Desm. Mamm. 170; Gray, Cat. Mamm. B. M. 74.

*N. socialis*, var., Pr. Max. Beitr. ii. 283.

*N. socialis* or *N. rufa*, Fischer, Syn. Mamm. 148.

*Coatimonde*, Perr. Anim. ii. 15, t. 37; Shaw, Zool. i. 385.

*Coati noirâtre*, Buffon, H. N.

*Coati roux*, Cuvier, Règ. An. i. 144; F. Cuvier, Mamm. Lithogr. t.

*Brazilian Weezel*, Penn. Syn. 229, t. 22. f. 1.

*Coati*, Marcgr. Brazil, 228.

*Myrmecophaga annulata*, Desm. Mamm., from Krusenstern's Voy. t.; Griffith, A. K. t. (figure altered).

*M. striata*, Shaw, Zool. i. 51, 1786.

*Tamandua* —, Buffon, H. N. Supp. iii. t. 56.

Mr. Turner (P. Z. S. 1851, p. 218) professes to have rediscovered the fact (though it is stated in the 'Catalogue of the Mammalia in the British Museum,' p. 74, 1843) that Krusenstern's *M. annulata* in only a *Coatimondi*; but he is puzzled to explain the figure in Griffith's 'Animal Kingdom.' This figure is engraved from a drawing of Major Hamilton Smith's, no doubt copied from Krusenstern's figure, but altered and improved, as was his habit when making his very large collection of drawings—a bad habit, that has rendered them of comparatively small value for scientific purposes, as it is impossible to determine whether they are from a figure or a specimen.

## 2. NASUA NARICA.

B.M.

Fur blackish brown, beneath yellowish; head ashy; tail black and yellow, obscurely ringed. The sides of the nose are sometimes marked with a black and white streak.

*Viverra narica*, Linn. S. N. i. 64; Schreb. Säuegeth. t. 119.

*Ursus narica*, Cuvier, Tab. Elém. 113, 1798.

*Viverra quasie*, Gmelin, S. N. i. 87.

*Nasua quasie*, Geoff. Mus. Paris.

*N. leucorypha*, Tschudi, Arch. für Naturg.

? *N. nocturna*, Pr. Max. Beitr. ii. 298.

*N. obfusca*, Illiger, Prodr.

*N. mondie*, Illiger, Prodr.

*N. fusca*, Desm. Mamm. 170; P. Z. S. 1859, p. 435; 1860, p. 243, 333.

? *N. solitaria*, Pr. Max. Beitr. ii. 299.

*N. socialis fusca*, Fischer, Syn. Mamm. 149.

*N. narica*, Gray, Cat. Mamm. B. M. 74.

*Coati brun*, Cuvier, Règne Anim. i. 444; F. Cuvier, Mamm. Lithogr. t.; Buffon, H. N. viii. t. 48, 49.

*Dusky Brazilian Weesel*, Penn. Syn. 330.

*Coati*, Azara, Essai, i. 334.

*Meles surinamensis*, Brisson, Règne Anim. 255.

*Narica*, Linn. Act. Holm. 1768, p. 152, t.

*Le Coati noirâtre*, Buffon, H. N. viii. t. 47.

*Hab.* Surinam (*J. H. Lance*).

I have examined with care a series of skulls which are said to have belonged to these two species, but have been unable to discover any characters by which the skulls belonging to one species can be distinguished from those belonging to the other. The skulls of animals of each species vary considerably in the breadth and flatness or convexity of the palate, in the form of the palate behind near the hinder nasal aperture, and in the length of the line occupied by the upper canines and grinders.

In most of the specimens of *N. rufa* and *N. narica* the upper canine teeth and the grinders occupy a line of  $1\frac{5}{6}$  inch; but in two large skulls, with very strong occipital ridges and expanded zygomatic arches, the teeth occupy a line rather more than 2 inches long; in another large skull, with the occipital ridge less developed, and the zygomatic arches less prominent, they occupy the same length: the skulls are each 5 inches long; and one is  $3\frac{1}{2}$ , the other  $3\frac{1}{4}$ , and the last 3 inches wide. But I can find no other characters to separate them, nor can I find any young specimens having similar characters.

If I had only two or three skulls, I might have perhaps seen differences which I might have regarded as distinctions; but when a series of some twenty or more are examined, it is impossible to define any distinction.

Skulls.	Length of skull.		Width of skull.		Length of nose.		Width of nose.		Length of palate.		Width of palate.		Length of tooth-line.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
<i>N. narica.</i> 225 <i>g.</i> Aged .....	5	1	3	4	1	10	1	0	3	3	0	11	2	0
225 <i>h.</i> Aged .....	5	0	3	5	1	11 $\frac{1}{2}$	1	0 $\frac{1}{2}$	3	3	0	11	2	0 $\frac{1}{2}$
225 <i>a.</i> Aged .....	5	0	3	0	1	11 $\frac{1}{2}$	0	11	3	2 $\frac{1}{2}$	0	9	2	1
225 <i>h.</i> Adult .....	4	9	2	9	1	9	1	0	3	0	0	10	1	10
225 <i>j.</i> .....	4	9	2	8	1	8	1	0	3	1	0	9	1	9 $\frac{1}{2}$
225 <i>f.</i> Skull B.M. ...	4	6	2	5	1	8	0	11	2	11 $\frac{1}{2}$	0	9	1	9
<i>N. rufa</i> ... 224 <i>a.</i> Adult .....	4	8?	2	6	1	7	0	11	3	0	0	9 $\frac{1}{2}$	1	10
224 <i>b.</i> .....	4	6	2	7	1	7 $\frac{1}{2}$	1	0	2	11	0	11	1	9 $\frac{1}{2}$
224 <i>c.</i> .....	8	8	2	6	1	8	0	9 $\frac{1}{2}$	3	0	0	8 $\frac{1}{2}$	1	10

3. *NASUA OLIVACEA.*

B.M.

Olive-brown, grizzled; hairs black-brown, with a yellowish sub-terminal ring; under fur black; face pale; orbits, legs, and feet blackish brown; chest yellowish grey; tail short, with black rings and a black tip.

*Nasua olivacea*, Gray, Cat. Mam. B. M. App. 195 (not described).  
*Hab.* Santa Fé de Bogota.

I do not know

1. *Nasua solitaria*, Pr. Max. Beitr. ii. 292.
  2. *N. nocturna*, Pr. Max. Beitr. ii. 292, from Brazil.
  3. *N. monticola*, Tschudi, Fauna Peruana, 102, t. 5, from Peru.
- Are they distinct?

## Tribe 3. PROCYONINA.

*Nose short; underside flat, with a central longitudinal groove.*

## 7. PROCYON.

*Procyon*, Storr; G. Cuvier, 1798; De Blainv. Ostéogr. Subursus, t. 3.

*Lotor*, Tiedem.

Head broad, depressed. Ears small, ovate. Muzzle short, conical. Muffle large; under surface covered with hair, without any central groove. Nostril subhorizontal, on hinder edge of muffle. Body stout. Tail moderately long, black-ringed. Toes 5/5, front toe elongate. Soles bald, furrowed, but without pads. Claws falcate. Skull short; orbit incomplete, contracted above and below only. Teeth 40; canines sharp-edged; premolars 4/4, 4/4, three front small, conical; hinder set broad, like flesh-teeth; flesh-teeth 1/1, upper oblong, transverse; molars 1/1, 1/1, upper ovate, transverse.

"Prefers the vicinity of running water, where bushes are thick, or hollow trees, in which it makes its bed; when pursued, it takes immediately to the water, swimming with great rapidity and ease. The flesh is highly esteemed by the Mexicans (who call it *Tejou*) as an article of food. It throws itself on its back in a state of defence,

showing its teeth in a threatening manner ; but I never heard it utter any cry."—*C. B. Kennerly*.

\* *Tail bushy, four or five rings ; forehead of skull high, convex ; brain-case moderate ; palate much produced and narrow behind ; grinders moderate.* *Procyon*.

1. *PROCYON LOTOR.* Raccoon.

B.M.

Tail reddish, with four or five black rings. Fur ashy, more or less black-washed ; lower side, ears, and feet whitish ; oblique streak under the eye blackish ; face whitish, with a narrow streak across the forehead before the eyes, becoming broader on the cheeks ; outer side of the limbs and feet palish.

*Ursus lotor*, Linn. S. N. i. 70, 1766 ; Schreb. Säugeth. t. 143 ; De Blainv. Ostéogr. Subursi, t. 3 (skeleton).

*Raccoon*, Lawson, Carolina, 121, fig. ; Penn. Syn. 199 ; Shaw, Zool. i. 464.

*Raton*, Buffon, H. N. vii. 337, t. 43 ; Supp. iii. 215.

*Procyon lotor*, Storr, Prod. 1780 ; Desm. Mamm. 168 ; Fischer, Syn. Mamm. 147 ; Gray, Cat. Mamm. B. M. 74.

*Meles lotor*, Bodd. Elenchus. Anim. i. 80, 1784.

*Lotor vulgaris*, Tiedem. Zool. i. 380.

*Procyon gularis*, H. Smith, Jard. Cab. Lib. xiii. 222, 1842.

*P. brachyurus*, Wieg. Arch. iii. 369 ; Schreb. Suppl. t. 143 C.

*P. obscurus*, Wieg. Arch. iii. 370 ; Schreb. Suppl. t. 142 D.

*Var. melanus* ; nearly black.

*Var. albina*.

*Meles alba*, Brisson, Règne An. i. 255.

*Ursus meles alba*, Erxl. Syst. 164.

*Procyon nivea*, Gray, Mag. Nat. Hist. i. 580, 1837.

*Hab.* America : Mexico (*Capt. Lyon*).

General colour greyish white ; the tips of the long hairs black, imparting this colour to the back ; under fur black-brown ; a large oblique black patch on the cheek, continuous with a paler one beneath the jaw ; another behind the ears ; end of the muzzle, except the upper line, together with the portion on the border of the cheek-patch, whitish ; tail not tapering, with tip and four annules black, these as broad as the rusty-white interspaces : hind feet not exceeding 4 inches, above dirty whitish ; fore feet not exceeding  $2\frac{1}{2}$  inches. Varies in being nearly black, with the markings obscured ; sometimes more or less yellowish or white, with obsolete markings or none—a decided tendency to albinism (*Baird, l. c.* 201).

*Var. 1.* Feet black, rather large.

*Procyon hernandesii*, Wagner, Isis, xxix. 514, 1833 ; Wieg. Arch. iii. 367 ; Baird, Mamm. N. Amer. 215.

*Hab.* Mexico.

*Var. 2.* *Procyon hernandesii*, var. *mexicana*, Baird, Mamm. N. A. 215.

Var. 3. Yellowish; cheek-patch small.

*Procyon psora*, Gray, Ann. & Mag. N. H. 1842, p. 261; Voy. Sulphur, pl. 9 & 17; Cat. Mamm. B. M. 38; Baird, Mamm. N. A. 215; Wieg. Arch. 1848, p. 2.

*Raccoon*, Cook's Voyage?; Richardson, Beechey's Voy. 4, no. 10.

*Talyocoyth*, Hernand. Mex. 12, no. 37?

Hab. Sacramento. Called "Psora."

This species varies rather in the tint of its colours in the different parts of North America. It is very apt to become white, and is the *Procyon nivea* (Gray, Mag. N. Hist. 1837, p. 580) from Texas. Wagler, in 1831, described the Mexican variety, which sometimes has black feet, as *P. hernandesii* (Isis, xxix. 514); I described a specimen from California, with the tail injured, as *P. psora* (Ann. & Mag. N. H. 1842); and Wiegmann described two other varieties under the names of *P. brachyurus* and *P. obscurus* (Arch. iii. 369). Dr. Baird, in the 'Mammals of North America,' considers *P. hernandesii* as a species, and calls it the black-footed *Procyon*, including *P. psora*, which has feet as pale or paler than *P. lotor*.

The skulls vary considerably in the width and concavity of the palate; in some the width is half the length to the end of the tooth-line, in others less than half the length. In general there is only a single large suborbital perforation; but in specimen *d* there are two small well-separated pores.

Skulls.	Length of skull.		Length of palate.		Length of lower jaw.		Width of skull.		Width of palate.		Width of nose.		Length of nose.		Width of brain-case.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
<i>P. lotor.</i> 222 <i>b.</i> .....	4	6½	2	9	3	4½	3	21	0	1	3½	1	6	2	1½	
222 <i>d.</i> .....	4	0	2	5	2	11	2	9	0	10	1	1	3	1	9	
222 <i>e.</i> .....	4	0	2	4½	2	11	2	9	0	9	1	0	1	2½	1	9½
222 <i>l.</i> Injured } (young) }	4	0	2	6	3	0	2	2	0	9	1	1½	1	4	1	9
<i>P. psora.</i> 223. Adult.....	4	7	2	10	3	5	3	3	0	11	1	3	1	6	2	1½

\*\* Tail slender, eight- or nine-ringed. Forehead of skull flat, in a line with the nose; brain-case swollen; palate only shortly produced, and broad behind; grinders large. Euprocyon.

## 2. PROCYON CANCRIVORA.

B.M.

Tail reddish, with eight or nine black rings. Fur ashy, blackish-washed; feet brownish, beneath whitish; face with a large black patch, extended on to the cheeks, and one side of the limbs black.

*Ursus cancrivorus*, Cuv. Tabl. Elém. 113, 1798.

*Procyon cancrivorus*, Illiger, Prod.; Fischer, Syn. Mamm.; Gray, Cat. Mamm. B. M. 74; De Blainv. Ostéogr. Subursi, t. 5 (skull); P. Z. S. 1859, p. 432.

*Raton crabier*, Buffon, H. N. Supp. vi. 236, t. 32.

Hab. South America: Demerara (*Mus. Z. S.*); Paraguay; Brazil.

Skull with one very large suborbital foramen. The palate concave. The grinders are longer, and occupy a longer line than they do in *P. lotor* and its varieties.

Skull.	Length of skull.	Length of palate.	Length of lower jaw.	Width of skull.	Width of palate.	Width of nose.	Length of nose.	Width of brain-case.
837 a. Adult; imperfect behind .....	in. 1. 4 9?	in. 1. 2 8	in. 1. 3 7	in. 1. 3 3½	in. 1. 0 10½	in. 1. 1 1	in. 1. 4½	in. 1. 2 2½

## Section II. DENDROPODA,

or Cat-footed Bears. *The feet moderate; toes short, webbed, covered with hair, arched; last joint bent up; claws compressed, short, acute, retractile. Head rounder.*

*Dendropoda*, Gray, P. Z. S. 1864, p. 506.

These animals climb trees, and defend themselves with all their four feet, lying on their backs.

### Tribe 4. CERCOLEPTINA.

*Tail elongate, subcylindrical, covered with shortish hairs, prehensile. Soles of the feet bald.*

*Cercoleptina*, Gray, Cat. Mamm. B. M.

### 8. CERCOLEPTES.

*Cercoleptes*, Illiger.  
*Kinkajou*, Lacépède.  
*Potos*, Cuvier.  
*Caudivolvulus*, Desm.

Head rounded. Nose short, acuminate. Ears oblong. Toes 5/5; soles naked. Claws short, sharp. Tail elongate, hairy, prehensile. Teats two, ventral.

Skull ovate. Nose short, shelving. Forehead arched. Teeth:—cutting 6/6, regular, lower rather shelving out; canines grooved; grinders 5/5, 5/3, two front conical, third like flesh-tooth; tubercular ovate, flat. The lower jaw thick, with a well-developed inferior angle. Brain ovate; case ventricose. Orbit incomplete; suborbital foramen large, single. Chin long, well marked.

Professor Owen has published some notes on the anatomy (see P. Z. S. 1835, p. 119).

### CERCOLEPTES CAUDIVOLVULUS.

B.M.

Fulvous.

*Viverra caudivolvulus*, Pallas, in Schreb. Säugeth. 453, t. 125 B.

*Ursus caudivolvulus*, Cuv. Tab. Elém. 113, 1798.

*Potos caudivolvulus*, Geoff. Mus. Paris; Desm. Mamm. 171.

*Caudivolvulus flavus*, Tiedem. Zool. i. 381.



*Cercoleptes megalotus*, Martin, P. Z. S. 1836, p. 83; Schinz, S. M. 311.

*C. brachyotus*, Martin, P. Z. S. 1836, p. 83; Schinz, S. M. 311.

*C. caudivolvulus*, Illiger, Prod. 127; Fischer, Syn. Mamm. 150; Gray, Cat. Mamm. B. M. 75; P. Z. S. 1848, p. 76.

*Lemur flavus*, Schreb. Säugeth. 145, t. 42 (fig. Penn.); De Blainv. Ostéogr. Subursi, t. 5 (skeleton), t. 7 (skull).

? *Lemur bicolor*, Penn.; Miller, Cim. Phys. t. (badly coloured).

*Yellow Maucacoco*, Penn. Syn. 138, t. 16. f. 2.

*Potto*, Vosmaer, Descrip. Amsterd. 1771, t.

*Poto*, Buffon, H. N., ed. Allam, Suppl. iv. 160, t. 66; Cuvier, Règne Anim. i. 144.

*Kinkajou*, Buffon, H. N. Suppl. iii. 245, t. 50, 51.

*Prehensile Weesel*, Shaw, Zool. i. 403.

The two species described by Mr. Martin only depended on the artifice of the preserver.

Skull, length  $3\frac{1}{2}$  inch; breadth 2 inches, of brain-base  $1\frac{7}{8}$  inch; length of palate  $1\frac{1}{2}$  inch; breadth of nose  $\frac{1}{2}$  inch, of palate  $8\frac{1}{2}$  lines; length of tooth-line 1 inch, of lower jaw 2 inches.

#### Tribe 5. AILURINA.

*Tail not longer than the body, subcylindrical, covered with long bushy hairs, not prehensile; soles of the feet covered with hair.*

*Ailurina*, Gray, Cat. Mamm. B. M.

#### 9. AILURUS.

*Ailurus*, F. Cuvier, Mamm. Lithogr.; Hodgson, Journ. Asiat. Soc. Bengal.

Head roundish, very hairy; nose acute, short; ears short, rounded, hairy; feet short; toes  $5/5$ ; claws acute; tail elongate, tufted.

Skull ovate; nose short; zygoma much spread out. Teeth 36; grinders squarish, many-tubercled. Lower jaw arched, rounded, very large.

Lives on trees, but breeds in holes of rocks, living in pairs or small families; feeds on fruit, roots, eggs, young birds and animals. Claws completely retractile, half sheathed.

"I can only report the frugivorous habits, gentle disposition, ursine arm, feline paw, profoundly cross-hinged yet grinding jaw, and purely triturative and almost ruminant molar of *Ailurus*; anus, perineum, and prepuce entirely free from glands or pores; scrotum none; tongue smooth; pupil round; feet enveloped in woolly socks, with leporine completeness."—Hodgson.

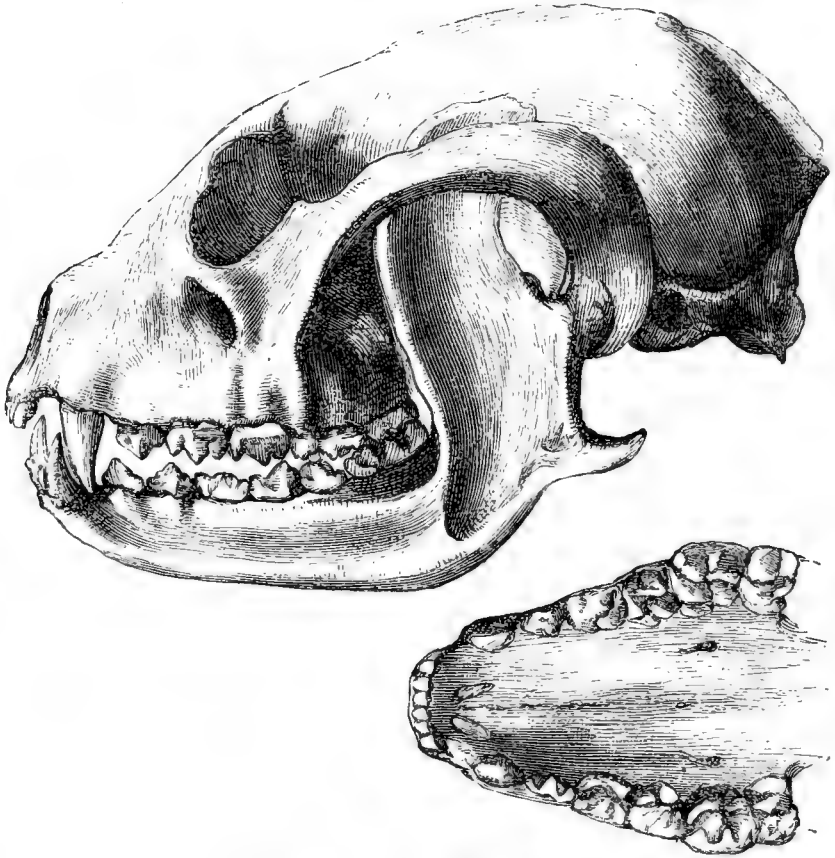
#### AILURUS FULGENS.

B.M.

*Ailurus fulgens*, F. Cuv. Mamm. Lithogr. t.; Hardw. Linn. Trans. xv. 161; Fischer, Syn. Mamm. 157; Gray, Cat. Mamm. B. M. 74; De Blainv. Ostéogr. Subursus, t. 7 (skull imperfect).

*A. ochraceus*, Hodgson, Journ. As. Soc. Bengal, t. 52, 53 (skull).  
*Hab.* India, Nepal (called "Wah") (Hodgson).

In the paper above referred to, Mr. Hodgson gives an interesting account of the habits and affinities of the Wah. It walks like the Marten, climbs, and fights with all the four legs at once, like the *Paradoxuri*, and does not employ its fore feet, like the Raccoon, Coatis, or Bears, in eating.



Skull of *Ailurus fulgens*.

Skull ovate; forehead arched; nose short; brain-case ovate, ventricose; the zygomatic arches very large, expanded; crown bent down behind. The palate concave in front between the canine teeth, bent up behind in a line with the tubercular teeth, and suddenly contracted behind them; the hinder opening of the nostrils triangular, narrow in front. Lower jaw very strong, lower edge arched; the ramus very large, elongated, extended far above the zygomatic arch, and bent forwards and then backwards at the tip. Teeth 36; cutting teeth 6/6, regular, the upper lateral larger; canines 1/1, 1/1, upper straight, grooved, lower curved; grinders  $\frac{5-5}{5-5}$ , the first upper conical, triangular; second and third and the tubercular grinders like the flesh-tooth, squarish, with many conical processes, but smaller;





J Wolf. del, et, lith.

M & N. Hanhart imp

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the lower grinders similar, but longer and narrower ; the condyles of the lower jaw very large, transverse.

Skulls.	Length of skull.		Breadth of skull.		Length of nose.		Breadth of nose.		Length of palate.		Breadth of palate.		Length of tooth-line.		Width of brain-case.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
226 g. Darjeeling (adult) .....	4	1	3	0	1	3	1	3	2	2	0	9	1	9	1	10
226 d. ....	3	10	2	5	1	3	1	1	2	0	0	8	1	9	1	9
226 h. ....	4	0	3	1	1	4	1	2	2	1	0	9	1	9	1	9

7. NOTE ON THE QUADRUMANA LIVING IN THE SOCIETY'S MENAGERIE. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plates XL., XLI.)

Our collection of living *Quadrumana*, which has been now for some months arranged in the New Monkey-House, although not yet very rich in species, has amongst its members several forms of much interest, concerning which I have a few notes to communicate to the Society.

The following is a systematic list of the collection as it now stands:—

Fam. SIMIDÆ.

Chimpanzee .....	<i>Troglodytes niger</i> , Geoff.
Orang-Utan .....	<i>Simia satyrus</i> , Linn.
Entellus Monkey .....	<i>Semnopithecus entellus</i> (Linn.).
Purple-faced Monkey .....	— <i>cephalopterus</i> (Zimm.).
Green Monkey .....	<i>Cercopithecus callithrix</i> , Is. Geoff.
Grivet Monkey .....	— <i>griseo-viridis</i> , Desm.
Vervet Monkey .....	— <i>lalandii</i> , I. Geoff.
Diana Monkey .....	— <i>diana</i> (Linn.).
Sykes's Monkey .....	<i>Cercopithecus albigularis</i> , Sykes.
Mona Monkey .....	— <i>mona</i> , Erxl.
Mangabey Monkey .....	<i>Cercocebus aethiops</i> (Kuhl).
Lunulated Monkey .....	— <i>lunulatus</i> , Kuhl.
Bonnet Monkey .....	<i>Macacus radiatus</i> (Shaw).
Toque Monkey .....	— <i>pileatus</i> (Shaw).
Macaque Monkey .....	— <i>cynomolgus</i> (Linn.).
Rhesus Monkey .....	— <i>erythræus</i> (Schreb.).
Japanese Monkey .....	— <i>speciosus</i> , F. Cuv.
Round-faced Monkey .....	— <i>cyclopis</i> , Swinhoe.
Pig-tailed Monkey .....	— <i>nemestrinus</i> (Geoffr.).
Wanderoo Monkey .....	<i>Silenus veter</i> (Linn.).
Anubis Baboon .....	<i>Cynocephalus anubis</i> , F. Cuv.

## Fam. CEBIDÆ.

Chuva Spider Monkey . . . . .	<i>Ateles marginatus</i> , Geoff.
Black-fronted Spider Monkey..	— <i>frontatus</i> , Gray.
Marimonda Spider Monkey ..	— <i>belzebuth</i> (Briss.).
Brown Capuchin Monkey . . . .	<i>Cebus apella</i> (Linn.).
White-throated Sapajou . . . . .	— <i>hypoleucus</i> , Geoff.
Negro Tamarind Monkey . . . .	<i>Hapale ursulus</i> , Geoff.
Pinche Monkey . . . . .	— <i>œdipus</i> (Linn.).
Black-eared Marmoset . . . . .	— <i>penicillata</i> , Geoff.
Squirrel Monkey . . . . .	<i>Callithrix sciureus</i> (Linn.).
Feline Douroucouli . . . . .	<i>Nyctipithecus felinus</i> , Spix.

## Fam. LEMURIDÆ.

Ring-tailed Lemur . . . . .	<i>Lemur catta</i> , Linn.
Ruffed Lemur . . . . .	— <i>varius</i> , Geoff.
Black Lemur . . . . .	— <i>niger</i> , Geoff.
Black-fronted Lemur . . . . .	— <i>nigrifrons</i> , Geoff.
White-fronted Lemur . . . . .	— <i>albifrons</i> , Geoff.
Yellow-cheeked Lemur . . . . .	— <i>xanthomystax</i> , Gray.
White-whiskered Lemur . . . . .	— <i>leucomystax</i> , Bartl.
Grand Galago . . . . .	<i>Galago crassicaudata</i> (Geoffr.).
Garnett's Galago . . . . .	— <i>garnettii</i> (Ogilby).
Slow Lemur . . . . .	<i>Nycticebus tardigradus</i> (Linn.).

## Fam. CHIROMYIDÆ.

The Aye-aye . . . . .	<i>Chiromys madagascariensis</i> , Cuv.
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I add a few notes upon some of the rarer species of the collection:—

## 1. MACACUS SPECIOSUS.

*Inuus* (*Macacus*) *speciosus*, Temm. F. J. Mamm. pls. 1, 2, p. 9.

Of this rare Monkey we have a fine young male specimen, purchased from a dealer in Liverpool in June last, said to have come from "Brazil"! I am not aware that it has been previously brought to England alive, although there was a specimen in the Gardens at Rotterdam some time since.

## 2. MACACUS CYCLOPIS, Swinhoe, P. Z. S. 1862, p. 350, pl. XLII.

The pair of this species presented by Mr. Swinhoe in 1862 are still in good health in the Society's Menagerie. Since they have attained maturity, the female has acquired a most extraordinary development of the parts surrounding the organs of generation—far exceeding anything I have ever noticed in the Rhesus Monkey—of which the accompanying sketch (see p. 711) will give some idea.

An accurate examination of this species has still to be made, Mr. Swinhoe's notes having been taken from the living animal; but I have little doubt that when narrowly compared with *M. rhesus* good points of distinction will present themselves.





### 3. GALAGO GARNETTII. (Pl. XL.)

*Otolicnus garnettii*, Ogilby, P. Z. S. 1838, p. 6.

*Otogale garnettii*, Gray, P. Z. S. 1863, p. 140.

Of this little-known *Lemur* we have a specimen purchased of a dealer in November last. Mr. Ogilby's original description of the species (*l. c.*) is so short as to be hardly recognizable; but Dr. Gray has given further characters, and a figure of the skull (*l. c.*). Mr. Wolf's figure (Pl. XL.), taken from the living animal, may serve to make the species still better known.

Temminck (*Esquisses Zoologiques du Côte de Guinée*, p. 40) has united this species to *Galago allenii*, Waterhouse. This, I need hardly say to those who have had an opportunity of comparing these two species together, as they were placed, a short time since, side by side in our collection, is an error, the greater size of the present species being alone sufficient distinction, and the *Galago allenii* belonging to a separate section of the genus\*. The nearest ally to *Galago garnettii* is in fact the next species (*G. crassicaudata*).

### 4. GALAGO CRASSICAUDATA, Geoffr.

We have a *Lemur*, presented to us by Dr. Waghorn in July last, which I refer to this species as described by Dr. Peters (*Zool. Reise n. Mossambique*, p. 5). It is at the same time so very like the specimen from Angola, received from Mr. Monteiro, upon which Mr.

\* See Mr. Mivart's paper, *antèa*, p. 611.

Bartlett founded his *Galago monteiri*\*, that I cannot help believing that the latter may turn out to be nothing more than a pale variety of *Galago crassicaudata*. Dr. Waghorn's specimen is from the Zambesi, where this species is stated by Dr. Kirk to be common †.

I may take this opportunity of exhibiting a drawing (Pl. XLI.) of a small species of American Monkey which we received alive in March last, along with other animals, from Para. It is obviously nearly allied to the Jew-Monkey (of the dealers), *Pithecia satanas* (Hoffm.), and agrees as nearly as may be with a specimen in the British Museum labelled as the young of that species; and such I believe it to be, as the skull, on the decease of the animal, proved to be that of a young individual, although I was not very clear on this point whilst it was alive.

\* *Galago monteiri*, Bartlett, P. Z. S. 1863, p. 231, pl. xxviii.; *Callotus monteiri*, Gray, P. Z. S. 1863, p. 145.

† See *anteà*, p. 650.

## APPENDIX.

LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE  
DURING THE YEAR

1864.

- Jan. 1. 1 pair of Passerine Doves. *Chamæpelia passerina* (Linn.). Presented by T. Goin, Esq.
2. 2 Ceram Lories. *Lorius garrulus* (Linn.). Purchased.
4. 1 Bonnet Monkey. *Macacus radiatus* (Shaw). Presented by Fred. G. Rubie, Esq.
- 1 Tayra. *Galera barbara* (Linn.). Presented by Dr. Wucherer, of Bahia, C.M.Z.S.
- 1 Kinkajou. *Cercopithecus caudivolvulus* (Pall.). Presented by Dr. Wucherer, of Bahia, C.M.Z.S.
- 2 Fasciated Finches. *Amadina fasciata* (Gmel.). Purchased.
5. 1 Brown Coati. *Nasua fusca*, Desm. Presented by W. T. Rigg, Esq.
6. 1 Male Viscacha. *Lagostomus trichodactylus*, Brookes. Presented by Messrs. Werner and Co., of Buenos Ayres.
7. 1 ♀ Impeyan Pheasant. *Lophophorus impeyanus* (Lath.). Purchased.
11. 1 ♂ Axis Deer. *Cervus axis*, Erxl. Born.
- 1 Little Grebe. *Podiceps minor* (Gmel.). Presented by Henry Hall, Esq.
13. 1 Common Kestrel. *Tinnunculus alaudarius*, Briss. Presented by N. L. Austin, Esq.
14. 1 Common Trumpeter. *Psophia crepitans*, Linn. Purchased.
19. 1 Javan Cat. *Felis javanensis*, Horsf. Presented by John Fleming, Esq.
- 1 Ruffed Lemur. *Lemur varius*, Geoff. Presented by John Fleming, Esq.
- 1 pair of Ground Squirrels. *Xerus* — ? Purchased.
- 1 Marsh Ichneumon. *Herpestes paludosus*, Cuv. Purchased.
20. 2 ♀ Ring-ousels. *Turdus torquatus*, Linn. Presented by — Day, Esq.
22. 3 Rose-hill Parrakeets. *Platycercus eximius* (Shaw). Deposited.
26. 1 Undulated Grass Parrakeet. *Melopsittacus undulatus* (Shaw) Presented by Charles Dyke, Esq.
28. 2 Jerboas. *Dipus ægyptius* (Hasselq.). Presented by H. G. Hopkins, Esq.

- Feb. 1. 1 Pinche Monkey. *Hapale ædipus* (Linn.). Purchased.  
 2. 1 Gazelle. *Gazella dorcas* (Linn.). Presented by H. Stracker, Esq.  
 3. 1 Lesser Sulphur-crested Cockatoo. *Cacatua sulphurea* (Gmel.). Presented by Mrs. King.  
 7. A collection of Barnacles. Presented by Sir W. C. Trevelyan, Bart., F.Z.S.  
 8. 2000 Trout-Ova. *Salmo fario*, Linn. Presented by Samuel Gurney, Esq., M.P., F.Z.S.  
 1 Spix's Cavy. *Cavia spixii*, Wagl. Purchased.  
 1 Azara's Fox. *Canis azaræ*, Pr. Max. Purchased.  
 8 Common Boas. *Boa constrictor*, Linn. Purchased.  
 1 Anaconda. *Eunectes murinus* (Linn.). Purchased.  
 1 ♀ Hybrid Markhor. Between ♂ *Capra megaceros*, Hutt., and ♀ *Capra hircus*, Linn., var. Purchased.  
 11. 1 ♂ Brahmin Calf. *Bos indicus*, Linn., var. Born.  
 2 Smelts. *Osmerus eperlanus* (Linn.). Presented by A. Arce-deckne, Esq., F.Z.S.  
 14. 1 Berigora Hawk. *Hieracidea berigora*, Vig. & Horsf. Purchased.  
 15. 1 Salmon. *Salmo salar*, Linn. Presented by F. T. Buckland, Esq., F.Z.S.  
 18. 1 Yellow Baboon. *Cynocephalus papioides*, Gray. Purchased.  
 20. 1 Black-faced Kangaroo. *Macropus melanops*, Gould.  
 1 Emu. *Dromæus novæ-hollandiæ*, Vieill.  
 2 Grey-headed Sparrows. *Pyrgita simplex* (Licht.). Purchased.  
 2 Crimson-crowned Weaver-Birds. *Euplectes flammiceps*, Sw. Purchased.  
 21. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Born.  
 22. 2 pairs of Common Trout. *Salmo fario*, Linn. Presented by Samuel Gurney, Esq., M.P., F.Z.S.  
 23. 1 pair of Guinea-fowl (White variety). *Numida meleagris*, Linn., var. Presented by Lieut. L. C. Keppell, R.N.  
 3 Barred Doves. *Geopelia striata* (Linn.). Presented by Arthur Dixon, Esq.  
 24. 2 Guinea Baboons. *Cynocephalus papio*, Desm. Received in exchange.  
 1 Green Macaw. *Ara militaris* (Linn.). Purchased.  
 2 Vinaceous Turtledoves. *Turtur vinaceus* (Gmel.). On approval.  
 25. 1 Mona Monkey. *Cercopithecus mona*, Exl. Presented by Charles Richards, Esq.  
 2 Barbary Turtledoves. *Turtur risorius* (Linn.). Presented by Lieut. John J. Rutherford, 21st Fusileers.  
 1 St. Lucia Dove. Presented by Lieut. John J. Rutherford, 21st Fusileers.  
 1 ♂ Scemmering's Pheasant. *Phasianus scemmeringii*, Temm. Deposited.  
 26. 2 Prairie Marmots. *Arctomys ludovicianus*, Ord. Born.  
 27. 1 Grivet Monkey. *Cercopithecus griseo-viridis*, Desm. Purchased.  
 1 ♂ Gold Pheasant. *Thaumalea picta* (Linn.). Received in exchange.  
 29. 1 Silky Cow Bird. *Molothrus sericeus* (Licht.). Purchased.  
 2 Malaccan Parrakeets. *Palæornis malaccensis* (Gmel.). Purchased.  
 1 Jardine's Parrot. *Pecocephalus gulielmi* (Jard.). Purchased.  
 2 West-Indian Rails. *Aramides cayennensis* (Gmel.). Purchased.  
 1 Brown Coati. *Nasua fusca*, Desm. Purchased.  
 1 Yellow Snake. *Chilobothrus inornatus*, Dum. Purchased.

- Feb. 29. 1 Marsh Harrier. *Circus æruginosus* (Linn.). Presented by J. H. Gurney, Esq., M.P., F.Z.S.  
 6 American Finches. Purchased.
- Mar. 1. 2 pairs of Brent Geese. *Bernicla brenta*, Steph. Purchased.  
 2. 1 ♂ Fallow Deer. *Cervus dama*, Linn. Purchased.  
 1 ♂ Isabelline Antelope. *Heleotragus isabellinus* (Afzel.). On approval.  
 3. 1 Griffon Vulture. *Gyps fulvus* (Gmel.). Deposited.  
 1 Golden-winged Woodpecker. *Colaptes auratus* (Linn.). Purchased.  
 4. 4 ♀ Fallow Deer. *Cervus dama*, Linn. Purchased.  
 5. 1 Azara's Opossum and three young ones. *Didelphys azarae*, Temm. Presented by Wm. Reay, Esq.  
 2 ♀ Goosanders. *Mergus merganser*, Linn. Presented by Anth. Sanaze, Esq.  
 6. 3 Lions. *Felis leo*, Linn. Born.  
 7. 1 Common Macaque. *Macacus cynomolgus* (Linn.). Presented by H. Ramsay Forster, Esq.  
 8. 1 Jacket Monkey. *Pithecia satanas*. Purchased.  
 1 Rufous-throated Falcon. *Hypotriorchis rufigularis* (Daud.). Purchased.  
 3 Red-billed Tree Ducks. *Dendrocygna autumnalis* (Linn.). Purchased.  
 1 Crimson-billed Teal. *Querquedula ipecutiri* (Vieill.). Purchased.  
 6 Scarlet Ibises. *Ibis rubra*, Linn. Purchased.  
 1 Jabiru. *Mycteria americana*, Linn. Purchased.  
 2 Maguarie Storks. *Ciconia maguari*, Briss. Purchased.  
 3 Snowy Egrets. *Egretta candidissima* (Gmel.). Purchased.  
 1 Great Egret. *Egretta leuce* (Ill.). Purchased.  
 1 Green Bittern. *Butorides virescens* (Linn.). Purchased.  
 2 Green-winged Trumpeters. *Psophia viridis*, Spix. Purchased.  
 4 Guira Cuckoos. *Gura piririgua* (Vieill.). Purchased.  
 2 Blue-bearded Jays. *Cyanocorax cyanopogon* (Max.). Purchased.  
 2 Brazilian Tanagers. *Ramphocœlus brasilius* (Linn.). Purchased.  
 1 Fasciated Tanager. *Diuopsis fasciata* (Licht.). Purchased.  
 2 Yellow Hangnests. *Cacicus persicus* (Linn.). Purchased.  
 2 Banded Curassows. *Crax fasciolata*, Spix. Purchased.  
 4 Red-breasted Guans. *Penelope pileata*, Licht. Purchased.  
 10. 1 Axis Deer. *Cervus axis*, Erxl. Born.  
 11. 1 Vulpine Opossum. *Phalangista vulpina* (Shaw). Presented by Fred. Moger, Esq.  
 6 pairs of Summer Ducks. *Aix sponsa* (Linn.). Purchased.  
 13. 2 Common Jackals. *Canis aureus*, Linn. Born.  
 14. 1 Bearded Lizard. *Grammatophora barbata*. Purchased.  
 15. 1 Feline Douroucouli. *Nyctipithecus felinus*, Spix. Purchased.  
 1 Squirrel Monkey. *Callithrix sciureus* (Linn.). Purchased.  
 2 Black-tailed Parrakeets. *Platycercus melanurus*, Vig. Purchased.  
 1 Common Mole. *Talpa europæa*, Linn. Presented by G. N. L. Austin, Esq.  
 16. 2 Aoudads. *Ovis tragelaphus*, Desm. Born.  
 1 Crab-eating Raccoon. *Procyon cancrivorus*, Geoff. Purchased.  
 1 ♀ Globose Curassow. *Crax globicera*, Linn. Purchased.  
 1 Great Kangaroo. *Macropus giganteus*, Shaw. Presented by Mrs. Alex. Watson.

- Mar. 16. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by Mr. Sedger.
17. 11 Shawl Goats. *Capra hircus*, Linn., var. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 4 Rufous-tailed Pheasants. *Euplocamus erythrophthalmus* (Raffl.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 21 Green-winged Doves. *Chalcophaps indica* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 6 Nicobar Pigeons. *Caloenas nicobarica* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 5 Barred Doves. *Geopelia striata* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 6 Dwarf Turtledoves. *Turtur humilis* (Temm.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Eastern Turtledove. *Turtur orientalis* (Lath.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 2 Common Crowned Pigeons. *Goura coronata* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 4 Porphyrios. *Porphyrio indicus*, Horsf. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 5 Black Francolins. *Francolinus vulgaris*, Steph. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 5 Wood Francolins. *Francolinus gularis* (Shaw). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Grey Francolin. *Francolinus ponticerianus* (Gmel.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 6 Fantail Pigeons. *Columba domestica*, Linn., var. Presented by the Babu Rajendra Mullick, C.M.Z.S.
18. 1 Piping Crow. *Gymnorhina leuconota*, Gould. Presented by Capt. Ridgers.
19. 1 ♂ Fallow Deer. *Cervus dama*, Linn. Purchased.
- 1 Tigress. *Felis tigris*, Linn. Deposited.
23. 1 Kinkajou. *Cercoleptes caudivolvulus* (Pall.).
27. 4 Black Swans. *Cygnus atratus*, Lath. Hatched.
28. 4 Common Otters. *Lutra vulgaris* (Linn.). Presented by J. H. Gurney, Esq., M.P., F.Z.S.
30. 1 Meadow Starling. *Sturnella ludoviciana* (Linn.). Purchased.
- 2 Black Squirrels. *Sciurus niger*, Linn. Purchased.
- 1 Hybrid Pheasant. Between *Thaumalea picta* (Linn.) and *Phasianus colchicus*, Linn. Deposited.
31. 1 Diamond Snake. *Morelia spilotes* (Lacép.). Presented by the Acclimatization Society of Victoria.
- 2 Great Cyclodus Lizards. *Cyclodus gigas* (Bodd.). Presented by the Acclimatization Society of Victoria.
- 5 Wonga-wonga Pigeons. *Leucosarcia picata* (Lath.). Deposited.
- 2 Brush Turkeys. *Talegalla lathamii*, Gray. Deposited.
- 1 pair of Gold Pheasants. *Thaumalea picta* (Linn.). Purchased.
- Apr. 2. 4 Yellow-footed Kangaroos. *Petrogale xanthopus*, Gray. Purchased.
3. 1 Hybrid Ibex. *Capra ibex* (Linn.) and *Capra hircus*. Born.
4. 3 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Deposited.
- 1 Horned Tragopan. *Cerionis satyra* (Linn.). Deposited.
- 1 ♀ Peacock Pheasant. *Polyplectron chinquis*, Temm. Deposited.

- Apr. 4. 1 ♀ White-crested Kaleege. *Euplocamus albo-cristatus* (Vig.). Deposited.
- 1 Grey Francolin. *Francolinus ponticerianus* (Gmel.). Deposited.
- 3 Hill Francolins. *Arboricola torqueola* (Val.). Deposited.
- 1 Cheer Pheasant. *Catreus wallichii* (Hardw.). Deposited.
6. 2 Black Bulbuls. *Pycnonotus pygæus* (Hodgs.). Purchased.
- 1 White-bellied Sea Eagle. *Haliaëtus leucogaster* (Gmel.). Purchased.
- 1 Rabbit-eared Perameles. *Perameles lagotis*, Reid. Purchased.
- 2 Gray's Jerboa-Kangaroos. *Bettongia grayi* (Gould). Purchased.
- 2 Black-tailed Water-Hens. *Tribonyx ventralis*, Gould. Purchased.
7. 1 Skunk. *Mephitis chilensis*, Geoff. Presented by Mr. Edmonds.
8. 1 Bonnet Monkey. *Macacus radiatus* (Shaw). Presented by W. Freeman, Esq.
9. 4 Cereopsis Geese. *Cereopsis novæ-hollandiæ*, Lath. Deposited.
- 1 Black Swan. *Cygnus atratus*, Lath. Deposited.
10. 2 Blood-stained Cockatoos. *Cacatua sanguinea*, Gould.
- 2 Australian Thick-knees. *Ædicnemus grallarius* (Lath.). Presented by the Royal Dublin Zoological Society.
- 4 Wattled Fruit Pigeons. *Carpophaga microcera*, Bonap. Purchased.
- 1 Double-crested Pigeon. *Lopholaimus antarcticus* (Shaw). Presented by the Acclimatation Society of Sydney.
- 1 Tooth-billed Pigeon. *Didunculus strigirostris*, Jard. Presented by Geo. Bennett, M.D., F.Z.S.
- 1 Black-backed Porphyrio. *Porphyrio melanotus*, Temm.
- 2 Brush Turkeys. *Talegalla lathamii*, Gray.
- 1 Australian Pelican. *Pelecanus conspicillatus*, Gould. Purchased.
- 2 Wedge-tailed Eagles. *Aquila audax* (Lath.).
- 5 Java Sparrows. *Padda oryzivora* (Linn.). Presented by Charles Sidgreaves, Esq.
- 1 Indian Turtledove. Presented by Charles Sidgreaves, Esq.
- 1 Common Macaque. *Macacus cynomolgus* (Linn.). Presented by Charles Sidgreaves, Esq.
11. 1 Red-sided Green Lory. *Polychloros magnus* (Gmel.). Purchased.
- 1 Malabar Squirrel. *Sciurus purpureus*, Temm. Received.
- 1 Banded Ichneumon. *Herpestes fasciatus*, Desm. Purchased.
12. 1 Blossom-headed Parrakeet. *Palaornis bengalensis* (Linn.). Purchased.
- 1 Blue-crowned Conure. *Conurus hæmorrhous*, Spix. Purchased.
- 1 ♀ Elegant Grass Parrakeet. *Euphema elegans*, Gould. Purchased.
- A collection of Marine Animals. Purchased.
13. 1 Crested Ground Parrakeet. *Calopsitta novæ-hollandiæ*, (Gmel.). Presented by Lady Phillimore.
- A collection of Marine Animals. Purchased.
- 6 Green Lizards. *Lacerta viridis*, Linn. Purchased.
- 1 Sooty Monkey. *Cercopithecus fuliginosus*, Geoff. Presented by Colonel Addison.
14. 1 American Night Heron. *Nycticorax pileatus* (Bodd.). Presented by E. B. Webb, Esq.
- 1 Burchell Zebra. *Asinus burchellii*, Gray. Born.
- 1 pair of Common Peafowl. *Pavo cristatus*, Linn. R. W. Tampling, Esq.

- Apr. 16. 4 Spotted-sided Finches. *Amadina lathamii* (Vig. & Horsf.). Purchased.  
 3 Red-tailed Finches. *Estrellda ruficauda*, Gould. Purchased.
17. 2 Javan Parrakeets. *Palaeornis javanica* (Osb.). On approval.  
 1 Fat Dormouse. *Myoxus glis*, Schreb. Purchased.  
 A mass of *Tubularia*. Presented by T. J. Moore, Esq., C.M.Z.S.
18. 1 Green Lizard. *Lacerta viridis*, Linn. Presented by Mrs. Clark.  
 1 Indian Porcupine. *Hystrix leucura*, Sykes. Presented by A. Oswald Brodie, Esq.
19. 2 Grey Squirrels. *Sciurus cinereus*, Linn. Purchased.  
 4 Laughing Kingfishers. *Dacelo gigantea* (Lath.). Presented by L. Mackinnon, Esq.
20. 1 Bonnet Monkey. *Macacus radiatus* (Shaw). Received.
22. 1 Wedge-tailed Eagle. *Aquila audax* (Lath.). Capt. Stewart.
23. 1 Ursine Colobus. *Colobus ursinus*, Ogilby. Purchased.  
 1 Smooth Snake. *Coronella levis*, Lacép.
24. 3 Gold Fish. *Cyprinus auratus*, Linn. Presented by Arthur Russell, Esq.  
 2 ♂ Kids, Hybrids. Between ♂ *Capra megaceros*, Hutt., and ♀ *Capra bedon*, Forsk. Born.
25. 1 Wild Sow. *Sus scrofa*, Linn. Deposited.  
 1 ♂ Emu. *Dromæus novæ-hollandiæ*, Vieill. Exchanged.  
 1 Hawfinch. *Coccothraustes vulgaris* (Briss.). Presented by C. Wolley, Esq.
27. 1 Crocodile. Deposited.  
 1 Lizard. Deposited.  
 1 New Zealand Parrakeet. *Cyanoramphus novæ-zelandiæ* (Sparm.). Purchased.
28. 1 Malabar Squirrel. *Sciurus purpureus*, Zimm. Presented by Capt. Gideon.  
 1 Ring-necked Parrakeet. *Palaeornis torquata* (Linn.). Presented by Miss Thacker.  
 1 Blue-faced Lorikeet. *Trichoglossus hæmatodus* (Linn.). Received.  
 2 Antillean Snakes. *Dromicus antillensis*, Schleg. Presented by Capt. Abbott.  
 1 Three-toed Sloth. *Bradypus tridactylus*, Linn. Purchased.  
 1 White Ibis. *Ibis alba*, Linn. Purchased.  
 2 Tiger Bitterns. *Tigrisoma brasiliense* (Linn.). Purchased.  
 3 Antillean Snakes. *Dromicus antillensis*, Schleg. Purchased.  
 1 Dorsal Lizard. *Ameiva dorsalis*, Gray. Presented by Capt. Abbott.
30. 1 Common Boa. *Boa constrictor*, Linn. Presented by Dr. Leard.  
 2 Quebec Marmots. *Arctomys empetra* (Schreb.). Presented by the Hon. A. Gordon.  
 1 Snowy Owl. *Nyctea nivea* (Daud.). Presented by the Hon. A. Gordon.  
 2 Bisons. *Bison americanus* (Gmel.). Purchased.
- May 1. 3 Dusky Ducks. *Anas obscurus*, Gmel. Hatched.  
 3. 1 Turquoise Parrakeet. *Euphema pulchella* (Shaw). Received.  
 1 Jerboa Kangaroo. *Bettongia*, sp.? Presented by G. Mitchell and W. Sluce, Esq.  
 4. A collection of Fishes. Presented by Dr. Salter, F.Z.S.  
 A collection of Fishes. Purchased.  
 5. 1 ♀ Leucoryx. *Oryx leucoryx* (Pall.). Born.



- May 5. 5 Upland Geese. *Chloëphaga magellanica* (Gmel.). Hatched.  
 5 Ruddy-headed Geese. *Chloëphaga rubidiceps*, Selater. Hatched.
6. 2 West-Indian Rails. *Aramides cayennensis* (Gmel.). Purchased.
7. 2 Orang-Utans. *Simia satyrus*, Linn. Purchased.  
 1 Blessbok Antelope. *Damalis albifrons* (Burch.). Purchased.  
 1 Spotted Pigeon. *Columba arquatrix*, Temm. Purchased.  
 1 Rufous Francolin. *Galloperdix spadicea* (Gmel.). On approval.  
 1 Wood Francolin. *Francolinus gularis* (Shaw). Purchased.  
 A collection of Fishes. Presented by Dr. Salter, F.Z.S.  
 1 Wild Cat. *Felis catus*, Linn. Presented by the Earl of Seafield, F.Z.S.
9. 6 Common Pheasants. *Phasianus colchicus*, Linn. Purchased.
10. 1 Brown Bear. *Ursus arctos*, Linn. Presented by Viscount Ranelagh.
11. 1 ♂ Black Scoter. *Ædemia nigra*, Flem. Purchased.  
 1 Common Adder. *Felias berus*, Merr. Presented by F. T. Buckland, Esq., F.Z.S.  
 1 Common Kestrel. *Tinnunculus alaudarius*, Briss. Presented by T. Havers, Esq.
12. 1 Black-fronted Lemur. *Lemur nigrifrons*, Geoff. Presented by F. Le Breton, Esq., F.Z.S.
13. 1 Chameleon. *Chamæleo vulgaris*, Daud. Deposited.  
 1 Red and Blue Maccau. *Ara macao* (Linn.). Deposited.  
 1 Blue-fronted Amazon. *Chrysotis amazonica* (Gmel.). Deposited.
14. 1 ♀ Ganga Cockatoo. *Callocephalon galeatum* (Lath.). Purchased.  
 2 American Deer. *Cervus virginianus*? (Bodd.). On approval.
16. 3 Parasitic Kites. *Milvus parasiticus* (Daud.). Purchased.  
 2 Crested Ground Parrakeets. *Calopsitta novæ-hollandiæ* (Gmel.). Hatched.  
 2 Sturgeons. *Acipenser sturio*, Linn. Purchased.  
 2 German Loach. *Cobitis fossilis*. Purchased.
17. 2 Tigers. *Felis tigris*, Linn. Born.
18. 4 Burbot. *Lota vulgaris*, Willoughby. Presented by Francis Francis, Esq.
19. 1 White Fallow Deer. *Cervus dama*, Linn., var. *alba*. On approval.  
 1 Arabian Baboon. *Cynocephalus hamadryas* (Linn.). On approval.  
 4 Bluish Finches. *Spermophila cærulescens* (Vieill.). Purchased.  
 1 White-throated Finch. *Spermophila albobularis*, Spix.
20. 11 Summer Ducks. *Aix sponsa* (Linn.). Hatched.
21. 1 Brown Coati. *Nasua fusca*, Desm. Presented.
23. 2 Weka Rails. *Ocydromus australis* (Sparrm.). Presented by the Acclimatization Society of Melbourne.  
 3 Lizards. Presented by the Acclimatization Society of Melbourne.  
 10 Australian Quails. *Synæcus australis* (Lath.). Deposited.  
 2 Black-breasted Peewits. *Sarciophorus pectoralis* (Cuv.). Deposited.  
 3 Vulpine Opossums. *Phalangista vulpina* (Shaw). Deposited.  
 4 Emus. *Dromæus novæ-hollandiæ*, Vieill. Deposited.  
 2 Lobsters. *Homarus vulgaris* (Linn.). Presented by A. Arce-deckne, Esq., F.Z.S.

- May 23. 6 Black-headed Gulls. *Larus ridibundus*, Linn. Presented by the Hon. Aug. A. C. Ellis.  
 8 Naked-footed Owls. *Athene noctua* (Retz.). Presented by the Hon. Aug. A. C. Ellis.  
 1 Crossbill. *Loxia curvirostra*, Linn. Purchased.
26. 1 Herring-Gull. *Larus argentatus*, Brünn. Presented by Mrs. Hooker.  
 1 Common Quail. *Coturnix communis* (Bonn.). Presented by Miss Maul.
27. 1 Rusa Deer. Deposited.
28. 2 Kingfishers. *Alcedo ispida*, Linn. Purchased.  
 2 Feline Douroucoulis. *Nyctipithecus felinus*, Spix. Purchased.  
 1 Little Guan. *Ortalia katraea* (Bodd.). Purchased.  
 1 Red-billed Tree Duck. *Dendrocygna autumnalis* (Linn.). Purchased.  
 1 Turkey Vulture. *Cathartes aura* (Linn.). Purchased.  
 2 Cocoi Herons. *Ardea cocoi*, Linn. Purchased.  
 1 Common Jackal. *Canis aureus*, Linn. Presented by Thomas Waite, Esq.
30. 1 ♂ Eland. *Oreas canna* (Pall.). Born.  
 1 Ruddy Sheldrake. *Casarca rutila* (Pall.). Hatched.  
 1 Ashy-headed Goose. *Chloephaga poliocephala*, Gray. Hatched.  
 1 Grey Parrot. *Psittacus erythacus*, Linn. Purchased.
31. 1 ♂ Wapiti Deer. *Cervus canadensis*, Briss. Born.  
 1 Pinche Monkey. *Hapale ædipus* (Linn.). Presented by Augustus Cooper, Esq.
- June 1. 5 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Hatched.
3. 1 Rhesus Monkey. *Macacus erythraeus* (Schreb.). Born.  
 2 Dwarf Turtledoves. *Turtur humilis* (Temm.). Hatched.  
 1 Snake. Presented by C. A. Wright, Esq.  
 3 Terrapins. Presented by C. A. Wright, Esq.  
 1 ♂ Ring-necked Pheasant. *Phasianus torquatus*, Gmel. Deposited.  
 12 ♂ Sømmering's Pheasants. *Phasianus sømmeringii*, Temm. Deposited.  
 2 ♀ Sømmering's Pheasants. *Phasianus sømmeringii*, Temm. Deposited.  
 1 Japanese Dog. *Canis domesticus*, Linn., var. Deposited.  
 1 Japanese Monkey. *Macacus speciosus*, F. Cuv. Purchased.  
 A collection of Marine Animals. Purchased.
4. 1 Skink. Presented by Brownlow O. Knox, Esq.  
 1 Cinereous Sea Eagle. *Haliaëtus albicilla* (Linn.). Deposited.  
 1 Tawny Eagle. *Aquila nævioides*, Cuv. Deposited.
6. 11 Summer Ducks. *Aix sponsa* (Linn.). Hatched.  
 3 Bahama Ducks. *Pacilonetta bahamensis* (Linn.). Hatched.
8. 4 Red-billed Tree Ducks. *Dendrocygna autumnalis* (Linn.). Received in exchange.
8. 1 Zebu Cow. *Bos indicus*, Linn. Deposited.  
 2 Sheep. *Ovis aries*, Linn., var. Deposited.
10. 5 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Hatched.  
 1 Horned Tragopan. *Cerionis satyra* (Linn.). Hatched.  
 2 Australian Tree Frogs.  
 2 Great Kangaroos. *Macropus giganteus*, Shaw.
12. 2 Brown Howlers. *Mycetes ursinus* (Humb.). Purchased.
13. 1 ♀ Eland. *Oreas canna* (Pall.). Born.

- June 14. 2 Diana Monkeys. *Cercopithecus diana* (Linn.). Purchased.  
 1 Impeyan Pheasant. *Lophophorus impeyanus* (Lath.). Purchased.  
 3 Yellow Snakes. *Chilobothrus inornatus*, Dum. Presented by Capt. Abbott.  
 2 Emus. *Dromæus novæ-hollandiæ*, Vieill. Presented by P. D. M'Ewen, Esq.
15. 1 Pinche Monkey. *Hapale ædipus* (Linn.). Purchased.
16. 1 ♂ Wapiti Deer. *Cervus canadensis*, Briss. Born.  
 1 Common Squirrel. *Sciurus vulgaris*, Linn. Presented by Mrs. Mivart.
17. 2 Azara's Foxes. *Canis azaræ*, Pr. Max. Presented by W. K. Martin, Esq.
18. 1 Rose-hill Parrakeet. *Platycercus eximius* (Shaw). Presented by Miss Peele.
20. 1 Lioness. *Felis leo*, Linn. Deposited.  
 1 Leopard. *Felis leopardus*, Linn. Deposited.  
 4 African Toads. Purchased.
21. 2 Mooruks. *Casuarus bennettii*, Gould. Hatched.  
 A collection of Marine Animals. Purchased.
22. 1 Black-eared Marmoset Monkey. *Hapale penicillata* (Geoff.). Purchased.  
 2 ♂ Scemmering's Pheasants. *Phasianus scemmeringii*, Temm. Presented by R. Russell, Esq.  
 2 pairs of Scemmering's Pheasants. *Phasianus scemmeringii*, Temm. Purchased.
23. 2 Rabbit-eared Perameles. *Perameles lagotis*, Reid. Purchased.  
 1 Herring-Gull. *Larus argentatus*, Brünn. Presented by J. Williams, Esq.
24. 1 Reh-bok. *Pelea capreola* (Licht.). Purchased.  
 1 Grysbok. *Calotragus melanotis* (Rüpp.). Purchased.
25. 3 Wild Cats. *Felis catus*, Linn. Presented by the Earl of Seafield, F.Z.S.  
 1 Black Kite. *Milvus niger*, Briss. Hatched.
27. 2 Australian Pelicans. *Pelecanus conspicillatus*, Gould. Presented by the Acclimatization Society of Victoria.  
 5 Black Swans. *Cygnus atratus*, Lath. Deposited.  
 2 Slender-billed Cockatoos. *Licmetis tenuirostris* (Wagl.). Presented by Dr. Müller, C.M.Z.S.  
 2 Lizards. Presented by Dr. Müller, C.M.Z.S.  
 4 Electric Eels. *Gymnotus electricus*, Linn. Purchased.  
 2 Rufous Tinamous. *Rhynchotus rufescens*, Temm. Purchased.  
 1 Common Sand-Grouse. *Pterocles arenarius* (Pall.). Purchased.  
 2 Emus. *Dromæus novæ-hollandiæ*, Vieill. Presented by the Acclimatization Society of Victoria.  
 2 Australian Cranes. *Grus australasiana*, Gould. Presented by the Acclimatization Society of Victoria.  
 1 Shining Parrakeet. *Pyrrhulopsis splendens*, Cass. Purchased.
28. 1 Adder. *Pelias berus*, Merr. Presented by E. J. Lowe, Esq.
29. 7 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Hatched.  
 3 Green-breasted Pheasants. *Phasianus versicolor*, Temm. Hatched.
30. 1 ♂ Barasingha Deer. *Cervus duvaucelii*, Cuv. Born.
- July 2. 1 Mantchourian Deer. *Cervus mantchuricus*, Swinhoe. Presented by R. Swinhoe, Esq., F.Z.S.

- July 2. 1 Dampier Strait Wild Hog. *Sus* —? Presented by R. Swinhoe, Esq., F.Z.S.  
 3 King Crabs. *Limulus polyphemus*. Presented by T. J. Moore, Esq., C.M.Z.S.  
 2 King Crabs. *Limulus polyphemus*. Deposited.  
 7. 1 ♀ Double-banded Pigeon. *Treron bicinctus*, Jerd. Deposited.  
 1 Purple-shouldered Pigeon. *Treron phaeocoptera* (Lath.). Deposited.  
 6 Rain Quails. *Coturnix coromandelica* (Gmel.). Deposited.  
 11 Purple Pheasants. *Euplocamus horsfieldii*, Gray. Deposited.  
 7 Fantail Pigeons. *Columba domestica*, Gmel., var. Deposited.  
 8. 1 Japanese Deer. *Cervus sika*, Temm. Born.  
 9. 1 ♀ Yak. *Bos grunniens*, Linn. Born.  
 1 Raccoon. *Procyon lotor* (Linn.). Purchased.  
 12. 6 Kingfishers. *Alcedo ispida*, Linn. Presented by A. Yates, Esq.  
 13. 2 Young Common Kestrels. *Tinnunculus alaudarius*, Briss. Presented by Oct. Morgan, Esq.  
 1 Gannet. *Sula bassana*, Linn. Presented by J. J. Broadwood, Esq.  
 14. 1 Canadian Beaver. *Castor canadensis*, Kuhl. Born.  
 3 Australian Quails. *Synæcus australis* (Lath.). Hatched.  
 16. 1 Rose-crested Cockatoo. *Cacatua rosacea* (Lath.). Deposited.  
 18. 1 Red Ground-Dove. *Geotrygon montana* (Linn.). Hatched.  
 1 Bartlett's Pigeon. *Phlogænas bartlettii*, Sclater. Hatched.  
 1 Crested Ground-Parrakeet. *Calopsitta novæ-hollandiæ* (Gmel.). Hatched.  
 2 Dwarf Turtledoves. *Turtur humilis* (Temm.). Hatched.  
 2 Undulated Grass Parrakeets. *Melopsittacus undulatus* (Shaw). Presented by A. Holmes, Esq.  
 2 Young Rheas. *Rhea americana*, Vieill. Presented by A. Brenner, Esq.  
 1 Bonnet Monkey. *Macacus radiatus* (Shaw). Presented by J. Seaton, Esq.  
 19. 2 Brown Bears. *Ursus arctos*, Linn. Presented by H. H. Elder, Esq.  
 2 Pied Wagtails. *Motacilla yarrellii*, Gould. Hatched.  
 20. 4 Blue-headed Pigeons. *Starnænas cyanocephala* (Linn.). Purchased.  
 4 Moustache-Pigeons. *Peristera mystacea* (Temm.). Purchased.  
 21. 1 Python. *Python sebæ* (Gmel.). Purchased.  
 8 Java Sparrows. *Padda oryzivora* (Linn.). Purchased.  
 1 Senegal Parrot. *Pæocephalus senegalensis* (Linn.). Received.  
 22. 1 Common Jackal. *Canis aureus*, Linn. Presented by E. Blake, Esq.  
 23. 1 Red-breasted Pigeon. *Phlogænas cruentata* (Lath.). Deposited.  
 1 Entellus Monkey. *Semnopithecus entellus* (Linn.). Presented by Miss M. L. Gordon.  
 25. 1 ♂ and 2 ♀ Lineated Pheasants. *Euplocamus lineatus* (Lath.). Presented by Dr. Squire, C.M.Z.S.  
 1 pair of Rhinoceros. *Rhinoceros unicornis*, Linn. Presented by A. Grote, Esq., C.M.Z.S.  
 1 pair of Eastern Jabirus. *Mycteria australis*, Shaw. Presented by A. Grote, Esq., C.M.Z.S.  
 1 White-headed Tantalus. *Tantalus leucocephalus*, Linn. Presented by A. Grote, Esq., C.M.Z.S.  
 1 Concave-casqued Hornbill. *Buceros bicornis*, Linn. Presented by the Babu Rajendra Mullick, C.M.Z.S.

- July 25. 1 Rhinoceros Hornbill. *Buceros rhinoceros*, Linn. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 pair of Common Cassowaries. *Casuarus galeatus* (Vieill.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 2 ♀ Javan Peafowl. *Pavo muticus*, Horsf. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 2 ♀ Rufous-tailed Pheasants. *Euplocamus erythrophthalmus* (Raffl.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 ♀ Peacock Pheasant. *Polyplectron chinquis*, Temm. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 White-headed Tantalus. *Tantalus leucocephalus*, Linn. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 pair of Black Cuckoos. *Eudynamys orientalis* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 9 Rose-coloured Pastors. *Pastor roseus* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 2 Large Indian Tortoises. *Testudo indica*, Gmel. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 2 Sarus Cranes. *Grus antigone*, Linn. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 ♂ Javan Peafowl. *Pavo muticus*, Horsf. Presented by Wm. Dunn, Esq., C.M.Z.S.
- 1 ♀ Concave-casqued Hornbill. *Buceros bicornis*, Linn. Presented by Wm. Dunn, Esq., C.M.Z.S.
- 1 ♂ Rhinoceros. *Rhinoceros unicornis*, Linn. Deposited.
- 3 Madagascar Francolins. *Francolinus madagascariensis* (Scop.). Deposited.
- 1 Black Crested Eagle. *Spizaetus occipitalis* (Daud.). Deposited.
- 2 Black Kites. *Milvus niger*, Briss. Deposited.
- 1 ♀ Sonnerat's Jungle-fowl. *Gallus sonneratii*, Temm. Deposited.
26. A collection of Marine Animals. Presented by Edw. Pugh, Esq.
27. 1 Young Common Zebra. *Asinus zebra* (Linn.). Presented by H. E. Sir Edmund Wodehouse, K.C.B., Governor of the Cape Colony.
- 1 Barbary Falcon. *Falco barbarus*. Purchased.
- 1 Spotted Eared Owl. *Bubo maculosus* (Vieill.). Purchased.
- 1 Vervet Monkey. *Cercopithecus lalandi*, Is. Geoff. Presented by — Bushe, Esq.
- 1 Hawk's-billed Turtle. *Caretta imbricata*. Presented by Messrs. T. C. W. McKay and Co.
- 2 Turquoise Parrakeets. *Euphema pulchella* (Shaw). Hatched.
- 1 Bartlett's Pigeon. *Phlogœnas bartlettii*, Selater. Hatched.
28. 1 Razorbill. *Alca torda*, Penn. Presented by P. W. Symonds, Esq.
- 2 Patagonian Cavies. *Dolichotis patachonicus* (Shaw). Presented by John Duguid, Esq.
29. 1 Gray's Jerboa Kangaroo. *Bettongia grayi* (Gould). Born.
- 1 Young Porpoise. *Phocœna communis*, Less. Purchased.
30. 1 Moor Monkey. *Semnopithecus maurus* (Schreb.). On approval.
- Aug. 1. 8 Algerian Greenfinches. *Fringilla aurantiventris*, Cab. Purchased.
- 2 Algerian Chaffinches. *Fringilla spodiogenia*. Purchased.
- 1 Short-toed Lark. *Alauda brachydactyla*, Temm. Purchased.
2. 1 Pinche Monkey. *Hapale œdipus* (Linn.). Presented by A. de Mosquese, Esq.

- Aug. 2. 1 White-throated Sapajou. *Cebus hypoleucus*, Geoff. Presented by A. Yates, Esq.  
 1 Peewit. *Vanellus cristatus*, Meyer. Presented by A. Yates, Esq.
3. 2 Emus. *Dromæus novæ-hollandiæ*, Vieill. Presented by H. G. Ashurst, Esq.
4. 1 Alexandrine Parrakeet. *Palæornis alexandri* (Linn.). Presented by Mrs. Synd.  
 1 Negro Tamarind-Monkey. *Hapale ursulus*, Geoff. Presented by Comm. C. A. J. Asham, R.N.  
 1 Weasel-headed Armadillo. *Dasyypus encoubert*, Desm. Deposited.
6. 1 Alpine Chamois. *Rupicapra tragus*, Gray. Born.
9. 1 Hybrid Barbary Dove. Hatched.  
 1 Capistrated Squirrel. *Sciurus capistratus*, Bosc. Received in exchange.
10. 1 Ring-necked Parrakeet. *Palæornis torquata* (Linn.). Presented by Miss Bessie Ryan.
11. 1 Common Sturgeon. *Acipenser sturio*, Linn. Purchased.  
 1 Common Buzzard. *Buteo vulgaris*, Bechst. Presented by Prof. Rolleston.
12. 1 pair of Globose Curassows. *Crax globicera*, Linn. Presented by R. S. Newall, Esq.
13. 1 Mexican Deer. *Cervus mexicanus*, H. Smith. Born.
15. 1 Vervet Monkey. *Cercopithecus lalandii*, Is. Geoff. Presented by Lieut. Chester Doughty.
16. 2 Mangabey Monkeys. *Cercocebus æthiops* (Geoff.). Received in exchange.  
 4 Snow Buntings. *Plectrophanes nivalis* (Linn.). Received in exchange.  
 1 Grey Crow. *Strepera anaphonensis* (Temm.). Received in exchange.  
 1 Pine Grosbeak. *Corythus enucleator* (Linn.). Received in exchange.  
 1 African Owl. *Bubo maculosus* (Vieill.). Received in exchange.
17. 1 Red Fox. *Vulpes fulvus* (Desm.). Presented by Mrs. Wm. Reid.
18. 1 Angola Vulture. *Gypohierax angolensis* (Gmel.). Purchased.  
 1 Chilian Sea-Eagle. *Geranoæetus aquia* (Temm.). Purchased.  
 4 Greek Partridges. *Caccabis saxatilis* (Meyen). Purchased.  
 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by T. J. Hutton Wood, Esq.
19. 2 Common Partridges. *Perdix cinerea* (Linn.). Presented by — Riley, Esq.  
 1 Golden Eel. Presented by — Ward, Esq.
20. 2 Black-backed Porphyrios from New Zealand. *Porphyrio melanotus*, Temm. Presented by Henry St. Hill, Esq.  
 1 Blue Tanager. *Tanagra cana*, Sw. Purchased.
22. 1 Two-spotted Paradoxure. *Nandinia binotata* (Reinw.). Presented by Geo. Tidcombe, Esq.
23. 2 Crested Ground-Parrakeets. *Calopsitta novæ-hollandiæ* (Gmel.). Hatched.  
 2 Amandava Finches. *Estrellda amandava* (Linn.). Deposited.  
 3 Indigo Birds. *Cyanospiza cyanea* (Linn.). Deposited.  
 1 Grenadier Weaver Bird. *Euplectus onyx* (Linn.). Deposited.  
 1 Nonpareil. *Cyanospiza ciris* (Linn.). Deposited.  
 2 Spotted-sided Finches. *Amadina lathamii* (Vig. & Horsf.). Deposited.

- Aug. 23. 3 Crimson-eared Waxbills. *Estrela phanicotis*, Sw. Deposited.  
 2 Orange-cheeked Waxbills. *Estrela melpoda* (Vieill.). Deposited.  
 2 Common Waxbills. *Estrela cinerea* (Vieill.). Deposited.  
 1 Zebra Waxbill. Deposited.  
 1 St. Helena Seed-eater. *Crithagra butyracea* (Linn.). Deposited.  
 1 African Canary. Deposited.  
 1 Silverbeak. *Munia cantans* (Gmel.). Deposited.  
 1 Hooded Finch. *Amadina cucullata*, Sw. Deposited.  
 1 Common Cuckoo. *Cuculus canorus*, Linn. Presented by F. Luck, Esq.  
 1 Sacred Ibis. *Geronticus aethiopicus* (Lath.). Deposited.  
 1 Angola Vulture. *Gypohierax angolensis* (Gmel.). Deposited.  
 24. 1 Derbian Wallaby. *Halmaturus derbianus*, Gray. Purchased.  
 26. 2 Raccoons. *Procyon lotor* (Linn.). Presented by H. O. Harvey, Esq.  
 1 Capuchin Monkey. *Cebus capucinus*, Erxl. Presented by Wm. Lloyd, Esq.  
 1 Canadian Beaver. *Castor canadensis*, Kuhl. Born.  
 2 Mitred Guinea-fowls. *Numida mitrata*, Pall. Presented by Lady Walker.  
 1 Common Guinea-fowl. *Numida meleagris*, Linn. Presented by Lady Walker.  
 27. 1 Squirrel Monkey. *Callithrix sciureus* (Linn.). Purchased.  
 1 Vulpine Opossum. *Phalangista vulpina* (Shaw). Deposited.  
 29. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by Wm. Houlder, Esq.  
 30. 1 Weasel-headed Armadillo. *Dasypus encoubert*, Desm. Purchased.  
 2 Axalotts. *Siredon humboldtii*. Purchased.  
 1 Common Chameleon. *Chamæleo vulgaris*, Daud. Presented by — Hands, Esq.  
 31. 1 Globose Curassow. *Crax globicera*, Linn. Presented by Capt. Abbott.  
 2 Iguanas. Presented by Capt. Abbott.  
 1 Great Sulphur-crested Cockatoo. *Cacatua galerita* (Lath.). Presented by G. Norton, Esq.
- Sept. 1. 1 Rose-crested Cockatoo. *Cacatua rosacea* (Lath.). Presented by Mrs. Fairrei.  
 1 Horned Viper (Algiers). Presented by M. Curry, Esq.  
 1 Indian Moth. *Attacus atlas*. Deposited.  
 2. 1 Porpoise. *Phocæna communis*, Less. Presented by Walter Weld, Esq.  
 1 Vulpine Phalanger. *Phalangista vulpina* (Shaw). Presented by E. E. Ashley, Esq.  
 1 Turtle. Presented by C. Butler, Esq.  
 3. 1 Brazilian Caracara. *Polyborus brasiliensis* (Gmel.).  
 4. 1 Vinaceous Turtledove. *Turtur vinaceus* (Gmel.). Hatched.  
 5. 1 Indian Moth. *Attacus atlas*. Deposited.  
 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by Mrs. R. B. Beddome.  
 2 Green Lizards. *Lacerta viridis*, Linn. Presented by Mrs. Baker.  
 9. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by — Ellis, Esq.

- Sept. 9. 1 Azara's Fox. *Canis azaræ*, Pr. Max. Presented by Mrs. Laird Warren.  
 1 Red Coati. *Nasua rufa*, Desm. Presented by Mrs. Laird Warren.  
 1 Australian Crane. *Grus australasiana*, Gould. Deposited.  
 1 Black Swan. *Cygnus atratus*, Lath. Deposited.  
 1 White Goshawk. *Astur novæ-hollandiæ* (Gmel.). Deposited.  
 1 Boobook Owl. *Athene boobook* (Lath.). Presented by the Acclimatization Society of Queensland.
10. 2 Slender-billed Cockatoos. *Licmetis tenuirostris* (Wagl.). Presented by Dr. Müller, C.M.Z.S.  
 1 White Goshawk. *Astur novæ-hollandiæ* (Gmel.). Presented by Dr. Müller, C.M.Z.S.  
 1 Himalayan Bear. *Ursus torquatus* (Wagn.). Presented by H. A. Hebler, Esq., 6th Regiment of Foot.
12. 2 Herring-Gulls. *Larus argentatus*, Brünn. Presented by Wm. Houlder, Esq.
13. 1 Smooth Snake. *Coronella lævis*, Lacép. Presented by John Pures, Esq.
14. 1 Piedmontese Calf. *Bos taurus*, Linn., var. Born.  
 1 American Thrush. *Turdus migratorius*, Linn. Presented by W. H. Boare, Esq.  
 30 Crested Lizards. *Anolis cristatellus*, Dum. & Bibr. Presented by Capt. Sawyer.
19. 1 African Wild Ass. *Asinus taniopus*, Heugl. Purchased.  
 2 Imperial Eagles. *Aquila heliaca*, Savig. Purchased.  
 5 Little Egrets. *Egretta garzetta* (Linn.). Purchased.  
 6 Squacco Herons. *Buphus comatus* (Pall.). Purchased.  
 2 Red-footed Falcons. *Falco vespertinus*, Linn. Purchased.  
 1 Common Cuckoo. *Cuculus canorus*, Linn. Presented by R. Branzel, Esq.
20. 2 Young Turtles. Presented by H. Jones, Esq., R.N.
21. 1 Young ♂ Syrian Bear. *Ursus syriacus*, Ehrenb. Presented by E. T. Rogers, Esq., H.B.M. Consul, Damascus.
22. 1 Bartlett's Pigeon. *Phlogœnas bartletti*, Sclater. Hatched.  
 8 Gold Carp. *Cyprinus auratus*, Linn. Presented by A. Russell, Esq.
23. 1 Jaguar. *Felis onça*, Linn. Born.
25. 2 Cambayan Turtledoves. *Turtur senegalensis* (Linn.). Hatched.  
 1 Rufous-necked Weaver Bird. *Hyphantornis textor* (Gmel.). Hatched.
27. 1 Hybrid Peccary. Between *Dicotyles tajaçu* (Linn.), ♀, and *Dicotyles labiatus*, Cuv., ♂. Born.  
 1 Porpoise. *Phocœna communis*, Less. Presented by Theodore Grant Cresey, Esq.  
 1 Marimonda Spider Monkey. *Ateles belzebuth* (Briss.). Purchased.
29. 1 Kiwi. *Apteryx mantelli*, Bartl. Presented by Major Keene.  
 1 Laughing Kingfisher. *Dacelo gigantea* (Lath.). Deposited.
30. 1 Addax. *Addax naso-maculatus* (Licht.). Purchased.  
 1 Black-fronted Spider Monkey. *Ateles frontatus*, Gray. Purchased.  
 A collection of Marine Fishes. Presented by Dr. Salter, F.Z.S.  
 6 Crested Lizards. *Anolis cristatellus*, Dum. & Bibr. Deposited.
- Oct. 1. 1 Malabar Squirrel. *Sciurus purpureus*, Zimm. Presented by R. A. Peirce, Esq.



- Oct. 1. 1 Green Monkey. *Cercopithecus callitrichus*, Is. Geoff. Presented by C. H. White, Esq.  
 1 Two-lined Palm-Snake. *Craspedocephalus bilineatus*, Wied. Presented by Dr. Wucherer, C.M.Z.S.
4. 1 Nylghai. *Portax picta* (Pall.). Born.  
 1 Common Genet. *Genetta vulgaris* (Linn.). Presented by T. Aldersey, Esq.
5. 1 Nylghai. *Portax picta* (Pall.). Born.  
 1 Bonnet Monkey. *Macacus radiatus* (Shaw). Presented by Miss Hall.
8. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by Mrs. Paton.
9. 3 Alligators. *Alligator lucius*, Cuv. On approval.
11. 1 Nutcracker. *Nucifraga caryocatactes*, Briss. Purchased.
13. 1 Marmoset Monkey. *Hapale jacchus* (Linn.). Deposited.
14. 2 Armadillos. *Dasyus peba*, Desm. Presented by Maximo Terrero, Esq.
17. 1 Brown Capuchin Monkey. *Cebus apella* (Linn.). Purchased.  
 1 Bonnet Monkey. *Macacus radiatus* (Shaw). Deposited.
18. 1 Pine Marten. *Mustela martes*, Linn. Presented by Lord Baynes.  
 3 Bimaculated Ducks. Supposed hybrids between *Mareca penelope* (Linn.) and *Querquedula crecca* (Linn.). Presented by J. A. Heaton, Esq.
- 1 Japanese Brown Bear. *Ursus arctos*, Linn., var. *beringensis*, Midd. Presented by Capt. W. Beauchamp Seymour, R.N., C.B.
19. 12 Common Oysters. *Ostrea edulis*, Linn. Presented by A. Arcedeckne, Esq., F.Z.S.
20. 2 African Genets. *Genetta*, sp. ? Presented by Wm. Vare, Esq.
21. 1 Lesser White-nosed Monkey. *Cercopithecus petaurista* (Schreber). Deposited.
22. 2 Great Bustards. *Otis tarda*, Linn. Deposited.
23. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Deposited.
24. 1 Malabar Squirrel. *Sciurus purpureus*, Zimm. Presented by A. G. Dove, Esq.  
 3 American Bisons. *Bison americanus* (Gmel.). Deposited.  
 2 Cinereous Sea Eagles. *Haliaëtus albicilla* (Linn.). Presented by H. Stafford O'Brien, Esq.  
 1 Chuva Spider Monkey. *Ateles marginatus*, Geoff. Purchased.  
 2 Barbary Apes. *Inuus sylvanus* (Linn.). On approval.  
 1 Downy Owl. *Athene torquata* (Daud.). On approval.
27. 2 Golden Eagles. *Aquila chrysaëtus* (Linn.). Presented by Capt. Herd, C.M.Z.S.
29. 1 Black-fronted Spider Monkey. *Ateles frontatus*, Gray. Purchased.  
 1 Tuberculated Iguana. *Iguana tuberculata*, Laur. Purchased.  
 2 Blue-shouldered Tanagers. *Tanagra cyanoptera*, Bonap. Purchased.  
 A collection of Marine Animals. Purchased.  
 A collection of Marine Animals. Presented by W. Thompson, Esq.
31. 2 Black-backed Jackals. *Canis mesomelas*, Schreb. Presented by E. L. Layard, Esq., F.Z.S.  
 1 White Stork. *Ciconia alba*, Briss. Purchased.
- Nov. 1. 2 Common Goats. *Capra hircus*, Linn., var. Presented by — Heley, Esq.

- Nov. 1. 1 ♂ Nylghai. *Portax picta* (Pall.). Purchased.  
 1 White-necked Ibis. *Geronticus albigollis* (Gmel.). Purchased.  
 2 Hamsters. *Cricetus vulgaris*, Desm. Purchased.  
 A collection of marine Fishes. Received.
3. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Deposited.  
 1 Vervet Monkey. *Cercopithecus lalandii*, Is. Geoff. Presented  
 by Francis L. Plumb, Esq.
4. 5 Vinaceous Turtledoves. *Turtur vinaceus* (Gmel.). Presented  
 by R. B. W. Walker, Esq.
7. A collection of marine Fishes. Presented by W. Thompson,  
 Esq.  
 1 Banded Ichneumon. *Herpestes fasciatus* (Desm.). Presented  
 by Spencer Chapman, Esq.
8. 1 ♂ Molucca Deer. *Cervus moluccensis*, Müll. Born.  
 A collection of marine Fishes. Purchased.  
 1 Grey Ichneumon. *Herpestes griseus* (Geoff.). Purchased.
10. 1 Temminck's Tragopan. *Ceriornis temminckii* (Gray). Pur-  
 chased.  
 1 Black Lemur. *Lemur niger*, Geoff. Purchased.
11. 1 Black Swan. *Cygnus atratus*, Lath. Hatched.
12. 1 ♂ Serval. *Felis serval*, Schreb. On approval.
13. 5 Variable Codfish. *Morrhua callarias* (Linn.). Received.
14. 1 Purple-faced Monkey. *Semnopithecus cephalopterus* (Zimm.).  
 Purchased.  
 1 Barred Dove. Presented by Mrs. Sparkes.
15. 1 Stanley Parrakeet. *Platycercus icterotis*, Temm. Received in  
 exchange.  
 1 ♀ Chimpanzee. *Troglodytes niger*, Geoff. Purchased.  
 1 Tuberculated Iguana. *Iguana tuberculata*, Laur. Presented  
 by Capt. Sawyer.
18. 1 ♂ West African River Hog. *Potamochoerus penicillatus*, Gray.  
 Presented by M. Du Chaillu.
19. 1 Deer from Honduras. Presented by Miss Williams.
21. 3 Maned Geese. *Bernicla jubata* (Lath.). Purchased.  
 1 Saiga Antelope. *Saiga tatarica* (Pall.). Purchased.
22. 1 ♀ Ocellated Turkey. *Meleagris ocellata*, Temm. Presented  
 by Capt. D'Arcy, R.N.  
 1 Crested Guan. *Penelope cristata*, Gmel. Presented by Capt.  
 D'Arcy, R.N.  
 1 Black Bear. *Ursus americanus*, Pall. Presented by Capt.  
 D'Arcy, R.N.
24. 1 Wild Cat. *Felis catus*, Linn. Presented by Miss Johnstone  
 Douglas.
25. 1 Black Rat. *Mus rattus*, Linn. Presented by Charles Hampden  
 Wigram, Esq.
28. 1 Gray's Jerboa Kangaroo. *Bettongia grayi* (Gould). Born.  
 1 Green Monkey. *Cercopithecus callitrichus*, Is. Geoff. Purchased.
29. 1 Lioness. *Felis leo*, Linn. Deposited.
30. 1 Young ♀ Eland. *Oreas canna* (Pall.). Received in exchange.  
 15 Dunlins. *Tringa variabilis*, Meyer. Presented by F. Cress-  
 well, Esq.  
 3 Knots. *Calidris canutus*, Briss. Presented by F. Cresswell,  
 Esq.  
 1 Golden Plover. *Charadrius pluvialis*, Linn. Presented by  
 F. Cresswell, Esq.  
 1 Vervet Monkey. *Cercopithecus lalandii*, Is. Geoff. Presented  
 by J. C. Thompson, Esq.

- Nov. 30. 1 Capuchin Monkey. *Cebus apella* (Linn.). Presented by Lieut. C. S. Candall, R.N.  
 1 Squirrel Monkey. *Callithrix sciureus* (Linn.). Presented by Lieut. C. S. Candall, R.N.  
 1 Spotted Ichneumon. *Herpestes auropunctatus*, Hodgs. Presented by Capt. Salvin.
- Dec. 1. 1 Chacma Baboon. *Cynocephalus porcarius* (Bodd.). Deposited.  
 3. 1 Mangabey Monkey. *Cercocebus ethiops* (Kuhl). Presented by A. F. Ridgway, Esq.  
 2 Dingos. *Canis dingo*, Blumenb. Presented by Dr. Müller, C.M.Z.S.  
 42 Red-headed Cardinals. *Paroaria dominica* (Linn.). Purchased.  
 5 Saffron Finches. *Sycalis brasiliensis* (Gmel.). Purchased.  
 2 South American Finches. Purchased.  
 5. 1 pair of Barbary Deer. *Cervus barbarus*, Benn. Presented by H. E. Sir J. Gaspard le Marchant, K.C.B., Governor of Malta.  
 7. 1 Fallow Deer. *Cervus dama*, Linn., from the Island of Rhodes. Presented by Mrs. Randal Callander.  
 1 Pig. Hybrid between *Sus*, sp.? ♂ and *S. andamensis* ♀. Born.  
 8. 1 ♂ Bar-tailed Pheasant. *Phasianus reevesii*, Gray. Presented by John Kelk, Esq.  
 1 Red-billed Waxbill. *Estrela rubriventris* (Vieill.). Presented by Mrs. Gerrard Meynell.  
 9. 1 Black Spider Monkey. *Ateles*, sp.? Purchased.  
 1 Greek Partridge. *Caccabis saxatilis*, Bechst. Presented by A. H. Layard, Esq., M.P.  
 11. 1 Persian Cat. *Felis domestica*, Linn., var. Presented by Sir John Robinson.  
 12. 3 Undulated Grass Parrakeets. *Melopsittacus undulatus* (Shaw). Hatched.  
 1 Crested Ground-Parrakeet. *Calopsittacus novæ-hollandiæ* (Gmel.). Hatched.  
 2 Bateleur Eagles. *Helotarsus ecaudatus* (Daud.). Deposited.  
 13. 1 pair of Peron's Deer. *Cervus peronii*, Gray. Presented by Capt. Lewis Brayley.  
 14. 2 Blue Creepers. *Cæreba cyanea*. Purchased.  
 15. 16 Prairie-Grouse. *Tetrao cupido*, Linn. Purchased.  
 1 Sykes's Monkey. *Cercopithecus albogularis*, Sykes. Received in exchange.  
 1 Pig-tailed Monkey. *Macacus nemestrinus* (Linn.). Received in exchange.  
 1 ♀ Vervet Monkey. *Cercopithecus lalandii*, Is. Geoff. Received in exchange.  
 1 Common Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by Capt. Maitland, R.N.  
 11 Sly Silurus. *Silurus glanis*, Linn. Deposited.  
 60 Thunder-Fish. *Cobitis fossilis*. Deposited.  
 16. 1 pair of Ringdoves. Presented by Mrs. Phillips.  
 17. 1 Mynah. Presented by T. Joynson, Esq.  
 18. 1 ♀ Hog Deer. *Cervus porcinus*, Zimm.  
 1 Black-headed Ibis. *Ibis melanocephalus*, Linn.  
 1 Porphyrio from Bagdad. *Porphyrio hyacinthinus* (Temm.).  
 19. 2 Tree-Sparrows. *Passer montanus*, Linn. Purchased.

- Dec. 19. 2 Twites. *Ægiothus montium* (Gmel.). Purchased.  
 2 Bramble-Finches. *Fringilla montifringilla*, Linn. Purchased.
21. 4 Double-banded Sand-Grouse. *Pterocles bicinctus*, Temm. Purchased.
22. 4 Red-quilled Porcupines. *Hystrix malabarica*, Day. Presented by H. E. Col. Sir W. T. Denison, K.C.B., Governor of Madras.
- 9 Bankiva Jungle-fowls (3 ♂, 6 impure ♀). *Gallus bankiva*, Temm. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 ♂ Lineated Pheasant. *Euplocamus lineatus* (Lath.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 3 Hybrid Pheasants (2 ♂, 1 ♀). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 2 Cabul Chukar Partridges. *Caccabis chukar*, Gray. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Wood Francolin. *Francolinus gularis* (Shaw). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 2 Double-banded Pigeons. *Treron bicincta*. Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Purple-shouldered Pigeon. *Treron phœnicoptera* (Lath.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Black Cuckoo. *Eudynamys orientalis* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
- 1 Slow Loris. *Nycticebus tardigradus* (Linn.). Presented by the Babu Rajendra Mullick, C.M.Z.S.
23. 14 specimens of *Sabella ventilabrum*. Purchased.
27. 1 Alexandrine Parrakeet. *Palæornis alexandri* (Linn.). Presented by J. B. Sparke, Esq.
- 3 Patas Monkeys. *Cercopithecus ruber* (Gmel.). Purchased.
- 2 Marmoset Monkeys. *Hapale jacchus* (Linn.). Purchased.
29. 1 Porpoise. *Phocæna communis*, Less. Purchased.
31. A collection of Marine Animals. Purchased.

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