

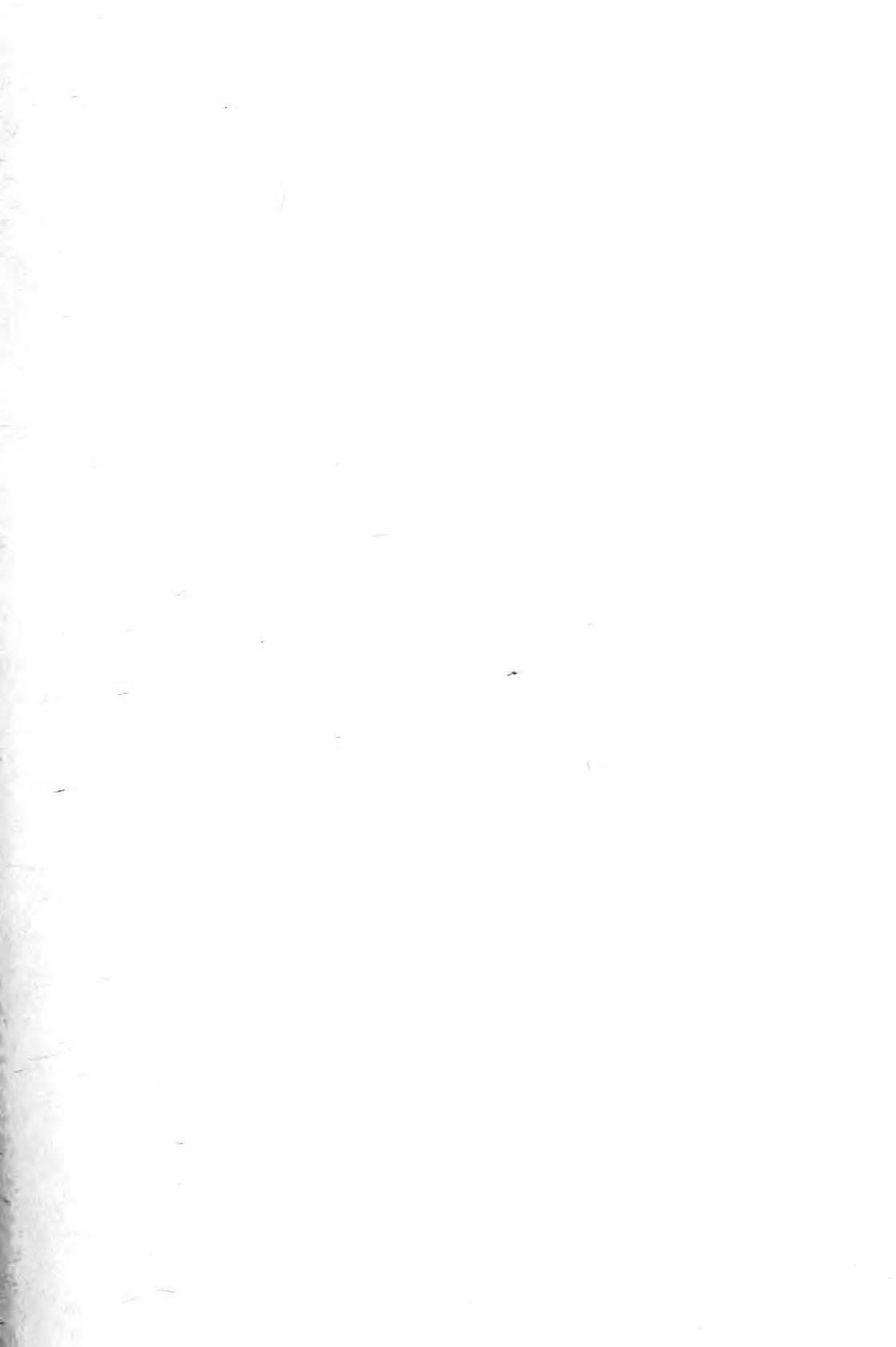


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# PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

# ZOOLOGICAL SOCIETY

## OF LONDON

FOR THE YEAR

1865.



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PRINTED FOR THE SOCIETY,  
AND SOLD AT THEIR HOUSE IN HANOVER SQUARE.

LONDON:  
MESSRS. LONGMANS, GREEN, READER, AND DYER,  
PATERNOSTER ROW.

PARIS:  
M. J. ROTHSCHILD,  
43, RUE SAINT ANDRÉ DES ARTS.

LEIPZIG:  
M. J. ROTHSCHILD,  
34, QUERSTRASSE.

66.  
12 - 30.  
4.

PRINTED BY TAYLOR AND FRANCIS,  
RED LION COURT, FLEET STREET.

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OF THE  
CONTRIBUTORS,

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### ERRATA.

- Page 10, line 2 from top, for  $D. \frac{10}{13}$  read  $D. \frac{10}{15}$
- \* „ 19, „ 15 „ for *hypostoma*, Bleeker, read *belengeri*, C. V.
- „ 22, „ 6 „ for B. vi. read B. viii.
- „ 294, „ 5 „ for *minor* read *mino*
- „ 297, „ 26 „ for Cirri 2 read Cirri 4
- „ 317, „ 15 „ for *antiquorum* (Linn.) read *semicagittatus* (Shaw)
- „ 331, „ 11 from bottom, for insertion at the upper part of the humerus;  
however, read insertion; at the upper part of  
the humerus, however,
- „ 340, „ 3 „ for between read beneath
- „ 341, „ 11 „ for inner read outer
- „ 343, „ 8 from top, for left read right
- „ 345, „ 11 „ for insert read insertion
- „ 346, in description of Fig. 9, for left half read right half
- „ 348, line 21 from top, for into *linea aspera* read into the *linea aspera*



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

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January 10, 1865.

Dr. J. E. Gray, F.R.S., in the Chair.

The Secretary called the attention of the Meeting to the fine specimen of the Manchurian Deer from Newchwang, now in the Society's Gardens, which had been received from Mr. Swinhoe on the 4th of July, 1864, and which was the specimen upon which Mr. Swinhoe had proposed to found his species, *Cervus mantchuricus*, P. Z. S., 1864, p. 169.

With reference to this animal, the Secretary read the following extract from a letter addressed by Mr. Swinhoe to Dr. Gray, dated Amoy, 6th October, 1864:—

“Amoy, 6th October, 1864.

“I find here a magnificent buck Deer in the possession of Mr. Pasedag, the gentleman from whom I procured the Newchwang Deer for the Gardens on my arrival in China. This noble animal, which stands 4 feet high from the shoulder, is also from Newchwang, and being in fine spotted red summer coat, and of a commanding stature, I took it at first for a distinct species. But on closer examination, I feel pretty convinced it is of the same breed as the animal for which I proposed the name *Cervus mantchuricus*; and that on second thought I suspect will turn out to be the same as the three skins I forwarded to the Museum from the summer residence of the Chinese Emperor, the oldest buck of which you had figured in the ‘Proceedings’ as *C. pseudaxis*, and for which Blyth has proposed the name *C. mantchuricus*, and I, subsequently, *C. hortulorum*.

“*Cervus mantchuricus*. Approaching the *Axis* type, closely allied to *Cervus taiwanus* and *C. sika*, more so, apparently, to the former.

“Fine buck from Newchwang, still in summer coat; examined 30th

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September, 1864. General colour reddish brown. Under neck and fore thighs covered with rather long dusky brown hair. Hair of neck, chiefly on its back part, and down part of the back list, long and shaggy. List black between the shoulders, fading towards the tail. Inner portion of hind thighs, inside hair of ears, a large spot on the outer portion of back of ear near its root, rim round the eye, chin, and throat white. Body ornamented with large spots of white. Tail, including apical hair, nearly one foot long. The hair that overhangs the roots of the tail on either side black; basal half of tail white; apical half black, with white tips; under the tail and between the hams white. Knees and front of tibiæ brown. Head, from crown to tip of nose, about 20 inches long; ear about 9 inches. Forehead and before the eyes reddish; rest of face brownish fawn-colour. Horns with frontal tine about 5 inches long, bent a little downwards at the tip; about 8 inches in the stem between lowest tine and the next above, which are broken and represented only by a knob; top stem between that and the top knob about 4 inches.

“This is the finest species of the Spotted Deer I have seen. Besides being much larger than the *C. taëvanus* of Formosa, it is at once to be distinguished by the much greater proportion of white in the tail and hind parts, and by the faintness of the dorsal list; but doubtless many other more considerable distinctive characters will be found to exist on a careful comparison of the two species. With *C. sika* it has much less in common; and this bears out the opinion I advanced as to the greater probability of the fauna of Formosa having been derived from the Chinese main rather than from the Japanese islands. But it is curious that at the present day, south of the Yangtze River, the only Spotted Deer known to exist is what I take to be the true *Cervus axis*, some of which from Hankow I saw captive in Hongkong, and reported on in a former letter.”

The following papers were read:—

1. ON THE FISHES OF COCHIN, ON THE MALABAR COAST OF INDIA. BY SURGEON F. DAY, F.Z.S., F.L.S., ETC., MADRAS ARMY.

#### Part I. ACANTHOPTERYGII.

During a few years' residence at Cochin, on the Malabar or western coast of India, whilst inquiring into the fauna, I made a collection of fresh- and salt-water fish, a short account of which I beg to offer for the consideration of this Society. My catalogue (for it is scarcely more) will only contain such species as I have been able to bring with safety to this country; for many specimens, I regret to say, have been either mislaid or destroyed.

As my purpose is simply to enumerate fishes of Cochin, the periods of the year at which they arrive, and the uses or abuses to which they are put, I shall take Dr. Günther's most valuable catalogue as my text-book, adhere to his arrangement, and as closely as

possible make use of the names he has appropriated to each species. I shall describe not only every new fish which I have obtained, but also those whose existence has been declared *very doubtful*, but of which I have been so fortunate as to obtain specimens. In the descriptions I shall adhere as nearly as possible to one formulary, and give the exact and comparative proportions of the various parts of the body, head, and fins. The vernacular names will be recorded, when such were ascertained beyond a doubt; but they vary greatly in different localities. The native Christians do not give the same appellations to species as obtain amongst the Mahomedans, which again differ from those employed by the Hindus and even by different castes of the Hindu races. In short, various designations are found for the same fish, according to the locality it inhabits and the race of natives conversing.

The classes who fish along the sea-coast and in the backwaters are the native Christians, the Mahomedans, and the Arrian caste of Hindus; whilst the inland pieces of water are left to the Perdana Kanakas, the most degraded of a degraded race of slaves, who are only able to follow this pursuit in the early mornings or late in the evenings, when not required for agricultural labour. Nominally manumitted, but in reality compelled to work for a certain amount of rice (at least, when in health; for since their freedom they obtain nothing when ill), it is fortunate for them that fish forms no portion of their masters' diet.

The manner of fishing varies according to the season of the year, and whether employed in the sea, backwater, rivers, or tanks. Wall, cast, stake, and Chinese nets are all used. The last, situated on the banks of the river, are about 16 feet square, suspended by bamboos attached to each corner, and let down like buckets into the water, and, after remaining there a few minutes, pulled up again. As this mode of fishing is continued all through the year, it affords an excellent criterion of the families and species present, even when sea-fishing is suspended.

Besides the foregoing, fishing with a bait is employed at all times, both from the shore and small canoes. Trolling at the river's mouth, chiefly for the *Polynemus tetradactylus*, mostly takes place in the cold months. Likewise shooting with a Chittagong bow, or bows and arrows, capturing by means of bamboo labyrinths, and poisoning the water by nux vomica, cocculus indicus, Croton-oil seeds, or other deleterious substances, are all common; also damming up and lading out streams, purse-nets in small water-courses, especially in rice-fields, catching by the hand, or by means of wicker baskets somewhat resembling the eel-traps in this country.

The coast is low, without rocks, but with several mud-banks, to which many fish appear to come for the purpose of depositing their spawn. A low narrow slip of sandy soil divides the backwater from the sea, with which it runs parallel for several hundred miles. Some large rivers, which take their rise in the Western Ghauts, pass downwards through this backwater into the sea. The Cochin River is 800 yards in width.

During the south-west monsoon, which lasts from the commencement of June until the middle of August, an immense amount of fresh water finds its exit by these rivers; and it is said that the sea, for sometimes as much as two miles from the shore, is comparatively saltless. Of course, at this period, whole tribes of fish migrate, whilst others take their place.

The exact amount of salt fish exported from British and Native Cochin I have been unable to ascertain; but in the neighbouring state of Travancore the average yearly exports by land and sea are a little above 44,000 bundles, of about the declared value of £3150. Ceylon is the chief market for salt fish; and, off British Cochin, Ceylonese boats may frequently be perceived scudding along, their occupants capturing the fish, which, after having salted, they carry back to their own country. A heavy salt-tax renders the outlay necessary for the purchase of any quantity of this condiment almost an impossibility to the poor fishermen of the coast; it is consequently only the moneyed man who can engage in the curing of fish. But large taxes on its sea export, duties on its transit along the backwater, vexatious scrutinies and detentions at the various Custom Houses do not conduce to the success of this trade.

The Mackerel, Saw-fish, Rays, Sharks, and the *Chirocentrus dorab* are those most commonly salted; whilst the Sardines, which sometimes appear in enormous numbers, are turned into fish-oil, although the manufacturer of this article is not very particular as to the exact species which finds its way into his boiling-pot. These fisheries, which might be made extensively available for increasing the amount of human food, have been applied to quite another use, although one which is very profitable to Europe. As the market for fish has increased, the supply has kept pace with the demand; and the greater part of those not consumed when fresh are manufactured into oil, as the following figures of the exports and imports of British Cochin will demonstrate:—

Fish-oil.	Imported. cwt.	Exported. cwt.
In five years ending 1845, 1846....	36	66
„ „ 1850, 1851....	912	3,586
„ „ 1855, 1856....	31,196	91,077
„ „ 1860, 1861....	24,142	98,151

The livers of the Sharks and Rays also afford excellent oil, which is used in the Government hospitals as a substitute for cod-liver oil. This was formerly manufactured in British Cochin; but for the last few years has been so at Calicut. Two species of fish-roes are extensively sold, those most esteemed when fresh being the small ones of the *Hemiramphus*, whilst the largest are taken from the Mulletts; these last are often dried and even exported. I was unable to ascertain that isinglass had ever been made in Cochin; but remarks on the uses to which the various fish are put will be placed with the respective species.

In Europe, from very early ages, fisheries have been protected by

legislative enactment; but in India they have not yet met with the attention they deserve. Along the Malabar coast, since fish have obtained such a ready market, the number of fishermen has greatly increased, and instead of there being, as formerly, competition for the post of panlanquin-bearers, they are procured with the greatest difficulty, which no doubt is partly owing to the augmented profits of the fishermen.

The Western Ghauts are gradually becoming studded with coffee-plantations, and the coolies employed on them are glad to purchase all the salt fish they can obtain. Probably, at no distant date, the coffee-planter will unite with the philanthropist in desiring that the western-coast fisheries may be turned to greater advantage for the supply of human food. The first step towards this desirable result must be some diminution or alteration in the salt-tax, or rather in the price of salt, which is now a monopoly of the British and native governments. But this is a subject for the politician and financier, not for the naturalist, to solve; but such a result would undoubtedly prove to Malabar humane, beneficial, and politic.

**LATES CALCARIFER, Bloch.**

*Nuddee-meen* (Malayalim).

B. vii. D.  $7\frac{1}{11}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{3}{8-9}$ . C. 17. L. l. 52. L. tr.  $\frac{7}{11}$ .

Length of specimens\*, from  $6\frac{5}{10}$  to  $22\frac{4}{10}$  inches.

This large grey Perch is well entitled to his distinctive native name of "The River-fish," for in Cochin it must be ranked as amongst the best of the finny tribes. It is also called the "Nair-fish," because the Nairs, although Sudras, are considered the nobility of Malabar.

Plentiful; but held in too great a request for the table to be salted or dried. The best quality of "Tamarind-fish" is prepared from it by the following process:—The fish is boiled, then the bones are removed; it is next sliced, and, having been highly spiced, is left to soak for some days, and subsequently packed in jars. This is held in great estimation in the East.

It is caught up to 5 feet in length; but the largest fish are not the best for eating.

**SERRANUS BONTOO, Cuv. & Val.**

B. vii. D.  $\frac{11}{16}$ . P. 19. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 17. L. r. † about 100.

Length of specimen 13 inches.

*Colours.* Brownish grey on the back, fading to dirty white on the abdomen. When first caught, they have generally five or six dark

\* These figures denote the largest and smallest specimens in my collection, but not the largest obtained in Cochin.

† L. r. is used in this paper to denote the number of rows of scales, *passing downwards* to the lateral line; and L. l. the number of scales *along* the lateral line.

vertical bands; but these fade after death. The whole of the body and fins are covered with round black spots, in some places amounting to blotches. Iris olive-green, with a golden margin.

Not very common; do not appear to attain any very large size; are good eating.

*SERRANUS SEXFASCIATUS*, Cuv. & Val.

B. vii. D.  $\frac{11-12}{16}$ . P. 18. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 17. L. r. about 100.

Length of specimens from 5 to  $7\frac{6}{10}$  inches.

One specimen has twelve dorsal spines and sixteen rays; consequently it is not an undeviating rule in this genus that, should one spinous ray be in excess, there will be a corresponding soft ray deficient.

Common. General length about 5 inches; rarely, if ever, exceeding 8.

*SERRANUS DIACANTHUS*, Cuv. & Val.

*Killi meen* (Mal.).

B. vii. D.  $\frac{11}{15}$ . P. 19. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 16. L. r. 90.

Length of specimens from  $5\frac{7}{10}$  to 13 inches.

*Colours.* Brownish, fading into white on the abdomen. The whole of the fish, even over its branchiostegous rays, covered with bright orange spots, intermingled with brown ones on the head and tail. Fresh specimens have five vertical bands, which often fade after death. In the young fish these bands are more distinct and persistent; whilst the general ground-colour is leaden, and the orange spots less marked.

Plentiful; excellent eating; and fish from 10 to 15 lbs. weight are considered of fair size, but they grow much larger.

*SERRANUS LANCEOLATUS*, Bloch.

*Serranus horridus*, Cuv. & Val.

*Kurrupu* (Mal.).

B. vii. D.  $\frac{11}{15}$ . P. 19. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 17. L. r. 90 to 105.

Length of specimens  $7\frac{5}{10}$ ,  $13\frac{1}{10}$ , and  $22\frac{7}{10}$  inches.

The *Serranus lanceolatus* and the *S. horridus* have been so accurately described by Cantor and others that a recapitulation appears to be unnecessary. In the smallest of these three specimens the comparative length of the spines exceeds the proportion to that of the soft rays which exists in the larger specimens. But the same alteration of the comparative length with age also obtains in the young specimens of the *S. diacanthus*.

*Colours.* These vary exceedingly with the age of the fish, so much so that the beautiful young has been named *S. lanceolatus*, and the old *S. horridus*; whilst, curiously enough, not only do the Malays (according to Cantor) recognize this fish, the "Ikan krapu," as being the same in both its liveries, but so do also the natives of Malabar.

There is one very distinctive portion of its coloration that appears hardly to vary, whether examined in the smallest specimens or those at least up to 20 lbs. weight: it is that of the pectoral, ventral, anal, and caudal fins, which are of a bright gamboge, with black spots or blotches, sometimes coalescing and forming arched bands. Cantor mentions that in the adult *S. horridus* the colours of the fins become greenish olive; but in a specimen 4 feet 3 inches long, which he describes, they were the same as given above.

The very young fish, of which there are several in the Government Museum at Madras, are of a fine citron or sulphur ground-colour, with irregular black bands or markings, which become more distinct as the size of the fish increases.

In a beautiful specimen,  $7\frac{1}{2}$  inches in length, captured in Cochin in 1863, the ground-colour of the body and fins is of a bright gamboge, with five vertical blackish-blue bands,—the first passing from the orbit directly downwards over the præoperculum; the second from the crown of the head downwards over the operculum, and slightly impinging on the præoperculum, becomes lost in the first band anteriorly and the third posteriorly; the third, commencing in the space between the third and tenth dorsal spines, passes downwards and, narrowing, joins the second band in front, whilst below it is continued on to the abdomen; the fourth band extends from the fifth to the last soft ray of the dorsal, and passes downwards to the whole base of the anal; the fifth band covers most of the space between the caudal and the termination of the dorsal and anal fins. The fins are of the same bright yellow ground-colour as the body, with black spots or blotches forming confluent lines near their base; whilst on the pectorals they are disposed in three or four arched undulating bands. Large black blotches exist on the jaws. Iris golden.

In a fine specimen, over 13 inches in length, captured at Cochin in November 1863, the same distribution of coloration is perceptible; but its vividness has begun to fade, and marbling can be distinctly perceived over the whole of the yellow ground, whilst the dark tints of the bands have much lessened. It must also be remarked that, in this specimen, the comparative length of the dorsal spines to the rays has become the same as in the adult hitherto known as the *S. horridus*.

In a specimen captured in Cochin in 1862, nearly 23 inches in length, the adult livery of the *S. horridus* is perceptible. Back brownish, gradually fading into grey over the abdomen, the whole being marbled with darkish grey lines. The spinous portion of the dorsal brownish yellow, with a dark base. The soft portion of pectoral, ventral, anal, and caudal the same as in the younger specimens. Iris brown, with a golden rim.

This fish, which is excellent eating, is never rare at Cochin, but is mostly captured in the monsoon months: one, in 1861, was of about 20 lbs. weight. Cantor observes that it grows in the Straits to a gigantic size, and instances a specimen captured at Pinang, the weight of which exceeded 130 lbs.

**GENYOROGE NOTATA**, Cuv. & Val.

B. vii. D.  $\frac{10}{14}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 19. L. l. 52. L. tr.  $\frac{8}{14}$ .

Length of specimens from  $3\frac{6}{10}$  to 6 inches.

Not uncommon; do not appear to grow to a large size.

**GENYOROGE CÆRULEOPUNCTATA**, Cuv. & Val.

B. vii. D.  $\frac{10}{15}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 17. L. l. 45-50. L. tr.  $\frac{9}{15}$ .

Length of specimens from  $4\frac{5}{10}$  to 6 inches.

Not common; mostly captured in the monsoon months. Do not appear to grow very large at Cochin; but in the Madras Museum are some of a great size.

**MESOPRION JOHNNI**, Bloch.

*Chembolay* (Mal.).

B. vii. D.  $\frac{10}{14}$ . P. 18. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 16. L. l. 48. L. tr.  $\frac{7}{10}$ .

Length of specimens from  $2\frac{5}{10}$  to  $10\frac{5}{10}$  inches.

The intensity of the coloration of this fish very much decreases with age. A specimen,  $2\frac{1}{2}$  inches in length, is of a beautiful golden colour, with an intense black finger-mark, extending from the lateral line to the fourth scale above and the second below it. In very old specimens the golden metallic lustre of the scales is almost gone.

Very common; grow to a large size, and are good eating.

**MESOPRION AUROLINEATUS**, Cuv. & Val.

B. vii. D.  $\frac{10}{13}$ . P. 16. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 17. L. l. 46. L. tr.  $\frac{7}{13}$ .

inches.

Length of specimen.....	$4\frac{5}{10}$ .	
—— of head .....	$1\frac{2}{10}$ ,	or four-fifteenths of total length.
—— of pectoral .....	1,	or two-ninths of total length.
—— of caudal.....	$\frac{8}{10}$ ,	or one-sixth of total length.
—— of base of dorsal..	$1\frac{8}{10}$ ,	or one-third of total length.
—— of anal.....	$\frac{6}{10}$ ,	or one-eighth of total length.
Height of head .....	$\frac{9}{10}$ ,	or one-sixth of total length.
—— of body .....	$1\frac{3}{10}$ ,	or one-third of total length.
—— of hard dorsal....	$\frac{11}{20}$ ,	or one-fourth of total length.
—— of soft dorsal ....	$\frac{7}{20}$ ,	or one-sixth of total length.
—— of base of caudal..	$\frac{4}{10}$ ,	or one-eleventh of total length.
—— of ventral.....	$\frac{7}{10}$ ,	or one-sixth of total length.
—— of anal.....	$\frac{6}{10}$ ,	or one-eighth of total length.

Diameter of eye  $\frac{7}{20}$  inch, or  $\frac{2}{7}$  of the length of the head,  $\frac{4}{10}$  inch from end of snout,  $\frac{2}{10}$  apart, situated close to the upper margin of profile.

The profile rises very slightly from the snout to dorsal fin; the line of the abdomen is rather straight. Lower jaw slightly the longest. Superior maxillary bones extend as far backwards as the



anterior margin of the orbit. The openings of the nostrils rather wide apart, and opposite the upper fourth of the orbit. Præorbital entire. Præoperculum finely serrated on the posterior edge of its vertical limb, very slightly emarginate opposite the interoperculum, curved at its angle, where the serrations become coarser, but they decrease again as they approach the anterior end of the lower limb, which is slightly oblique. Sub- and inter-opercula entire. Operculum with two points, hardly to be termed spines, and terminating in an acute fleshy extremity. Scales on the opercula; but none either between or in front of the orbits. Two broad bands of scales pass over the shoulders, separated by two or three rows of smaller ones. Suprascapular denticulated; scapular and humeral entire.

*Teeth.* An external row of large sharp teeth in the lower jaw, and several villiform rows in the centre. Upper jaw the same; intermaxillaries crowded with small teeth *en velour*, and having two canines on either side, the external of which is curved and very large in comparison to the size of the fish.

*Fins.* Origin of dorsal and pectoral in a line, the latter reaching as far backwards as the anal; ventral slightly behind pectoral; anal arises opposite third soft ray of dorsal; pectoral pointed; soft portions of dorsal and anal rounded; caudal slightly emarginate; ventral pointed, first soft ray prolonged.

Dorsal spines rather strong: first  $\frac{2}{10}$  inch; second  $\frac{4}{10}$ ; third  $\frac{5}{10}$ ; fourth very slightly longer; thence they decrease to the last, which is  $\frac{4}{10}$  inch. Ventral spine weak,  $\frac{9}{20}$  inch long. Anal, second spine much the longest and strongest; first  $\frac{5}{20}$  inch; second  $\frac{5}{10}$ ; third  $\frac{9}{20}$ .

*Scales.* Longest diameter from above downwards; above the lateral line they run in an ascending backward series of rows to the base of the dorsal until the end of that fin, when they pass parallel with back. Below the lateral line the first four rows run horizontally, terminating in the lateral line; the next five or six pass direct towards the caudal. Consequently the row commencing at the humerus is the superior one at the tail.

Lateral line passes parallel with the back in its upper third.

*Colours.* Back olive, shot with yellow. Abdomen yellow, with several horizontal brilliant golden lines; these lines are divided by a darker one running along the centre of each row of scales, so that each golden one is on parts of two. A large, very black mark exists on the lateral line, commencing at the twenty-second, and continued until the thirty-first scale; it extends below the lateral line for three rows, and above it for one and a half. Dorsal and pectoral olive; caudal and anal olive-yellow; ventrals golden. Iris golden.

Rare in Cochin. The foregoing was the only one obtained; a second was frequently searched for, but invariably without success.

#### MESOPRION RANGUS, Cuv. & Val.

B. vii. D.  $\frac{10}{14}$ . P. 16. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 16.  $\frac{3}{3}$ . L. l. 46. L. tr.  $\frac{7}{15}$ .

Length of specimens from 7 to 9 inches.

Very common; grow to a large size; are excellent eating.

## MESOPRION SILLA00, Cuv. &amp; Val.

B. vii. D.  $\frac{10}{13}$ . P. 16. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 17. L. l. 50. L. tr.  $\frac{7}{12}$ .

inches.

Length of specimens from  $11\frac{9}{10}$  to  $19\frac{5}{10}$  inches.

———— of head . . . . .  $5\frac{6}{10}$ , or two-sevenths of total length.

———— of pectoral . . . . .  $4\frac{5}{10}$ , or one-fourth of total length.

———— of caudal . . . . .  $3\frac{2}{10}$ , or one-sixth of total length.

———— of base of dorsal . . . . .  $7\frac{6}{10}$ , or two-fifths of total length.

———— of base of anal . . . . .  $2\frac{2}{10}$ , or one-ninth of total length.

Height of head . . . . .  $4\frac{2}{10}$ , or one-fourth of total length.

———— of body . . . . .  $5\frac{6}{10}$ , or two-sevenths of total length.

———— of hard dorsal . . . . . 2, or two-nineteenths of total length.

———— of soft dorsal . . . . .  $4\frac{8}{10}$ , or one-fourth of total length.

———— of base of caudal . . . . . 2, or two-nineteenths of total length.

———— of ventral . . . . . 3, or two-thirteenths of total length.

———— of anal . . . . .  $2\frac{1}{10}$ , or one-ninth of total length.

Diameter of eye  $1\frac{2}{10} \times 1$  inch, or  $\frac{1}{5} \times \frac{1}{6}$  of length of head,  $2\frac{1}{10}$  from end of snout, 1 inch apart.

Profile gradually rises to the dorsal; but a slight concavity exists over the nostrils. Lower jaw a little the longest. The superior maxillary bone extends as far backwards as opposite the anterior third of the orbit. Præoperculum, posterior limb nearly vertical in its upper half, which is entire, then emarginate to receive a knob of the interoperculum, and at this spot it is very finely serrated; angle rounded, with about six very blunt denticulations; lower limb horizontal and very short. Sub- and inter-opercula entire; a protuberance on the upper angle of the latter. Operculum with two blunted points; no spines. No scales between or before the orbits. Arched double row of scales over the nape very conspicuous. Suprascapular scale veined, but entire. Scapular and coracoid bones entire.

*Teeth.* Canines large,  $\frac{3}{10}$ ths of an inch exposed; an external row of conical teeth in both jaws; two or three rows of villiform in intermaxillaries and upper jaw. A very few villiform teeth in lower jaw, and only in its anterior portion. Numerous and fine villiform teeth on vomer and palate.

*Fins.* Origin of dorsal and ventral in a line; pectoral slightly in advance; anal arises opposite first or second soft ray of dorsal; pectoral, pointed, does not reach so far as anal by  $\frac{8}{10}$ ths of an inch; ventral pointed.

Dorsal spines not very strong, base of spinous portion  $4\frac{4}{10}$  of total length; interspinous membrane rather deeply notched: first spine  $\frac{7}{10}$  inch; second  $1\frac{6}{10}$ ; third 2; fourth 2; fifth  $1\frac{8}{10}$ ; thence they decrease to the ninth, which is  $1\frac{1}{10}$ ; tenth  $1\frac{3}{10}$ . Ventral spine weak,  $1\frac{5}{10}$  inch. Anal spines rather strong: first  $\frac{5}{10}$  inch; second  $1\frac{1}{10}$ , and slightly the strongest; third  $1\frac{3}{10}$ .

Scales passing in longitudinal rows, both above and below the lateral line. Opposite the termination of the soft dorsal, they become slightly undulating in their course.

Lateral line passes parallel with the back in the upper quarter of the body.

*Colours.* These do not vary very much, except that in the young fish they are rather brighter; and also it must be noted that they soon commence to fade after the fish has been taken out of the water; then the brilliancy of its red decreases, and its back becomes rather brownish grey. Each scale is rather darker at its base than at its margin. Below the lateral line it is of a bright deep lake-colour, above of a brownish red, with the base of each scale of a greyish-ash or brown colour. Under surface of the throat and chest scarlet, with a shade of orange. Cheeks orange scarlet. A bright blue zigzag line passes along either side of the snout on the lower margin of the præorbital and suborbital ring of bones. Hard portion of dorsal brownish grey; soft, of an orange scarlet. Anal, hard portion greyish, soft scarlet. Caudal scarlet. Pectoral scarlet, stained with darker at its margins. Eye bluish grey, with a golden-red centre.

Common at Cochin; excellent eating; and grows to a large size.

### MESOPRION RUBELLUS, Cuv. & Val.

B. vii. D.  $\frac{10}{14}$ . P. 16. V.  $\frac{1}{5}$ . A.  $\frac{3}{8-9}$ . C. 17  $\frac{4}{4}$ . L. l. 46. L. tr.  $\frac{7}{13}$ .

inches.

Length of specimen . . . . .	17 $\frac{1}{2}$ .
—— of head . . . . .	5 $\frac{4}{10}$ , or two-sevenths of total length.
—— of pectoral . . . . .	4 $\frac{3}{10}$ , or one-fourth of total length.
—— of caudal . . . . .	3 $\frac{2}{10}$ , or two-elevenths of total length.
—— of base of dorsal . . . . .	7 $\frac{3}{10}$ , or two-fifths of total length.
—— of base of anal . . . . .	2, or one-ninth of total length.
Height of head . . . . .	4, or two-ninths of total length.
—— of body . . . . .	5 $\frac{3}{10}$ , or two-sevenths of total length.
—— of hard dorsal . . . . .	2 $\frac{2}{10}$ , or one-ninth of total length.
—— of soft dorsal . . . . .	2, or one-ninth of total length.
—— of base of caudal . . . . .	1 $\frac{8}{10}$ , or one-tenth of total length.
—— of ventral . . . . .	3, or one-sixth of total length.
—— of anal . . . . .	2 $\frac{4}{10}$ , or one-ninth of total length.

Diameter of eye  $1\frac{1}{10} \times \frac{9}{10}$  inch, or  $\frac{1}{5} \times \frac{1}{6}$  of length of head,  $\frac{9}{10}$  apart,  $1\frac{9}{10}$  from end of snout.

A very considerable rise from the snout to the commencement of the dorsal fin. Lower jaw very slightly the longest. Superior maxillary bones reach to opposite the anterior one-third of the orbit. Præoperculum almost vertical in the upper portion of its ascending limb; in the lower third (opposite the interoperculum) slightly emarginate, finely serrated in the whole of its extent; angle slightly rounded, with three or four blunt denticulations; lower limb oblique, entire. Sub- and inter-opercula entire. Two very blunt points to operculum; no spines. Suprascapular serrated. Scapular and coracoid entire. No knob to the interoperculum.

*Teeth.* Canines, exposed portion  $\frac{2}{10}$  inch. An external series of large conical teeth in lower jaw, and also in the upper, but smaller.

Villiform teeth in both jaws; most numerous in the upper. Fine villiform teeth in vomer and palate.

*Fins.* Origin of dorsal, pectoral, and ventral on a line. Anal arises opposite about the third soft ray of dorsal.

Dorsal spines moderately strong; interspinous membrane very slightly notched; first dorsal spine  $\frac{6}{10}$  inch; second  $1\frac{9}{10}$ ; third  $2\frac{2}{10}$ ; fourth a little shorter; and they decrease to the last, which is  $\frac{1.9}{20}$ . Ventral spine weak,  $1\frac{8}{10}$  inch. Anal spines, first  $\frac{5}{10}$  inch; second 1, and much the strongest; third  $1\frac{3}{20}$ . Pectoral pointed, and reaching upwards of half an inch beyond the origin of the anal. Ventral pointed; first soft ray prolonged. Anal rather pointed. Caudal truncated.

Scales in horizontal lines, both above and below the lateral line.

Lateral line, in upper third of the body, following the curve of the back the whole way to just beyond the termination of the soft dorsal, when it proceeds direct to the caudal, which it reaches above its centre.

*Colours.* Back greyish brown. Chest orange. Abdomen and sides of a light violet, each scale tipped with white. Cheeks orange; scales also white on their exteriors. Eye silvery, with a golden rim round the pupil. Hard dorsal greyish; soft dorsal yellowish grey. Caudal brownish. Pectoral with a tinge of red. Anal, hard portion greyish; soft yellowish grey. Ventrals greyish, with an orange base.

Common; excellent eating.

**MESOPRION FULVIFLAMMA, Forsk.**

B. vii. D.  $\frac{10}{14}$ . P. 16. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 17. L. l. 43. L. tr.  $\frac{7}{16}$ .

Length of specimen  $2\frac{2}{10}$  inches.

**AMBASSIS COMMERSONII, Cuv. & Val.**

*Aranyee* (Mal.).

B. vi. D.  $7\frac{1}{10}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{9}$ . C. 17. L. l. 33. L. tr.  $\frac{5}{12}$ .

Length of specimens from 3 to 7 inches.

Common in all pieces of fresh and brackish water. They are eaten by the natives.

**AMBASSIS DUSSUMIERI, Cuv. & Val.**

B. vi. D.  $7\frac{1}{9}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{10}$ . C. 17. L. l. 27. L. tr.  $\frac{3}{6}$ .

Length of specimen  $2\frac{4}{10}$  inches.

Scales not so deciduous in this as in some of the other species.

Lateral line interrupted.

**AMBASSIS NALUA, Buch. Ham. ?**

*Aranyee* (Mal.).

B. vi. D.  $7\frac{1}{10}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{9}$ . C. 17. L. l. 30. L. tr.  $\frac{5}{12}$ .

Length of specimen  $3\frac{1}{10}$  inches.

Inferior margin of interoperculum strongly denticulated : thus with the double denticulated edge of the præoperculum and the denticulations on the interoperculum there are three parallel lines of teeth in this species. A sharp spine directed backwards at the posterior superior angle of the orbit ; and two or three more along its posterior edge, but separated from the first by a notch. Ventral spine comparatively long, reaching close to the origin of the anal, whilst its soft rays extend as far as the third anal spine.

Length of head one-third of the total ; height of body two-sevenths of total length ; second dorsal spine two-thirds the height of body ; second anal spine half the height of body.

**THERAPON TRIVITTATUS, Buch. Ham.**

*Keetcha* (Mal.).

B. vi. D.  $\frac{12}{10}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{9}$ . C. 15. L. l. 95. L. tr.  $\frac{12}{24}$ .

Length of specimens from  $2\frac{6}{10}$  to  $4\frac{4}{10}$  inches.

All the Therapons are indiscriminately termed *Keetcha*, and, unless by the poorest of the population, are utterly rejected as food, as they are reputed to prey on any corpses that may be floating in the backwater. They do not, in Cochin, attain to the size they are found in Madras.

**THERAPON SERVUS, Bloch.**

*Keetcha* (Mal.).

B. vi. D. 11/10. P. 13. V. 1/5. A. 3/8. C. 17. L. l. 82. L. tr. 12/27.

Length of specimens from  $2\frac{1}{10}$  to 7 inches.

**THERAPON THERAPS, Cuv. & Val.**

*Keetcha*, Mal.

B. vi. D. 12/10. P. 15. V. 1/5. A. 3/8. C. 17. L. l. 50. L. tr. 10/14.

Length of specimen  $4\frac{9}{10}$  inches.

**PRISTIPOMA MACULATUM, Bloch.**

B. vii. D.  $11\frac{1}{11-14}$ . P. 17. V. 1/5. A. 3/7. C. 17. L. l. 52. L. tr. 8/12.

Length of specimens from  $2\frac{7}{10}$  to 7 inches.

Common ; not esteemed as food.

**PRISTIPOMA HASTA, Bloch.**

B. vii. D. 12/14. P. 17. V. 1/5. A. 3/7. C. 17. L. l. 47. L. tr. 7/10.

Length of specimens from  $2\frac{5}{10}$  to  $7\frac{3}{10}$  inches.

Common ; does not grow to a large size ; eaten by the natives.

**DIAGRAMMA NIGRUM, Cantor.***Diagramma affine* (Günther).B. vii. D. 14/16. P. 16. V. 1/5. A. 3/7. C. 17. L. 1. 47.  
L. tr. 10/17.Length of specimens from  $8\frac{5}{10}$  to 21 inches.Excellent eating; usually comes in vast numbers about July, when the *Chrysophrys calamara*, up to that time abundant, has entirely disappeared.**LOBOTES SURINAMENSIS, Bloch.***Parrandee*, Mal.B. vii. D. 12/15. P. 17. V. 1/5. A. 3/11. C. 18. L. 1. 48.  
L. tr. 8/16.Length of specimens from  $2\frac{1}{10}$  to 13 inches.

Small specimens are very common, and always have the caudal deeply margined with white. Large ones are good eating.

**SCOLOPSIS JAPONICUS, Bloch.**B. vi. D. 10/9. P. 15. V. 1/5. A. 3/7. C. 17. L. 1. 44.  
L. tr. 5/12.Length of specimen  $3\frac{1}{2}$  inches.

Rare.

**SYNAGRIS GRAMMICUS, Day, sp. nov.**B. vi. D. 10/10. P. 17. V. 1/5. A. 3/7. C. 17. L. 1. 48.  
L. tr. 4/10.

	inches.
Length of specimen . . . . .	$7\frac{2}{10}$ .
——— of head . . . . .	$1\frac{6}{10}$ , or two-ninths of total length.
——— of pectoral . . . . .	$1\frac{4}{10}$ , or one-fifth of total length.
——— of caudal . . . . .	$1\frac{9}{10}$ , or one-fourth of total length.
——— of base of dorsal . . . . .	$2\frac{6}{10}$ , or one-third of total length.
——— of base of anal . . . . .	$\frac{8}{10}$ , or one-ninth of total length.
Height of head . . . . .	$1\frac{4}{10}$ , or one-fifth of total length.
——— of body . . . . .	$1\frac{8}{10}$ , or one-fourth of total length.
——— of hard dorsal . . . . .	$\frac{1}{10}$ , or one-tenth of total length.
——— of soft dorsal . . . . .	$\frac{8}{10}$ , or one-ninth of total length.
——— of base of caudal . . . . .	$\frac{9}{20}$ , or one-eighth of total length.
——— of ventral . . . . .	$\frac{8}{10}$ , or one-ninth of total length.
——— of anal . . . . .	$\frac{7}{10}$ , or one-tenth of total length.

Diameter of eye  $\frac{5}{10} \times \frac{9}{20}$  inch, or  $\frac{1}{3} \times \frac{1}{4}$  of length of head.

Nape short; profile convex from snout to dorsal. Lower jaw longest. Upper jaw reaches to anterior third of orbit. Præoperculum, posterior limb nearly vertical, and finely serrated in its lower half, whilst from between each serration a fine furrow runs a short way downwards and forwards; angle rounded and entire; lower limb horizontal and entire; the lower part of the præoperculum is

furrowed. Sub- and inter-opercula entire. Operculum ending in a blunt point. Præorbital large, entire, but furrowed downwards and backwards. Upper margin of orbit close to profile. Shoulder-bones entire. Three rows of scales between the orbit and margin of the præoperculum; no scales between or before the orbits. Intermaxillaries nearly four-tenths of an inch in length, and protrusible. Nostrials close to anterior superior margin of the eye, not far apart, anterior rather the largest. Three oval facets in anterior half of the under surface of the lower jaw, the posterior of which is the largest.

*Teeth.* An external row of six curved conical teeth in intermaxillary bones, with villiform ones behind and extending all along both upper and lower jaw, in which last they are equal in size, close together, and in about five rows.

*Fins.* Dorsal commences over pectoral, which is slightly in advance of ventral. Anal arises opposite about second soft ray of dorsal.

Dorsal, spinous portion  $1\frac{4}{10}$  inches in extent; interspinous membrane not notched. Spines weak: first  $\frac{4}{10}$  inch; second  $\frac{5}{10}$ ; third  $\frac{6}{10}$ ; they continue much the same to the tenth, which is slightly more. Ventral spine weak,  $\frac{4}{10}$  inch; first soft ray prolonged. Anal spines weak: first  $\frac{5}{20}$  inch; second  $\frac{1}{20}$ ; third  $\frac{1}{20}$ . The hard portion of the dorsal and anal, and also a part of the soft portion, can be laid flat in a groove on the back. Caudal deeply emarginate, the first and second rays on either side being prolonged. Pectoral pointed, reaching as far as the first soft ray of anal.

Scales large, arranged in longitudinal rows; none on any of the fins except the base of pectoral and caudal. The scales above the lateral line are rather smaller than those below it.

Lateral line runs parallel with the back in the upper fifth of the body.

*Colours.* Of a yellowish ground-colour, with reddish longitudinal lines. Upper portion of head and opercula of a dull reddish colour; throat, chin, and chest yellowish; back dull reddish, with darker longitudinal lines running along the centre of each row of scales. Below the lateral line, ground-colour yellowish, and the longitudinal lines not so deep in colour as those above. Dorsal fin yellowish, with a grey base and pinkish exterior. Caudal reddish, stained at the tip with grey. Anal yellowish, with a grey base, and two reddish stripes along the centre of its foremost part. Ventrals yellowish, with a grey base and yellow centre. Pectoral reddish yellow. Eyes golden.

Rare at Cochin.

UPENEOIDES VITTATUS, Forskål.

*Cheerul* (Mal.).

B. iv. D. 8  $\frac{1}{8}$ . P. 17. V.  $\frac{1}{5}$ . A. 7. C. 15. L. 1. 38.  
L. tr.  $\frac{3}{5}$ .

Length of specimens from  $3\frac{5}{10}$  to  $6\frac{3}{10}$  inches.  
Common.

**CHRYSOPHRYS CALAMARA, Cuv. & Val.***Aree* (Mal.).B. vi. D. 11/11. P. 15. V. 1/5. A. 3/8. C. 17. L. l. 45.  
L. tr. 5/10.

Length of specimen 9 inches.

Very common until July, when they give place to the *Diagramma nigrum*: both are known as the "Black Rock-fish." They are excellent eating.**CHRYSOPHRYS HASTA, Bloch, Schn.**B. vi. D. 11/11. P. 15. V. 1/5. A. 3/8. C. 17. L. l. 48.  
L. tr. 5/9.Length of specimen  $5\frac{3}{10}$  inches.Rare; whilst the *C. sarba*, so common at Madras, seems unknown at Cochin.**CHÆTODON PRETEXTATUS, Cantor.**B. vi. D.  $\frac{12}{27}$ . P. 15. V. 1/5. A. 3/20. C. 17.Length of specimens from  $3\frac{1}{10}$  to  $3\frac{3}{10}$  inches.

Common for about a fortnight in June, after the commencement of the monsoon. They are taken in the Chinese nets at the side of the river. Never much exceed 3 or 4 inches in length. They are not esteemed by even the natives for eating.

**HENIOCHUS MACROLEPIDOTUS, Artedi.***Purroamee* (Mal.).B. v. D. 11/25. P. 17. V. 1/5. A. 3/18. C. 17. L. l. 60.  
L. tr. 9/22.Length of specimens from  $2\frac{6}{10}$  to  $4\frac{5}{10}$  inches.

Common at times; are not found large.

**SCATOPHAGUS ARGUS, L. Gm.***Nutchar char* (Mal.).

B. vi. D. 10 1/16. P. 15. V. 1/5. A. 4/14. C. 16.

Length of specimens from  $1\frac{1}{10}$  to  $4\frac{6}{10}$  inches.

Only eaten by the lower classes, as they are reputed to be very foul feeders.

**EPHIPPIUS ORBIS, Bloch.**

B. vi. D. 9/19. P. 19. V. 1/5. A. 3/5. C. 19.

Length of specimen  $3\frac{8}{10}$  inches.

Rare at Cochin.

**DREPANE PUNCTATA, L. Gm.***Pündthee* (Mal.).

B. vi. D. 8/20. P. 17. V. 1/5. C. 3/17. L. l. 50. L. tr. 14/33.



Length of specimen from  $2\frac{8}{10}$  to 6 inches.

Not uncommon in Cochin. At Aden, in February 1864, very fine specimens were brought by the fishermen for sale.

*PTEROIS VOLITANS*, L. Gm.

*Purroah* (Mal.).

B. vii. D.  $12\frac{1}{10-11}$ . P. 14. V.  $1/5$ . A.  $3/6$ . C. 13.

Length of specimens from  $7\frac{3}{10}$  to  $7\frac{5}{10}$  inches.

Not uncommon.

*PTEROIS MILES*, Bennett.

*P. miles*, Cantor.

B. vii. D.  $12\frac{1}{11-12}$ . P. 12. V.  $1/5$ . A.  $3/7$ . C. 14.

Length of specimens from  $10\frac{1}{2}$  to  $11\frac{1}{2}$  inches.

*Head.* Between and internal to the two nasal orifices is a sharp spine, directed upwards and backwards; there are some roughnesses along the upper margin of the orbit (which in old specimens become spiniferous), and one large spine at the posterior superior angle of the orbit. The temporal ridge, commencing about the centre of the posterior margin of the orbit, is spiny in the whole of its course towards the lateral line. The space between the orbits is shallow, and rather concave from side to side; down its centre runs a deep groove, continued anteriorly as far as the intermaxillary bones, whilst posteriorly it expands over the occiput, where it is bordered on either side by an outwardly curved blade-like crest, flattened from side to side, and which terminates in its posterior superior part in two large flat spines; these in old specimens become several badly marked spines. The ridge on the præorbital and infraorbital bones is spiny; it proceeds downwards over the cheeks towards the angle of the præoperculum, from which arise three spines, the superior of which is directed backwards, the two inferior backwards and downwards. In old subjects this ridge is very rugged, and, instead of having a single row of spines, it has two or three rows of smaller ones, consequently much increasing its width. At the centre of the supraorbital ridge is a prominence, from which arises a fleshy filament in young specimens, which is half the diameter of the eye, but appears to become shorter with age; there is generally another at the angle of the mouth, and some others at the inferior margin of the præoperculum.

Mouth horizontal; superior maxillary bones do not reach as far as the anterior margin of the orbit. Præoperculum, posterior limb slightly oblique, angle rounded, and with three large spines; lower limb nearly horizontal, entire. Sub- and inter-opercula entire. Operculum having a blunt spinous extremity. Under surface of lower jaws grooved. Shoulder-bones entire in old specimens; two spines in upper portion of suprascapular.

This fish arrives at Cochin in the commencement of the monsoon; but it is not common. From one I took twenty-one specimens of

the *Atherina forskålii*, each from 2 to 3 inches in length; so gorged was it (its entire length being only  $11\frac{1}{2}$  inches) that the tail of one was protruding from its mouth.

**MINOUS MONODACTYLUS**, Bl., Schn.

B. vii. D.  $\frac{9-11}{13-9}$ . P. 11. V.  $\frac{1}{5}$ . A. 9—11. C. 10.

Length of specimens from  $2\frac{5}{10}$  to  $2\frac{7}{10}$  inches.

Very common.

**PROSOPODASYS DRACÆNA**, Cuv. & Val.

B. vii. D.  $3\frac{9}{8}$ . P. 13. V.  $\frac{1}{5}$ . A.  $\frac{3}{6}$ . C. 12.

Length of specimens from  $2\frac{3}{10}$  to  $2\frac{5}{10}$  inches.

Common.

**PLATYCEPHALUS INSIDIATOR**, Forsk.

B. vii. D.  $1\frac{7}{13}$ . P. 17. V.  $\frac{1}{5}$ . A. 13. C. 15. L. r. 94.  
L. tr.  $\frac{12}{24}$ .

Length of specimen 13 inches.

Common; eaten by the lower classes.

**PLATYCEPHALUS MALABARICUS**, Cuv. & Val.

B. vii. D.  $1\frac{8}{11}$ . P. 19. V.  $\frac{1}{5}$ . A. 12. C. 15. L. r. 85.  
L. tr.  $\frac{9}{20}$ .

Length of specimen  $10\frac{8}{10}$  inches.

Common. Both this and the last species, directly they are caught, are knocked on the head with a wooden mallet. They are known as the "Crocodile-fish."

**SILLAGO SIHAMA**, Forsk.

*Cuddeerah* (Mal.). Whiting.

B. vi. D.  $11\frac{1}{22}$ . P. 16. V.  $\frac{1}{5}$ . A.  $\frac{1}{23}$ . C. 17. L. l. 74. L. tr.  $\frac{7}{14}$ .

Length of specimens from  $3\frac{2}{3}$  to  $11\frac{6}{10}$  inches.

Common; good eating.

**UMBRINA DUSSUMIERI**, Cuv. & Val.

B. vii. D.  $10\frac{1}{24}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{2}{7}$ . C. 17. L. l. 48. L. tr.  $\frac{7}{19}$ .

Length of specimens from  $5\frac{1}{10}$  to  $5\frac{9}{10}$  inches.

Rare.

**SCIÆNA DIACANTHUS**, Lacép.

*Vüdah* (Mal.).

B. vii. D.  $10\frac{1}{23}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{2}{7}$ . C. 17. L. r. 53. L. tr.  $\frac{10}{14}$ .

Length of specimens from  $5\frac{5}{10}$  to  $15\frac{5}{10}$  inches.

Very common, and good eating.

The *Nella katchelée* of Russell, well represented in his plate,

no. 115, as the female of this fish, appears to me as requiring still further inquiry. The *S. diacanthus* is one of the most common fish in Cochin; but I only procured three specimens of the latter, which were as follows:—

B. vii. D.  $10\frac{1}{23-24}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{2}{7}$ . C. 15. L. r. 45. L. tr.  $\frac{7}{17}$ .  
Length of specimens from  $2\frac{7}{10}$  to  $6\frac{1}{10}$  inches.

*SCIÆNA MACULATA*, Bl., Sch.

B. vii. D.  $10\frac{1}{24}$ . P. 16. V.  $\frac{1}{5}$ . A.  $\frac{2}{7}$ . C. 17. L. l. 45. L. tr.  $\frac{11}{16}$ .  
Length of specimens from  $4\frac{3}{10}$  to  $4\frac{8}{10}$  inches.  
Air-bladder with fourteen or fifteen lateral processes on either side.  
Not common; not considered good eating.

*SCIÆNA DUSSUMIERI*, Cuv. & Val.

B. vii. D.  $10\frac{1}{29}$ . P. 18. V.  $\frac{1}{5}$ . A.  $\frac{2}{7}$ . C. 15. L. l. 52. L. tr.  $\frac{6}{15}$ .  
Length of specimens from  $5\frac{6}{10}$  to  $6\frac{5}{10}$  inches.

*SCIÆNA HYPOSTOMA*, Bleeker.

B. vii. D.  $9\frac{1}{31}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{2}{7}$ . C. 15. L. l. 45. L. tr.  $\frac{6}{11}$ .  
Length of specimen  $4\frac{8}{10}$  inches.

*OTOLITHUS RUBER*, Bl., Schn.

B. vii. D.  $10\frac{1}{30}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{2}{7}$ . C. 17. L. l. 50. L. tr.  $\frac{7}{17}$ .  
Length of specimen  $8\frac{5}{10}$  inches.  
Rare; not found of a large size.

*POLYNEMUS HEPTADACTYLUS*, Cuv. & Val.

B. vii. D.  $8\frac{1}{12}$ . P. 15 vii. V.  $\frac{1}{5}$ . A.  $\frac{3}{12}$ . L. l. 50. L. tr.  $\frac{5}{11}$ .  
Length of specimens from  $4\frac{2}{10}$  to  $4\frac{3}{10}$  inches.  
Very common in the monsoon time; but they do not appear ever to exceed 4 or 5 inches in length.

*POLYNEMUS SEXTARIUS*, Bloch.

B. vii. D.  $8\frac{1}{12}$ . P. 15 vi. V.  $\frac{1}{5}$ . A.  $\frac{3}{12}$ .  
Length of specimens  $2\frac{4}{5}$  inches.  
For several days during the monsoon they swarmed into the Cochin River; but all captured were young.

*POLYNEMUS INDICUS*, Shaw.

B. vii. D.  $8\frac{1}{13}$ . P. 20 v. V.  $\frac{1}{5}$ . A.  $\frac{2}{11-12}$ . C. 17. L. l. 62.  
L. tr.  $\frac{7}{13}$ .  
Length of specimens from  $4\frac{2}{10}$  to  $7\frac{5}{10}$  inches.

**POLYNEMUS TETRADACTYLUS**, Shaw.

B. vii. D.  $8\frac{1}{15}$ . P. 16 iv. V.  $\frac{1}{5}$ . A.  $\frac{2}{16}$ . C. 17. L. l. 75. L. tr.  $\frac{10}{14}$ .

Length of specimens from  $9\frac{8}{10}$  to 15 inches.

This fish grows to a very large size; and in the months of December and January numbers are captured by trolling. The bait is a small fish; and the hook is attached to the line by a piece of twisted brass wire. The line is thrown, direct from the hand, a distance of at least 20 or 30 yards into the breakers. Fish of several feet in length are thus caught by coolies after their working-hours.

Common, and excellent eating.

**SPHYRÆNA JELLO**, Cuv. & Val.

*Cheelahoo* (Mal.).

B. vii. D.  $5\frac{1}{9}$ . P. 14. V.  $\frac{1}{5}$ . A.  $\frac{1}{8}$ . C. 17.

Length of specimens from  $6\frac{2}{10}$  to  $8\frac{5}{10}$  inches.

**TRICHIURUS MALABARICUS**, Day, sp. nov.

B. vii. D. 132. P. 11.

Length of specimens from  $10\frac{5}{10}$  to 12 inches.

——— of head . . . . .  $1\frac{7}{10}$ , or one-seventh of total length.

——— of pectoral . . . . .  $\frac{5}{10}$ , or one twenty-fourth of total l.

Height of body . . . . .  $\frac{7}{10}$ , or one-seventeenth of total length.

——— of head . . . . .  $\frac{6}{10}$ , or one-twentieth of total length.

Diameter of eye  $\frac{7}{20}$  inch, or  $\frac{1}{5}$  of length of head;  $\frac{5}{10}$  inch from end of snout,  $\frac{2}{10}$  apart.

Lower jaw the longest. Superior maxillary bones reach to opposite first quarter of orbit. Operculum finely lined, extends backwards to above the pectoral fin. Præorbital large, entire, lined. Opening to nostril large, rather close to the anterior margin of the orbit, the upper margin of which is nearly horizontal, and close to the profile of the head.

*Teeth.* In intermaxillary bones three large canines; the anterior the longest, curved, directed forwards and downwards, barbed at its extremity; the two posterior ones, arising from the posterior margin of the intermaxillaries, are curved backwards and downwards; they are also slightly barbed at their extremities. An external row of about five fine teeth in intermaxillaries. A single row of about seven large pointed teeth, flattened from side to side, in maxillaries. In lower jaw a single row of pointed teeth, similar to those in superior maxillary, but smaller.

Dorsal fin commences to arise opposite commencement of operculum. Spines weak; they gradually increase in length until they are  $\frac{6}{10}$ ths of an inch, or nearly as long as the height of the body. Anal spines truncated at their extremity, and only visible with the aid of a magnifying-glass.

Lateral line curves downwards behind the pectoral, and runs at

first along the lower third of the body; subsequently it descends lower.

*Colours.* Silvery white, with a slight pinkish tinge; back a little the darkest. The first three or four dorsal spines have a black spot upon them; a line of greenish black, in very fine dots, extends along the upper third of the dorsal in its whole extent. Tail with a black margin. Eyes silvery. Tongue smooth, and of a golden tinge. Pectoral greyish yellow. Skin diaphanous.

Not rare at Cochin.

*SCOMBER KANAGURTA*, Cuv. & Val.

*Ila* (Mal.). Indian Mackerel.

B. vi. D.  $10 \frac{1}{11}$  v. P. 21. V.  $1/5$ . A.  $1 \frac{1}{11}$  v. C. 25.

Length of specimen  $7 \frac{5}{10}$  inches.

These fish, which average about  $7 \frac{1}{2}$  inches in length, are captured in enormous quantities from January until May. Although very excellent eating, they are not often brought to the tables of Europeans, as they are reputed to be rather bitter; therefore those captured are commonly salted, dried in the sun, and exported in bundles of about 1000 each to Ceylon, where they are extensively bought for the coolies in the coffee-plantations.

Many Ceylonese come over for the Mackerel season. Thousands of these fish are frequently landed daily and salted. The first process consists in a coolie making one cut with a sharp knife along their back-bone, from the head to the tail, and then a second down their ventral surface, exposing their intestines. They are then tossed over to a woman, who, having removed their insides, throws them into a basket having two handles, which, when half full, is carried by two men to the sea-shore, where the fish are washed without being removed. Women and children rapidly put some black salt into each cut, and throw the fish into a boat close behind them (on the shore), in which there is brine; there they remain for a few hours, and are subsequently spread out in the sun, dried, and packed in square bundles of about 1000 each for export.

*CYBIUM GUTTATUM*, Bl., Schn.

*Arrakeeah* (Mal.). Seir-fish.

B. vii. D.  $16/20$  ix. P. 15. V.  $1/5$ . A. 20 viii. C. 26.

Length of specimen 23 inches.

The Seir-fish abound off Cochin, where they are captured from October throughout the whole of the cold months. They are excellent eating, but should be cooked when quite fresh. They salt well, besides being amongst the best fish for Tamarind-fish. Large ones are rather coarse for eating.

*CYBIUM COMMERSONII*, Lacép.

*Chumbum* (Mal.).

B. vii. D.  $16 \frac{2}{15}$  ix. P. 20. V.  $1/5$ . A.  $2/16$  x.

Length of specimen 12 inches.

**ELACATÉ NIGRA**, Bloch.

B. vii. D. 8/34-38. P. 21. V. 1/5. A. 26-28. C. 17.

Length of specimens 12 inches.

**ECHENEIS NAUCRATES**, Linn.*Putthoo muday* (Mal.).

B. vi. D. 39. P. 20. V. 1/5. A. 3/34. C. 17. Disks 22.

Length of specimens from 8 to  $11\frac{3}{10}$  inches.

They are generally captured in Cochin about the size of the present specimens, and are not rare. One of these was taken from the back of a Shark, to which they appear to frequently attach themselves.

**STROMATEUS ARGENTEUS**, Bloch.B. vi. D.  $7\frac{1}{39}$ . P. 27. A.  $6\frac{1}{41}$ .

Length of specimen 8 inches.

**STROMATEUS ATOUS**, Cuv. & Val.*Vella arwoolee* (Mal.). White Pomfret.

B. vi. D. 1/43. P. 23. A. 40. C. 17.

Length of specimen  $11\frac{1}{2}$  inches.

This species of Pomfret is esteemed the best in Cochin, where it is by no means uncommon during the south-west monsoon.

**STROMATEUS NIGER**, Bloch.*Kar arwoolee* (Mal.). Black Pomfret.

B. vii. D. 5/42. P. 22. A. 3/39. C. 19.

Length of specimen from  $3\frac{3}{10}$  to  $14\frac{8}{10}$  inches.

This fish comes to Cochin about the same time as the *S. atous*, to which it is considered slightly inferior. It arrives in droves, and disappears as suddenly as it comes.

In the young specimen,  $3\frac{3}{10}$  inches in length, the ventrals are  $\frac{4}{10}$  inch in length. The hidden spines of dorsal and anal are apparent, the numbers being D. 5/40, A. 3/37.

Colours grey; dorsal and anal fins black; tail yellow, with three brown cross bands, one of which is at its base.

**STROMATEUS CINEREUS**, Bloch.B. vii. D.  $7\frac{1}{38}$ . P. 24. A.  $5\frac{1}{32}$ . C. 19.Length of specimen  $3\frac{2}{10}$  inches.**CARANX ROTTLERI**, Bloch.B. vii. D.  $8\frac{1}{10}$  ix. P. 21. V. 1/5. A.  $2\frac{1}{8-9}$  viii. C. 18. L. 1. 55.

Length of specimens from 4 to 9 inches.

This fish is common, but not often seen above 9 inches in length. It is employed as food more by the natives than the European population; for by the last it is not held in much esteem.

**CARANX HIPPOS, Linn.***Caranx heberi*, Bennett.B. vii. D.  $8 \frac{1}{20}$ . P. 20. V.  $1/5$ . A.  $2 \frac{1}{16}$ . C. 21. L. 1. 29.Length of specimen  $8 \frac{6}{10}$  inches.

After death, the deep black point of the upper lobe of the caudal fades.

Very common; comes into the mouth of the river; but the largest specimens, which attain to  $2 \frac{1}{2}$  feet, are captured in the deep sea. They are most excellent eating. When caught, they give a grunt like a young pig; and this is continued, should they be moved, as long as they have any life remaining.

They are first captured at the end of the south-west monsoon, and continue off Cochin during the whole of the cold months.

**CARANX ATROPUS, Bl., Schn.**B. vii. D.  $8 \frac{1}{22}$ . P. 19. V.  $1/5$ . A.  $2 \frac{1}{18}$ . C. 16. L. 1. 32.Length of specimen  $7 \frac{2}{10}$  inches.**CARANX MELANOSTETHOS, Day, sp. nov.**B. vii. D.  $8 \frac{1}{23}$ . P. 19. V.  $1/5$ . A.  $2 \frac{1}{19}$ . C. 19. L. 1. 28. inches.Length of specimens from. . .  $6 \frac{7}{10}$  to  $6 \frac{8}{10}$  inches.—— of head . . . . .  $1 \frac{5}{10}$ , or two-ninths of total length.—— of pectoral . . . . .  $1 \frac{3}{10}$ , or one-fifth of total length.—— base of first dorsal. . . . .  $\frac{8}{10}$ , or two-seventeenths of total l.—— base of second dorsal  $2 \frac{2}{10}$ , or one-third of total length.—— of caudal . . . . .  $1 \frac{5}{10}$ , or two-ninths of total length.Height of body . . . . .  $1 \frac{6}{10}$ , or one-fourth of total length.—— of head . . . . .  $1 \frac{4}{10}$ , or one-fifth of total length.—— of first dorsal. . . . .  $\frac{6}{10}$ , or one-eleventh of total length.—— of second dorsal. . . . .  $\frac{7}{10}$ , or one-tenth of total length.—— of ventral . . . . .  $\frac{7}{10}$ , or one-tenth of total length.—— of anal . . . . .  $\frac{6}{10}$ , or one-eleventh of total length.—— of base of caudal . . . . .  $\frac{5}{20}$ , or two twenty-sevenths of total.

Diameter of eye  $\frac{5}{10} \times \frac{4}{10}$  inch, or  $\frac{1}{3} \times \frac{1}{4}$  of length of head;  $\frac{4}{10}$  inch apart,  $\frac{4}{10}$  from end of snout. The membranous curtain to the eye extends nearly one-fifth across its diameter on either side.

*Head.* Upper jaw protrusible for  $\frac{2}{10}$ ths of an inch. Lower jaw very slightly the longest. Superior maxillary extends backwards as far as the anterior margin of the orbit. Præorbital small, and has two straight raised lines on its posterior part. Præoperculum oblique, angle rounded, and the inferior margin convex; suboperculum large; it and other opercular bones entire. Nostrils situated nearly 2 lines in front of orbit, with a curved nasal arch over them.

*Teeth.* In intermaxillaries and superior half of upper jaw from two to three bands of fine villiform teeth; the same are also perceptible in the lower jaw. A triangular space (convex anteriorly) of

rather sharp teeth in vomer, distinct from which, but commencing close to its posterior margin, is a straight single row of sharp teeth, the two thus covering a somewhat T-shaped spot. No teeth on palatines.

*Fins.* Pectoral rather in advance of the origin of the dorsal and ventral. Anal arises under second dorsal: a deep membranous sheath to second dorsal and anal. First dorsal triangular; second dorsal highest in front, where it exceeds the height of the first dorsal. Pectoral falciform, reaching to nearly opposite anal. Caudal deeply lobed. Dorsal spines weak; first  $\frac{3}{10}$ , second  $\frac{6}{10}$  inch; third slightly higher; thence they decrease. First ray of second dorsal the longest. Pectoral fifth or sixth ray the longest. Ventral spine weak. Of the two anal spines, the second is the longest and strongest. Spine of anal fin weak; first ray the longest.

Scales cover the whole of the body, under the eye, and slightly the upper part of the operculum.

The lateral line has a very moderate curve in the first portion of its course, and opposite the eighth dorsal ray it begins to pass straight; but the laminated scales do not commence until opposite the thirteenth ray. They are well marked, but not so strong as in many species of *Caranx*; in their widest portion they are not above 2 lines.

*Colours.* Back of a leaden blue, which below the lateral line becomes silvery white. The fore part of the chest, throat, the opercula, summit of head, and upper jaw are of a deep brown, almost black, which sometimes remains and sometimes fades; over all these places there are numerous black dots and spots. Fins tinged with yellow; second dorsal deeply stained with black in its first eight rays, and having a white summit; the whole of the rest of that fin stained with brown, and dotted with fine brown-black points. Eyes silvery; curtain brown.

This is not a very rare fish in the cold season; and small specimens of 6 and 7 inches are captured at the mouth of the river, but in the deep sea much larger ones are taken. It is good eating.

#### CARANX KURRA, Cuv. & Val.

B. vii. D.  $8\frac{1}{30}$  I. P. 25. V.  $\frac{1}{5}$ . A.  $2\frac{1}{27}$  I. C. 17. L. l. 33.

Length of specimen  $4\frac{5}{10}$  inches.

This is Russell's fish, plate 139, not Günther's, from which it may be readily distinguished by having a double row of sharp teeth along the centre of its tongue.

Not rare at Cochin.

#### CARANX XANTHURUS, Cuv. & Val.

*Batta parra* (Mal.).

B. vii. D.  $8\frac{1}{24}$ . P. 20. V.  $\frac{1}{5}$ . A.  $2\frac{1}{19}$ . L. l. 45.

Length of specimen  $5\frac{6}{10}$  inches.



**CARANX SPECIOSUS**, Forsk.*Batta courchee* (Mal.).B. vii. D.  $8\frac{1}{19-20}$ . P. 20. V.  $\frac{1}{5}$ . A.  $2\frac{1}{16-17}$ . L. l. 34.Length of specimens from  $4\frac{4}{10}$  to  $4\frac{5}{10}$  inches.

Several rows of villiform teeth in the upper jaw, and an external row of larger pointed ones. In lower jaw, a single row of irregular-sized teeth. Teeth on vomer and palate.

**CARANX ARMATUS**, Forsk.B. vii. D.  $7\frac{1}{21}$ . P. 19. V.  $\frac{1}{5}$ . A.  $2\frac{1}{17}$ . C. 19. L. l. 20.Length of specimen  $2\frac{1}{10}$  inches.**CARANX CILIARIS**, Bloch.B. vii. D.  $6\frac{1}{19}$ . P. 18. V.  $\frac{1}{5}$ . A.  $2\frac{1}{16}$ . C. 19. L. l. 15.Length of specimen  $6\frac{5}{10}$  inches.**CARANX GALLUS**, Linn.B. vi. D.  $1/19$ . P. 17. V.  $1/5$ . A.  $1/16$ . C. 19. L. l. 10.Length of specimen  $13\frac{4}{10}$  inches.**CHORINEMUS LYSAN**, Forsk.B. viii. D.  $7\frac{1}{20}$ . P. 19. V.  $1/5$ . A.  $2\frac{1}{18}$ .Length of specimen  $19\frac{8}{10}$  inches.

The *Chorinemi* come to Cochin in great numbers about July; they are esteemed good eating, but are rather dry, especially the larger ones. They salt well.

**CHORINEMUS TALA**, Cuv. & Val.B. viii. D.  $7\frac{1}{20}$ . P. 20. V.  $1/5$ . A.  $2\frac{1}{17}$ . C. 19.Length of specimen  $8\frac{8}{10}$  inches.**CHORINEMUS SANCTI-PETRI**, Cuv. & Val.*Pallagay* (Mal.).B. viii. D.  $7\frac{1}{21}$ . P. 17. V.  $\frac{1}{5}$ . A.  $2\frac{1}{18}$ . C. 15.Length of specimens from 7 to  $8\frac{3}{10}$  inches.

Common; but does not appear to be found of a large size.

**TRACHYNOTUS OVATUS**, Linn.B. vii. D.  $6\frac{1}{19}$ . P. 17. V.  $1/5$ . A.  $2\frac{1}{17}$ . C. 17.Length of specimen from  $4\frac{8}{10}$  to 5 inches.

Not rare; but does not appear to exceed 6 or 7 inches in length.

**TRACHYNOTUS BAILLONI**, Lacép.*Vella oodoo* or *Parruvu* (Mal.).B. vii. D.  $6\frac{1}{23}$ . P. 17. V.  $1/5$ . A.  $2\frac{1}{23}$ . C. 17.Length of specimen  $8\frac{5}{10}$  inches.

Uncommon; are usually captured by cast-nets in the surf. The fishermen assert that they always swim in the surf, are very rarely captured in the deep sea, never in the river.

*PSETTUS ARGENTEUS*, Linn.

B. vi. D.  $\frac{8}{28-29}$ . P. 16. V.  $1/3$ . A.  $3/28$ . C. 17. L. tr. 75.

Length of specimens from  $3\frac{1}{10}$  to 6 inches.

Mostly found in the monsoon time.

*PSETTUS FALCIFORMIS*, Lacép.

B. vii. D.  $8/27$ . P. 17. A.  $3/29$ . C. 17. Scales, upwards of 120 rows.

Length of specimen  $4\frac{6}{10}$  inches.

*PLATAX TEIRA*, Cuv. & Val.

B. vi. D.  $5/32$ . P. 16. V.  $1/5$ . A.  $3/24$ . C. 17. L. r. 86.

Length of specimen, to end of caudal,  $3\frac{2}{10}$  inches.

*EQUULA INSIDIATRIX*, Bloch.

*Paarl coorchee* (Mal.).

B. iv. D.  $9/16$ . P. 15. V.  $1/5$ . A.  $3/14$ . C. 19.

Length of specimen  $2\frac{9}{10}$  inches.

Exceedingly common; and, along with other species of the same genus, large numbers are kept for consumption during the monsoon; for, owing to the small amount of intestines and the compressed form of their bodies, very little salt is necessary for their preservation. As to the poorer natives the salt-tax is great, they evade it along the coast by opening and cleaning these little fish, soaking them in the sea, and then drying them in the sun. That they have become semi-putrid by the monsoon time is not to be wondered at; neither can we be surprised at the numerous cases of dysentery and diarrhoea to which such diet gives rise.

*EQUULA DAURA*, Cuv.

B. v. D.  $8/15$ . P. 17. V.  $1/5$ . A.  $3/14$ . C. 17.

Length of specimen 3 inches.

*EQUULA EDENTULA*, Bloch.

B. v. D.  $8/16$ . P. 17. V.  $1/5$ . A.  $3/14$ . C. 17.

Length of specimen  $3\frac{7}{10}$  inches.

*LACTARIUS DELICATULUS*, Bloch, Schn.

*Purruwah* (Mal.).

B. vii. D.  $7-8\frac{1}{22}$ . P. 17. V.  $1/5$ . A.  $\frac{3}{26-28}$ . C. 17.

Length of specimens from  $3\frac{1}{10}$  to  $6\frac{7}{10}$  inches.

Arrives in shoals in February and March. Are esteemed by the natives good eating, whether fresh or salted; they do not attain any size.

**GobiUS GIURIS, Buch. Ham.***Wartee poollah* or *Pooan* (Mal.).

B. iv. D. 6 1/9. P. 20. V. 4/4. A. 1/8. C. 17. L. l. 30 to 34.

Length of specimens from 3 to 13  $\frac{5}{10}$  inches.

Very common in all the fresh and even brackish waters. In the monsoon time, when the freshes remove the saltness from the river, these Gobies are commonly caught in the Chinese nets or by baits. In the fort-ditch they grow to about 1  $\frac{1}{3}$  foot in length, and, though highly esteemed by the natives for food, are insipid, and even muddy in some waters. They are very voracious, taking a bait freely.

**GobiUS VIRIDIPUNCTATUS, Cuv. & Val.**

B. iv. D. 6 1/10. P. 17. V. 1/5. A. 1/9. C. 15. L. l. 28. L. tr. 13.

Length of specimen 4  $\frac{9}{10}$  inches.

These beautifully emerald-green-spotted Gobies, though not common, are not rare. They are caught in the sea-fisheries, and also occasionally in the river.

**GobiUS ACUTIPINNIS, Cuv. & Val.**

B. iv. D. 6 1/11. P. 19. V. 4/4. A. 1/11. C. 19. L. l. 25. L. tr. 6.

Length of specimen 3  $\frac{6}{10}$  inches.

Usually captured in the river, about July. They do not appear to grow to any size.

**GobiUS MALABARICUS, Day, sp. nov.**

B. iv. D. 6 1/10. P. 13. V. 4/4. A. 1/10. C. 13. L. l. 50. L. tr. 10.

Length of specimen from .. 2  $\frac{4}{10}$  to 2  $\frac{8}{10}$  inches.

———— of head .....	$\frac{6}{10}$ , or one-fifth of total length.
———— of pectoral .....	$\frac{9}{20}$ , or one-sixth of total length.
———— of caudal .....	$\frac{7}{10}$ , or one-fourth of total length.
———— of base of 1st dorsal	$\frac{3}{10}$ , or one-ninth of total length.
———— of base of 2nd dorsal	$\frac{7}{10}$ , or one-fourth of total length.
———— of base of anal .....	$\frac{6}{10}$ , or one-fifth of total length.
Height of head .....	$\frac{4}{10}$ , or one-seventh of total length.
———— of body .....	$\frac{6}{10}$ , or one-fifth of total length.
———— of hard dorsal .....	$\frac{7}{20}$ , or one-eighth of total length.
———— of soft dorsal .....	$\frac{7}{20}$ , or one-eighth of total length.
———— of base of caudal ..	$\frac{5}{20}$ , or one-eleventh of total length.
———— of ventral .....	$\frac{6}{10}$ , or one-fifth of total length.
———— of anal .....	$\frac{3}{10}$ , or one-ninth of total length.

Diameter of eye  $\frac{1}{10}$  inch, or  $\frac{1}{6}$  length of head;  $\frac{1}{10}$  inch from end of snout,  $\frac{1}{20}$  apart.

The profile does not rise very much to the first dorsal. Snout obtuse; its upper profile descends abruptly. Cleft of mouth rather

oblique; lower jaw the longest. The superior maxillary bone extends as far backwards as the anterior third of the orbit. Rather a strong prominent crest at the nape; the bony bridge between the orbits narrow, with a low crest running along its centre. Orbits very closely approximating at upper surface; a well-developed projecting angle at their anterior and posterior margins; the anterior the strongest. A bony ring surrounds opening to nostril. No scales on head.

*Teeth.* Conical, an external row in upper jaw the largest; smaller, but conical ones in lower jaw.

*Fins.* Origin of ventral in front of pectoral, of first dorsal over its first third; one-tenth of an inch between first and second dorsal. Spines weak. Caudal wedge-shaped. Ventrals united.

Scales nearly quadrangular, elevated along their centre.

*Colours.* Of a general light brown, with some irregularly disposed dusky bands on the sides and back; a dark brown bar descends directly downwards from the eye; several irregular brown marks about operculum and head. The first dorsal has a deep black crescentic mark, commencing between second and third spines, and continued to the last; above this a white curved band, bordered above with black. Second dorsal, anal, and caudal brownish, barred with several series of rows of a darker colour.

This fish appears in large quantities in the Kurriavanoor River, north of the town of Cochin, when the bar is broken down, and the freshes from the Ghauts reach the sea. It is not captured there more than 2 or 3 inches in length; but perhaps they may be the young of a larger species.

**ELEOTRIS BUTIS**, Buch. Ham.

*Kullahray* (Mal.).

B. vi. D. 6  $\frac{1}{8}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{1}{8}$ . C. 15. L. l. 28.  
L. tr. 12.

Length of specimens from 4 to  $5\frac{2}{10}$  inches.

Very common in the backwater, where they are most numerous at the commencement of the year. They are eaten by the natives.

**ELEOTRIS FUSCA**, Bloch, Schn.

*Poollan* (Mal.).

B. vi. D. 6  $\frac{1}{8}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{1}{8}$ . C. 15. L. l. 64.  
L. tr. 21.

Length of specimens from 2 to  $2\frac{5}{10}$  inches.

Inhabits most of the muddy ditches and tanks; are often found in the paddy-fields, and sometimes in the backwater.

**AMBLYOPUS HERMANNIANUS**, Lacép.

B. v. D.  $\frac{6}{40}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{1}{37}$ . C. 13.

Length of specimen from 5 to  $5\frac{7}{10}$  inches.

**AMBLYOPUS CÆCULUS**, Bloch, Schn.

B. v. D. 6/46. P. 15. V. 1/5. A. 1/43. C. 13.

Length of specimen  $7\frac{4}{10}$  inches.**BATRACHUS GRUNNIENS**, Bloch.

B. vi. D. 3/20. P. 25. V. 1/5. A. 14. C. 12. Opercular spines iv.

Length of specimen 8 inches.

**BATRACHUS TRISPINOSUS**, Günther.

B. vi. D. 3/20. P. 25. V. 1/5. A. 14. C. 12. Opercular spines iii.

Length of specimen  $5\frac{6}{10}$  inches.

Caught with the last.

**SALARIAS FASCIATUS**, Bloch.

B. vi. D. 12/20. P. 15. V. 1/5. A. 24. C. 11.

Length of specimen  $2\frac{4}{10}$  inches.**TEUTHIS JAVA**, Linn.

B. v. D. 13/10. P. 15. V. 2/3. A. 7/9. C. 17.

Length of specimens from 4 to  $4\frac{5}{10}$  inches.

Small specimens common; they are eaten by the lower class of natives.

**TEUTHIS VERMICULATA**, Kuhl & V. Hass.B. v. D.  $\frac{13}{9-10}$ . P. 16. V. 2/4. A.  $\frac{7}{8-9}$ . C. 17.Length of specimens from 4 to  $11\frac{2}{10}$  inches.

Four specimens were captured in June 1863; two upwards of 11 inches, the other two upwards of 4 inches. The natives asserted the fish to be good eating.

**TEUTHIS MARMORATA**, Quoy & Gaim.

B. v. D. 13/10. P. 17. V. 2/3. A. 7/9. C. 19.

Length of specimen 9 inches.

**ACANTHURUS MATOIDES**, Cuv. & Val.

B. v. D. 9/25. P. 17. V. 1/5. A. 3/25. C. 16.

Length of specimens from 4 to 6 inches.

Very common; they do not appear to grow to any very large size there, although the natives assert the contrary. They are eaten by the lower classes.

**ACRONURUS MELANURUS**, Cuv. & Val.

B. v. D. 10/24. P. 15. A. 3/24. C. 17.

Length of specimen  $1\frac{5}{10}$  inches.

Second dorsal spine serrated on its anterior margin.

## NANDUS MARMORATUS, Buch. Ham.

*Mootahree* (Mal.).B. vi. D. 13/12. P. 16. V. 1/5. A. 3/7. C. 15. L. 1. 46.  
L. tr. 7/13.Length of specimens from 3 to  $5\frac{5}{10}$  inches.

Common in the rivers and paddy-fields.

## CATOPRA MALABARICA, Günther\*.

B. vi. D. 14/12. P. 15. V. 1/5. A. 3/8. C. 16. L. 1. 25.  
L. tr. 4/8.

	inches.	
Length of specimen . . . . .	$3\frac{3}{10}$ .	
— of head . . . . .	$\frac{9}{10}$ ,	or about one-fourth of total length.
— of pectoral . . . . .	$\frac{7}{10}$ ,	or about one-fifth of total length.
— of caudal . . . . .	$\frac{7}{10}$ ,	or about one-fifth of total length.
— of base of dorsal . . . . .	$1\frac{5}{10}$ ,	or about one-half of total length.
— of base of anal . . . . .	$\frac{5}{10}$ ,	or about one-seventh of total length.
Height of head . . . . .	$\frac{8}{10}$ ,	or about one-fourth of total length.
— of body . . . . .	$1\frac{2}{10}$ ,	or about one-third of total length.
— of hard dorsal . . . . .	$\frac{7}{20}$ ,	or about one-ninth of total length.
— of soft dorsal . . . . .	$\frac{5}{10}$ ,	or about one-seventh of total length.
— of base of caudal . . . . .	$\frac{4}{10}$ ,	or about one-eighth of total length.
— of ventral . . . . .	$\frac{5}{10}$ ,	or about one-seventh of total length.
— of anal . . . . .	$\frac{5}{10}$ ,	or about one-seventh of total length.

Diameter of eye  $\frac{5}{20}$  inch, or  $\frac{2}{7}$  of the length of head;  $\frac{5}{20}$  inch from end of snout,  $\frac{2}{10}$  apart.

Body compressed. The mouth being situated below the median line of the body, there is a considerable rise to the dorsal. Jaw equal; intermaxillaries protractile; upper lip rather fleshy; the superior maxillary extends to slightly behind the anterior margin of the orbit. Upper surface of eye nearly close to profile. Præoperculum, posterior limb nearly vertical, entire; angle rounded; inferior limb horizontal, and little more than half the length of the posterior limb. Sub- and inter-opercula with a few very fine serrations at their approximating extremities. Operculum with two rather strong flat spines, and ending in a membranous point. Præorbital entire. Nostrils rather wide apart, posterior the largest. Pseudobranchiæ present. Branchiostegous rays hidden. Gills  $3\frac{1}{2}$ . Opercula and head scaled; but no scales between or before the eyes, nor on the præorbital.

*Teeth.* Several rows of small teeth in the jaws, with an external larger band. Numerous villiform teeth on vomer and palate.

*Fins.* Origin of pectoral and dorsal in a line. Ventral slightly behind. Anal arises opposite commencement of soft dorsal. Dorsal,

\* Dr. Günther has described this species from one of the two specimens out of my collection which I had placed in the British Museum. Having a smooth præorbital, and no serrations at the præoperculum, smooth tongue, &c., I should have placed it in the genus *Badis*, as defined in his 'Catalogue of the Acanthopterygian Fishes.'

spinous portion can be laid flat on the back, where it is received into a depression; it is  $1\frac{2}{10}$  inch in extent, and much lower than the soft portion, which is  $\frac{9}{20}$  inch and pointed. Caudal wedge-shaped. Pectoral rounded. Ventral pointed. Soft portion of anal pointed. Dorsal spines rather strong; interspinous membrane deeply notched, and extending a little beyond the points of the spines; first  $\frac{1}{10}$ ; second  $\frac{2}{10}$ ; third  $\frac{3}{10}$ ; thence they continue much the same length; central soft rays the longest. Ventral spine pretty strong. Anal spines strong, and they can be received into a depression the same as the dorsal spines; first  $\frac{2}{10}$ ; second  $\frac{3}{10}$ , and strongest; third slightly longer; centre soft rays longest, the same of the caudal.

Scales ctenoid, greatest diameter from above downwards; some are continued over the soft portion of the dorsal and anal, and also over the base of caudal.

Lateral line interrupted, at first in upper fourth of body; opposite fourth soft dorsal ray it ceases on twenty-first scale; then from below last portion of soft dorsal it is continued along median line as far as, but not on to, caudal fin.

*Colours.* Rifle-green, with purplish reflexions, darker on the back than on the abdomen. Fins greenish. Eyes yellowish green.

Two specimens were sent me by the Rev. Henry Baker (junior) from Mundykiem, on the hill-ranges of Travancore, not far from Cochín. It appears to be common there.

#### ANABAS SCANDENS, Daldorff.

*Undee collee* (Mal.).

B. vi. D.  $\frac{17-18}{8-10}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{9-10}{9-11}$ . C. 16. L. 1. 27-32.  
L. tr.  $\frac{5}{9}$ .

Length of specimens from 3 to  $6\frac{8}{10}$  inches.

The number of scales along the lateral line differs considerably in different specimens, as do also the number of fin-rays, the comparative size and colour of the body, and the valance at the margin of the superbranchial organ.

The climbing-properties attributed to these fish in other parts of India are believed in by the natives of Malabar; but personal observation can neither confirm nor refute this belief.

Having taken some live specimens at Kurriapudnam in the hot weather, and kept them in damp grass, some retained vitality as long as eighteen hours; frequently, when apparently dead, if water were cautiously applied, they recovered.

Climbing Perch are difficult to keep in a vivarium, owing to their constantly jumping out, a foot in height being insufficient for the purpose of retaining them. They are able to progress on the ground in two ways, either by laying on their sides, flapping their tails, and assisting themselves by their pectoral fins, or else by the aid of their pectoral fins, first one being advanced, and then the other.

They can erect their fins, and likewise their scales, at pleasure; and when placed on a flat surface, even when apparently nearly dead,

should their tail be touched, they at once erect their spinous fins and their scales, even as far as those at the base of the caudal. They at the same time erect their gill-covers. This power must of course be of great use in progression, if they employ their gill-covers to assist them in climbing.

They inhabit most pieces of fresh water and paddy-fields, and are deemed good eating by the natives, who, immediately they catch them, kill them by biting their heads. A fatal accident occurred a few years since near Cochin, owing to one of these fish having slipped into the throat of the native who was biting its head. Owing to the erectile nature of its spines and scales, it could not be withdrawn, and the man was suffocated.

**POLYACANTHUS CUPANUS, Cuv. & Val.**

*Caringanah* and *Wunnuttee* (Mal.).

B. vi. D.  $\frac{14}{6}$ . P. 10. V.  $\frac{1}{5}$ . A.  $\frac{18}{11}$ . C. 13. L. 1. 30-32.  
L. tr.  $\frac{4}{7}$ .

Length of specimens from  $1\frac{5}{10}$  to  $2\frac{5}{10}$  inches.

Posterior half of horizontal limb of præoperculum serrated; præ-orbital serrated.

*Colours.* Of a general rifle-green, with some spots on the fins, and an elongated scarlet ray to the ventral.

In one specimen an inch long, but which appears to be the *P. cupanus*, there was one spine less in the dorsal, and one ray less in the anal. It was of a beautiful rose-colour, rather dark brown along the back and base of anal fin. Two deep-black horizontal lines passed, one from above the orbit direct to the caudal, and a second from the angle of the mouth, through the eye, to the caudal. Head and cheeks spotted. The natives asserted it was the same as the common species; but, out of hundreds subsequently procured, none had the coloration of this one.

**ATHERINA FORSKÄLII, Rüpp.**

B. vi. D.  $5\frac{1}{10}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{1}{13}$ . C. 15. L. 1. 40.  
L. tr. 6.

Length of specimens from 3 to  $3\frac{1}{10}$  inches.

Very abundant during the monsoon months, and some are captured at the end of the year. This is one of several families which are known to the Europeans as *Whitebait*, like which they are dressed for the breakfast-table.

**MUGIL WAIGIENSIS, Quoy & Gaim.**

*Freshwater Mullet.*

B. vi. D.  $4\frac{1}{8}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{3}{8}$ . C. 15. L. 1. 26.  
L. tr. 8.

Length of specimen  $11\frac{2}{10}$  inches.

Captured from June, when they ascend high up the rivers, and are considered by the natives as freshwater fish.



**MUGIL SUNDANENSIS**, Bleeker.

B. v. D. 4  $\frac{1}{8}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{9}$ . L. l. 31. L. tr. 9.  
Length of specimen 5 inches.

**MUGIL ENGELI**, Bleeker.

B. v. D. 4  $\frac{1}{8}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{9}$ . C. 14. L. l. 34.  
L. tr. 11.  
Length of specimen  $7\frac{2}{10}$  inches.

**MUGIL CUNNESIUS**, Cuv. & Val.*Mahlak* (Mal.).

B. v. D. 4  $\frac{1}{8}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{3}{9}$ . L. l. 41. L. tr. 13.  
Length of specimen  $15\frac{6}{10}$  inches.

It is from this species the fine fish-roe is obtained for which Cochin is so celebrated. They are removed from the fish immediately on being captured, and then dried in the sun. They commence coming into season about the middle of October or November, when these fish swarm into the river to deposit their spawn. By February all the Mulletts (commonly known as "Cunnumboo," *Mal.*) begin to be scarce, and by April they are almost unprocurable.

**MUGIL PARSIA**, Buch. Ham.

B. v. D. 4  $\frac{1}{7}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{9}$ . C. 14. L. l. 32.  
L. tr. 8.  
Length of specimen  $9\frac{1}{10}$  inches.

**MUGIL POICILUS**, Day, sp. nov.

B. v. D. 4  $\frac{1}{8}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{9}$ . C. 14. L. l. 32.  
L. tr. 10.

Length of specimens from  $3\frac{4}{10}$  to 7 inches.

— of head . . . . .	$1\frac{4}{10}$ ,	or about one-fifth of total length.
— of pectoral . . . . .	1,	or about one-seventh of total length.
— of caudal . . . . .	$1\frac{3}{10}$ ,	or about one-fifth of total length.
— of base of 2nd dorsal . . . . .	$\frac{5}{10}$ ,	or about one-fourteenth of total length.
— of base of anal . . . . .	$\frac{5}{10}$ ,	or about one-fourteenth of total length.
Height of head . . . . .	$\frac{9}{10}$ ,	or about one-eighth of total length.
— of body . . . . .	$1\frac{4}{10}$ ,	or about one-fifth of total length.
— of hard dorsal . . . . .	$\frac{8}{10}$ ,	or about one-ninth of total length.
— of soft dorsal . . . . .	$\frac{7}{10}$ ,	or about one-tenth of total length.
— of base of caudal . . . . .	$\frac{7}{10}$ ,	or about one-tenth of total length.
— of ventral . . . . .	1,	or about one-seventh of total length.
— of anal . . . . .	$\frac{7}{10}$ ,	or about one-tenth of total length.

Diameter of eye  $\frac{4}{10}$  inch, or  $\frac{2}{7}$  length of head;  $\frac{3}{10}$  inch from end of snout,  $\frac{6}{10}$  apart. An adipose eyelid covers a little more than one-third of the eye on either side in the adult fish. In the young the anterior curtain is much broader than the posterior one.

There is not much rise from the snout to the first dorsal. Lower  
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jaw slightly the shortest, with a notch in its centre, which is curved upwards. Upper lip broad, superior maxillary considerably protrusible; it is bent downwards below and behind the angle of the mouth, where its extremity is visible. Præorbital angularly bent, with a rounded, finely serrated margin. Nostrils rather wide apart; the posterior largest, and nearer the orbit than it is to the anterior one. Interorbital space nearly flat. Snout broad, somewhat pointed in the centre. The cleft of the mouth is rather more than twice as broad as deep. The free space on the chin is moderately long, tongue-shaped.

Pectoral fin situated a little above the central line of the body, and extending to the eighth scale; no elongated pointed scale at the axil. Twenty scales from the snout to the origin of the first dorsal, which commences nearer the snout than to the caudal fin, and above the eighth scale of the lateral line. Eight rows of scales between the two dorsal fins.

First dorsal spines strong: first  $\frac{8}{10}$ , the strongest; second  $\frac{8}{10}$ ; third  $\frac{7}{10}$ ; fourth  $\frac{3}{10}$ . The spines, laid flat on the back, reach a little more than halfway from their origin to the base of the second dorsal. Second dorsal, caudal, anal, and pectoral have some fine scales at their base. Caudal deeply emarginate. Pectoral rounded. Ventral with a pointed scale at its origin.

*Teeth.* A fine row of teeth in the upper jaw, more apparent in the young fish than in the older specimens.

*Scales.* Rather irregular in size, highest from above downwards. Each scale on the body and base of the fins in the adult fish with a gland in its centre of a deep black colour. In the young fish these glands are not so apparent; and until they reach about 3 inches the black central spots on the scales do not commence to show themselves; but still each scale is marked by a central cavity of a rounded shape, but very irregular in size. The scales covering the head vary much in shape, the posterior ones being irregularly quadrilateral, the central one between the orbits nearly round but with deeply emarginated sides, two oval ones in front, which partially cover it.

*Colours.* Greyish, shot with silver, lightest on the sides and abdomen: each scale with a deep black central spot. Shot with pink and golden about the cheeks. Fins stained with grey.

By no means rare at times; but in some years they seem to almost absent themselves. They are rarely seen above 8 inches. Are good eating.

#### OPHIOCEPHALUS STRIATUS, Bloch.

*Verarl* or *Wrahl* (Mal.).

B. v. D. 37-40. P. 17. V. 6. A. 23-26. C. 13. L. 1. 51.  
L. tr.  $\frac{5-7}{9-7}$ .

Length of specimens from  $5\frac{5}{10}$  to  $15\frac{1}{10}$  inches.

These fish, known over most of India as the Morrul (Hind.), are said to attain to the length of 3 feet; they inhabit all stagnant pools of water and rivers, whilst the young may be found in every paddy-

field. It is extraordinary in what small pieces of water they will live and thrive, owing to the immensity of animal life in the fresh waters of Malabar.

They have obtained their common appellation of "Walking-fish" from being able to progress some distance over moist places, and thus change their localities, which they do either when the pond in which they live is becoming dried up, or when the monsoon fills every place with water. Possessing a cavity (like the rest of the genus) above the gills which enables them to carry water, they are capable of keeping their respiratory organs moist so long as the fluid lasts, and can consequently breathe for some time after leaving their native element. They are not able to erect their fins, gill-covers, and scales like the *Anabas scandens*, but otherwise progress in the same manner. It is often asserted that these fish can exist in the dried mud of tanks; but though frequently promised by natives that they would discover them in such places, they invariably failed. Perhaps this idea may have originated because it is at the commencement of the monsoon, when the rains begin to render all the previously dried-up tanks first mud and then water, these fish may be seen migrating. It may be that as they were known to exist there at a prior time when there was water, were not apparent when the tank was dry, but were again seen as the exsiccated mud became moist\*, the natives believe they have arrived out of it. It can scarcely be supposed these fish could retain vitality in dried mud, where they would be unable to breathe, to move, or to feed. Europeans have frequently seen them migrating; and that they are capable of walking, personal observation can attest.

*OPHIOCEPHALUS GACHUA*, Buch. Ham.

*Kuravu* (Mal.).

B. v. D. 32-33. P. 13. V. 6. A. 21. C. 11. L. l. 40.  
L. tr.  $\frac{4}{7}$ .

Length of specimens from 5 to  $5\frac{3}{10}$  inches.

Said not to grow upwards of 8 inches in length. Very common, and found in almost every piece of fresh water, even in many wells. Eaten by the natives. Takes a bait freely.

*OPHIOCEPHALUS MARULIUS*, Buch. Ham.

*Chaaree verarl* (Mal.).

B. v. D. 50. P. 18. V. 6. A. 32. C. 14. L. l. 59. L. tr.  $\frac{6-9}{9-6}$ .

\* In one south-west monsoon, the grassland in front of the house I lived in, and formerly part of the esplanade, became one day a sheet of water. As that evaporated and soaked into the earth I could perceive fish swimming about. Having sent out persons to capture them, several species were brought me, viz. a *Saccobranchus singio*, an *Ambassis*, and some Barbels or *Systomi*. I could never account for how they arrived; for the remnants of the ramparts precluded their entrance except by the drains, but the only one which opened there took a circuitous route to the sea-face of the river, whilst all captured were freshwater species.

Length of specimen  $20\frac{4}{10}$  inches.

Its coloration varies considerably: in the specimen in my collection the back was dark grey, which colour passed downwards in five or six digitations to below the lateral line. Abdomen bright orange, with a few dusky markings at the base of the scales. Dorsal, caudal, pectoral, and anal grey; ventrals orange. On the posterior third of the body, of the dorsal and anal fins, and over the whole of the caudal were round pearl-like spots.

These are considered the best of the genus for the table; they do not appear to frequent stagnant waters or pools.

The *O. grandinosus*, C. & V., appears to be this species. The colours of many Indian specimens are nearly as vivid as represented by the Chinese painter. Likewise *O. leucopunctatus*, Sykes, seems to be merely the *O. marulius*.

#### OPHIOCEPHALUS DIPLOGRAMMA, Day, sp. nov.

B. v. D. 43. P. 15. V. 6. A. 27. C. 15. L. 1. 84. L. tr.  $\frac{7-8}{13-12}$ .

inches.

Length of specimen from  $3\frac{9}{10}$ .

———— of head . . . . .  $1\frac{1}{10}$ , or about two-sevenths of total length.

———— of pectoral . . . . .  $\frac{4}{10}$ , or about one-tenth of total length.

———— of base of dorsal  $1\frac{8}{10}$ , or about one-half of total length.

———— of base of anal .  $1\frac{1}{10}$ , or about two-sevenths of total length.

———— of caudal . . . . .  $\frac{6}{10}$ , or about one-seventh of total length.

Diameter of eye  $\frac{2}{10}$  inch, or  $\frac{2}{11}$  of length of head;  $\frac{2}{10}$  inch from end of snout, nearly  $\frac{3}{10}$  apart.

Body subcylindrical in front; head depressed and flat superiorly, rather compressed laterally. Orbit oval and close to profile.

Cleft of mouth lateral, wide; lower jaw the longest; superior maxillary extends behind to below posterior third of orbit. Thirteen rows of scales between orbit and angle of præoperculum. Inter-orbital space flat, slightly wider than the length of the snout; plates irregularly round, with raised margins, and smaller than those on the back of the head. About six series of scales between the orbits, the centre ones of which are the largest. Nostrils rather wide apart, the anterior of which is superior and the largest. A sharp spinous process exists on either side of the back of the head, above the operculum.

*Teeth.* Several rows of sharp teeth in the lower jaw, with an irregular internal row of larger ones. Several bands of sharp teeth in the upper jaw, vomer, and palate, in these two last places interspersed with larger ones.

*Fins.* Ventral reaches nearly as far as the commencement of anal. Fin-rays all weak. Pectoral rounded. Caudal slightly rounded.

Scales comparatively small, lineated, and raised at their margins. Lateral line makes a curve from the seventh to the eighth row of scales.

*Colours.* Back greyish; sides scarlet; abdomen white. A broad black band passes through the eye direct to the upper half of caudal

fin; a second commences at the angle of the mouth, and proceeds to lower half of caudal. Dorsal fin grey; caudal scarlet, with two black longitudinal lines; pectoral, ventral, and anal yellowish, with a dark grey base.

Rare; only one specimen obtained, in October 1863.

*FISTULARIA SERRATA*, Cuv.

B. vii. D. 15. P. 15. V. 6. A. 14. C. 2+6 | 2 | 6+2.

Length of specimens from  $18\frac{4}{10}$  to  $23\frac{7}{10}$  inches.

Not rare.

*MASTACEMBALUS ARMATUS*, Lacép.

*Ahlee* (Mal.).

B. vi. D. 37 | 74. P. 23. A. 3 | 79. C. 15.

Length of specimens from  $9\frac{6}{10}$  to  $18\frac{4}{10}$  inches.

Common in the rivers. They are dangerous to handle, on account of their dorsal and anal spines, as well as those on the præoperculum and in front and below the orbit.

Fair eating; but best in a dry curry. They salt well.

*MASTACEMBALUS GUENTHERI*, Day, sp. nov.

B. vi. D. 27-28 60-64. P. 15. A. 3 62-64. C. 9.

	inches.	
Length of specimens from ..	$4\frac{8}{10}$	to 7 inches.
———— of head .....	1,	or about 1-7th of total length.
———— of pectoral .....	$\frac{3}{10}$ ,	or about 1-23rd of total length.
———— of caudal .....	$\frac{4}{10}$ ,	or about 1-17th of total length.
———— of base of hard dorsal	$2\frac{8}{10}$ ,	or about 2-5ths of total length.
———— of base of soft dorsal	$2\frac{4}{10}$ ,	or about 1-3rd of total length.
———— of anal .....	$2\frac{6}{10}$ ,	or about 2-5ths of total length.
Height of head .....	$\frac{3}{10}$ ,	or about 1-23rd of total length.
———— of body .....	$\frac{8}{10}$ ,	or about 1-9th of total length.
———— of soft dorsal .....	$\frac{3}{10}$ ,	or about 1-23rd of total length.
———— of anal .....	$\frac{3}{20}$ ,	or about 1-12th of total length.

Diameter of eye  $\frac{1}{10}$  length of head; eyes slightly wider apart,  $\frac{4}{10}$  from end of snout.

Superior maxillary longer than the inferior; and soft snout extends  $\frac{1}{8}$ th of an inch beyond the end of the jaw. Cleft of mouth small, and extending about halfway to the orbit. Præoperculum with two spines at its angle, directed backwards and downwards, and some fine ones along its lower limb. A rather long and strong, sharp, erectile præorbital spine. Thirteen rows of scales between orbit and angle of the præoperculum. The whole of the head and between the orbits scaled.

*Teeth.* Several rows of sharp-pointed teeth, directed backwards, in both upper and lower jaws.

*Fins.* Dorsal spines strong, short, and sharp, commencing at about the termination of the first fifth of the body. Soft dorsal, caudal, and anal united. Anal spines strong, the centre one the longest and

strongest, the third being nearly hidden; they all can be laid flat in a kind of sheath, as can also those of the dorsal.

*Colours.* General colour greenish brown; a yellowish-white streak passes from just above the eye, along the lateral line, to the centre of the caudal. Soft portion of dorsal dotted with brown, and having fourteen irregular blotches along its base, extending to the back of the fish. Caudal with a black bar at its base, and four or five lighter ones between that and its extremity; anal irregularly spotted. Abdomen, from vent to head, of a dirty yellowish white, with a number of blotchy markings extending on to it from the side. Operculum greyish brown, the same colour being also found on the throat. Præoperculum of a lighter colour; lower jaw dirty white.

Very common in paddy-fields and the Trichoor backwater; said never to grow to a large size; is considered good eating.

**GLYPHIDODON COCHINENSIS, Day, sp. nov.**

B. vi. D.  $\frac{13}{11}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{2}{10}$ . L. l. 28. L. tr.  $\frac{3}{8}$ .

	inches.	
Length of specimens from	$3\frac{3}{10}$ to $3\frac{8}{10}$	inches.
— of head . . . . .	$\frac{7}{10}$	or about 2-11ths of total length.
— of pectoral . . . . .	$\frac{1}{10}$	or about 1-6th of total length.
— of caudal . . . . .	$1\frac{3}{10}$	or about 1-3rd of total length.
— of base of dorsal . . . . .	$1\frac{6}{10}$	or about 2-5ths of total length.
— of base of anal . . . . .	$\frac{7}{10}$	or about 2-11ths of total length.
Height of head . . . . .	$\frac{7}{10}$	or about 2-11ths of total length.
— of body . . . . .	$1\frac{1}{10}$	or about 2-6ths of total length.
— of hard dorsal . . . . .	$\frac{5}{10}$	or about 2-15ths of total length.
— of soft dorsal . . . . .	$1\frac{1}{10}$	or about 2-6ths of total length.
— of base of caudal . . . . .	$\frac{4}{10}$	or about 1-9th of total length.
— of ventral . . . . .	$\frac{6}{10}$	or about 1-6th of total length.
— of anal . . . . .	$\frac{9}{20}$	or about 1-8th of total length.

Diameter of eye  $\frac{2}{10}$  inch, or  $\frac{2}{7}$  length of head;  $\frac{3}{20}$  inch from end of snout,  $\frac{2}{10}$  apart.

Body ovoid, compressed, width at shoulder being scarcely equal to half its height; profile from snout to dorsal fin convex. Soft portions of dorsal, anal, and caudal fins much elongated.

Jaws of equal length; superior maxillary extends as far backwards as opposite the anterior margin of the orbit. Præoperculum entire; posterior limb slightly oblique, and half as long again as the inferior limb, which is horizontal, the angle being rounded. Sub- and interopercula entire. Operculum ending in a flat rather strong spine at its centre, a little below the level of the lower margin of the orbit; a second a short distance above, and in one specimen a third about an equal distance below the central one. The posterior nostril rounder than the anterior, which is transversely oval; they are a short distance apart, and near anterior surface of the orbit, slightly above its median line. All the opercula and interorbital space scaled. Suprascapular, scapular, and humeral bones entire.

*Teeth* flattened and compressed into a single row, decreasing in size from the centre of the jaws to their circumference.

*Fins.* Dorsal commences opposite end of operculum. Pectoral slightly behind, and ventral a little more posterior. Anal commences opposite about the tenth dorsal spine. Spinous portion of dorsal  $1\frac{2}{10}$  inch in extent; spines moderately strong; interspinous membrane slightly longer than the spines, and deeply notched; soft portion elongated; first spine  $\frac{2}{10}$ , second nearly  $\frac{3}{10}$  inch; and they gradually increase to the last, which is  $\frac{5}{10}$ . Pectoral rounded. Ventral spine  $\frac{4}{10}$  inch, moderately strong; first soft ray prolonged. Anal, first spine  $\frac{5}{20}$ , second  $\frac{5}{10}$ , and the strongest; soft rays prolonged. Caudal deeply lunated; outer rays much prolonged.

*Scales.* Greatest diameter from above downwards; some are continued over the soft portion of the dorsal and anal and commencement of caudal.

Lateral line at first on third scale, and is thus continued for about eighteen scales, when it apparently ceases; but it may be found continued on the sixth row in the form of round glandular cavities in the centre of each scale.

*Colours.* Of a deep purplish black; the margins of some scales of a lighter shade, lightest on the abdomen. Pectoral fins not so deeply stained as the others. Eyes dark hazel.

Only three specimens were observed at Cochin, and they were all captured in one net.

*PLATYGLOSSUS DUSSUMIERI*, Cuv. & Val.

B. vi. D.  $\frac{9}{12}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{12}$ . C. 15. L. l. 29. L. tr.  $\frac{3}{10}$ .

Length of specimens from  $3\frac{6}{10}$  to  $4\frac{4}{10}$  inches.

*GERRES PUNCTATUS*, Cuv. & Val.

B. vi. D.  $\frac{9}{10}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{7}$ . C. 17. L. l. 42. L. tr.  $\frac{5}{8}$ .

Length of specimens from  $4\frac{1}{10}$  to  $7\frac{7}{10}$  inches.

Arrives in Cochin in large numbers in the month of October; is eaten by the natives.

*GERRES FILAMENTOSUS*, Cuv. & Val.

B. vi. D.  $\frac{9}{10}$ . P. 15. V.  $\frac{1}{5}$ . A.  $\frac{3}{7}$ . C. 17. L. l. 42. L. tr.  $\frac{5}{9}$ .

Length of specimen  $5\frac{9}{10}$  inches.

*ETROPLUS SURATENSIS*, Bloch.

*Kurree meen* (Mal.).

B. vi. D.  $\frac{18-19}{14}$ . P. 17. V.  $\frac{1}{5}$ . A.  $\frac{13}{11}$ . C. 16. L. l. 45. L. tr. 21.

Length of specimens from  $1\frac{4}{10}$  to  $10\frac{2}{10}$  inches.

During the monsoon time the colours of these fish are most beautiful; the eight vertical bands are more distinctly marked, the abdomen becomes nearly white, the back dark green, whilst a round white pearly spot exists on nearly every scale. Very young fish

have a large black ocellus, surrounded by a white margin, and extending from the fourth to the tenth soft ray of the dorsal. When these fish frequent brackish water, they generally become of a deep purple colour.

Very common in all pieces of fresh water, and excellent eating when of a large size. They take a bait freely, but are not so easily captured by a net, as they appear to dive down into the mud.

*ETROPLUS MACULATUS*, Bloch.

*Pulluttay meen* (Mal.).

B. vi. D.  $\frac{18}{10}$ . P. 14. V.  $\frac{1}{5}$ . A.  $\frac{13}{9}$ . C. 16. L. l. 35. L. tr. 21.

Length of specimens from  $1\frac{5}{10}$  to  $3\frac{1}{10}$  inches.

Having captured about fifty specimens, on July 15th, 1863, from the fort ditch, for the purpose of minutely examining their colours, no two could be said to be exactly similar. The seventeen or eighteen rows of golden spots were more or less apparent in all: but in some the three blotches on the side were black, in others of emerald-green, whilst all intermediate shades were perceptible; some were glossed over with purple, which was absent in others.

Common in every paddy-field, tank, or piece of fresh water; and even occasionally in the backwater within the influence of the tides.

Eaten by the natives, but, as they rarely exceed 3 inches in length, are not esteemed by the Europeans.

## 2. NOTICE OF A NEW WHALEBONE WHALE FROM THE COAST OF DEVONSHIRE, PROPOSED TO BE CALLED *ESCHRICHTIUS ROBUSTUS*. BY DR. J. E. GRAY, F.R.S., ETC.

A better proof could not be required of the little attention that has hitherto been paid to the study of the Whales of the seas surrounding the British islands than the fact that, almost immediately after the appearance of my paper on British Whales, in which I had doubled the number of species that had before been recorded as found on our coast, a bone has been discovered showing most distinctly that a species of Whalebone Whale which had only been described from an imperfect skeleton buried in the sand on the coast of Sweden is also an inhabitant of our seas.

Mr. Pengelly has kindly brought to me one of the middle cervical vertebræ of a Finner Whale, which was washed ashore at Babbacombe Bay, in Torbay, on the coast of Devonshire, on the 24th of November 1861. It is so different in its form and proportions from the cervical vertebræ of any of the species of British Whales which I described in my paper on those animals (printed in the 'Proceedings' of the Society for 1864), that I lose no time in bringing a description of it before the Society; for, as I have already observed, I consider that we must treat remains of Whales as we do fossil animals—describe them from a single bone, if no more can be procured, if, after careful study and comparison, we are satisfied that the bone in



question differs in important characters from the corresponding bone in the hitherto known species.

In this case, though as yet we only know a single bone, there cannot be any doubt,—1, that the body of the vertebra differs in its form and thickness from the vertebra of any Finner Whale yet described; 2, that the thickness of the lateral processes is exceedingly different from that of those parts in any other known species; 3, that the size, or rather width, of the canal of the spine, as compared with the size of the body of the vertebra, differs from the width found in any Whale yet examined.

On comparing this vertebra with the drawing of the cervical vertebræ of *Balænoptera robusta*, described by Professor Lilljeborg in his very excellent paper on the Scandinavian Whales, which he had been so kind as to transmit to me, I was induced to believe that the bone sent by Mr. Pengelly might belong to that species; but, for greater certainty, as I cannot read the Professor's Swedish description of the species, nor get it properly translated here, I sent a tracing of the bone to Upsal, and the Professor has replied that he believes that it belongs to the species he described. He has also sent me a drawing of one of the cervical vertebræ of his species, which certainly agrees with the one from Babbacombe Bay in every particular, except in being a trifle larger in all its parts.

The addition of this animal to our marine fauna, and the procuring of the remains of a second specimen of a species which only rested on the description of an imperfect skeleton found imbedded in the sand on the coast of Sweden, is important.

In my "Notes on the Whalebone Whales, with a synopsis of the species," published in the 'Annals and Magazine of Natural History' (vol. xiv. p. 343), I gave the reason why I thought *Balænoptera robusta* was probably more allied to *Megaptera* than to *Physalus*, and I there proposed for that species a new subgenus, under the name of *ESCHRICHTIUS*. The examination of the vertebra from Devonshire, and the additional figures which Professor Lilljeborg has so kindly sent to me, confirms me in the idea that it is of a distinct form, proper to be considered as a genus. Professor Lilljeborg observes, "Depuis peu vous considérez que mon *B. robusta* appartient aux genre *Megaptera*. D'après les principes que vous avez suivies dans la distinction des genres des *Balænoptères*, cette espèce, sans doute, doit faire type d'un genre particulier."

In the cervical vertebræ of all the genera of Finner Whales which I have examined, and which have hitherto been described, the width of the canal of the spinal marrow is rarely more than half the width of the body of the vertebra: thus in *Physalus* the canal is  $5\frac{3}{4}$  inches wide, and the body of the vertebra 11 inches; in *Megaptera*, which had the largest and widest canal known until the discovery of this Whale, the canal is 5 inches, and the body of the vertebra 9 inches wide; but in this Babbacombe Whale the canal is  $6\frac{3}{4}$  inches, and the body of the vertebra only  $7\frac{1}{2}$  inches wide. The cervical vertebræ of the *Balænidæ* have a large canal for the spinal marrow, compared with the size of the body of these vertebræ.

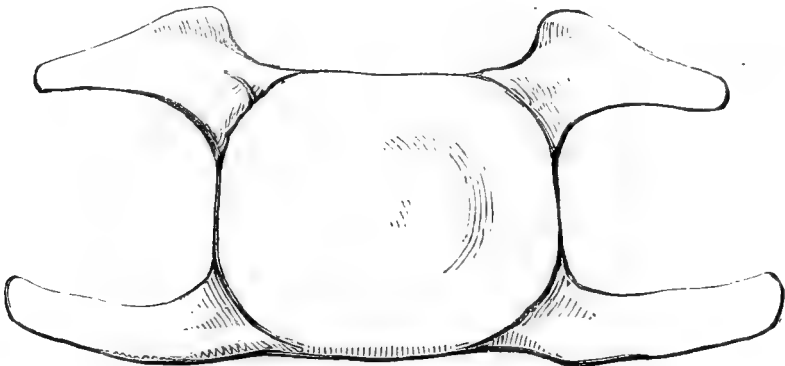
The large size of this canal in *Megaptera*, *Pæscopia*, and *Cuvierius*, as well as peculiarities in other parts of the skeleton in the two former genera, shows that the long-armed Humpbacked Whales have some characters which make them, in some respects, more allied to the Right Whales, or *Balænidæ*, than the other Finner Whales. *Eschrichtius* is separated from both *Megaptera* and *Pæscopia* by the regular and well-developed form of the lateral processes, which are even larger and longer, compared with the size of the body of the vertebra, than are found in any of the species of *Physalus* or *Benedenia*.

The canal of the spinal marrow in *Eschrichtius* is broader, compared with the size of the body of the vertebræ, than it is in the last cervical vertebra of *Balæna biscayensis* (the canal in this species becomes wider, compared with its height, as it approaches the dorsal vertebræ); for its width is only four-fifths of the width of the body of the vertebra, while in *Eschrichtius* it is eight-eighths of the same measurement.

In the study of these animals, I have observed that the form and proportion of the canal of the spinal marrow constitute one of the best characters for the distinction of the Whales. Under these circumstances, I propose to form a genus for this Whale, under the name

#### ESCHRICHTIUS.

The external form and size of pectoral fin, and the position and form of the dorsal fin, unknown. Lower jaw with a very low, strongly developed coronoid process. Vertebræ 60. Ribs 15—15. The cervical vertebræ free, the body small, thick, suborbicular, quadrangular, rather wider than high; lateral processes of the third to the seventh vertebræ not forming a ring; the canal of the spinal marrow very broad, compared with the width of the body of the vertebræ, and very high, subtrigonal, with rounded angles. The second cervical not known. Bladebone with a distinct acromium and



Vertebra of *Eschrichtius robustus*.

coracoid process. Arm-bones broad, not longer than the humerus. Fingers, phalanges half as long again as broad. The breastbone

trigonal, rather longer than wide; front part broad, arched out in front, broadly truncated at the sides; the hinder part at first suddenly tapering, for half its length, and then gradually tapering to a point behind.

The body of the cervical vertebra of *E. robustus* from Babbacombe is very thick, and of a nearly uniform thickness; front and hinder surfaces nearly flat; the sides are nearly straight, the lower one being the widest and most arched out. The upper and lower lateral processes are strong; the upper one subtrigonal, slightly bent down, and nearly on a level with the articulating surfaces of the body; the hinder one rather compressed above, broader and somewhat flattened on the lower edge. The width of the body  $7\frac{1}{4}$ , the height 6 inches. The upper processes  $3\frac{3}{4}$ , and the lower  $4\frac{1}{2}$  inches long; but they are evidently broken and sea-worn at the end.

This vertebra appears to be either the fourth or fifth cervical, as the lateral processes are nearly on the same plane as the articulating surface; while in the anterior or posterior cervicals they are usually either bent forwards or backwards. It differs from other cervical vertebræ in the squareness of its form, the straightness of the sides, the smallness of the size, and the very great and equal thickness of the body. It is evidently the bone of an adult animal, as the epiphyses are completely united to the body of the vertebra.

The body of the vertebra is nearly as wide and thick as that of the corresponding one in *M. longimana* (width of body 9, height 7, width of neural arch  $5\frac{3}{4}$  inches in widest part), at the same time that the space between the bases of the neural arch is nearly  $1\frac{1}{2}$  inch wider, and the lateral processes are very much thicker and more developed, than in the vertebra of *M. longimana*.

It differs in the same characters, but in a greater degree, from the corresponding cervical vertebra of *Physalus* (width of body 11, height 7, width of neural arch  $5\frac{1}{2}$  inches); for in that genus the body of the vertebra is thin and transversely more oblong, and the canal of the neural arch not so broad, compared with the width of the body of the vertebra.

### 3. NOTES ON THE MYOLOGY OF A SPECIMEN OF CERCOPITHECUS SABÆUS. BY ST. GEORGE MIVART, F.Z.S., F.L.S.

In October last I received from the Society's collection a fine adult female Monkey of the above-mentioned species. It may perhaps be worth while to record the conditions presented by some of those muscles which show such interesting variations in the order Primates.

The levator claviculæ arose from the transverse process of the atlas only, and, descending beneath the sterno-mastoid, was inserted into the acromion and the anterior third of the spine of the scapula, but not at all into the clavicle. The trapezius was entirely superficial to it.

The omo-hyoid was wanting.

The pectoralis major arose from the whole length of the sternum, the sternal ends of the ribs, and the sterno-clavicular articulation, but not from the clavicle itself; it was inserted into the external edge of the bicipital groove of the humerus, side by side with the deltoid, and having the same upper and lower limits as that muscle has at its insertion.

The pectoralis minor consisted of two very distinct portions. The first arose from the sternum (below the second bone), and from the sternal ends of the ribs beneath, extending as far down as the origin of the pectoralis major. The second part arose exclusively from the aponeurosis of the external oblique. The fibres of these two portions converged (leaving a triangular space between them covered by the pectoralis major), and were together inserted into the capsular ligament of the humerus.

The trapezius was inserted into the whole length of the spine of the scapula to the extremity of the acromion, but it had no insertion into the clavicle.

The rhomboideus major and rhomboideus minor were represented by a single muscle; but there was a very distinct and separate muscular slip which arose from the supra-occipital, and was inserted by a distinct tendon into the inner side of the posterior margin of the scapula, just below the triangular surface at the root of the spine.

The latissimus dorsi separated into two portions when about 2 inches from the axilla: the smaller and inner portion joined the tendon of the teres major; the larger and outer portion was inserted into the bicipital groove.

The dorso-epitrochlear arose from the larger division of the latissimus dorsi (just where it became tendinous), and was inserted, as usual, into the olecranon.

A small, short muscular slip arose from the outer side of the tendon of the coraco-brachialis, and was inserted into the humerus just above the insertion of the teres major.

The extensor indicis ended in two tendons inserted, respectively, into the second and third digits.

The extensor minimi digiti similarly gave tendons to the fourth and fifth digits.

The extensor primi internodii pollicis was entirely absent.

The extensor ossis metacarpi pollicis gave rise to two tendons, one being inserted into the trapezium, the other into the radial border of the first metacarpal.

The flexor profundus consisted of four fleshy bellies, of which the first arose from the anterior surface of the radius and interosseous ligament, the second from the anterior surface of the ulna, the third from the inner condyle of the humerus, and the fourth from the inner border of the ulna. The last was very distinct, and supplied the tendon for the fifth digit. The other three soon fused together, and gave origin to a very broad tendon, from the middle of the superficial surface of which a small tendon arose, which crossed over and was inserted into the pollex.

The scansorius was completely fused with the gluteus minimus.

The tensor vaginæ femoris was strongly developed, but very closely united, at its origin, with the gluteus medius.

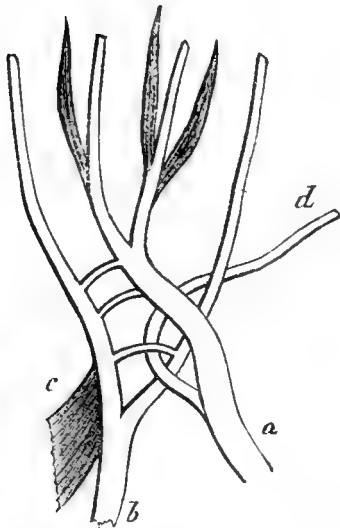
The biceps femoris had but one origin, namely, from the outer side of the base of the ischium beneath the acetabulum.

The rectus femoris and soleus had each also but a single origin, the latter arising from the head of the fibula.

The tibialis anticus had its lower half divided into two distinct fleshy bellies, one giving off a tendon to the ento-cuneiform, the other sending one to be inserted into the tibial side of the ventral surface of the first metatarsal.

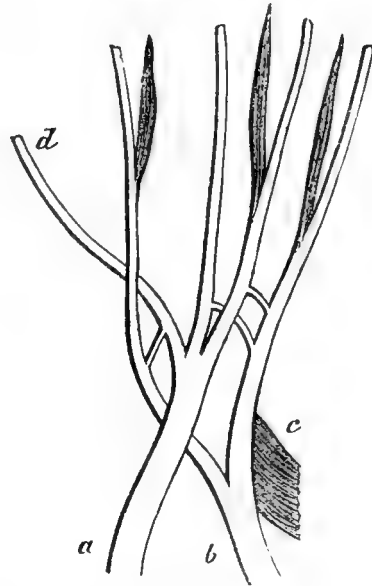
The peroneus quinti digiti consisted of a very small fleshy belly, which arose from the middle of the external surface of the fibula (between the peroneus longus and the peroneus brevis) and soon gave rise to a very long and exceedingly slender tendon, which was closely applied to that of the peroneus brevis and, beyond the insertion of the latter, was continued along the upper and outer edge of the fifth metatarsal to be inserted into the extensor sheath of the fifth digit.

Left foot.



a. Flexor longus hallucis.  
b. Flexor longus digitorum.

Right foot.



c. Flexor accessorius.  
d. Tendon of hallux.

The flexor longus digitorum and the flexor longus hallucis were connected together by their tendons in a peculiar manner, but which differed slightly in the two feet. In both feet the tendon of the flexor longus digitorum bifurcated, one branch going to the second, the other to the fifth digit. The flexor longus hallucis divided into three strong tendons, destined for the hallux and for the third and

fourth digits respectively. In both feet also the tendon to the hallux was bent round that going to the second digit, becoming superficial to it. In both feet also the tendon of the fifth digit gave off two short and very slender tendons to join those of the flexor longus hallucis destined for the third and fourth digits respectively; and the tendon of the second digit also gave off a short and slender slip; but while, in the right foot, this slip joined the tendon of the hallux (the flexor longus digitorum being thus, directly or indirectly, connected with all the digits of the right foot), this slip, in the left foot, joined the other branch of the flexor longus digitorum (namely, the tendon for the fifth digit), the tendon of the hallux, in that foot, thus passing between the two branches of the flexor longus digitorum and their connecting slip, but having no connexion whatever with any tendon of that muscle.

The flexor accessorius gave off no tendon, but was inserted into the outer side of the tendon of the flexor longus digitorum and of its external branch, its insertion extending from a little distance above to about the same distance below the point of bifurcation of the tendon.

The lumbricales were three in number in each foot, and inserted into the third, fourth, and fifth digits; but while, in the right foot, the lumbricalis inserted into the third digit took origin from the outer side of the tendon of the second digit; in the left foot it arose from the inner side of the tendon of the third digit. Again, the lumbricalis of the fourth digit arose, in the right foot, from the inner side of the tendon destined for that digit, while in the left foot it arose from the outer side of the tendon for the third digit. Finally, the lumbricalis of the fifth digit, which, in the right foot, arose from the tendon of that digit, took origin, in the left foot, from the outer side of the tendon of the fourth digit.

The plantar interossei formed a very distinct muscular layer, which arose from the proximal end of the plantar surface of the third metatarsal, and from the sheath of the tendon of the peroneus longus. It divided into three distinct portions, which were inserted in the usual manner, *i. e.* like the palmar interossei of the human hand.

#### 4. ON TWO NEW BIRDS FROM THE ISLAND OF RODRIGUEZ. BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

(Plate I.)

I have the pleasure of laying before the Society specimens of two undescribed birds, which I have recently received from my brother, Mr. Edward Newton, Acting Auditor-General of Mauritius, C.M.Z.S. They were obtained by him during a short visit to the Island of Rodriguez, a locality so interesting as having been the seat of one, if not more, species of the family *Dididæ*. I may add that these two species were the only land-birds observed by him on this occasion, with the exception of a small Parrot (*Poliopsitta cana*) and a spe-



J. Wolf. del. et. lith.

M & N. Harhart imp

1 2. FOUDIA FLAVICANS.  
3. DRYMŒCA RODERICANA.





cies of *Numida*, both of which have been, according to the information he collected, introduced into the island from Madagascar.

The first I call

**FOUDIA FLAVICANS**, sp. nov. (Pl. I. figs. 1, 2.)

*F. major*, capite et pectore pulchre luteis, alis unifasciatis, pedibus validioribus.

Descr. maris adulti. Olivaceo-virens, dorso striolato; subtus pallidior; capite, collo, pectore et uropygio pulchre luteis, capistro et genis rubro-aurantiaco ardescensibus; abdomine medio albido-lutescente; alis albido late unifasciatis; regionibus ophthalmicis nigris; rostro gracili, subincurvo, nigro; pedibus validioribus, dilute brunneis; iridibus perfuscis.

Long. tota 5, alæ 2·72, caudæ 1·9, acrotarsi ·85, dig. med. cum ungue ·75, hallucis cum ungue ·64, rostri a fronte ·56, ejusdem a rictu ·54 poll. Angl.\*

Descr. fœminæ adultæ. Fusco-virens, dorso striolato; subtus multo pallidior; alis late unifasciatis; rostro et iridibus perfuscis; pedibus fuscis.

Hab. in insula Mascarena "Rodriguez" dicta.

Mus. A. et E. Newton.

Obs. I characterize this fine species as new without any hesitation.

I may mention that a specimen has been in the possession of myself and my brother for nearly twenty years. All we know of it was that it was sent to England by the late Colonel Lloyd, who was Surveyor-General of Mauritius. We took it to be an accidental variety of *Foudia madagascariensis*, perhaps arising from the bird having been kept in captivity. When, however, I came to compare it with examples of that species, it was plainly distinct; but having no knowledge of the precise locality where it was obtained, though I had little doubt it came from one of the Mascarene Islands, I forbore to describe it. The new species, though no doubt most nearly allied to *F. erythrocephala*, will be easily distinguished not only by its greater size, but by its very different colouring.

The second I propose to designate as

**DRYMCEA (?) RODERICANA**, sp. nov. (Pl. I. fig. 3.)

*D. supra cinereo-olivacea, subtus flavescens, annulo periophthalmico paroticisque albis flavido tinctis.*

Descr. maris adulti. Rostro gracili, sub apicem emarginato; maxilla incurvata; mandibula recta, ultra medium lævissima, sursum inclinata; naribus basalibus, superne membrana clausis, inferne rima longitudinali apertis; rictu setoso; alis brevioribus, ro-

\* Addo mensuras similes marium Foudiæ madagascariensis et *F. erythrocephalæ*:—

	<i>F. m.</i>	<i>F. e.</i>		<i>F. m.</i>	<i>F. e.</i>
Long. tota .....	4·8	4·4	Long. dig. med. c. ungue....	·73	·7
— alæ .....	2·52	2·65	— hallucis .....	·55	·58
— caudæ .....	1·75	1·55	— rostri a fronte.....	·51	·55
— acrotarsi .....	·79	·85	— rostri a rictu .....	·56	·54

*tundatis, remige primo brevissimo, secundo abrupte longiore et nono æquali, tertio quarto et quinto subæqualibus longissimis externe emarginatis; cauda rectricibus decem, elongata, gradata; acrotarsis longiusculis. Supra cinereo-olivacea, flexura flavescente, remigibus rectricibusque olivaceo-fuscis, illis externe griseo limbatis; subtus pallide flavescens, annulo periophthalmico paroticisque albis, pallide flavido tinctis; maxilla perfusca flavo limbata; mandibula flava; pedibus schistaceo-brunneis.*

Long. tota 5·75, alæ 2·8, caudæ 2·6, acrotarsi ·9, dig. med. cum ungue ·58, hallucis cum ungue ·51, rostri a fronte ·54, ejusdem a rictu ·7 poll. Angl.

*Hab.* in insula Mascarena “Rodriguez” dicta.

*Mus.* A. et E. Newton.

*Obs.* It is with considerable doubt that I refer this bird to the genus *Drymæca*. It seems to me to be quite as nearly allied to *Prinia*, with certain leanings towards *Orthotomus*. In my determination of it, I am chiefly influenced by the opinion of Mr. G. R. Gray, who has most obligingly examined the specimen, and informed me that he considers it belongs to the first-named genus, adding that it “is somewhat allied to *D. thoracica*, which is the type of Swainson’s subdivision *Apalis*.” I would take this opportunity of remarking that no other species of the genus *Drymæca*, as restricted, is found in any island of the Mascarene group; for the *Drymæca madagascariensis* of Dr. Hartlaub (*Orn. Beitr. zur Fauna Madagascars*, p. 35) seems to me more properly to belong to the genus *Cisticola*, having *twelve*, instead of *ten*, rectrices.

##### 5. ON THE OS PENIS OF THE CHIMPANZEE (*TROGLODYTES NIGER*) AND OF THE ORANG (*SIMIA SATYRUS*). BY EDWARDS CRISP, M.D., F.Z.S., &c.

The communication I am about to make will, I think, be received with some amount of gratification by the members present, as there are none of us, I presume, that wish to claim relationship with the ape, and any discovery that makes the line of demarcation between man and the brute more definite and positive will be hailed with satisfaction. All, as far as I know, who have dissected the two apes above named—animals among the anthropoid *Quadrumanæ* that have most frequently come under the knife of the anatomist—have either



a. The penis-bone of a young Orang.

b. The penis-bone of a young Chimpanzee\*.

denied the existence of a bone in the penis, or have inferred that it was not present. During my first examinations of the Orang and

\* These bones are represented with the periosteal covering.

Chimpanzee, when the anatomy of these apes excited less interest, I did not examine the male generative organs with sufficient care, and I inferred, as others had done, that no bone was present. In my more recent examinations I have been more minute, and, to my surprise, I find that both the Chimpanzee and Orang have a penis-bone as exhibited in the preparations before the Society and in the drawing which I now exhibit. (See woodcut, p. 48.)

I first discovered this bone in a young Orang, and next in two Chimpanzees, now in my possession. Through the kindness of Mr. Flower, conservator of the Hunterian Museum, I examined all the male anthropoid apes in spirits at the College of Surgeons. In a very young Chimpanzee weighing about 5 lbs., and having only four incisor teeth, I found this bone small and acicular. In two Orangs, about two years of age, it appeared to be of about the size of the specimens before the Society; but in these I judge only from *external* examination. This bone, I believe, is present in the Gorilla also, an animal that in many respects is more distant from the human family than the Chimpanzee. The bone in these young anthropoid apes (Orang and Chimpanzee) is about one-third of an inch in length, and about a line in width, with the extremities slightly enlarged. In the Chimpanzee it is rather shorter and thicker. What size it attains in the adult animal remains to be seen: it is probably as large as, or perhaps larger than the same bone in many of the lower *Quadrumana*. There is one thing, however, tolerably certain, that the presence of this bone is an indication of a great degree of inferiority, as regards place and position, in the animal scale.

6. ON THE ANATOMY AND HABITS OF THE WATER-OUSEL (*CINCLUS AQUATICUS*). BY EDWARDS CRISP, M.D., F.Z.S., ETC.

I have for a long time been occupied in preparing a work on the British Birds, more especially in reference to their structure, in connexion with their habits, the nature of their food, &c.; and there is no bird that has puzzled me so much as the Water-Ousel, and it is on this account that I bring the subject before the Society, hoping that I may obtain some information from the members present. I need not go very minutely into the history of this bird; but it will, I think, be interesting to compare some parts of its anatomy with those of the other *Merulidæ*. The object of my paper will be to endeavour, first, to ascertain by what means this bird, so unlike all aquatic birds in form, is enabled to dive and remain some time under water and capture its prey; secondly, to inquire respecting the nature of its food, and its supposed depredations on the ova and fry of fishes. I may premise that I have shot several of these birds in Scotland for the purpose of ascertaining the character of their food, and that I have had many opportunities of observing their habits. The three specimens on the table were sent to me recently (Nov. 30) by my friend Mr. Grierson, of Thornhill, Dumfriesshire; and I have dissected and

examined them, as I had done on former occasions, in relation to the two questions above referred to. As the evidence of one inquirer in reference to the habits of this or of any other bird is comparatively valueless, let me quote a few authorities upon the subject.

Montagu, in his *Ornithological Dictionary*, says he "discovered the nest of this bird in consequence of the old bird flying, with a fish in its bill, to the young. These were nearly fledged, but incapable of flight; and the moment the nest was disturbed, they fluttered out and dropped into the water, and, to our astonishment, instantly vanished, but in a little time made their appearance at some distance down the stream, and it was with difficulty two out of five were taken, as they dived on being approached. The motion under water," he says, "is effected by short jerks from the shoulder-joint, not, as in all other diving-birds, with extended wings."

Yarrell dissected this bird, and found nothing in its structure to account for its diving and remaining on the ground without any muscular effort.

Mr. Macgillivray (*Naturalist*, vol. i. p. 105) says, "I have seen the Dipper moving under water in situations where I could observe it with certainty, and I readily perceived that its actions were similar to those of the Divers, Mergansers, and Cormorants, which I have often watched from an eminence as they pursued the shoals of sand-eels along the sandy shores of the Hebrides. It in fact flew, not merely using the wing from the carpal joint, but extending it considerably, and employing its whole extent as if moving in the air. The general direction of the body is obliquely downwards; and great force is evidently used to counteract the effects of gravity, the bird finding it difficult to keep at the bottom."

Other observers have given similar testimony, some asserting that bubbles of air appeared on the surface after the bird was submerged: but these must have arisen from the disturbance of the earth at the bottom of the river; for no diving-bird, I believe, emits air from its lungs when under water. The air is got rid of before the act of diving takes place. But let me now speak of some parts of the anatomy of this bird, before I attempt to answer the first question. The average weight of this bird is said to be  $2\frac{1}{2}$  oz.; but in four that I have weighed the average weight has been about  $2\frac{1}{4}$  oz., the males being a little heavier than the females; the length  $7\frac{1}{4}$  inches, and 11 inches from the tip of each wing. The brain weighed 10 grains, the eyes 12 grains, the skin and feathers 132 grains, the pectoral muscles 135 grains. The gizzard moderately thick, and lined with a tough cuticle. The length of the whole alimentary tube was 16 inches; the œsophagus, as in the other *Merulidæ*, not dilated into a crop. The trachea of nearly uniform calibre, and consisting of 36 rings; the vocal muscles largely developed, as in the other members of this family. The tail-glands comparatively of large size.

I have depicted all the above parts in the drawing before the Society; but the parts of the anatomy of this bird to which I am anxious to direct attention are the shortness of the wing and the great development of the wing-muscles—features which I believe will in

a great measure account for the diving-powers of this bird and its progress under water. As might be expected, too, from the frequent motion of the tail, the caudal muscles are much developed. On comparing the visceral anatomy of this bird with that of the other British *Merulidæ*, all of which I have dissected, with the exception of White's Thrush (*Turdus whitei*), very little proportional difference is observed. The length of the intestinal tube in the Redwing (*T. iliacus*) is 14 inches; the brain weighs 16 grains, the pectoral muscles 170 grains, the weight of the body being about  $2\frac{1}{2}$  oz. In the Fieldfare (*T. pilaris*), weighing  $4\frac{1}{2}$  oz., the brain weighs 26 grains, and the intestinal tube measures 22 inches. In the Ring-Ousel (*T. torquatus*), weight 3 oz. 180 grains, the alimentary canal is  $13\frac{1}{2}$  inches in length, and the weight of the brain is 26 grains; and these parts in the Missel-Thrush (*T. viscivorus*), in the Blackbird (*T. merula*), and Song-Thrush (*T. musicus*) are of nearly the same proportionate length and weight. In the young Water-Ousel that I have dissected, I observed nothing remarkable in its anatomy. So that, as regards the visceral anatomy, there is no important difference between the Water-Ousel and the other members of this group, although among the British Merules this is the only bird that feeds exclusively on animal food; but, to show how the habits of a bird may be altered in this respect, I have mentioned a young Water-Ousel that was reared under a Bantam, and fed on porridge (P. Z. S. 1859, p. 200).

Some writers upon this bird have spoken of the claws as being well adapted for holding on to stones and other objects at the bottom of the water; but on comparing the claws of the Water-Ousel with those of the other *Merulidæ*, it will be seen that the bird has no advantage of this kind, although the comparatively blunted form of the claw would lead to the inference that it is used for the purpose mentioned.

The bones of the Water-Ousel, like those of the other British members of this group, contain no air\*; and it is singular that the skeleton of the Fieldfare, Redwing, and Missel-Thrush (birds of passage) should in this respect resemble that of the short-flighted Water-Ousel.

As regards the food, I am afraid that we cannot entirely acquit this bird of occasionally destroying the fry of fish; but I know of no reliable evidence to prove that it takes the ova. In the three specimens before the Society, the gizzards of all contained Entomostraca, and one of them a Gordian (*Gordius aquaticus*). In others that I have dissected, I have discovered chiefly Entomostraca and the larvæ of *Phryganea*; indeed I have found that its food is very similar to that of the young Salmon (*Salmo salar*).

Mr. Gould, in his present work 'The Birds of Great Britain' (part 1), mentions that he examined five of these birds that were shot on the River Usk, in Nov. 1859, and that no trace of spawn was found in any of them; their hard gizzards were entirely filled with the larvæ of *Phryganea* and the Water-beetle (*Hydrophilus*). One had a small Bullhead (*Cottus gobio*), which the bird had doubtless

\* I need scarcely say that some of the cranial bones of birds, like those of mammals, contain air.

taken from under a stone. Mr. Gould thinks that, by destroying insects and their larvæ that may attack the ova and fry of fishes, these birds may do great service.

Mr. Macgillivray found beetles and water shells (*Lymnea* and *Ancylus*) and the larvæ of *Ephemera*, *Phryganea*, and other aquatic insects.

Sir W. Jardine, in his 'Birds of Great Britain,' says, "In one part of Scotland, sixpence per head is given for these birds. In another district, 548 were killed in three years." He adds, "The ova of any kind of fish we have never detected in the stomach or intestines; nor do we think that they habitually frequent the places where the spawn would be deposited; and if they did, we would deem it almost impossible that they could reach it after it was covered in the spawning-bed," &c.

So that I hope we may fairly acquit this interesting little bird of the depredations of which it has so often been accused; but I hope that we shall ere long see the Water-Ousel, with the Little Grebe (*Podiceps minor*), in the Society's fish-house, where a better opportunity will be afforded of learning its habits.

As is well known, this bird has been variously classed by different writers. Mr. Gould, in the work before quoted, says he regards *Cinclus* as one of the isolated forms of ornithology, and that it has some remote alliance with the genera *Troglodytes* and *Scytalopus* and their allies. In my next communication I hope, by a careful comparison of the skeleton of this bird with those of the other *Merulidæ*, to come to a more definite conclusion on this subject.

## 7. ON THE SYNONYMY OF *SISTRUM CANCELLATUM*.

BY W. HARPER PEASE, CORR. MEM.

We find a great discrepancy, as to the name of this species, among the several authors who have noticed it. It was originally described by Quoy and Gaimard (*Voyage de l'Astrolabe*, vol. ii. p. 563, pl. 37. figs. 15, 16) as *Purpura cancellata*.

The next author who noticed it was De Blainville in his *Monograph of Purpura*, *Nouv. Ann. du Mus.*, 1832, p. 221. He refers correctly to the '*Voyage de l'Astrolabe*,' but names it "*P. fenestrata*," possibly by mistake in copying. His name is consequently a synonym of *P. cancellata*. Deshayes, in his edition of Lamarck, gives the description as *P. fenestrata*, Blainv., referring correctly to the figure and description by Quoy and Gaimard, as well as to that of De Blainville. Kiener, most surprisingly, does not notice it. Reeve discards both the names of Blainville and Quoy & Gaim., but describes and figures it more correctly than had been done previously, under the name *P. elongata*, Blainv. We can find no description of such a species by De Blainville. In his *Monograph*, however, on pl. 10, fig. 9, a shell is figured to which he attaches the name *P. elongata*; but no corresponding description appears in the text. Dr. Gould, in his '*Mollusca of the U. S. Exploring Expedition*,' figures and describes the animal, following Reeve in naming it *P. elongata*, Blainv.; but he refers to

the description and figure given by De Blainville of *P. fenestrata*, and also quotes *P. fenestrata* of Quoy & Gaim., who make no mention of such a species. On comparing the above figures and descriptions, it will be found that they all refer to one species. The shell figured by De Blainville as *P. elongata* is a member of the same group as *P. cancellata*, which is represented by a number of species and varieties in the Pacific.

8. DESCRIPTION OF A NEW SPECIES OF LATIRUS, AND REMARKS ON OTHERS, INHABITING THE PACIFIC ISLANDS. BY W. HARPER PEASE.

Four species of *Latirus* inhabit the Pacific Islands. They possess in common the remarkable peculiarity of displaying, when wet or moist, bright iridescent hues of various colours, although there is but slight analogy between them as to other characters. As they are of rare occurrence, and as we have in our collection a full suite of perfect and mature specimens, we propose to revise and extend the previous descriptions. The species range, so far as we have ascertained, from the Carolines, through the Ralick and Radack groups, to the Kingsmill; thence south to the Tongas, and east over the small islands near the Equator, not reaching Tahiti. The first and most notable is

*LATIRUS PRISMATICUS*, Mart.

Although figured by Martyn, the original and (so far as we can learn) the only description of this species was given by Mr. Reeve in *Conch. Icon.*, under *Turbinella*, from a worn specimen. The figure of Martyn is not correct; but the colour is not exaggerated, nor can it be. Occasionally we have observed the tints change, and pass through several shades, while drying. We have seen specimens 3 inches in length. The following description is taken from a mature specimen:—

*L. t. turrito-fusiforini, crassa, longitudinaliter plicato-costata, transversim nodoso-lirata; liris elevatis, supra costas compresso-angulatis; interstitiis concentricè tenuiter liratis, longitudinaliter squamuloso-rugosis; columella triplicata, callositate parva superne munita; labro simplici, acuto, intus lirato; fulva, liris nigro-purpureis, purpureo vel viridi vel cæruleo iridescentibus, intus crocata.*

*LATIRUS GEMMATUS*, Reeve.

The iridescent colours of this species are the same as those of the preceding, but in a less degree. The white colour is confined to the left side of the nodules. To the description given by Mr. Reeve we add as follows:—

“*Longitudinaliter nodoso-plicata, transversim striata, nodis subrotundatis.*”

## LATIRUS VIOLACEUS, Reeve.

To the description we only add that the iridescent colours differ from those of the two preceding species in being of delicate golden and silvery shades of purple and green.

To the above we add the following new species:—

## LATIRUS GIBBUS.

*I. t. fusiformi, solida, lævi; spira acuminata, gracili; longitudinaliter nodoso-costata, costis quinque, magnis, obliquis, compressis, valde elevatis; transversim costata, costis tribus, rotundatis, indistinctis et irregularibus; labro tenui, simplici; costis albidis, interstitiis purpureo-violaceis iridescentibus, apertura violacea.*

Long. 13, diam. 8 mill.

The iridescence appears but faintly in this species.

9. DESCRIPTIONS OF TWO NEW SPECIES OF SHELLS IN THE COLLECTION OF GEORGE FRENCH ANGAS. BY HENRY ADAMS, F.L.S., AND G. F. ANGAS, CORR. MEM. Z. S.

(Plate II.)

Genus SUBULINA, Beck.

Subgenus CÆLIAXIS, nob.

*Testa umbilicata; spira superne attenuata.*

SUBULINA (CÆLIAXIS) LAYARDI, nob. (Pl. II. fig. 1.)

*S.t. umbilicata, cylindraco-turrita, tenuis, oblique confertim costulato-striata, candida; spira superne sensim attenuata, apice obtuso; anfr. 19, convexiusculi, ultimus basi rotundatus; apertura subverticalis, ovato-lunaris; perist. simplex, rectum, marginibus callo tenui junctis, columellari reflexo.*

Long. 28, diam. 7 mill., ap. 4 mill. longa.

*Hab.* Cape of Good Hope (*Brit. Mus. and Coll. Angas*).

The examples of this species in the British Museum were collected during the voyage of H.M.S. 'Herald,' and were received, with several other shells, as having been obtained at the Cape. The specimen in the collection of Mr. Angas was sent to him from the Cape, with the locality "East London, Buffalo Mouth" attached to it.

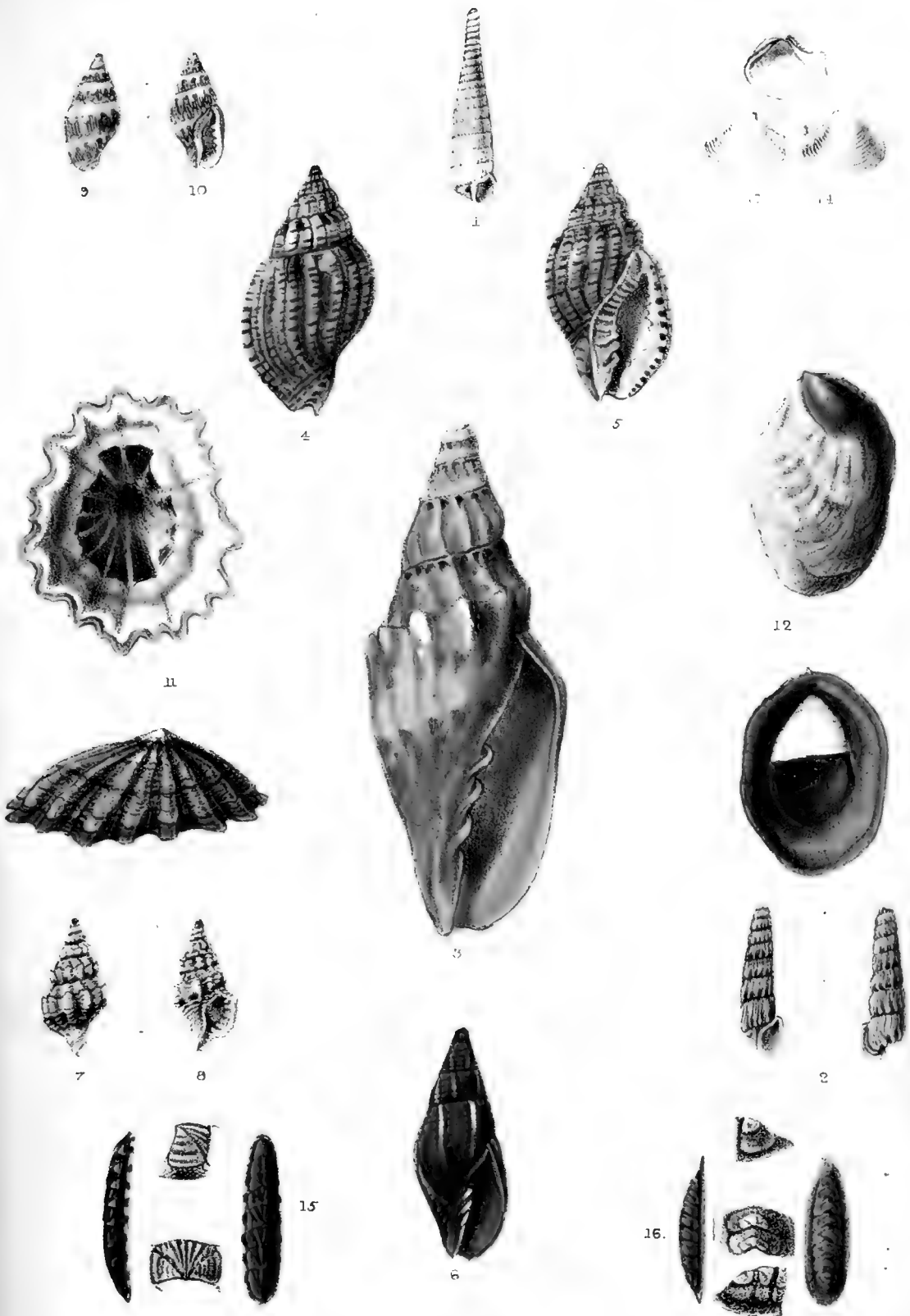
TRUNCATELLA (TAHEITIA) CLATHRATA, nob. (Pl. II. fig. 2.)

*T. t. elongata, subcylindrica, tenui, decollata, pallido-fulva, clathris acutis irregularibus subdistantibus instructa; anfr. superst. 7, convexiusculi, ultimus penultimo sejunctus; apertura subovalis; perist. continuum, undique reflexum, margine dextro expanso.*

Long. 9, diam. 3 mill., ap. diam. 3 mill.

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





G.B. Sowerby. del.

M. & N. Hanhart. imp.

EXPLANATION OF PLATE II.

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| 1. <i>Coelaxis Layardi.</i>          | 9, 10. <i>Columbella interrupta.</i> |
| 2. <i>Tahitia clathrata.</i>         | 11. <i>Patella alticostata.</i>      |
| 3. <i>Voluta Kreuzleræ.</i>          | 12. <i>Crepidula immersa.</i>        |
| 4. <i>Lyria Archeri.</i>             | 13, 14. <i>Myadora convexa.</i>      |
| 5. <i>Mitra Rosettae.</i>            | 15. <i>Stenochiton juloides.</i>     |
| 7. 8. <i>Siphonalia fuscozonata.</i> | 16. <i>Microplax Grayi.</i>          |



10. DESCRIPTIONS OF TEN NEW SPECIES OF SHELLS, CHIEFLY FROM THE AUSTRALIAN SEAS. BY GEORGE FRENCH ANGAS, CORR. MEMB. Z. S.

(Plate II.)

1. VOLUTA (ALCITHOË) KREUSLERÆ, nob. (Pl. II. fig. 3.)

*V. testa elongato-fusiforimi, subangustata, pallide fulvo-lutea; spira turrita, apice papillari; anfractibus 6, lævibus, in medio angulatis et plicato-nodosis, ad suturas castaneo maculatis, ultimo fere  $\frac{2}{3}$  longo, testam adæquante, maculis aurantiaco-fuscis, trigonato; labro simplici; columella subrecta, 4-plicata, et callo tenui induta.*

Long. 2 poll. 9 lin., lat. 1 poll.

*Hab.* South Australia (*Coll. Archer*).

This species is an interesting addition to the Australian *Volutes*. In its general characters it somewhat resembles *V. pacifica*, Soland. (belonging to H. & A. Adams's section *Alcithoë*), from which it differs in the greater length of the spire, in the narrowness of its form, and in having a different style of painting.

The specimen in Mr. Archer's collection was picked up on the beach at Glenelg, near Adelaide. I have named it after Mrs. Kreusler, a German lady resident in South Australia, who, by her diligent researches in the natural history of that province, has added to our knowledge of its fauna.

2. VOLUTA (LYRIA) ARCHERI, nob. (Pl. II. figs. 4 & 5.)

*V. testa ovata, solida, basi subrecurva, longitudinaliter valde lirato-costata; costis obtusis, vix flexuosis, ad marginem parvis, gradatim evanidis, interstitiis lævibus; pallide carneo-fusca, interstitiis fuscis, costis lineis tenuibus castaneis ornatis; spira subacuminata; anfractibus 6, convexiusculis, superne fusco irregulariter maculatis; apertura oblonga, subangustata, vix  $\frac{2}{3}$  longa, testam æquante, intus pallido-carnea; labro incrassato, valde varicoso, interne dentato, margine subtenui, punctis nigris ornato; columella basi triplicata, plicis numerosis supra exsculpta.*

Long. 1 poll. 4 lin., lat. 8 lin.

*Hab.* Montserrat, West Indies (*Coll. Archer*).

This beautiful West-Indian species belongs to Gray's genus *Lyria*, and is allied to *V. delessertiana*, Petit, from Madagascar, and *V. mitræformis*, Lam., from South Australia. The description is taken from an adult specimen, in very fine condition, in the collection of Mr. Archer, of Liverpool.

3. MITRA ROSETTÆ, nob. (Pl. II. fig. 6.)

*M. t. satis turrita, læviore, aurantiaco-fusca, marginibus spiræ vix excurvatis; anfr. nucl.!? . . . (decollatis); norm. 5, planatis, suturis haud impressis; lineis punctulorum minimorum spiralibus, plus minusve distantibus, quarum circ. 6 in spira monstrantur, sæpe obsolete, insculpta; circa basim prolongatam sulculis altioribus*

*ornata*; *columella* 4-plicata, antice torta, canali aperto; *apertura* elongata; *labro* acuto, haud lirato; *labio* nullo.

Long. .8; long. spir. .4, lat. .3 poll.; div. 40°.

*Hab.* Rosetta Head, Encounter Bay, South Australia (*Coll. Angas*).

The specimens are all decollated, with a mamillate vertex. The locality was named by Col. Light, the first Surveyor-General, after Mrs. Angas, the author's mother.

4. *SIPHONALIA FUSCOZONATA*, nob. (Pl. II. figs. 7 & 8.)

*S. t. parva, turrita, alba, striga lata fusca plus minusve interrupta sub peripheriam ornata, marginibus spirae rectis; vertice nucleoso mamillato; anfr. norm. 6, medio angulatis, regione suturali concava; costis radiantibus circ. 8, validis, obtusis, rotundatis, supra et infra obsoletis, interstitiis concavis eas aequantibus; lirulis spiralibus crebris, obtusis, supra costas transeuntibus, quarum circ. 12 in spira monstrantur, postice confertis minoribus; canali curtiore, excurvato; apertura subrotundata; labro intus acute lirato; labio inconspicuo; pariete sub suturam unidentato.*

Long. .54, long. spir. .27, lat. .28 poll.; div. 50°.

*Hab.* South Australia (*Coll. Angas*).

Resembles a *Peristernia*, but without the distinct fold of that genus. The broad brown belt is sometimes interrupted over the ribs, and is more or less dark according to the spiral sculpture. As the suture follows its middle, a part of the colour is seen on the spire, forming an elegant sutural line.

5. *COLUMBELLA INTERRUPTA*, nob. (Pl. II. figs. 9 & 10.)

*C. t. minima, fusiformi, levi, marginibus spirae excurvatis; vertice nucleoso naticoideo, prominente, apice mamillato; anfr. norm. 5, subplanatis, suturis distinctis; livida, seu pallide viridi, lineis radiantibus creberrimis, angustissimis, a zonis interruptis, eleganter picta; zonis duabus, postica et subperipheralis, valde lobatis, concinne ornata; basi prolongata, spiraliter striata; apertura elongata, undulata; labro intus circ. 5-dentato; labio conspicuo.*

Long. .19, long. spir. .1, lat. .09 poll.; div. circ. 50°.

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

The unique specimen has two broad scalloped bands, scarcely coloured, which interrupt the finely pencilled pattern of the rest of the shell.

6. *EULIMA AUGUR*, nob.

*E. t. minore, satis gracili, candida, valde nitente, marginibus spirae rectoribus; anfr. nucl. ? (decollatis); norm. 10, planatis, suturis minimis, definitis; basi curtiore; apertura subovali; columella recta; labro postice sinuato; labio parvo, solido.*

Long. .44, long. spir. .32, lat. .14 poll.; div. 27°.

*Hab.* South Australia (*Coll. Angas*).

7. *PATELLA ALTICOSTATA*, nob. (Pl. II. fig. 11.)

*P. t. regulari, solida, albida, fusco tincta; apice submediano; costis*

*radiantibus circ. 14, validis, rotundatis, aliis interdum intercalantibus; interstitiis duplo vel triplo majoribus, concavis; pagina interna nitente, alba, plus minusve fusco pallide tincta; margine elegantissime pectinato, fusco undato; spathula rubro-fusca, exacte definita.*

Long. 1·45, lat. 1·2, alt. ·45 poll.

*Hab.* Port Lincoln, South Australia (*Coll. Angas*).

Easily recognized by the distant, rounded ribs.

8. *PATELLA GEALEI*, nob. *B 2*

*P. t.* “*P. jacksonensi*” *simili; sed pagina interna metallice splendente, aureo parum tincta, margine minimo; spathula lurida, plumbeo et fusco nebulosa.*

Long. ·1, lat. ·86, alt. ·4 poll.

*Hab.* South Australia (*Coll. Angas*).

I have named this species after Mr. Geo. Geale, Mr. Cuming’s worthy and intelligent assistant.

9. *CREPIDULA IMMERSA*, nob. (Pl. II. fig. 12.)

*C. t.* “*C. hepaticæ*” *simillima; tenui, hepatica, recta, ovali, epidermide tenuissima tenace induta; vertice nucleoso mediano, majore, vix sinistrorsum torta, apici immerso; margine normaliter acutissimo, interdum laminato; septo tenui, curtiore, profundiore, subdiaphano, margine recto.*

Long. 1·06, lat. ·73, alt. ·2 poll.

*Hab.* Port Lincoln, South Australia, on dead *Pinnæ* (*Coll. Angas*).

The species is named from the sunken apex of the nuclear portion. The shell is curiously like fine young specimens of *C. rugosa*, Nutt.; but in that species the nucleus is much smaller, and the apex visible.

10. *MYODORA CONVEXA*, nob. (Pl. II. figs. 13 & 14.)

*M. t. parva, compacta, solidiore, vix inæquilaterali, valde inæquivalva; v. dextra valde convexa, altera planata; margine dorsali subrecto, postico satis incurvato, ventrali valde excurvato; tota superficie (præter lunulam posticam elongatam, parum excavatam, a carinis obtusis definitam, lævem) liris concentricis crebris obtusis ornata, interstitiis parvis; parte postica ab angulis obtusis definita; intus vivide nacrea, fossa cartilaginea parva, altissima, ossiculo?..; valva convexa dentibus lateralibus validis, marginibus valvæ planatæ extantibus convenientibus; cicatr. adductoris post. subtriangulari, ant. pyriformi; linea pallii simplici; sinu parvo, semilunato.*

Long. ·39, lat. ·35, alt. ·16 poll.

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

The convex valve entirely embraces the other, as in *Corbula*, receiving its margin within the lateral teeth, and leaving a projecting ventral edge. The ossicle had perished.

I have included, in the plate which illustrates this paper, figures of two new forms of *Chitonidæ*, which were described by Mr. Henry

Adams and myself in a recent paper (see Proc. Zool. Soc., May 10, 1864):—

Fig. 15. *Stenochiton juloides*, Ad. & Ang. Holdfast Bay, South Australia.

Fig. 16. *Microplax grayi*, Ad. & Ang. Sydney Harbour, N.S. Wales.

11. DESCRIPTION OF A NEW SPECIES OF ENTOZOON FROM THE INTESTINES OF THE DIAMOND-SNAKE OF AUSTRALIA (*MORIELIA SPILOTES*). BY W. BAIRD, M.D., F.L.S.

**BOTHRIDIUM (SOLENOPHORUS, Creplin) ARCUATUM, Baird.**

Length of the largest specimen (which, however, is not quite perfect at lower extremity) 10 inches. Breadth, about the middle of

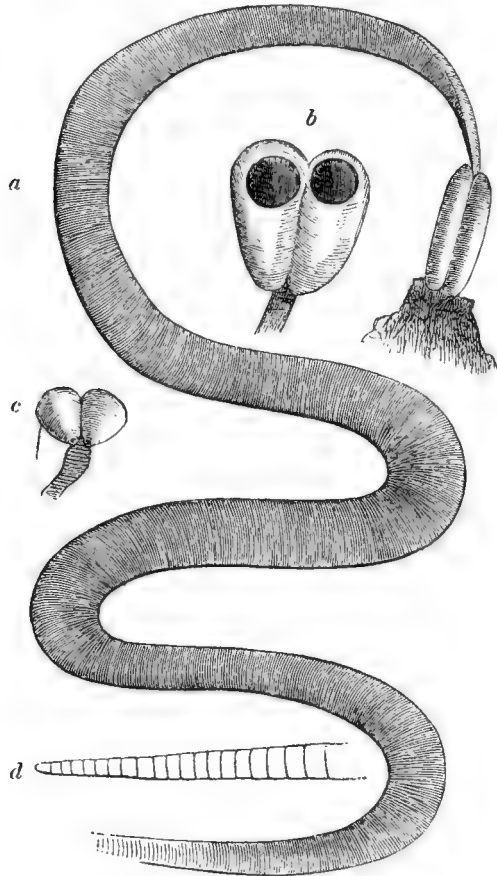


Fig. a. Worm of natural size, attached to inner surface of intestine.

Fig. b. Bothria, slightly enlarged, showing the upper openings.

Fig. c. The same, showing lower openings.

Fig. d. Posterior extremity of a young specimen, showing the, comparatively speaking, larger articulations.

its length, 4 lines. Head, consisting of its two tubular bothria, about 7 lines in length and 3 lines in breadth. Bothria smooth, cylindrical, arched outwardly, and connected together throughout their whole extent, and each of about the same diameter at the top as at the bottom. Upper openings circular and large; lower openings very small and quite terminal. Neck none. Articulations at anterior extremity extremely small, appearing like mere rugæ. Articulations of rest of body, in adult specimens, very numerous, narrow, much broader than long, and crowded together; in smaller and apparently younger specimens (which, however, look as if perfect in length), the articulations near the posterior extremity are, comparatively speaking, much larger, longer than broad, and are more like those of *B. laticeps* or *B. pythonis*. The most distinguishing character is the size and shape of the head.

*Hab.* Intestines of the *Morelia spilotes*, from Australia. (*Mus. Brit.*).

For the specimens of this species I am indebted to Dr. A. Günther, who found them attached to the inner surface of the intestines of a specimen of an Australian Python, the Diamond-Snake, *Morelia spilotes*.

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January 24, 1865.

E. W. H. Holdsworth, Esq., in the Chair.

The Secretary read the following extract from a letter addressed to him by Dr. Bennett, F.Z.S., dated Sydney, Nov. 18th, relating to a living specimen of the Lyre-bird of New Holland (*Menura superba*), which the Acclimatization Society of that city were intending to transmit by the first favourable opportunity to this Society:—

“After repeated trials of keeping this wild and restless bird in captivity, and having procured and lost in one year numerous living birds of all ages, from the young bird to the adult, we have so far succeeded as to preserve one alive and in excellent health, and feeding well, since the 23rd of August last; to this day it continues in good health and condition. It is a young bird, at present in immature plumage, and the sex cannot yet be determined. It is placed in a large wire compartment with the Talegallas or Brush-Turkeys, and it appears to enjoy their society very much. Whether their company reconciles it to confinement I cannot say; but, at all events, it feeds well and thrives, and displays a great amount of activity for a great part of the day, running about the cage incessantly, scratching the ground. It feeds on the larva of the *Tettigonia* or “Locust” of the colonists, meat chopped very small, slugs, and worms. This bird was captured at Broughton’s Pass, Illawarra district. Should we be fortunate enough to keep it alive by the time of the departure of the ‘La Hogue,’ it will be sent to the Zoological Society under

Mr. Broughton's care, when it will have every chance of reaching England alive."

The Secretary called the attention of the meeting to the fine young male specimen of the Prong-horned Antelope of America (*Antilocapra americana*), just received, in the Society's Menagerie, being as he believed, the first instance of the introduction of this animal alive into Europe. This animal, of which a water-colour drawing by Mr. Wolf (Plate III.) was exhibited, had been imported into New York from California, and thence brought to this country.

Mr. Sclater exhibited a stuffed specimen of a Water-Pipit considered by Mr. Gould to be *Anthus spinoletta* (Linn.), from the collection of the Bishop of Oxford, V.P. of the Society, and read the following letter, giving particulars as to its supposed capture in this country :—

"44 Ship Street, Dec. 22, 1864.

"MY LORD,—In answer to your note of this morning respecting the Water-Pipit, I beg to say we cannot give very definite information as to the truth of its capture; but we remember the circumstances very well.

"It was killed, about the winter of 1859 or 1860, by a young gentleman from the Brighton College, who was in the habit of shooting a great many birds, on an extensive beach extending from the outskirts of Brighton to Shoreham, where there are some large ponds and a good expanse of mud, which at high tide is covered with water.

"He had that day killed several birds, namely, Skylarks, Pipits, &c., which he brought to me the same evening. I immediately noticed the Water-Pipit amongst them as a bird new to me, and strongly recommended him to have it preserved; but he refused, and gave me all his birds. I preserved it at once and kept it, expecting to be able at some future time to discover its species, which I did shortly after purchasing Mr. Bree's 'Birds of Europe.'

"The reason that we cannot tell the exact date is that, as it was given to us, no entry was made in our books.

"Your Lordship's obedient Servant, &c.,

"JOHN PRATT."

Mr. Sclater stated that a second specimen of the same species, obtained under similar circumstances, was in the possession of Mr. Gould.

Mr. Sclater exhibited the type specimen of *Galago monteiri*\*, Bartlett, P. Z. S. 1863, p. 231, pl. xxviii., from the collection of Mr. L. A. Monteiro, and stated that he had compared it with the specimens of *Galago crassicaudata* and *Otogale crassicaudata*, var. *kirkii*, Gray (P. Z. S. 1864, p. 456), in the British Museum.

Mr. Sclater stated that the specimen called "var. *kirkii*" by Dr. Gray was intermediate in colouring between what Dr. Gray considered the typical *G. crassicaudata* and the present specimen.

\* *Callotus monteiri*, Gray, P. Z. S. 1863, p. 145.





J. Wolf. lith.

M & N. Hanhart. imp.

ANTILOCAPRA AMERICANA.



In the present specimen the fur was greyish above, without any rufous tint; in the var. *kirikii* the upper surface was tinged with rufous; in the third example, considered to be the typical form, the fur above was of a deep rufous. Besides the coloration, no other differences of importance were noted in these three specimens; and the conclusion arrived at was that *Galago monteiri* was little, if anything, more than a pale variety of *Galago crassicaudata*. It would be desirable, however, to get additional specimens of this Angolan form for further comparison.

The following papers were read:—

1. NOTES ON THE CHEIROPTERA OF JAMAICA. BY THE LATE MR. W. OSBURN. COMMUNICATED BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

[In these 'Proceedings' for 1861 (p. 63) will be found a paper by Mr. R. F. Tomes on the Mammals collected in Jamaica by the late Mr. W. Osburn. Mr. Osburn died suddenly, at Raymond Hall, St. Andrew's, in Jamaica, the 21st of February 1860, after a residence of two years, devoted to the pursuit of natural history, in that island. The following notes on the Bats which he collected seem to be of great interest. They have been extracted from the MSS. of the deceased naturalist, which have been kindly placed at my disposal by Mr. Henry Osburn, his brother. The names and numbers of the species are those employed by Mr. Osburn. I have added what I believe to be the correct name of each species in a foot-note.—P. L. S.]

1. NYCTINOMUS\*, sp.?

“Mahogany Hall, 30th October, 1858.

“I caught two specimens of this Bat in the house after dusk: they were easily knocked down. One, very like them, only about half as large again, I got out of an old cocoa-nut palm in the garden. Unfortunately it was destroyed by ants. I was inclined at first to think it a full-grown specimen of this species; but the capture of two smaller ones successively at different places, under the same circumstances, makes it probable that it was quite different: when caught, they bit fiercely at the hands. When disturbed, it would make a rapid ‘bub-bub-bub,’ a dull sound, as if produced by lips, the effort jerking the whole body at each repetition. This sound was produced by its being partially covered with a glass. It had, I afterwards found, only one cry, ‘click-click.’”

“Mahogany Hall, 3rd December, 1858.

“These little Bats are extremely common here, making their way in through chinks of the shingles. This specimen, when caught, had the feet and wrist covered with cobwebs taken in his passage. They generally appear from half-past five to six o'clock, directly after sundown, and occasionally appear up to ten o'clock, but not in such numbers. They again make their appearance in my bedroom before

[\* *Nyctinomus nasutus*, Spix; Tomes, *l. c.* p. 68.—P. L. S.]

dawn. The beating of their wings, with the occasional squeaking call, is quite familiar to me as the first sound of morning. I kept one in confinement for two days. It would eat nothing—not even drink. It uttered the ‘click-click’ with a gaping mouth, if disturbed, the whole body being jerked. The ear shaded the eye when alive, and was a little raised when touched. I could not by any sharp sound produce the vibrating motion very discernible in *Arctibeus carpolegus* under a neighbouring glass. I took off the tumbler, and put in its place a bell-shaped lamp-shade. The Bat instantly seemed aware there was an opening at the top; for, instead of lying perfectly motionless as under the tumbler, it woke up immediately, and made violent efforts to thrust his head under the receding rim; when that would not do, it tried to hook its claws into the glass and climb to the hole: a constant vibrating motion of the nose, as it raised its head, was visible the whole time.

“The volar membrane folded very completely behind the forearm, and so as to form a much more serviceable fore leg than appears to be the case with *Arctibeus*. This specimen was a male: reproductive organs conspicuous; testes large. There were only three incisors in the upper jaw, two lateral, longer than single middle—an accidental formation doubtless; lower incisors had edges level and doubly notched; molars jagged and double-edged; first pair of lesser molars very minute.”

“Rowington Park (Vere), 28th March, 1859.

“Vast numbers of these little Bats inhabit the shingled roof of this house. It is an unusually favourable place for observing them. The rooms are ceiled. A store-room without ceiling communicates directly with the roof, whence a view can be obtained of a large part over the ceiling of the other rooms. A crack in the boarding that crossed a gable let in sufficient light for easy observation, and was besides of great importance to the Bats as their principal avenue of communication with the outer world. I often observed them during the day exactly as Goldsmith’s line expresses, ‘Lazy bats in drowsy clusters cling;’ for, what seems surprising, notwithstanding the extreme heat of the situation—shingles exposed to the sun (and it was disagreeably hot and confined where I stood, 12 or 15 feet below), the Bats clung in complete clusters. I counted fourteen little heads in a mass about the size of a turnip. But they are not all asleep: now and then a wing is stretched with drowsy enjoyment; and the luxury King James thought too great for subjects, and ought to be reserved for kings, is largely indulged in by Bats. First one and then another wakes up, and, withdrawing one leg and leaving himself suspended by the other alone, adroitly uses the foot at liberty as a comb, with a rapid effective movement dressing the fur of the under part and head—an action far from ungraceful. The foot is then cleaned quickly with the teeth or tongue, and restored to its first use. Then the other leg does duty. Perhaps the hairs with which the foot is set may aid to this end. I often have seen them do this in confinement; and probably the numerous Bat-flies with which they are infested may be the cause of extra dressing. It is

impossible to imagine a more perfect or effective comb than the little foot thus used makes; and I would here remark on the extreme sensitiveness of these little animals. I have often been painfully impressed with the amount of suffering some of my experiments were causing, by observing their fretful impatience: a Bat, with its wing broken, its bright little eye glazed with coming death, would resist the first touch and hum of a mosquito, and exhaust its dying efforts to escape the annoyance.

“A little after sundown, and, from the room below, the roof seems alive with movement; there are squeaks and a shuffling scuffle over the boards. From the place of observation before alluded to, it is too dark to see plainly the Bats within, though their little forms may be traced scrambling eagerly up the boards of the gable till they arrive at the chink, when they become quite plain against the evening sky without, as they go over the edge, their elbows and ears in the action being particularly prominent. From without, or the window below, we can see them shoot off with great rapidity (so that I have heard disputes as to whether they are Bats or Swallows) and dart after their insect-supper with the most intense enjoyment, far over the neighbouring trees and pastures. I would remark that there is a distinction in the mode of flight of these Bats and our *Hirundo pœciloma*. This is, that whilst the arc formed by the tip of the Swallow's wing is as much above as below the body, the wings being as far apart when fully raised as when fully depressed, in the Bat the wings scarcely rise above the level of the body, and meet apparently below. I do not mean this is universally the case. I do not think the frugivorous Bats do it; but it is very apparent in some of the insectivorous Bats when going at a great rate; and as I knew this species by tracing their course as they shot from their roosting-place, it must be noted as one of the most remarkable for this. Their exit during March was about half-past six o'clock. About eight to nine o'clock they returned. It is then they are so particularly annoying to the inhabitants of even the most carefully kept Jamaica houses. The great majority return to the roof; but one or two vigorous little fellows come into the room, and flap about in the most unmeaning way. Nothing is more remarkable than the agility with which a dozen, in the early part of the evening, skimmed and glided by every article of furniture. But now they bang themselves against the ceiling and walls, drop on the table, get up again, when the cat, by jumping, catches them a pat, and they fall on the floor, not much hurt, to judge by their liveliness; for Grimalkin, having performed the feat, sits down, her paws tucked under, and gravely watches the hurry of the alarmed Bat shuffling over the floor. They disturb the harmony of the evening by becoming the occupants of, and making an escapade beneath, a gentleman's coat-collar, or a great sensation by getting entangled hopelessly in a lady's hair, and bite more furiously than effectively during the process of release. They remain very active all night, scampering and shuffling about their ample quarters. For several nights the noise was so great, I attributed it to rats; but the Doctor assured me there were none—it was these little animals

alone; and I found he was right. I do not know at what time they again start for their morning meal; but they return between five and six in the grey of the morning.

“At Mahogany Hall, and many other houses where they are numerous, the squeaks and rush of the long, narrow volar membranes, as half-a-dozen circle round his room, are the first sounds of morning that fall on the occupants’ ear.

“This species is extremely common: half a dozen may often be found behind pictures in houses not much disturbed by housemaids. Chinks in stairs and fittings are very common refuges; and during the day they cling to them with such tenacity, they must be much injured if a stick is used before they can be got out. I have not yet met with it but in houses.”

## 2. ARCTIBEUS, sp.

[See no. 12.—P. L. S.]

## 3. ARCTIBEUS CARPOLEGUS\*.

“Mahogany Hall Cave, 24th November, 1858.

“Three; all females. This large species I found inhabiting this cave in great numbers, the beating of their wings making a murmuring sound when disturbed. They flew towards the roof, only occasionally coming within reach of the net. They were very unwilling to venture out into the light: I did not see one. The floor of the cave was strewn here and there with the kernels of bread-nut (*Brosimum*), which had sometimes germinated into young blanched trees on the thick deposit of dung.”

“Mahogany Hall, 2nd December, 1858.

“Returning to the cave to-day, I found it still occupied by great numbers of this species—though reduced, to what they were the other day. My servant easily caught two with the ring-net. They seemed stunned with the shock; for I took them out of the net quite motionless and with all the muscles rigid, so that I had the opportunity of closely examining the position during flight. The back was perfectly flat and on a level with the wings, which were tense, slightly arching downwards towards the tips, like a bird’s. Held against the light, the branching of the blood-vessels was a very beautiful sight. The interfemoral was perfectly flat and tense, kept so by the calcaria being stretched at right angles with the leg; the toes stretched wide apart. I never before realized how thoroughly fitted for flight these creatures are. On placing them in my botanizing-tin, their struggles to regain liberty were violent.

“On bringing them home, one of them escaped, and gave me a tedious chase, from his keeping in the apex of the high roof, occasionally hitching himself up, head downwards. As I cautiously advanced the net, he showed his sense of danger by elevating the head a little, whilst the little round ears underwent a constant and very

\* *A. perspicillatus* (Linn.); Tomes, *l. c.* p. 64.—P. L. S.]

rapid motion as if vibrating, and, what made it more curious, each independently of the other. It had a very curious effect, like a person rolling his eyes different ways. The nose-leaf had also a motion, but slighter. It looked as if he were feeling for sound and smell, to ascertain the nature of the attack. When placed under a glass, the same motion would take place on any sharp noise being made near him, which, however, he paid no attention to when repeated. Every now and then he would raise his head, agitate his ears; and I could then see a great motion in the nose-leaf preparatory to another violent effort to escape. It uttered no sound whilst under my observation, only opening its mouth and showing its formidable teeth, but would not bite. But whilst in the cave, I heard a loud cry several times repeated; and one which escaped, on being caught again, uttered a loud scream very like a rat. It is no proof of the silence of Cheiroptera that they utter no sound in confinement."

" Montego Bay, 16th May, 1859.

" A picturesque little cave, close to the town, I found abundantly inhabited by this and another species (no. 12). The cave was not deep, though there were dark passages from it. This species, however, is by no means so particular about a thoroughly obscure retreat as many other species. They were here reposing in light sufficient for me to shoot them. The floor was strewn with berries the negroes call cherries, but which I presume to be the fruit of *Cordia collococca*. They were all munched, leaving only a small portion of pulp attached to the skin. Of the young of this Bat I did not observe anything remarkable; it sucked my finger by gently nipping the portion of flesh taken up with its little flattened milk-incisors, but held on firmly by the hooked teeth."

" Kinross, Trelawny, 25th May, 1859.

" One example, a male. It was hardly a cave where I obtained the specimen. The steep wall of rock had been at its base hollowed out for 8 or 10 feet, leaving an overhanging mass 20 feet from the ground. When I first saw the recess, I felt convinced it was not dark enough for Bats, though a flock of *Hirundo paciloma* were hovering with alarmed twitterings, or peeping from their clay-built nests. A heap of dried seed, berries, husks, with some fresh ones on the top, showed the Bats were there. Amongst these last were gnawed fragments of unripe mangoes, and large pieces of the soft-scented fruit of the Rose-apple (*Eugenia jambos*). These last, I suspect, had not been plucked whole, but torn off in fragments. A swarm of a species of *Sphex* were hovering over the decaying mass, catching the insects which fed upon it. The Bats were at first nowhere visible; but I at length discovered them in some deep narrow crevices and water-worn holes in the roof. I fired, and they proved to be of this very common species. It certainly does not seem such a lover of darkness as the generality of the family; one of the species (*A. jamaicensis*) roosts among the foliage of trees, or is subumbral. A

swarm of ants were busy carrying off piecemeal a young sucking Bat which had fallen."

"Johnston Pen, Trelawny, 4th June, 1859.

"This *Artibeus* inhabits in great numbers these extensive caves, once used as sugarworks. I did not thoroughly explore them, as my ammunition fell short. It is also to be found in great numbers in the western cave of the adjoining estate, Harmony Hall. It has a loud, harsh screech, constantly heard, when in captivity, towards evening, and during the day when at liberty and it is disturbed in its gloomy abode. It seems a kind of alarm; for it is repeated every now and then, only by single individuals, and is accompanied by a general flapping of scores of leathery wings.

"Aquatta Vale (Metcalf), 11th November, 1859.

"This Bat (so common in the caves of St. James and Trelawny), I had always noticed, particularly haunted the entrances of caves, or caves of small depth, though often, as at Mahogany Hall, those where the light was wholly excluded. Its habits, however, in this respect are very curiously affected by the geological formation of the country it inhabits. In Metcalfe the transition shale, of course, never forms caves; and the strip of limestone along the sea-board is too marly, so far as I know it. A total change therefore takes place in the habits of the Bat. I found them at Aquatta Vale clustering under the fronds of the cocoa-nut palm, so thickly and in such numbers that at a single shot I brought down twenty-two, while many flew off and took refuge in the neighbouring trees. Their food seems principally the pulp of the young jelly cocoa-nuts, as they are called. I was shown one or two in which a large hole had been nibbled through the still soft husk, large enough to admit the body of the Bat. The question arises, whether this might not have been by the rats, as I have no proof; but I am at present inclined to attribute it to the Bat, as the trees were very lofty (60 or 70 feet high), and I never heard of rats being detected among the fruit. The hole, I observed, was nibbled next to the foot-stalk; so that doubtless the Bat rested on the fruit whilst perforating it. This would confirm my previous remarks, that these animals do not even principally feed whilst flying, but reclining in some position. The stomachs of several I examined were bilobed and internally reticulated by folds, but perfectly empty. The large intestine contained a yellow juice, among which many small seeds passed out at the anus on pressure, and which I suspect were those of the Fustic (*Morus tinctoria*).

"[Since writing the above, I learn that rats are very frequently seen up the cocoa-nuts. I am inclined to think, therefore, that these nibbled the holes, and not this Bat, whose incisors are so manifestly ill adapted for gnawing through 3 or 4 inches of round soft husk.]"

"Dover (Metcalf), 29th November, 1859.

"The above doubt is pretty nearly dissolved by a fact mentioned to me by Mr. Prosser, an engineer at present employed on the



estate. Whilst sitting at the window of the overseer's house, towards dusk, his attention was attracted by a flapping among the fronds of a cocoa-nut close by. A large white Owl (*Strix*) was struggling with something amongst the bunches of nuts, and, after many efforts, dragged out a rat, with which he slowly made off."

#### 4. LASIURUS RUFUS\*.

Expanse 9 inches; length from nose to insertion of tail  $1\frac{1}{2}$ ; tail  $1\frac{5}{8}$  longer than the body, membrane extending to the tip; length of forefinger  $2\frac{3}{8}$ ; ear from base to tip, front,  $\frac{1}{16}$ ; thigh  $\frac{1}{2}$ , nearly; leg, to calcaneum, 1; calcaneum  $\frac{9}{16}$ .

On the muzzle a ridged lobe, with a projecting point, between nostrils; lower lip large, and below this a thin projecting lamina; ears large, round, coming down below rictus, enclosing eyes, which are very minute; hair fringing edge of upper lip, very long, and increasing as it approaches corner of mouth, so as to resemble a moustache; head round; reproductive organ conspicuous. A male.

Colour a beautiful dormouse-yellow, paler below; fur soft and long; volar membranes black, much wrinkled. Length of intestine (and stomach) 3 inches; tongue attached by under surface.

"Mahogany Hall Cave, 24th November, 1858.

"Whilst in the cave catching the large *Artibeus*, occasionally a little Bat would fly among them, so nimble I could not catch it. It was only on going out that I discovered them clustering like bees in a little recess with a high domed roof. They seemed driven here by the larger Bats. It is a remarkable characteristic of Bats that thus large numbers of different species should inhabit different caves or parts of caves. This little Bat flew out with great facility, parties of five or six scudding along the steep face of the rock without, as if seeking for a hiding-place. It was here I shot one, 2nd December 1858. Returned to the cave for fresh specimens, though about two o'clock not a single individual of this species was there."

"Oxford Cave, Manchester, 22nd February, 1859.

"Seven males, four females. The difference in the colour of the fur is so great, varying from brownish grey to yellowish chestnut, that I give measurements of an individual of each shade:—

"Brown. Expanse 9 inches; muzzle to base of tail  $1\frac{1}{2}$ ; tail  $1\frac{1}{2}$ ; forearm  $1\frac{3}{8}$ ; carpus, to tip,  $2\frac{1}{4}$ .

"Chestnut. Expanse  $8\frac{3}{4}$ ; muzzle to base of tail  $1\frac{1}{2}$ ; tail  $1\frac{5}{8}$ ; forearm  $1\frac{5}{16}$ ; carpus, to tip,  $3\frac{1}{4}$ .

"Brown. First digit  $1\frac{6}{8}$ ; leg and foot  $1\frac{3}{8}$ .

"Chestnut. First digit  $1\frac{6}{8}$ ; leg and foot  $1\frac{3}{8}$ .

"Dental formula:—M.  $\frac{6-6}{6-6}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{6}$  = 38.

[\* Mr. Tomes (*l. c.* p. 65) refers this species to *Natalus stramineus*, Gray, of the continent of America; but Dr. Peters informs me that, though it belongs to the same genus, it is clearly distinct specifically, differing not only in its smaller size, but also in its dentition. It should therefore stand as *Natalus lepidus*, being the *Nyctiellus lepidus* of Gervais.—P. L. S.]

“Molars. Three larger jagged; three lower pointed.

“Canines. Lower have a second much shorter point in front of larger.

“Incisors. Upper pointed; each pair of one lateral and one middle, placed apart by a space equal to that occupied by each pair. Lower deeply double-notched, very minute.

“Mr. Gosse (Nat. Soj. p. 280), from whose account I have partly named this little Bat, says, ‘Long tail; an ample interfemoral, which is clothed on upper surface with rufous hair, like body,’ by which, I conclude, is meant, the hair was like the fur of the body in being rufous, *not as to quantity*; for in my specimens a few hairs are sparsely sprinkled over the interfemoral, but thicker on the tail and calcanea.”

### 5. CHILONYCTERIS, sp.\*

“Sportsman’s Hall Cave, 30th November, 1858.

“Two males, one female. In great numbers in this large cave. My servant caught, with a long net, a dozen whilst we were there. They flew in swarms along the roof. I know nothing of its habits.”

“Sportsman’s Hall Cave, 15th December, 1858.

“Two males, one female, stuffed; one in spirits, injured in bringing home; four males, one female.

“Intestine 6 inches; stomachs contained several minute fragments of insects much comminuted.

“Dental formula:—M.  $\frac{5-5}{5-5}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{4}=32$ .

“Upper middle incisors, one deep notch.

“I got about a dozen of these little Bats alive. The journey home must have had all the horrors of the middle passage; for I found several dead, evidently bitten in pieces by the rest. I suspected a very lively fruit-eating Bat (no. 6) of the chief slaughter. I placed the survivors in a box, with bobbin-net over it, so as to observe them. They were not particularly active, merely jumping up constantly to escape, but not running much. They clustered head downwards, during the day, in any dark and sheltered corner, making every now and then, especially when leaping, a sibilant bird-like chirp, very different from the ‘click’ of *Molossus*. This noise much increased at about a quarter past five p.m., when their activity commenced and renewed efforts to escape. The wings fold very completely, so as to leave forearm free whilst resting. The ears are then pointing forwards; they have a rapid and constant motion, but confined to their tips, and principally backwards and downwards.

“I let one fly to observe it, and the calcanea are stretched firmly backwards so as to keep the interfemoral tense and flat. At first they were very sulky, and would eat nothing. The second day my attention was called off; and the third morning I found several dead from hunger, with the remains of fæces (which they had eaten) in their mouths.

[\* *Chilonycteris osburni*, Tomes, P. Z. S. 1861, p. 66.—P. L. S.]

“ I took out the two survivors, and my regrets for the sufferings I had caused were in part allayed by the eagerness with which they sucked up the water I presented them with from the feather of a pen. They licked with the tongue, the jaw moving all this time with an action like chewing. Some water having got spilt over the muzzle and face of one, it combed these parts over with the hind paw very adroitly, putting it forward under the forearm, in this way the face all round front of ear, especially the long whiskers round muzzle. The movement of the leg was very rapid, almost too quick for the eye to follow. It afterwards licked the paw, as if to clean it in its turn. I have observed precisely the same habit in *Molossus* (no. 11) and *Macrotus* (no. 8). I found a dead moth in the window, which neither ants nor spiders seemed to have attacked. It did not notice it at first; but on looking a minute after, I had the gratification of seeing wings sticking on lips, the body having disappeared. Of flies, bees, &c., I caught for him he took no notice, merely shaking them off impatiently. I forgot to mention that fragments in the stomach appeared to be those of Coleoptera principally; but the contents of the stomach of Bats are so comminuted, it is often difficult to recognize them. Out of eleven whose sexes I have noted from this cave, eight were males, three females. This species (by far the most numerous) occupied one entrance and the centre of the cave. It was near the opposite entrance I caught no. 6 and no. 7.”

“ Oxford Cave, Manchester, 22nd February, 1859.

“ This species was not nearly so numerous here as the others; the specimen I skinned had a curious brindled appearance, with a yellowish tinge I have not observed before.”

#### 6. *MONOPHYLLUS REDMANII*, Leach\*.

“ Sportsman’s Hall Cave, 30th November, 1858.

“ One male, one female. This curious species I found (with no. 5) in a large cave at the summit of the steep hill that overlooks Sportsman’s Hall Works. It was not nearly so numerous as its companion: for a dozen of the other, I only got two specimens of this. As they were killed at the time, I had no opportunity of examining habits; but the tongue, protruded in death, attracted my attention. I thought the use of this curious member might be accounted for by the hypothesis that it sucks night-blowing flowers, as the Humming-bird those of the day.”

“ Sportman’s Hall Cave, 15th December, 1858.

“ It was principally to procure specimens of this little Bat I undertook a second expedition to the cave. Notwithstanding we went twice through its whole length, and saw fifteen or sixteen Bats, I only caught a single specimen of this species. It was creeping down the side of a large domed hollow in the roof when the boy put the net over it. Several Bats, on being taken out of the bag,

[\* Cf. Tomes, P. Z. S., 1861, p. 64 & p. 87, pl. xv.—P. L. S.]

were most cruelly mauled and killed. From the fierceness with which this little fellow bit my fingers, drawing blood from the back of my hand, he seemed the chief assailant. Its activity when first taken out of the bag was beyond anything I had seen with Chiroptera, running round the box by a series of little jumps, with almost the quickness of a mouse, and jumping with all the agility of a bird. On placing it beneath a glass after its first efforts had a little subsided, I saw its tongue projected very rapidly to the board. It seemed to me to be using an additional sense to ascertain the nature of the unusual substance on which it was resting. It frequently stretched its neck and head upwards, the nose-leaf and round ears in motion, as if trying to ascertain whether there were an aperture above, its bright little eyes peering with eagerness, and panting like a mouse. The motion of the ears was by sudden jerks, and often alternate one to the other, as in *Artibeus carpolegus*. The motion of the nose-leaf was a rapid contraction and dilatation. The activity especially commenced at a quarter past five p.m. The likeness of the pencilled tongue to that of the *Trochilidæ* suggested to me that this little Bat in the same way probed night-blowing flowers. Towards evening I got some of the large drooping flowers of *Datura arborea*, in which I first ascertained were some minute insects. It took no notice of them so long as I watched it. In the morning I found the large stamens bitten off, but it was lying across the flower. It then, for the first time, occurred to me that the powerful teeth that scratched my hand could not have been intended for masticating minute insects.

“ There was another bird with a pencilled tongue familiar to me, *Tanagrella ruficollis*; and this was a frugivorous bird. Might not this protractile tongue be for the same purpose of sucking juicy fruits? That this was the right hypothesis seemed the more probable, as then the similarity of its short round ears and nose-leaf to those of other frugivorous Bats would be accounted for. I then recollected that the yellow pulp I found in the stomachs and intestines of two former specimens was in appearance precisely like that I was familiar with in the alimentary canal of *Tanagrella* and *Euphonia*. It was unlucky this did not occur to me before, as the captive was already much fatigued with confinement and inflammation at the wrists. I offered it orange, but it took no notice. A little water, the night before, was all it had had. This it sucked up by repeated projections of the tongue a little beyond the muzzle, and with a satisfied purring noise. Towards evening it was more lively, and it accidentally got off and gave me a long chase. Flight seemed to refresh it. I then tried orange again, and had the pleasure of seeing the tongue protruded out of the groove of the lower jaw, whilst it certainly licked up a little of the juice; and there was a slight action of the body, like that of an animal feeding. But it was much exhausted, and it was only by close watching I could detect these movements. Every now and then there was an impatient toss of the head, which made me long doubtful of its really feeding; but I think it was that, in the unnatural attitude of feeding, some of the juice got into the nostrils and

incommoded it. After killing it, I found a little orange-juice on the tongue, which still further confirms my suspicions. Still the whole was not completely satisfactory. In the agonies of death it protruded the tongue to its full extent, and I had the opportunity of observing the complete manner in which it is set with bristles."

"Oxford Cave, Manchester, 22nd February, 1859.

"In this immense cave, whose winding galleries cannot be less than a mile in length, I procured no less than five species of Bats, but all well known to me.

"This little Bat was not uncommon; and at the end they positively swarmed like bees, crawling by dozens on the wall within reach.

"Of this species I brought away twenty-three males, and eleven females, which were all pregnant. There was a considerable difference in the shades of grey, some much more silvery. I immediately tried them with orange-juice, but they took little notice of it. One licked or rather lapped with his long tongue a little water. I put his muzzle into the water; but it shook its head to be rid of it, and, protruding its long tongue, licked up nose-leaf and over the whole of face to forehead, as if thoroughly to dry it. The next morning I tried again. They then licked water greedily, either off my finger or when held over it, protruding the tongue an inch or more. There was no chewing action, as with some Bats; it was simply a very rapid licking. I tried orange; they licked it, but not so eagerly as water. One bit at the orange. I saw nothing to show it likely to be their usual food. They voided urine when handled.

"There are some very large glandular bodies on each side the neck, close to the angle of the jaws, communicating (?) with one another, situated higher up, near the ear. I could not trace the ducts: are they glands for secreting saliva? In the muscles along the radius for moving the digits of the wing, and indeed in its whole muscular system, there is a great contrast between this little Bat and No. 7. It is also much more active on a flat surface, and much more tenacious of life. No. 7 has a much less developed muscular system, only jumps from the ground, and soon dies in confinement; yet its flight is very rapid. No. 6, however, is a very powerful little Bat, whatever food its long tongue may be adapted for.

"Several taken were pregnant females. Mammæ lateral; nipples broad. Fœtus:—Fore foot (wing rather) very like a five-clawed bird's foot, with a thin transparent web connecting four toes. This singular appearance was caused by the very small development of the four volar digits, whereas the thumb was disproportionately large—as long as the rest. Hind foot also disproportionately large. The tongue protrusible, like that of the adult, but not bristled. There is a series of fine transverse striæ across it. Towards the tip, two large blood-vessels follow the margin and meet at the extreme tip. No teeth; but on the gums rounded projections where they are coming through, three on each side. On upper jaw one large lump

where (deciduous) canine will be, and two a little behind, near position of lesser molars. Three on each side, lower jaw, in same situations."

### 7. MORMOOPS BLAINVILLII, Leach\*.

Expanse  $12\frac{1}{4}$  inches; muzzle to tail  $2\frac{1}{4}$ ; tail  $1\frac{1}{8}$ , free  $\frac{3}{8}$ ; forearm  $1\frac{3}{4}$ ; first digit  $2\frac{1}{4}$ ; fourth digit  $2\frac{1}{8}$ ; thigh  $\frac{3}{4}$ ; tibia to calcaneum  $1\frac{3}{8}$ ; calcaneum  $\frac{3}{4}$ ; foot  $\frac{3}{8}$ . Length of interfemoral  $1\frac{3}{4}$ ; beyond tip of tail, when expanded,  $\frac{5}{8}$  (?).

Muzzle flat, depressed; skin of sides of face connects muzzle with ears by a series of folds concealed by silky moustache. Upper lip obsolete in front, foliated behind with a single indent. Lower lip expanded into a thin broad cordate lamina, with a short foot-stalk between the lobes warted. Below this, and attached perpendicularly and transversely to its under surface, two thin, membranous, but broad lobes, like clerical bands. These are carried backwards, with sinuous folds. Thirdly, below this last, and attached to their under surface, two thin folds of skin, one to the under surface of each band. These are carried back on their respective sides, with one deep indentation near centre of their course, then continuing backwards and upwards till they reach the fold which connects lower ear with muzzle.

Ears united with skin at sides of face, so as to contain the eye. Eyes about size of a pin's head, bright, and both at same time visible on front view. Ears somewhat lunate, or perhaps rather the shape of some bivalve shells; tips brought forward and doubled on themselves before meeting over forehead. The external ear is furred, and the long silky fur of head extends over forehead, meeting the long moustache. The head thus appears disproportionately large, and the ears imbedded or plunged in it, so that only a narrow rim of membrane is visible above the fur externally.

Tongue fleshy; when in mouth, furrowed with about six transverse plicæ.

Dental formula, M.  $\frac{5-5}{6-6}$ ?, C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{4}$ =34 (?).

Molars jagged (there appear three lesser molars in lower jaw).

Incisors, upper, middle, one notch; lateral minute, leaning towards them. Lower level; each two notches.

Intestine 4 inches. Stomach empty.

Volar membrane semitransparent, and tissue so thin it dried almost before I had finished preparing the specimen; much wrinkled, between elbow and hand, into angular plicæ like shagreen. Nerves of interfemoral very beautiful when held against light; one central in line of tail, giving off at right angles pairs of branches like a pinnate leaf. Fur bright chestnut, above rather paler; very long, silky, and soft. Round the shoulders it is longer, so as to form a narrow frill longer than rest.

[\* Cf. Tomes, in P. Z. S. 1861, p. 65.—P. L. S.]

“Sportman’s Hall Cave, 15th Dec. 1858.

“It was at the opposite entrance of the cave to that we entered, and among some Bats that, terrified by our intrusion, were flying in the daylight, that my servant caught the first specimen I had seen of this very extraordinary little Bat. On returning, he caught another in the interior. A drawing will hardly convey an idea of the odd form of this curious animal, whose round head, the long fur of which nearly conceals the feathers, and its bright little eye make it look more like a fish than an animal. Then such of the features as are visible are so excessively foliated by meandering laminæ of skin as to be scarcely recognizable. Seen in profile, the thin muzzle and lower lip form a mouth very fish-like; and often in the vertical profile the foliations of the chin are the most prominent, so that when it moved the jaw I fancied it like a caricature of a mumbling old woman. It is evidently congeneric with No. 4. It is not only similar to it in colour in the moustache which fringes sides of face, but also in the extreme fragility and thinness of its whole structure. The light was visible through the roof of the open mouth; and the molar membranes dried like damp paper. This is in great contrast to the firm well-strung frame of *Molossus*, as well as to the loose flabby make of *Macrotus waterhousii* (No. 8). During life I observed only a very slight motion of tips of ears at any sharp sound. Tail was curled upwards, so as to carry the interfemoral with it; this was caused by the calcanea bearing up the interfemoral. Femora long; so that when reposing the knees were above the back, like a grasshopper’s. It jumped to escape, and opened jaws when touched; but did not bite, or utter any sound. It seemed very delicate, and was dead by the next morning, though the rest of my captives were as lively as ever.”

“Oxford Cave, Manchester, 22nd Feb. 1859.

“Five males, twelve females (none apparently pregnant).

“There is a great difference in the shade of the chestnut-colour, which varies from a sandy buff to deep reddish brown.

“Dental formula, M.  $\frac{5-5}{6-6}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{4}$  = 34.

“Molars. Upper, three larger much jagged; two lesser, first minute; second large, canine-like. Lower, three larger, much jagged; three lesser.

“Incisors. Upper, middle large, plain, like human; lateral minute, leaning towards them. Lower edges of all four level; each bi-notched.

“The muscular system of this Bat is not nearly so powerful as that of No. 6, but it flies with great agility and rapidity. The only house I ever knew them enter was Freeman’s Hall, where, notwithstanding the room was small and low, I had a long chase. I never saw them do anything on a flat surface but jump up. They soon die in confinement, and rarely survive the passage in the bag home. I observe that after death the volar membranes and forearm dry very rapidly; so that unless specimens are prepared immediately, these parts cannot

be arranged, even though putrefaction has not yet commenced in the stomach.”

“Freeman’s Hall, 21st July, 1859.

“One of these Bats entered the house this evening; and though the room is small and very low, it was only after a long chase I succeeded in taking it, from its extreme rapidity and agility of wing. At length it was completely tired out, and allowed me to take it by hand. I placed it under a candle-shade, where it made constant efforts to escape by jumping. It easily took wing off a flat surface, and its efforts to escape during the night broke some of the phalangeal bones; but, notwithstanding, on the cover being removed, after one or two efforts it succeeded in jumping out at the top. It refused flies I caught and offered it, shaking its muzzle at them with evident dislike; but it drinks greedily. The tongue was protruded; but the water taken up by it and the foliations of lips was sucked in with the head raised, by an action very like chewing.”

#### 8. MACROTUS WATERHOUSII\*.

Expanse  $14\frac{1}{4}$  inches. Length, to insertion of tail,  $2\frac{3}{4}$ ; tail  $1\frac{1}{4}$ , free  $\frac{1}{4}$ th length of forearm. First digit  $3\frac{1}{2}$ ; fourth digit  $2\frac{3}{4}$ ; ear up front  $1\frac{1}{4}$ , up back  $\frac{7}{5}$ ; nose-leaf  $\frac{1}{4}$ ; breadth of ear  $\frac{5}{8}$ ; knee to calcaneum  $\frac{7}{8}$ ; calcaneum  $\frac{3}{8}$ ; foot  $\frac{1}{2}$ ; intestines 8; stomach capacious, containing a yellowish mass with fragments of harder parts of insects interspersed. I recognized two short legs, with powerful double claws attached. These, from what I subsequently observed, I have reason to believe were those of Orthoptera.

Dental formula, M.  $\frac{5-5}{6-6}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{4}$  = 34.

Incisors. Upper, middle large, edges rounded; lateral minute, only visible with glass. Lower, one notch each; all edges level.

Molars. Large, jagged. Canines long.

Nose-leaf an isosceles triangle, apex rounded off, pubescent; nostrils oblique. Nostril-lobes large: outside these, on each side, five warts, from each of which springs a long hair. Ears large, capacious, erect, with apertures directed forward, transversely wrinkled inside. Skin of scalp so loose that fur will pull back, and leave merely bare skin over skull behind raised skin which connects inner edges of ear-bases. Interfemoral forked by calcanea, being stretched backward, shorter than extended foot. Teats lateral, flattened or compressed; so that young holds in its mouth a broad projection, not a mere round dug. Lacteals large; exuded milk on pressure. No cranial ridge. Muscles of forearm small, compared to those of *Arctibeus carpolegus*. Thighs, hardly any muscle. Bones, soft volars thin; whole structure much more delicate and loose than in *A. carpolegus*. Fur fluffy, loose, long, easily disarranged. Volar membrane extending along whole anterior edge of forearm, and, leaving only half thumb free, connects it beyond with first digit. Eyes large, bright.

Young male:—

[\* Cf. Tomes, *l. c.* p. 65.—P. L. S.]



Dental formula, M.  $\frac{2-2}{2-2}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{6} = 22$ .

Incisors. Upper hooked backwards; lower not hooked; edges level. Canines strongly hooked backwards. Molars hooked, set at wide intervals, in place of true lesser molars. The fangs of these little teeth passed in straight lines down the external surface of gum, but were not imbedded in its centre as usual. They were quite traceable with a glass beneath the skin. Intestine  $4\frac{3}{4}$  inches; reproductive organs very conspicuous. Skull bare of muscles. Feet large and much developed.

“Brampton Bryan, 17th Dec. 1858.

“My friend Mr. Farquharson, the overseer of this property, took me to a cave not far from the house. The mouth is in an angle of perpendicular rock, which, through a narrow aperture, leads to a circular space with a vaulted roof, as smooth as if chiselled, evidently once at a level with the sea, and worn by the vortex each billow sent into it. A strong smell announced the presence of Bats, which the boy, who went in first with a torch, soon gave notice of. In a short time we caught ten, and all, I saw, of the same species. It proved to be a particularly interesting one, which seems to be *Macrotus waterhousii*, from Mr. Gosse's description, the first of the kind I have met with on this side. They proved, with one exception, all females; and of these nine, seven had young of differing ages, but about half-grown, clinging to them. They were easily caught, dropping into the net or flying heavily, manifesting by no means the activity or terror of other species. On taking them out of the bag, one of the females was dead. The tenacity with which the young clutched the dead mother with feet and arms, and the eagerness with which it burrowed its snout in fur to search for the accustomed nutriment, were as affecting as the picture of the “Dying Doe.” Another female, living, had still the young clinging to her; and the usual position seemed, that the dug was held by the hooked teeth, and the fur or even thigh of opposite side grasped by feet, so that the position of the young Bat was diagonally across the mother's belly; but I observed them clinging in many other directions to the belly, but never to the back, except one I placed with a female under a glass: it then clung to her in every manner, burrowing its snout into the fur of the back for the nipple, groping and clinging with ludicrous energy. I carelessly omitted, before placing this female with the young, to ascertain from her nipple whether she was giving suck; it was only after killing her I found she was not. This may account for the savage manner in which she treated the foundling, biting it and holding the head between her teeth. But still the instincts of the little animal were too strong for any pain to alter, and it clung till death relaxed its hold. On examining the stomach of this female I found it full of coagulated blood, part of which was entering intestine; I could account for its presence in no other way than by supposing that she not only left the marks of her teeth on the head of the young, but actually sucked the blood like a vam-

pire. I could induce neither old nor young to take anything, though I tempted the first with water and the latter with milk. The one under glass made efforts to escape by jumping; but the existence of the volar membrane along the front of wing makes the forearm very unserviceable as a leg. There was a slight motion of the ear forwards on any sharp sound, but none of the rapid vibratory movement seen in *A. carpolegus*. Those in the box with gauze over it jumped a little, and then clung in a dark corner in a heap. The young were deserted, and remained quietly hanging from gauze. They bit fiercely, but could not draw blood, though I held them in my hand at once. Their forearms seemed little adapted for walking: three or four hours on a flat surface had made the wrists inflamed and sore. They uttered no noise, merely opening the mouth menacingly. The young, on being set at liberty, clambered about till they got hold of some object, and then hung quietly head downwards. From this and their desertion by the old ones in the box, I conclude they are sometimes left hanging under circumstances of danger. They opened the mouth threateningly when approached, and every now and then uttered a very acute sibilant chirp, not loud, though audible at a great distance, especially to animals whose external organs of hearing are so developed. This I take to be the call for the mother, as they never uttered it when she was within reach. On being hung against the wall, they made no attempt to move from the spot. On being taken into the hand, they clung to it. I found one climbing to the palm of my hand, even when turned downwards; so that the little Bat hung to it as to the body of the mother: I could not shake it off. It was perfectly secure even when I swung my extended arm round as quickly as possible, and, what was more curious, without the sharp claws penetrating the skin. I covered one of the young, which had strayed from the rest, in my hands. It felt cold, and seemed to like the warmth; for it searched with its nose for the nipple, making a purring noise, very like what *Chilonycteris* (No. 5) does on receiving water.

“They seemed roused to unusual activity about dusk, and became quiet at about 10 p. m.

“18th Dec.—In the morning one of the young ones dead. It had been killed by hæmorrhage in consequence of penis being bitten off. Though dead, it was still hanging to the muslin over the box by the hind legs. The young and females were all separate, young hanging from muslin, and females crouching sulkily in a corner. One of the young sucked in greedily little drops of milk I put to its muzzle, eagerly searching on my fingers for a nipple. He took several drops in this way till some got into his nostrils and incommoded him. Putting two young on the table together, they took each other for the mother, poking each other with their noses, and rolling about clinging together in a most grotesque way. Two of the females drank drops of water presented to them on a feather, eagerly protruding the pointed tongue a quarter of an inch beyond the muzzle, with an action like chewing. They were, with one night's confinement, too weak to fly.

"To give the two females and two young I did not require a chance of escape, I left them on an object against the wall. They all shuffled off, and hung head downward on the bare plaster. So perfectly at ease were they, that I noticed one of the young ones comb the fur of the belly, with the adroit action common with Bats, with one hind paw, while it remained suspended by the other. Both young constantly uttered the acute click on any movement near them, as if calling the mother.

"19th December.—Only one young one remained suspended to plaster this morning. I hope the rest got off, and were not carried away by rats. It was very weak. I got a bit of washleather, and, screwing it up, made a kind of nipple, soaking it with warm milk. It instantly seized it and sucked it dry. I could not withdraw the leather on account of the hooked teeth. In trying to give it more, a little got into the nostrils and stopped all further experiments. So admirably are the hind paws adapted for suspending the animal from the slightest inequalities of a surface, that I found I could easily suspend this little Bat, after death, by simply drawing the claws downwards for a little against the plaster, when they hooked themselves. This suspension, like the roosting of a bird, requires no muscular exertion at all. The odour of this species is stronger than that of any I have met with.

"27th December.—Returning to-day from Hampstead, I stopped to examine a very similar cave to the Brampton Bryan one on the roadside. A Bat flew from a dome within to the deeper recesses. As it was the only one, I could not feel certain of the species, but it looked like this one. On the floor of the cave was a heap of what I took at first to be dry leaves mixed with Bats' dung; on examining it, it proved to be a heap of the wings of large Orthoptera. Many were broken, but I found no limbs or bodies. Did these Bats bring them in?"

"Cave in Portland Ridge (Vere), 31st March, 1859.

"Males yellowish; females dark grey; some females show both tints in patches. Reproductive organs very conspicuous. This was the only species I found in these magnificent caves, and they were in no great numbers. They inhabit houses sometimes, but always the cellars, below ground, never the roofs—as, for instance, at Mount Pleasant, St. Elizabeth's, where they are numerous."

"Mount Pleasant (St. Ann's), Jamaica, 14th June, 1859.

"My host, in an open verandah, showed me a number of spirits on the wall, on examining which I could detect seeds of the fustic berry (*Morus tinctoria*) sticking to the wall in the dried pulp by which they were surrounded. These, he said, were, to his great annoyance, produced by the Long-eared Bat (*Macrotus*). They came in at night, hitched themselves up, when a chewing might be distinctly heard, and then these splashes on the wall. One let the wings and legs of a large grasshopper drop. Another annoyed him by making the lofty curtain-frame of a bed his perch: the jalousies

being left open, he would drop the fragments of his feasts on the bedclothes and sleeper below. A friend near was so annoyed in the same way that he procured bird-nets, used over fruit-trees, from England, as a protection. The berries Dr. Rose particularly mentioned were the fustic (*Morus tinctoria*), the breadnut (*Brosimum alicastrum*), and the rose-apple (*Eugenia jambos*).

"I did not myself see the Bats; but their long ears and their habit of entering houses make it extremely probable that this is the species."

"Mount Pleasant, St. Ann's, 4th October, 1859.

"I found this species abundant at the entrance of the large cave near Dry Harbour."

### 9. CHILONYCTERIS GRISEA, Gosse\*.

"Freeman's Hall, 19th January, 1859.

"Two males. Reproductive organs conspicuous. These specimens were brought to me by a boy, who, seeing them fly about, had knocked them down. I instantly recognized their likeness to no. 5, so as evidently to be included in the same genus. The measurements seem to agree with Mr. Gosse's 'Owl-faced Bat,' as well as the description, in all points of form and colour; I have therefore provisionally so termed it."

"Oxford Cave, Manchester, 29th February, 1859.

"One male; three females. Expanse  $11\frac{1}{2}$  inches; muzzle to base of tail 2; tail 1, tail free  $\frac{1}{4}$ ; forearm  $1\frac{7}{8}$ ; carpus, to tip,  $2\frac{7}{8}$ ; 1st digit  $1\frac{7}{8}$ . Dental formula:—M.  $\frac{5-5}{5-5}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{4}$  = 32.

"Molars consist of three larger and two lesser each side, larger much jagged."

"Incisors. Upper, middle, one deep notch; lateral minute, leaning towards them. Lower, two-notched; all edges level. Tongue will project  $\frac{1}{4}$  inch beyond muzzle.

"These two species of *Chilonycteris* (no. 5 & no. 9) differ considerably in size. Besides this, the raised warty points on each side the nostrils are much more prolonged in no. 9 than in no. 5."

### 10. NOCTILIO MASTIVUS †.

"Long Hill, St. Elizabeth's, March 1859.

"One skin. This skin was presented to me by Mr. Maxwell; shot here a short time before my arrival. It was so large that at first it was taken for a Pya Dove. One was shortly before captured at Falmouth, and excited a good deal of newspaper wonder, being considered by the quidnuncs a vampire. The teeth certainly are very formidable. I saw that specimen in spirits, and was unable to judge of the very considerable shrinking of the body of this specimen in drying."

[\* *Chilonycteris quadridens*, Gundlach: Tomes, *l. c.* p. 65.—P. L. S.]

[† *Noctilio americanus*: Tomes, *l. c.* p. 68.—P. L. S.]

11. *MOLOSSUS FUMARIUS* \*.

“ Shettlewood (St. James), 14th May, 1859.

“ Three skins ; males. The roomy roof of this house inhabited by great numbers of this little Bat. My bed-room so offensive with their peculiar odour, I was obliged to have every window left open at night. This odour is probably stronger at this, the breeding-season, than at other times. They kept, so far as I could observe, the same hours as our other species. Their apertures of egress were under the eaves outside, the room being ceiled within ; but little parties of a dozen or more would fly in, take an excursion round the room, and soon disappear in the fading light of evening and the grey of dawn. I sent up a man outside, who got me four or five quarts of these Bats. They were all males, the reproductive organs very conspicuous, and the gular gland humid and swollen, opening on pressure like two lips, and a very active circulation visible through the internal skin when this opened, giving the appearance of inflammation.

“ They made no noise, scrambled about very actively when taken out of the bamboo-joint which contained them, but made no attempt to fly.”

“ Windsor (Trelawny), 30th May, 1859.

“ I went this morning, accompanied by a negro with an axe, to cut down some of the tall headless trunks of lightning-smitten cocoa-nuts that still kept their place in the ranks of the beautiful avenues of these noble palms marshalled along the roadside and the course of the little river that meanders through the valley. I gave directions particularly to fix upon a stem in which a Woodpecker, of some generations perhaps, had drilled a hole. It was an immense trunk, sounder at the bottom than I anticipated, and took good thwacks and many to cut it half through, though the decayed top trembled at every stroke. It fell, breaking into dozens of crumbling pieces : ants and wood-boring larvæ in abundance ; but no Bats. We then tried another near the road, among the fallen fragments of which I found three males, all of this species, stunned by the fall. The negroes then recollected another trunk near their village, where, they reported, dozens flew out every night. It was an immense stem. An ants' nest was attached to it halfway up. Many holes, of various sizes, pierced the hard exterior near the top. It was evidently of great age. It was broken into fragments by the fall, and among them a perfect hetacomb of these little Bats, scattered into two distinct heaps, corresponding to a higher and lower story in the tree. There must have been at least 150 or 200 altogether. The heap which occupied the upper hole were exclusively males ; those in the lower, females in large proportion, though there seemed a male here and there among them. On the ground corresponding to the position immediately beneath each heap, scattered on the grass or partially contained in fragments of the trunk, was a quantity of powder looking like very coarse snuff : this, on examination under

[\* *Tomes, l. c.* p. 68.—P. L. S.]

the lens, proved to be entirely composed of fragments of the harder portions of insects; a portion at the surface was agglomerated in the usual form, but by far the largest part completely disintegrated and dry. Those not dead crawled actively on the grass, climbed upon clothes; one little fellow I captured between my coat and waistcoat. Their object was evidently to escape the light. They bit fiercely at my fingers, and drew blood with the sharp little canines, and made a squeaking bird-like chirp when put into the bag. Several got up from the grass for a few inches, but soon fell again after hovering with great exertion; when thrown three or four feet from the ground, flew easily. I noticed that with this species, when thus flying by day, the arc of the stroke was about a sextant, as much above the body as below. Several of the females were pregnant with one foetus."

" Mount Pleasant, St. Anne's, 14th June, 1859.

" The roof here is largely inhabited by Bats; Dr. Rose thought, by two species—a long-eared (*Macrotus*?) and a small one. Towards dusk I went out, anxious to ascertain what they were; but the little creatures were extremely cunning. Their place of egress was beneath the shingles of a low house. Though we could hear them scratching about, they always darted out at an unguarded point, and it was some time before the chaise-whip brought one down. It proved to be this species. There were no Long-eared Bats that I saw. I suspect my friend was mistaken."

" Freeman's Hall, 4th July, 1859.

" I observe, in looking over my specimens, that, besides the lips being fringed with ordinary stiff cilia, there is in the considerable space between the nostrils and edge of the lip a tuft of very singular bristles; they are very short and thick-set, and beneath the glass are seen to be spoon-shaped. I have no idea of the use of these, unless it be to aid in retaining struggling insects. Some cotton, I put the Bats in, was attached very firmly by the hooks."

" Windsor (Trelawny), 30th May, 1859.

On a foetus of this Bat I note as follows:—

" Milk-teeth not through, but in lumps on gum.

" Molars  $\frac{0-0}{1-1}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{2}{4}$ .

" Molars in the position of anterior pair of false molars. Lower limbs most developed; two exterior toes on each foot largest; outer toes of each foot set on lower than the rest, like a thumb. Naked."

Stomach of adult a lengthened membranous sac, thin, and, when empty, with difficulty distinguished from intestine, except by its rather wider diameter. No trace of internal plicæ. Male distinguished by a large gular gland,  $\frac{3}{16}$  in. in width. Made a loud chirping noise in captivity. Would not drink: rejected the flies I offered, and bit fiercely. The large size of the outer toe seems a distinction from *Nyctinomus* (no. 1). When about to bite, the ears are brought down; but they are ordinarily kept erect.

12. *ARCTIBEUS*, sp.? \*

Dental formula, M.  $\frac{4-4}{4-4}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{4}$  = 28.

Molars. Upper, two larger much flattened on crown, with an exterior jagged edge—posterior with one point, the other with two; false molars longer, with one point. Lower, two larger, with points on internal as well as external side; two false longer, with a single point.

Canines rounded.

Incisors. Upper, middle wedge-shaped, one notch; lateral minute or wanting. Lower of equal length, one-notched.

Tongue extensible about  $\frac{1}{4}$  inch; posterior half with large papillæ, anterior half roughened, with asperities scarcely visible under the lens, but very perceptible to the touch. Muzzle to base (along back) 3 inches, muzzle to fork  $3\frac{1}{2}$ ; tail 0; expanse  $16\frac{3}{4}$ ; radius  $2\frac{2}{3}$ ; carpus to tip  $4\frac{1}{2}$ ; first digit  $2\frac{5}{8}$ ; fourth digit  $3\frac{1}{4}$ ; leg 2; foot  $\frac{5}{8}$ ; calcaneum  $\frac{1}{4}$ . Interfemoral forked, when stretched out  $\frac{5}{8}$  inch below body. Irides hazel; eyes large. Colour of fur leaden grey, brindled by each hair being whitest towards the tip.

“ Montego Bay, 16th May, 1859.

“ Four skins, among which two males and one female. In a cave close by the town, and of no great depth, I procured several specimens of this *Artibeus*. It was in great numbers, and associated with *Artibeus carpolegus*, of which there were a few. The floor of the cave was strewn with kernels, large seeds, &c.; and among the most recent were seeds, with a portion of pulp sticking to them, of the scarlet berries called by negroes ‘cherries,’ and which I believe are the berries of *Cordia collococca*. The fact of the two species being found together, and, above all, the colour of the fur of a young sucking Bat attached to the mother (undoubtedly *Artibeus carpolegus*) being of a leaden colour, long kept me in doubt as to the distinctness of the two species. I have however determined to enter them as such provisionally. I found males and females of both with the reproductive organs conspicuous, and evidently adults.”

13. *MONOPHYLLUS* †.

Dental formula (from prepared skull), M.  $\frac{5-5}{5-5}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{4}$  = 32.

Molars small. Upper, two false—first minute, scarcely above gum, second the largest of the molars, with a single very blunt point; three true, first largest; this and second with the outer edge slightly hollowed, leaving two blunt points or tubercles, a small crown internally; third minute. Lower, two false—first a round, smooth, blunt cone or tubercle, second largest, the same; three true, as in upper jaw, hollowed so as to leave two blunt obsolete points in each (or tuberculated). These molars are evidently more adapted for holding than masticating.

Canines. Upper very long, powerful, sharp, dilated laterally

[\* *A. brachyotus* (Pr. Max.), Tomes, *l. c.* p. 64.—P. L. S.]

[† *Phyllonycteris poeyi*, Gundlach; Tomes, *l. c.* p. 65.—P. L. S.]

into two cutting-edges, anterior edge sinuated. Lower rather smaller.

Incisors. Upper, middle pair diverging slightly, entire, blunt, like human; lateral minute, conical (or as a tubercle). Lower, edges forming a concavity between canines; lateral minute, truncated; middle still smaller, visible only with glass in recent, but with the eye in prepared skull; conical truncated. (It is over these last the tongue is, of course, protruded.)

Dental formula, milk teeth:—M.  $\frac{2-2}{2-2}$ , C.  $\frac{1-1}{1-1}$ , I.  $\frac{4}{0}$  = 16.

Molars. Upper hooked; lower scarcely so. Canines excessively sharp, hooked backwards; upper largest. Incisors, upper middle broad, with one fine notch; lateral hooked.

Length to base of tail  $2\frac{5}{8}$  inches, length to fork  $2\frac{7}{8}$ ; expanse  $12\frac{1}{2}$ ; radius  $1\frac{3}{8}$ , in others 2; thumb  $\frac{1}{2}$ ; last phalanges  $\frac{3}{8}$ ; index  $2\frac{1}{8}$ ; carpus, to tip,  $3\frac{1}{8}$ ; 4th digit  $2\frac{1}{2}$ ; muzzle to ear  $\frac{5}{8}$ ; knee to calcaneum 1 (nearly); foot  $\frac{5}{8}$ ; calcaneum (minute)  $\frac{1}{16}$ ; ear, back  $\frac{1}{2}$ , front  $\frac{5}{8}$ . Tongue, protrusible beyond muzzle,  $\frac{5}{8}$  (it must have been more, I think), narrows towards tip more suddenly than with *Monophyllus redmanii*; covered with reversed prickles, which are especially long and bristle-like, on the edges of tip: large and full, tip narrowed, thinner, hollowed; when shortened and contained within mouth, thrown into two rows of oblique striæ or folds.

In the young the tongue had the same striæ, but only the tip was slightly extensible.

*Description.* Nose-leaf pentagonal; central lobe reduced to a small blunt point on the upper angle; seen under the lens to be covered with fine white hairs. Nostrils round; external lobe two series of conspicuous confluent warts, centres depressed and punctured for hairs, one series on each side, leaving a space behind, central lobe free. Lower lip split, and on each side a notched triangular wart; upper lip fringed with hairs; but scarcely any beard. Ears ample, points rounded; tragus lanceolate acute. Tail short. Thumbs, legs, and toes very long, the latter regularly decreasing from hallux, which is longest. Forehead low. Muzzle very long; colour a soft chestnut-yellow, paler beneath, each hair at its base white; volars, ears, and nose-leaf pale black. No cranial ridge. Caudal vertebrae 5 (?); intestine 14 inches long; stomach membranous, not reticulated, filled with a yellowish frothy pulp.

“ Harmony Hall (Trelawny), 4th June, 1859.

“ It is in the eastern cave on this estate this pretty little Bat abounds. The entrance is in a wall of rock shrouded by a thicket. The interior of the cave not very extensive, and not thoroughly dark. I had, at first, no light; but the noise of innumerable wings, and the heaps of fruit and droppings with which the floor was covered, showed it was densely inhabited. I fired my gun towards where the sound was loudest; had just light enough to pick up what fell, and on taking it to the entrance, saw this interesting species for the first time. When the light arrived, I was surprised at their immense num-



bers, flying about and swarming on the walls and roof like bees. They differ from some other Bats in settling on the walls low down, notwithstanding the alarm of the lights; and in this they are like *M. redmanii*, which I saw do the same thing at the Oxford Cave. Not one seemed to make an attempt to escape, which was the more remarkable as there was no hole for retreat in the cave, and it was nearly dark when I left it. I infer, therefore, that this species is very strictly nocturnal. I had a considerable number knocked down in various parts; but it appeared the only species inhabiting this cave. The sexes were pretty equal, and the number of young very great. No female, that I saw, had more than one young one. I picked from the floor bread-nut kernels and numbers of munched berries of clammy cherry (*Cordia collococca*). I found the captives brought home were seventeen, besides a few young.

“Those in the best condition I placed in a gauze-covered box. They bit fiercely, and not ineffectually, at my fingers, were extremely active, and ran about the box with great agility. One or two managed to get out, when I found they could run on the floor and rise to the wing with the greatest ease. After one or two turns round the room, they hitched themselves, raised the head a little, and moved the nose-leaf and ears alternately, in the eager inquiring way of *M. redmanii* and *Artibeus carpolegus*. All night I was disturbed with their violent efforts to escape. I congratulated myself I had taken the precaution to line the bottom with a good bed of silk cotton, for otherwise the inflammation produced on the wrists by their efforts renders them unfit for preservation. The loud bird-like chirps and squeaks were incessant. Next morning I found them much exhausted and quiet; they no longer bit at my fingers. A female with a young one had it still hanging to her breast; but another young, I had put in hap-hazard from a heap, was hitched up to the muslin by itself. I sent for a berry-laden branch of *Cordia collococca*, which I had seen strewn on the floor of the cave, but first took the precaution of letting them drink, lest an abnormal thirst, produced by their exertions or injuries, should make them take the juice. They drank eagerly, protruding the tongue—the lip, hollowed spoon-shape, and the bristles evidently taking up a great quantity. They would anxiously lick it off my fingers. When they began to refuse more, and shake their heads at it, I tried the berries; but, to my disappointment, they took little notice of them. A couple of hours afterwards I tried again, when it occurred to me to break the skin, so as to let some of the juice escape. The one I presented it to, after a little persuasion, began to lick the juice; he at last seemed to understand his new position, and licked away in good earnest. The tongue was rapidly protruded and drawn in again, and the juice and softer pulp cleared away with great rapidity. I noticed he was very particular in cleaning out the bit of loose skin of berry, and licked my fingers of the juice spilt on them, carefully cleaning out any that had collected under the nail. The sensation was not at all unpleasant, the tongue feeling soft and spongy, with a slight scratching from the bristles. I then got

another berry. The Bat was hanging from the edge of the box, its ventral surface against the side; and as I held the berry a little off, so as to see the action of the tongue, it had, whilst feeding, to bend the neck, so as to raise the head a little: this seemed to fatigue it. It therefore raised itself on one wrist, and turned round so that its back was against the box's side; but as it did not change the position of the feet, of course the legs crossed, the right foot now being on the left side, and *vice versa*. In this odd position it seemed perfectly at ease, and went on licking at a fresh berry with great relish. Of course, only its chin was now visible to me. I then began gradually to lower the berry; it stretched first the neck and then the tongue to its full extent. I took it beyond reach, and then suddenly brought it close again. It seized it with its teeth savagely, and then shifted it to one side of the mouth, so that the long sharp canines of one side and the blunt molars held the berry, much as a dog will do when he wishes to bring the force of the molars to bear on a bone. This left room for the tongue still to be protruded; for, from the arrangement of the minute lower incisors in a concave, the molars can be nearly closed, so as to hold an object, and the tongue still have room for protrusion. The little body trembled with the eagerness of his actions. As the pulp and juice he could thus reach became exhausted, I expected he would drop it, and was prepared with another berry; but, to my surprise, he brought up the wrists to the muzzle, took the berry between them, gave it two or three energetic bites, and then held the berry off. So I now understood what the unusually long thumbs were for; for they applied themselves dexterously to the berry, held it firmly, and then, as it appeared to me, by a reverse action of the two wrists the berry was turned round, a fresh hold taken by the teeth, and the same licking process renewed, till the seed in the centre was cleaned of the pulp, all but the little bit which served for the last tooth-hold. It was then dropped, and the eager little muzzle raised for more.

“ I supplied another, and soon I had a little heap of seeds, with bits of pulp attached, at the bottom of the box, exactly like those I found in the cave. A wounded Bat on the floor found some berries out and began to lick them. I next tried the female with a young one, with precisely the same result; only, notwithstanding her eagerness for food and evidently hungry state, it was affecting to see how constantly she stopped carefully to lick the little one at her breast, lest any spilt juice should soil it. When holding the berries in the wrists, their appearance reminded me much of monkeys. They now became very lively, evidently much refreshed by the meal, and began to snap at my fingers. I covered them up in darkness, which they seemed to want. On my return I found the young Bat which I had put in as an orphan had been taken by the other female, and was evidently sucking vigorously. It can hardly have happened that out of such a number I could have chosen mother and offspring by chance. Perhaps the old Bat, feeling the pressure of milk, in this way sought relief. The young were quite naked and blind, and

about two inches long, but clung with great tenacity. From a portion of umbilical cord still attached to one mother, I conclude one had only been born quite recently. I then took them and put them among the twigs of *Cordia*. They climbed about it, heads downwards, with the greatest ease. The length of the legs and toes, their muscularity, and the absence of any interfemoral or tail were all obvious advantages where this habit was constant, especially the power it gave them of turning as on a pivot, but without moving the feet. They twisted, within certain limits, like a body suspended by a string. They would thus follow a berry I moved; but they would not pluck any of the berries for themselves, seeming only anxious to get into a dark place. This I attribute to the unnatural hour of feeding. On placing them in the box, I found, after a short time, both mothers had crossed the legs in the attitude before mentioned, to avoid pressing the young against the side. I put them out of doors on a tree at some distance from the house. One attempted to return, doubtless to escape the light. It lit on a plastered wall, and, notwithstanding the incumbrance of the suckling, ran up the wall backwards by the legs with great rapidity (raising the body with the wrists so as not to rub the young) till it gained the shelter of the eaves, whence I hope it made a complete escape; for I left Harmony Hall that afternoon.

“From these observations I would infer that we have an explanation of the much greater muscularity of the frugivorous Bats, and their far less buoyancy, than the insectivorous; and further, of the use of the wrists in this Bat.

“The details on *Macrotus waterhousii* (No. 8), collected at Mount Pleasant, St. Ann’s, in which we have a Bat entering houses for the purpose of hitching itself up in verandah or room to eat the berries from a tree in the garden, its insect prey, and finally the collections of fruit—from this and what I have noticed in the caves, I come to the following conclusion:—that the supposition that these Bats eat fruit on the wing is groundless, for it would manifestly be a difficult feat to use the teeth and to chew whilst flying; but that they hitch themselves up somewhere near the scene of action, where they can use their wrists and feed on their prize at ease. Their long legs seem well adapted for hitching themselves up among their food. The much greater muscularity of the limbs, their greater activity in running and using them, their long thumbs, are all adapted to climbing and holding fruit—a curious approach to the habits of the *Quadrumana*.

“When the first cold streaks of dawn warn the curious little animals away to their gloomy retreats, each Bat carries off a berry, and in the security of the cave finishes his meal at leisure. The outer toe has a great tendency to diverge at a considerable angle from the next during suspension.”

2. DESCRIPTIONS OF SEVEN NEW SPECIES OF BIRDS DISCOVERED BY MR. J. J. MONTEIRO IN THE PROVINCE OF BENGUELA, ANGOLA, WEST AFRICA. BY DR. G. HARTLAUB, FOREIGN MEMB.

(Plates IV., V., VI.)

1. CRATEROPUS GYMNOGENYS, sp. nov.

*Capitis lateribus circumscripte nudis; pileo albido, nucham versus magis cinerascens; dorso fusco; collo postico et laterali lætius rufescente; alis et cauda nigro-fuscis; uropygio albo, fulvescente lavato; subalaribus dilute rufis; lateribus rufescentibus; subcaudalibus albis; remigum marginibus internis pallide rufis, primo et secundo exceptis totis nigris; rostro et pedibus nigris.*

Long. circa 9", rostri a fr.  $9\frac{1}{4}$ ", alæ 3" 11", caudæ 3" 8", tarsi  $14\frac{1}{2}$ ".

2. DRYOSCOPIUS GUTTATUS, sp. nov.

*Supra nitide niger, nitore chalybeo; cauda tota nigerrima; alis nigris, macula scapulari transversa alba; marginibus externis remigum duorum secundariorum late niveis, fasciam angustam longitudinalem formantibus; subalaribus albis, flexura alæ nigra; tergi et uropygii plumis obscure cinerascens, macula anteapicali rotundata alba notatis, ipso margine apicali nigro; abdomine unicolore albo; subcaudalibus albis; rostro valde compresso, vix plus quam emarginatum, nigro; pedibus nigris.*

Long. 7" 8", rostri a fr. 8", alæ 3" 7", caudæ 3" 7", tarsi 15".

*Obs.* A typical species.

3. UPUPA DECORATA, sp. nov.

*Simillima U. capensi, sed diversa; remigibus secundariis albis ante apicem extensum nigrum, nigro bifasciatis, fasciola nigredinis apicalis medio interrupta; abdomine in fundo pallide rufescente, maculis nonnullis longitudinalibus nigro-fuscis.*

Long. rostri a fr. 1" 7", alæ 5", caudæ 4", tarsi 8".

*Obs.* The unique specimen of this bird seems to be not quite adult; the crest is exactly like that of *U. capensis*; the rufous colour of the under parts goes much further down in *U. capensis*. This latter species has the secondary remiges, from the base to the black apical part, of a pure white.

4. TOCCUS ELEGANS, sp. nov. (Pl. IV.)

*Pileo ardesiaco, occipite subcristato; capitis lateribus albidis, ardesiaco longitudinaliter variegatis, superciliis eodem modo pictis; dorso fusciscenti-nigro, area mediana angusta alba; alarum tectricibus in fundo nigro maculis magnis rotundatis albis, nigerrime marginatis, pulchre variis; remigibus majoribus nigris, 1° et 2° macula alba unica in pogonio interno, 3°-7<sup>m</sup> albo bimaculatis, 3 secundariis albis, macula magna irregulari*



J. Wolf del. et. lith.

M. & N. Hanhart imp.

TOCCUS ELEGANS.





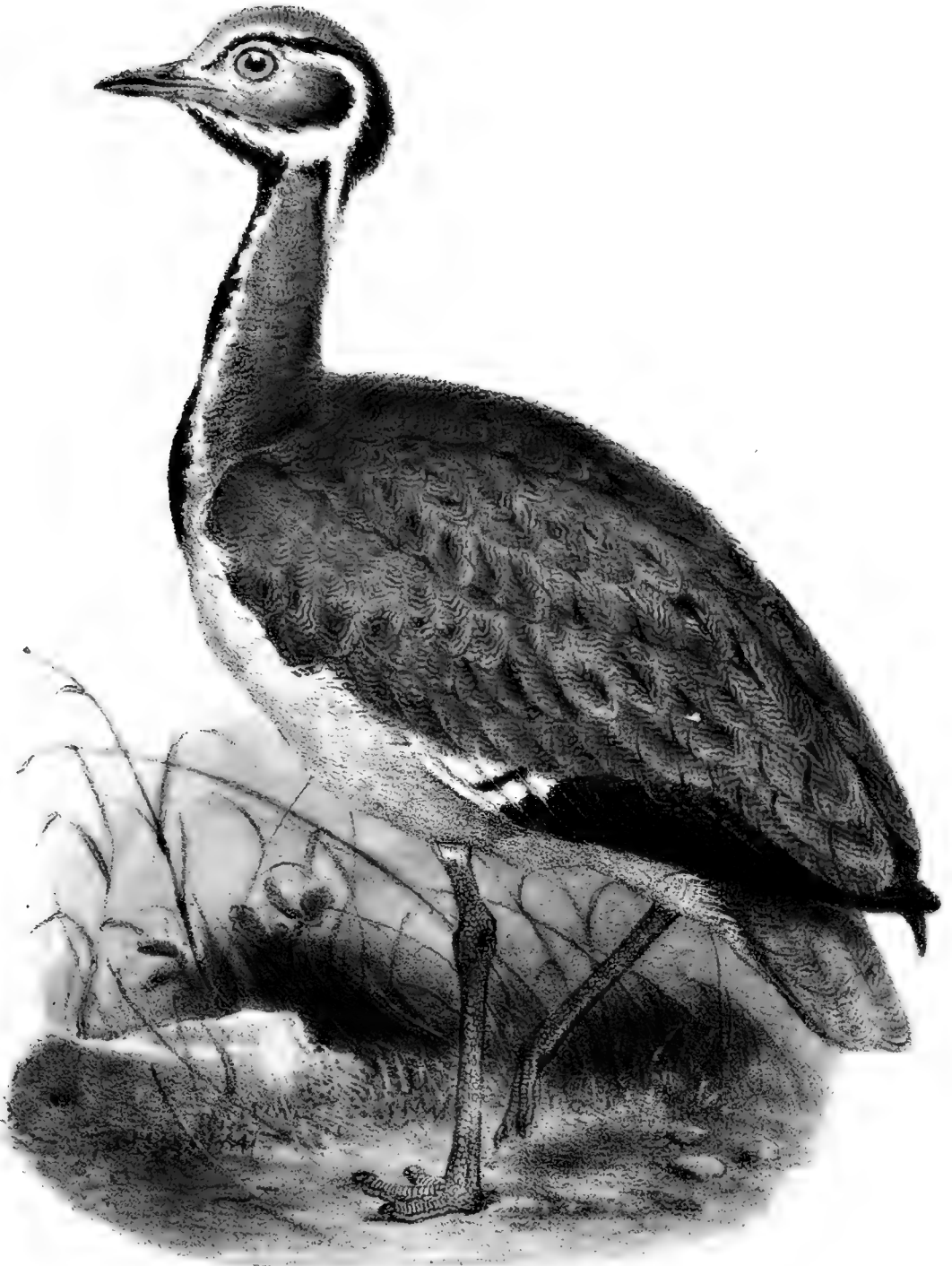
J. Wolf. del. et lith.

M & N Hanhart imp.

TOCCUS MONTEIRI.





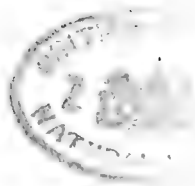


1  
3.

J. Wolf del. et lith.

M & N Hanhart imp

OTIS PICTURATA



*bipartita nigra; tertiariis pallide fuscis; subalaribus albis; subtus albus, gula denudata; jugulo nigro longitudinaliter vario; reatricibus 4 mediis nigro-fuscis, 2 sequentibus fusca lata mediana apiceque læte albis, extima fere tota alba, macula majore anteapicali nigro-fusca; rostro læte flavo, tomis, apice mandibulæ et macula longitudinali a naribus ad dimidium maxillæ usque producta nigricantibus; pedibus plumbeis.*

Long. circa 18", rostri a fr.  $3\frac{1}{2}$ ", alæ vix 7", caudæ  $8\frac{1}{2}$ ", tarsi  $1\frac{1}{3}$ ".

*Obs.* Typical; adult. Nearly allied to *B. flavirostris* of Rüppell; but beautifully different in the colouring of the upper mandible, the wing-coverts, the remiges, &c.

##### 5. TOCCUS MONTEIRI, sp. nov. (Pl. V.)

*Capite ardesiaco, occipite subcristato, lateribus albo longitudinaliter variis, pileo cinereo et nigricante minus distincte vario; gula plumosa juguloque cinereo-ardesiaco; pectore et abdomine niveis, dorso obsolete brunneo, tergo et uropygio obscuris fuscis; alarum tectricibus dorso concoloribus, maculis rotundatis albis pulchre ocellatis; remigibus primariis nigris, 1° et 2° macula angusta transversa alba versus basin pogonii interni, ipso apice albo largius notatis; 3°-6<sup>m</sup> pogonio externo macula unica alba, apice albescentibus; sequentibus nigris, apice largissime et irregulariter albis; secundariis albis, scapis a basi ultra medium nigris; tertiariis pallide fuscis; reatricibus 2 mediis totis fuscis, sequente utrinque fusca, macula pogonii externi apicali alba, tertia alba pogonio interno basi nigro, secunda tota alba, extima alba pogonio externo pro maxima parte brunneo, parte apicali tota alba; subalaribus albis; rostro ruberrimo, apice parum obscuriore, basi albido, maxilla distincte quadrisulcata; epithemate rostri, sicut in specie præcedente, nullo.*

Long. circa 19", rostri a fr.  $4\frac{1}{4}$ ", alæ 7" 9", caudæ  $8\frac{1}{2}$ ", tarsi  $1\frac{1}{3}$ ".

*Obs.* Typical. Allied to *B. limbatus* of Rüppell; but much smaller and widely different in the structure of the beak, the colour of the alar coverts, the tail-feathers, &c.

##### 6. CURSORIUS BISIGNATUS, sp. nov.

*Affinis C. bicincto Temm., sed diversus: 1°, statura multo minore; 2°, torque colli postici nigro vix conspicuo; 3°, notæi coloribus multo pallidioribus; 4°, remigibus secundariis omnibus primariisque 5°-10<sup>m</sup> pro maxima parte dilute rufis; 5°, gastræo a gutture inde, subalaribus et subcaudalibus pure albis; 6°, remigum pogoniis internis subtus rufescenti-albis, axillaribus albis; reatrice extima tota alba.*

Long.  $6\frac{1}{2}$ ", rostri a fr. 5", alæ 5", caudæ 1" 10", tarsi 1" 9", dig. med. c. ung. 8".

*Obs.* A most beautiful new species of an interesting genus. Represents the *C. bicinctus* of Caffraria, on the south-western coast. The two black collars are elegantly defined, the upper one being the

narrower. The whole bird is much smaller and much paler. Two specimens.

7. *OTIS PICTURATA*, sp. nov. (Pl. VI.)

*Corpore supra, alarum ptilosi minore et cauda in fundo pallide fulvescente nigricante lineolatis et vermiculatis; pilei plumis cærulescenti-cinereis, subtilissime obscurius fasciolatis; fascia supraciliari, macula parotica, altera majore nuchali, gula collique cinerei anticæ tænia longitudinali mediana nigerrimis; mento et capitis lateribus albis, his infra nigro cinctis; spatio inter fasciam supraciliarem et regionem paroticam albo; pectore et abdomine sordide albis; remigibus 1° et 2° nigro-fuscis, basin versus rufescenti-albidis, 3° et 4° pogonio interno flavescenti-albidis, externo dimidio apicali valde angustato nigricanti-fuscis, basali dilatato isabellino fusco maculatis; sequentibus flavidis, apice læte fuscis; minoribus isabellinis, ante apicem fuscum fusco bimaculatis; flexura alæ albida, nigricante variegata; pedibus pallide flavidis; rostro brunnescente, mandibula pro maxima parte a basi albida.*

Long. circa 20", rostri a fr. 17", alæ 12" 3", caudæ 6", tarsi 2" 9", dig. med. c. ung. 1½".

*Obs.* This bird belongs to the *Eupodotis* group of Lesson. We congratulate Mr. Monteiro upon the discovery of this very elegant new species of Bustard.

I add a few notes upon other species in Mr. Monteiro's collection, which Dr. Sclater has submitted to my examination.

*Gallinula chloropus*.—The Angola bird differs from our European Water-hen in the darker and more blackish colour of the back, which is without the olive-brown so apparent in the bird of Europe.

*Schizorhis concolor*.—Compared with an adult Natal specimen of the Bremen collection, the two fine birds in Mr. Monteiro's collection appear to be almost specifically different. The whole colour is much paler, more grey, and less brownish, the sides of the head being whitish, and the crest much paler. They should be compared with other Caffrarian specimens.

*Telephonus trivirgatus*.—Exactly like a Damara specimen in the Bremen collection, the beak being in both of a full pure black. Dr. A. Smith, who met with only one female specimen, figures and describes the beak of his *T. trivirgatus* as being of a light whitish brown.

*Halecyon semicærulea*.—Differs from a West-African bird in the Bremen collection in the much darker hue of the blue colour of the back, in the more brownish colour of the crown, in the back of the neck being grey, and in the pale fulvous colour of the under parts, which are ferruginous in the Gaboon specimen.

*Parus afer*.—Much smaller than more southern specimens; otherwise not different.

## 3. NOTES ON BIRDS COLLECTED IN BENGUELA.

BY J. J. MONTEIRO.

The following seventy species of birds were collected in 1862 and 1863 in the littoral region of the province of Benguela, Angola (between 12° and 15° S. lat.). This region is, generally speaking, arid, barren, and rocky (gneiss, with a narrow belt of limestone and gypsum rocks, on the sea-shore). The vegetation becomes abundant or luxuriant only in the vicinity of the few rivers, and at a distance of twenty to thirty miles towards the interior.

Dr. G. Hartlaub has kindly determined the names of the species for me.

1. *ARDEA ATRICOLLIS*, Wagl.

Very abundant on all the fresh-, salt-, and brackish-water lagoons and marshes along the whole coast of Angola. Often kept tame in the houses, and, though preferring fish, will eat almost all other kind of food.

2. *PLATALEA TENUIROSTRIS*, Temm.

Also very abundant in the brackish and salt muddy lagoons.

3. *PLOTUS LEVAILLANTII*, Temm.

Shot at the "Bimbas," freshwater lakes about six miles to the interior of the town of Benguela. Fly in flocks at an astonishing height in the air, wheeling and circling over the water in the manner of birds of prey. When they descend, it is with arrow-like rapidity, dashing into the water with great force, and emerging again to the surface, on which they swim with their bodies hardly visible above water, and wriggling their long snake-like necks.

4. *ARDEA GARZETTA*, Linn.

This beautiful bird is observed on all the stagnant fresh waters of the whole of Angola. The pure white of its plumage forms a lovely contrast, as it dazzles in the bright sunshine, to the green of the large-leaved species of duckweed and water-lilies on which it gracefully stands, or to that of the tall stems and elegant feathery heads of the *Papyrus* fringing with the most vivid colour the still, shining waters.

5. *PHALACROCORAX AFRICANUS* (Gm.).

Very common on all the rivers and fresh waters of Angola. Its flesh is dark-coloured, but good eating.

6. *ERISMATURA LEUCONOTA*.

From the freshwater lakes of Benguela. There are several other species of Duck, and many other very beautiful aquatic birds, particularly at Pinda, to the south of Mossamedes.

7. *OTIS RUFICRISTA*, Sm.

8. *OTIS PICTURATA*, Hartlaub, sp. nov.

Both these handsome Bustards, called "Tuas" by the natives, are found abundantly all along the littoral region of Angola, becoming more so in the vicinity of Benguela, and inhabiting in preference the gypsum plains and country driest and barest of vegetation. They utter a loud clucking cry, and go about always in pairs, run very fast, and when alarmed fly low and heavily, generally dropping to the ground again at a short distance. They are very shy, and difficult to shoot. Their flesh is the most delicate and best-tasted of perhaps any game bird. There is a third magnificent species similar in appearance to no. 8, with a white belly, but twice its size. The stomachs of these birds contain flowers, buds, and leaves of several species of shrubs, remains of scorpions, and several kind of hard seeds. I have known several Portuguese who have attempted to rear these birds, or keep the old ones in their gardens, but have always failed to preserve them alive for any length of time.

9. *PTEROCLES NAMAQUUS* (Gm.).

Male and female. Inhabit the same locality as the preceding; gregarious in small flocks, but keeping together in pairs.

10. *CURSORIUS BISIGNATUS*, Hartlaub, sp. nov.

Same locality and habits.

11. *LOBIVANELLUS LATERALIS*, Sm.

Same locality; scarce.

12. *PODICEPS MINOR* (Linn.).

Abundant on the freshwater lakes of Angola.

13. *ARDEA MINUTA*, Linn.

This beautiful species was shot at the Bimbas or freshwater lakes at Benguela.

14. *PARRA AFRICANA*, Gm.

This beautiful bird is common on all the still freshwaters of Angola.

15. *GALLINULA CHLOROPUS* (Linn.).

Common in the same localities as the preceding.

16. *CORVUS SCAPULATUS*, Daud.

Common to the whole of the Angola coast and interior. Have the same impudent thievish propensities as our Common Crow, and very nearly the same caw and croak. Have wonderfully acute sense of sight or smell. I could never encamp anywhere but they would soon make their appearance, often in the most bare and desert situations on the coast. I once only at Benguela, but several times at Mossamedes, observed another species, all black, and the size of our rook, or perhaps a little smaller.

17. *BUBO MACULOSUS* (Vieill.).

Abundant about Benguela.

18. *STRIX FLAMMEA*, Linn.

Also abundant in the same locality.

19. *SCOPS SENEGALENSIS*, Sw.

Shot at Benguela.

20. *ATHENE PERLATA* (Vieill.).

Same.

21. *FRANCOLINUS GARIEPENSIS*, Sw.

Common all over Angola.

22. *TOCCUS MONTEIRI*, Hartlaub, sp. nov.

This fine bird is pretty abundant at Benguela. The bill is of a fine fire-red colour, becoming white near the base. Inhabits the littoral region principally. Stomach contained remains of grasshoppers, a small hornets' nest, several large larvæ, and the flat bean-like seeds of a thorny tree. Are gregarious, and fly slowly. When sitting on a branch, they raise and depress their crest-feathers, and utter a very loud, disagreeable cry, like that of a child screaming. Feed on the ground, principally in the sandy valleys and the dry beds of what are rivers and water-courses in the rainy season, digging powerfully in the sand (which they throw back between their legs) in quest of grubs, &c.

The natives all over Angola affirm most positively that the female shuts up the male in the nest so that it cannot get out, and there feeds it constantly until it has incubated the eggs, when she tears down the nest and lets it and the young brood out. It is then said to be very lean and featherless. I never had an opportunity of verifying this singular statement; but the negroes have several proverbs in connexion with this curious habit, while I have very little doubt of its correctness.

23. *TOCCUS ELEGANS*, Hartlaub, sp. nov.

From the same locality, and identical in habits.

24. *CENTROPUS SUPERCILIOSUS*, Hempr.

Very abundant everywhere in Angola. Flies low amongst the bushes, and very fond of marshy places where the vegetation is very thick. Has a very loud, clucking, continued note. Of a second magnificently coloured species, with bright blue tail, I was unable to obtain a specimen, although I met with it in Benguela, and have seen the feathers brought from Bibé.

25. *SCHIZORHIS CONCOLOR* (Smith).

These handsome birds are very abundant at Benguela and Mos-

samedes, in all the woods. Are very active in their habits, running along the branches of the trees with great rapidity, uttering a loud rapid scream, and bobbing their heads up and down, and stretching their necks in a comical manner. Their crest-feathers are always erect; are never raised or depressed. In their manners they remind an observer very much of the "Plantain-eaters." Feed on wild fruits and berries.

26. *CORYTHAIX LIVINGSTONII*, G. R. Gray.

Are sometimes brought to Benguela for sale by the negroes from Bibé. Appears to be much rarer than the *C. paulina*. I have seen both pretty abundantly to the interior of Novo Redondo, in the Celis country (peopled by a cannibal tribe of negroes), where the magnificent forest resounds in all directions with their loud unearthly cry.

I have succeeded in bringing home to England a live specimen of this species, which is now in splendid plumage and health. It is perfectly tame—so much so as not to notice strangers in the least, but, on the contrary, coming to the side of its cage to take hold and play with their fingers in its beak. It is fond of a great variety of food—all kinds of fruit, bread, biscuit, or cake soaked in milk or water, and sugar pudding, raisins, figs, currants, green peas, water-cress, lettuce, boiled carrots, &c.

It is curious to observe the manner in which one of its toes is bent nearly backward when on the ground; when on its perch, its feet grasp it with two toes behind and two in front. It is fond of playing with the end of a piece of string, with which it rushes about in its cage. It always roosts on a little soft hay, &c., in a small basket, in the manner of a bird hatching; and it is exceedingly fretful at dusk until some person pets and talks to it, when it jumps into the basket and settles immediately, chattering all the while in a very satisfied and contented manner. Its cry is very loud and extraordinary—a long whoop, first repeated short many times, and finishing with a long scream. When alarmed at seeing a cat or other animal, it utters a loud cackle, something like that of a frightened hen. It is very fond of bathing, which it does in a large dish full of water, wetting itself completely, and screaming at the top of its voice all the time, making a terrible din for a bird of its size.

27. *TROGON NARINA*.

Shot in a wood at Benguela. I never observed another specimen.

28. *CUCULUS RUBECULA*, Sw.

Shot at Novo Redondo (11° S. lat.). Base of bill, eyelids, and legs of a beautiful yellow. Said by the natives to be a young one. Large eyes and extremely small body for such a large-feathered bird. It was flying in the air in the manner of a Hawk, which I took it to be when I fired at it.

29. *LAMPROCOLIUS PHENICOPTERUS*, Sw.

Extremely abundant all over Angola.



30. *DICRURUS MUSICUS*.

Also abundant everywhere. Is very active on the wing in the capture of its insect prey.

31. *ORIOLOUS LARVATUS*, Licht.

Very abundant in the woods at Benguela.

32. *HYPHANTORNIS CINCTA*, Cass.

Not uncommon at Benguela.

33. *ORIOLOUS BICOLOR*, Licht., juv.

Abundant; same locality.

34. *CRATEROPUS GYMNOPENYS*, Hartlaub, sp. nov.

Common at Novo Redondo and Benguela in the thick wood and underbrush. Fly in small flocks, and are most discordantly noisy.

35. *LANIARIUS BACKBAKIRI*, Lev.

Shot near the beach at Cirio Bay (13° S. lat.).

36. *DILOPHUS CARUNCULATUS*.

Shot in a newly dug field, evidently seeking for worms or grubs. Equemina Bay (13° 12' S. lat.).

37. *DRYOSCOPIUS GUTTATUS*, Hartlaub, sp. nov.

Very abundant; but difficult to see, from hiding so close in the bushes. Chatters much and loudly, with very varied and dissimilar notes or cries. When on a branch, its rump-feathers are puffed up in a remarkable manner.

38. *EUROCEPHALUS ANGITIMENS*, Smith.

This is also an extraordinarily noisy bird, and very abundant about the woods of Benguela. Fly in small flocks, keeping always very close together. I have counted as many as fourteen on a branch, side by side, all looking one way, and screaming and chattering most loudly all at once.

39. *AMYDRUS FULVIPENNIS* (Sw.).

Very abundant near the coast from Novo Redondo to Mossamedes (or Little Fish-Bay). Never observed it more to the north than the former locality. Only makes its appearance some months of the year (from November to June). Keep together in small flocks, uttering a cry very much like that of a Starling. They accumulate a large open nest on some flat-topped tree, without the least shade or protection, and on which as many as eight or ten birds are sitting together hatching their eggs, presenting a very singular appearance.

40. *TELEPHONUS TRIVIRGATUS*, Smith.

Common in Benguela; but difficult to obtain, from its flying close to the ground through the thick underwood.

41. *CERTHILAUDA SEMITORQUATA*, Smith.

Very abundant about Benguela, particularly in bare rocky places. Keeps always on the ground, and is very tame, as it may be passed quite close without its flying away or otherwise showing alarm.

42. *SAXICOLA INFUSCATA*, Smith.

Benguela.

43. *UPUPA DECORATA*, Hartlaub, sp. nov.

Benguela; abundant.

44. *CHRYSOCOCCYX AURATUS* (Gm.), juv.

Benguela.

45. *BUPHAGA AFRICANA*, Linn.

Abundant all over Angola, which, generally speaking, abounds in cattle. It appears to feed entirely on ticks: the stomach of this specimen contained no less than twenty-five. Its flesh is very dark-coloured, strong-smelling, and its blood extremely thick and dark. It is curious to watch the manner in which they crawl all over the body of an ox or large animal, under its belly and between its legs, which they are enabled to do by their strong claws tipped with exceedingly sharp-hooked nails. The beak is soft, of a bright red at the tip, graduating to bright yellow at the base. I once saw a nest of these birds, which they appeared to be finishing. It was large, loose, of dry grass, and nicely lined with long hair, seemingly taken from the tails of cattle. These birds were constantly robbing the hair from the tail of an old mule I had at Benguela. They will accompany a herd of cattle only for a certain distance, when they will return to their usual locality, and others immediately make their appearance and appear to take charge of the herd.

46. *IRRISOR CYANOMELAS*.

Not uncommon in Benguela.

47. *HALCYON SEMICÆRULEA* (Forsk.).

Benguela.

48. *HALCYON SENEGALENSIS* (L.).

Benguela.

49. *PSITTACULA ROSEICOLLIS*.

Very abundant at Novo Redondo to Mossamedes, and very destructive to the Indian-corn plantations.

50. *PSITTACUS RUEPELLI*, Gray.

Also not uncommon in the same localities.

51. *TURTUR ERYTHROPHRYS*, Sw.

Common in the whole of Angola.

52. *POGONIAS LEUCOMELAS* (Bodd.).

Benguela. Their stomachs contained different kinds of small seeds; but their principal food appears to be the fibrous bark of some herbaceous plants, as in both these specimens, as well as several others that I have examined, the stomachs always contained masses of green bark. Its strong-toothed bill would appear to be adapted, therefore, more for the purpose of tearing or cutting its bark food than for crushing seeds, as might appear at first sight; for I never found their stomachs to contain the remains of the latter.

53. *LIMNOCORAX FLAVIROSTRIS*, Sw.

Common on all the freshwaters of Angola.

54. *CHARADRIUS GEOFFROYI*, Wagl.

On sandy plains near the sea.

55. *CALIDRIS ARENARIA* (Linn.).

On the beach at Benguela.

56. *CYPSELUS APUS* (Linn.).

Common in Benguela, building their nests very commonly under the eaves of houses.

57. *HIRUNDO STRIOLATA*, Rüpp.

Imperfect skin. Benguela; most common about Novo Redondo.

58. *SPOROPIPES LEPIDOPTERA*, Sm.

Gregarious, in small flocks. Only observed in the rocky barren districts to the south of Benguela. Upwards of a dozen were caught for me by the blacks, one night, in a hole in the straw thatch of a hut, where they are fond of roosting together; and I had them alive many months in a cage, feeding on grass- and other small seeds.

59. *PLATYSTEIRA SENEGALENSIS*, L.

Also only observed in the same locality, generally in pairs, twittering much, and feeding on insects, principally small spiders.

60. *PARUS AFER*.

Benguela.

61. *BUSERINUS ALBIGULARIS*, Gm.

Benguela.

62. *PYTELIA ELEGANS*, Gm.

Loanda and Benguela. Called by the Portuguese "Maracachão," and much esteemed as a cage-bird on account of its marvellously sweet song.

63. *ESTRELLA ASTRILD* (Linn.).

Very abundant in Angola, particularly to the south; gregarious, in flocks of hundreds of individuals.

64. *NECTARINIA NATALENSIS*, Jard.

Benguela. The only specimen observed.

65. *NECTARINIA JARDINII*, Verr.

Very abundant about Benguela, even in comparatively barren places, where, I have observed, they eat little insects, particularly small spiders.

66. *PICUS FLAVISCAPUS*, Ill.

From Mossamedes, or Little Fish-Bay.

67. *MEROPS ERYTHROPTERUS*.

Benguela.

68. *MEROPS HIRUNDINACEUS*.

Benguela.

69. *MEROPS ÆGYPTIUS*, F.

Benguela. These birds have all a very graceful flight, circling leisurely in the air. This last is most abundant.

70. *ALCEDO CRISTATA*.

Abundant at the Bimbas (lagoons near Benguela).

## 4. SUPPLEMENTARY NOTES TO THE REVIEW OF VERMETIDÆ.

BY O. A. L. MÖRCH, OF COPENHAGEN.

As I see, from Mr. Carpenter's "Supplementary Report"\* , that several points in my papers on *Vermetidæ*, in these 'Proceedings' for the years 1861 and 1862, may be misunderstood, I feel myself called upon to make some further explanations.

The constancy of conchological characters is very different in different families. In some families, for instance, very small differences in the sculpture, the convexity of the whorls, and the height of the spire are very constant and of great importance. Thus among the *Helices* such differences are frequently supported by very notable and constant differences in the lingual dentition. In some genera the colours are exceedingly variable in one and the same species—for instance, in *Meretrix*, *Oliva*, *Pecten*, &c.,—in others, again, very constant as a specific mark—for instance, in *Conus*, *Cypræa*, *Natica*, &c. Prof. Troschel has thus lately proved that *Natica hebræa* (Martyn) and *N. stercus muscarum* (Chemn.†), chiefly distinguished by a somewhat different pattern of colour, and united into one species by several modern authors, have a notably

\* Report of the British Association for the Advancement of Science for 1863, p. 536.

† = *Natica adspersa* (Mke.) and *N. millepunctata* (Linn.), both of which are from the Mediterranean.

different lingual dentition. The same is the case with *Tritonium undatum* (L.) and the Arctic *Tritonium grænlandicum* (Ch.), which are chiefly distinguished by the different consistence of the testaceous matter, but vary in the size, shape, and sculpture of the shell in an analogous manner, as the following scheme will show:—

- |                                       |  |
|---------------------------------------|--|
| 1. <i>Tritonium undatum</i> , L.      | 1. <i>Tritonium undulatum</i> , Möll. = <i>Buccinum labradorensis</i> , Reeve. |
| 2. <i>Buccinum acuminatum</i> , Brod. | 2. A similar form is known from Greenland by five specimens.                   |
| 3. — <i>ciliatum</i> , auct. Brit.    | 3. <i>Tritonium grænlandicum</i> , Ch.   |
| 4. — <i>humphreysianum</i> , Bennet.  | 4. — <i>humphreysianum</i> , Möll.   |

The variation of the quasi-parasitical species, however, almost surpasses belief. One of the most striking instances is the *Patella compressa* (L.), which owes its remarkably compressed form to its habit of affixing itself to the stems of the large seaweeds of the Cape of Good Hope. When it drops from its place, and is received on a flat object, an expanded limb is added to the edge, of a somewhat coarser sculpture, and the uniform yellowish colour is changed to a whitish colour mottled with red spots, which proves clearly at this species is undoubtedly a form of *Patella miniata*, Born. Dr. Gray even mentions a specimen which is first a *Patella miniata*, then a *P. compressa*, and ultimately again a *P. miniata*. When the latter form becomes full-grown\*, “caput infantis superans”†, it is the *Patella rustica* of Linnæus. These three forms are by several authors placed in three different genera. These facts prove clearly the necessity of comparing extensive series of specimens before new species are established. It was very difficult for me, when I wrote my papers on the *Vermetidæ*, to procure numerous specimens of all the species, as this family has been very much neglected by collectors. I have, however, been able to compare sufficiently large suites of one or two species of each genus. I have most completely described all the different varieties of age and growth of *Vermetus conicus*, Dill. (P. Z. S. 1861, p. 341). I have convinced myself, by numerous dissected specimens, that this species is first a *Petalococonchus* with internal laminæ, then a *Bivonia* (Carp.) with liræ on the columella, without laminæ, and finally an *Aletes* (Carp.) with suddenly dilated whorls and a nearly smooth columella. I have only found the young in the latter form of shells. Finding it useful, or even necessary, to have a nomenclature for these differences, I have used these now superfluous generic terms for that purpose, in the same manner as the term *Cysticercus* is generally used for a stage of *Tænia*, or *Zoëta* for the young Crab.

I some time ago got a specimen of *Fasciolaria princeps* from Matatlan, with several solitary specimens of *Bivonia contorta* (Carp.) attached, two of which, after making three or four whorls, suddenly enlarge the aperture of the tube to twice its diameter, and change the dark-brown strongly granulated surface to a pale-yellowish nearly

\* Gray, Guide to the Systematic Distribution of Mollusca, p. 175; and Sowerby, Genera, fig. 3, *Patella*.

† Museum Ludovicæ Ulricæ, p. 694.

smooth shell, with longitudinal reddish bands, exactly answering to *Aletes centiquadrus* (Val., Carp.).

M. Lacaze-Duthiers\* has discovered that the female *Vermetus* deposits the egg-bags (which are very like those of *Hipponyx* and *Calyptrea*) in the last whorl, towards the aperture, where the eggs are hatched. It seems to me probable that the large aperture of the last whorl stands in connexion with this habit, as it otherwise would not be easily understood how the animal would be able to protrude the head in search of food. Still it must be remembered that some *Vermeti*, in a young state, close the aperture up with a convex septum, provided with a central slit†. This septum is, perhaps, analogous to the hybernaculum of the *Helices*, and indicates only some periodical rest in the growth.

I have never intended to introduce a tri- or poly-nomial nomenclature; but I believe it is necessary to name the different varieties, forms, and deviations, as well as the differences of sex and age. My nomenclature for the varieties, therefore, cannot properly be compared either with Klein's or Middendorf's generic nomenclature. "*Falco islandicus*, var. *grænlandicus*, young male in winter dress," is certainly, for instance, a very long name; but I cannot see any superfluous words. I have never named a variety with eight words, as Mr. Carpenter (who seems to have overlooked that he has confounded the appellations of two distinct varieties from two different localities) indicates (*l. c.* p. 558).

#### *Additions and Corrections.*

SILIQVARIA FLORINA (Defr., Chenu) is, according to M. Deshayes, a *Vermetus*, in the aperture of which a fragment of *Tenagodus* is inserted. For the variety figured by Dr. Chenu, M. Deshayes proposes (*Animaux sans Vertèbres du Bassin de Paris*, ii. p. 246) the name *Siliquaria millepeda*, which is synonymous with *Serpula cochlearia* (Defr., *Sow. Gen.*, where it is stated to be from the "calcaire grossière at Orglandes").

TENAGODUS AUSTRALIS (♂) is a distinct species, which I have named *T. reentzii*.

TENAGODUS (PYXIPOMA) MÖBII, n. sp.

*T. volubilis, laxa, solidissima, crassa, levigata, nitidula, sordide alba, infime flavescens; rima in anfr. tribus primis (qui adsunt) clausa, in anfr. sequente foraminibus duobus oblongis geminis remotis, deinde aperta marginibus irregularibus; aperturam versus hians, marginibus acutis simplicibus. Apex tubi septo hemisphærico clausus.*

Diam. aperturæ circ. 7 m.

\* *Annales des Sciences Naturelles*, sér. 4, vol. xiii. p. 248. It is also stated that the female of *Bivonia semisurrecta* has the mantle deeply fissured; but, unfortunately, it was not seen before the shell was lost.

† Gray, *Annals of N. H.* 1851, viii. p. 479, t. 17 B. f. 4-6; and Sowerby, *Genera, Serpula*, f. 5.

*Tirrebourres*, Davila, Cat. Rais. 1767, t. iv. f. e?; Buonanni, Recreatio, t. 20. f. C (quoad formam).

*Hab.* —? ad Manillam? (*Mus. Hamburg.*).

The lid of the true genus *Tenagodus* was unknown to me. I have now had an opportunity of examining a specimen of *T. squamatus*, Blv., from St. Thomas's, in Mr. A. H. Rüsse's collection.

*Operculum irregulare, incurvo-conicum; anfr. ciliis sat longis; area centralis pallide flava, sulco profunde circumscripta, segmentis radiantibus circiter 7, centro obscuro latiusculo, puncto centrali albo; limbus angustus, nitidus, reflexus, marginatus.*

SERPULA COSTALIS, Lam. Guérin (Iconographie du R. A. t. 1. f. 2), represents probably the typical specimen of Lamarck, and is thus the same species as *Vermiculus contortus*, Sldr.

VERMETUS CONTORTUS,  $\beta$ . FAVOSA, probably owes its remarkable sculpture to a *Flustra*, which it has copied, in the same manner as I have mentioned that a specimen of *Vermetus cereus*, Carp., has copied an *Astræa*.

VERMETUS ANELLUM, Mörch. As this species is always sinistral, it cannot be the young of *Vermetus squamigerus*, but is more likely to be a *Spirorbis*. The genus *Strebloceras* is quite unknown to me; the *Haliotis* on which it is found is perhaps only a variety of *H. corrugata* (Gray), from which it differs in being rounder, more convex, and in the pearly interior being whitish.

BIVONIA SUBTRIQUETRA (Mörch) is, according to original specimens in the collection of Mr. O. Semper, *Vermetus articulatus*, Bonelli (Sismondi, Synopsis, ed. 2. p. 27).

THYLACODES IMBRICATUS, Dkr. This name is preoccupied by Sandberger; the species must therefore be named

THYLACODES ADAMSI, Mörch, Journ. de Conch. 1859, p. 359; Adams, Ann. & Mag. of N. H. 1864, Feb., p. 141.

*Siphonium*, sp., Mrs. Gray, Figures of Moll. t. 2. f. 2-4, p. 82.

From Japan, according to Mr. A. Adams; but not from Borneo.

VERMETUS PERONII, Rouss. (Chenu, Ill. t. 4. f. 6), is perhaps different from *V. peronii* (Val., Voy. de la Venus).

THYLACODES MELANOSTOMUS, Mörch, n. sp.

*T. solitaria, spiralis, perforata, brunnea, crusta tenui (aliena) virescente, spiraliter lirulata, liræ plerumque alternatim minores; liræ 4-5 validiores, subæquidistantes, nodulis oblongis remotis; liræ incrementi minutæ, appressæ, regulariter approximata, hæc illuc acutiusculæ, in intersectionibus lirarum nodulo obsoletæ. Apertura circularis, faucibus nigrescentibadiis, columellæ candida.*

Diam. aperturæ circ. 15 m.

*Hab.* ad Zanzibar, in *Murice angulifero* Linn. affixum (*Coll. O. Semper.*) specimen unicum.

5. REVISION OF THE GENERA AND SPECIES OF MUSTELIDÆ  
CONTAINED IN THE BRITISH MUSEUM. BY DR. JOHN ED-  
WARD GRAY, F.R.S., F.L.S.

(Plate VII.)

The *Mustelidæ* are carnivorous Mammalia, with normal dentition, having a single tubercular grinder on each side of each jaw.

In my paper describing some little-known Mammalia, in the first volume of Charlesworth's 'Magazine of Natural History,' p. 579, published in 1837, I used the forms and number of the pads on the feet of *Mephitis* to divide it into three genera, and also showed the importance of observing the size of the bald parts of the soles of the feet in distinguishing the species of Otters; and in the 'Proceedings of the Zoological Society' for 1864 I have used the excellent character which the form of the bald part of the sole affords for the separation of the genera of *Viverridæ*.

The only naturalist who seems to have followed up the subject is Mr. Hodgson, who, in his paper "On the Tibetan Badger" in the 'Journal of the Asiatic Society of Bengal' for 1847, has given, in t. 31, figures of the under part of the feet, showing the form and disposition of the pads, of eight species of Indian *Viverridæ*, *Mustelidæ*, and *Ursidæ*.

*Synopsis of the Genera.*

Section I. ACANTHOPODA. *The feet rounded; the toes short, curved, more or less united by a web, the last joint bent up; the claws short, compressed, acute, retractile.*

Tribe 1. MUSTELINA. Head oblong. Toes slightly webbed. Tail cylindrical. Terrestrial.

A. Digitigrade. *Soles of the hind feet hairy, with four bald pads in front. Body elongate; anal glands developed. Tail slender; tubercular grinder short, transverse.*

\* *Teeth 38.*

1. MARTES. False grinders  $\frac{3}{4}$ . Head elongate. Feet very hairy; space between the pads hairy, often covering them from sight.

\*\* *Teeth 34.*

2. PUTORIUS. False grinders  $\frac{2}{3}$ . Head short, ovate. Feet and space between the pads very hairy. Body stout; underside blackish.

3. MUSTELA. False grinders  $\frac{2}{3}$ . Head elongate, narrow. Feet and space between the pads very hairy. Body slender; underside yellow or white.





J. Wolf del. et lith.

ENHYDRIS LUTRIS.

M & N Harkart. imp



4. VISON. False grinders  $2/3$ . Head elongate, narrow. Feet slightly hairy; pads exposed. Body rather slender; underside same colour as upper.
5. GYMNOPIUS. False grinders  $2/3$ . Head elongate, narrow. Feet rather naked, bald beneath, between, and rather behind the pads; toes largely webbed. Soles hairy behind. Body slender.
- B. Subplantigrade. *Soles and between the pads hairy. Body stout. Tail short, bushy. Anal glands none. False grinders  $3/4$ .*
6. GULO. Tubercular grinder oblong, transverse; flesh-tooth elongate, with a small subanterior inner lobe.
- C. Plantigrade. *Soles of hind feet bald, callous. Body elongate. Anal glands distinct. False grinders  $2/3$ ; tubercular grinder oblong, transverse.*
7. GALERA. Tail elongate. Soles of hind feet with a central longitudinal depression behind, and obscurely divided into four large pads in front. Heels hairy.
8. GRISONIA. Tail short. Body slender.
- Tribe 2. LUTRINA. Head depressed. Feet normal, rounded; toes webbed. Tail thick, tapering, depressed. Tubercular grinder oblong, transverse.
- A. *Tail conical, tapering, entirely covered with hair.*
- † *The palms and soles of the feet bald between the pads.*
- \* *The muzzle hairy; only the thin margin of the nostrils bald.*
9. BARANGIA. Claws rudimentary, blunt. Toes rather elongate.
- \*\* *The muzzle hairy between the nostrils; upper and front edge of the nostrils bald.*
10. LONTRA. Toes rather elongate, well webbed; claws sharp.
- \*\*\* *The muzzle bald, band-like between the front and upper edge of the nostrils. Orbit of skull defined by a conical process behind.*
- ‡. *Foot oblong; toes thick, webbed to the claws, sharply clawed; pads of toes and palm large, close together.*
11. LUTRA. Claws acute, strong. Head and skull elongate.
12. NUTRIA. Claws acute, strong. Head and skull short, broad.

‡‡. *Foot oblong; toes rather slender, free at the end, bluntly or imperfectly clawed; pad of palm large, of toes slender, separated.*

13. AONYX. Skull broad, depressed.

†† *The palms and soles of the feet slightly hairy between the pads; the two inner hinder toes with a band of hair on the inner side of the under surface. Muzzle bald, transverse.*

14. HYDROGALE. Claws acute. Skull elongate; orbits not defined behind, without any superior orbital prominence. Hind feet elongate. Toes slender, broadly webbed.

††† *Palms and soles of feet hairy between the pads. Muzzle bald between the nostrils, and produced into an angle on the upper edge.*

15. LATAX.

B. *Tail subcylindrical, elongate, covered with hair, and with a narrow fringe-like expansion on each side. Hind feet elongate.*

16. PTERONURA.

Tribe 3. ENHYDRINA. Head depressed. Feet large, elongate, rather fin-like, hairy above and below. Tail short, cylindrical. Grinders massive, flat-crowned.

17. ENHYDRA.

Section II. PLATYPODA. *The feet elongate; toes straight; claws exerted, blunt.*

A. Plantigrade. *Hind feet broad, depressed; soles bald, callous nearly to the heel; toes short, thick; claws thick. Body heavy. Tail short. Ears short, rounded.*

Tribe 4. MELINA. Tubercular grinder large, oblong, elongate. Palate produced behind. Flesh-tooth with two more or less distinct tubercles on inner lobe.

\* *Palate much produced behind; hinder opening in a line with the condyles.*

18. ARCTONYX. Tubercular grinder elongate. Nose of skull rather produced and contracted.

\*\* *Palate moderately produced behind; hinder opening in a line with the middle of zygomatic arch.*

19. MELES. Tubercular grinder elongate, oblong. Nose of skull broad. Flesh-tooth moderate, trigonal; inner lobe with a single ridge.

20. **TAXIDEA.** Tubercular grinder large, triangular, oblong; inner side broad. Flesh-tooth large, trigonal, with a broad inner lobe with two tubercles. Nose short, broad.
21. **MYDAUS.** Tubercular grinder oblong, nearly square; flesh-tooth moderate, trigonal, outer edge compressed, inner with two unequal tubercles on a ridge. Nose of skull produced.

Tribe 5. **MELLIVORINA.** Tubercular grinder transverse, band-like; palate only slightly produced behind; flesh-tooth with a small inner lobe and a single tubercle. Fur black below.

22. **MELLIVORA.** Skull short, broad.

Tribe 6. **MEPHITINA.** Tubercular grinder oblong, four-sided. Palate scarcely produced behind; hinder opening in a line with the hinder grinders. Skull short. Nose broad. Fur black, white-striped.

23. **CONEPATUS.** Sole of hind feet only divided across. Tail short, bushy. False grinders 3.
24. **MEPHITIS.** Sole of hind feet with three pads in front. Tail elongate, flaccid. False grinders 4.
25. **SPILOGALE.** Sole of hind feet with four pads in front. Tail short, bushy, flaccid. False grinders 4.

B. Subdigitigrade. *Hind feet rather narrow; soles hairy, with a narrow, elongate, triangular, bald space in front; toes unequal; claws elongate, slender. Tubercular grinder transverse.*

Tribe 7. **ZORILLINA.** Flesh-tooth elongate, with a small anterior inner lobe with a single tubercle.

26. **ZORILLA.** Tail elongate, with flaccid hair.

Tribe 8. **HELICTIDINA.** Flesh-tooth triangular, having a broad internal lobe with two conical tubercles.

27. **HELICTIS.** False grinders  $3/4$ . Tail elongate, subcylindrical.

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Section I. **ACANTHOPODA.** *Feet rounded; toes short, curved, more or less united by a web, the last joint bent up; the claws short, compressed, acute, retractile.*

Tribe 1. **MUSTELINA.** Head oblong. Toes slightly webbed. Tail cylindrical. Habits terrestrial or arboreal.

*Mustelina*, Gray, Ann. Phil. 1825; List Mamm. B. M.; Nilsson, Scand. Fauna, 138.

*-Martinae*, Burmeister, Baird, N. A. M. 148.

A. Digitigrade. Soles of the hind feet hairy, with four bald pads in front. Body elongate. Anal glands developed. Tail slender. Tubercular grinder short, transverse.

### 1. MARTES.

Teeth 38; false grinders  $3/4$ . Head elongate; feet very hairy; space between the pads covered; the hair of the feet is elongate, and more or less completely covers the bald pads at the base of the toes, and hides the toes and claws, especially during the cold weather.

*Martes*, Cuvier; Gray, L. M. B. M. xx. 63; Nilsson, Fauna Scand. 166.

a. Skull elongate, narrow, with the nose rather produced.

\* Tail moderate, not so long as the body and head, bushy. *Martes*.

† The hinder upper tubercular grinder large, massive, nearly twice as long on the inner as on the outer side.

#### 1. MARTES ABIETUM. Pine-Marten.

B.M.

Brown; throat yellow or yellow-spotted.

*Mustela martes*, Linn. S. N. 167; Keyserl. & Blas. W. E. i. 67; Pallas, Zoogr. i. 85; Bonap. Faun. Ital. t.; Brandt, Zobel, t. 3; Middendorf, N. u. O. Sib. Säugeth. 69, t. 2. f. 1, 6; Schrenck, Amurland, 36.

*Martes abietum*, Ray; Gray, Cat. M. B. M. 63; Bell, B. Quad. 174; Gerrard, Cat. Bones B. M. 90.

Var. *vulgaris*. Dark brown; throat yellow.

*Martes vulgaris*, Gray.

Pine-Marten, Penn. B. Z. i. 97; *Mustela zibellina*.

Var. *martes*, Brandt, Zobel.

*Martes sylvestris*, Gesner, Quad. 867, f. 866; Nilsson, Skand. Fauna, 171.

*Martes sylvatica*, Nilss, Sk. Faun. i. 41.

Length 18 inches; tail 10.

*Hab.* Europe, England and France, B. M.; Russia, B. M.

Var. *altaica*. Paler; nose and feet brown, tail dark, throat and chest yellow. Intermediate between *M. abietum* and *M. zibellina*; but the feet are not so hairy. B.M.

*Martes altaica*, Pallas, Zool. Ross.-Asiat.

*Hab.* Altai Mountains. Skull and teeth like *Martes abietum vulgaris*.

#### 2. MARTES JAPONICA.

B.M.

Brown; shoulder and outside of thigh blacker; feet black; head, chin, and upper part of throat dark red-brown; throat and sides of the neck yellow, crown paler; the last upper tubercular grinder longer on the inner side.

*Hab.* Japan. From Mus. Leyden?

The specimen is not in a good state; the fur is evidently in change, the tail being slender, with a long terminal pencil. It is most distinct from the specimen of *M. melanopus*. In the Museum collection the upper tubercular grinder is smaller than in the *M. abietum*, and is much larger than in *M. americana*.

There is an indistinct patch of paler hairs in the front of the ear, on the left side, not seen on the other; the pale brown on the chest is marked with some small dark spots on the lower part. The skull, and especially the brain-case, is broader, compared with its length, than that of *Martes abietum* and *M. zibellina*, and is intermediate in form between them and *M. foina*.

### 3. MARTES BRACHYURA. Gezolen.

Fur short, fine, close, pale brown; tail short; ears small, rounded, whitish; feet very hairy.

Length, body 16–17 inches; tail  $3\frac{1}{2}$  inches.

*Mustela brachyura*, Temm. Fauna Japon. 33; Schrenck, Amurland, 32.

*Hab.* Japan, near Zezo, and the Kurile Islands (*Siebold*).

Described from flat skins in Mus. Leyden.

### 4. MARTES MELANOPUS. Japanese Sable. B.M.

Fur soft, yellow brown; underside scarcely paler; orbit, and streak from orbit to nose, and feet blackish; crown of head paler; sides of nose, cheeks, and throat white.

*Martes (Melampus) melanopus*, Gray, C. L. B. M., 63; Gerard, Cat. Bones B. M. 91.

*Mustela melanopus*, Temm. Fauna Japon. 31, t. 7. f. 3, 4, animal and skull; Wagner, Schreb. Supp. ii.

*Hab.* Japan.

### 5. MUSTELA ZIBELLINA, Linn. Sable.

Fur very soft, black, grey, or yellow brown; throat like back, or paler yellowish or whitish; feet very hairy.

a. Fur blackish, with a few white scattered hairs; under-fur lead-colour; head and chin greyish, grizzled with pale grizzly hairs. B.M.

*M. zibellina asiatica*, Brandt, Zobel, t. 1.

b. Fur blackish, with many white hairs; under-fur whitish; orbit, cheeks, throat and chest whitish. B.M.

*M. zibellina asiatica rupestris*, Brandt, Zobel, t. 2. f.

c. Yellow brown; under-fur yellowish white; head, upper parts of body, neck, throat, and chest whitish; legs, feet, and tail darker. B.M.

*M. zibellina asiatica*, Brandt, Zobel, t. 2. f. 4.

d. Yellowish brown; under fur of same colour; ears and cheeks whitish; tail dusky, darker; feet blackish. B.M.

*M. zibellina sylvestris*, Brandt, Zobel, t. 2. f. 4.

e. Fur whitish or white.

*M. zibellina*, var. *alba* and *fulvo-flavescens*, Brandt, Zobel, t. 2. f. 5, 6.

*Mustela zibellina*, Linn.; Pall. Spic. Zool.; Blainv. Ostéogr. t. 7 (skull), t. 13. f. (teeth); Schrenck, Amurland, 27; Middendorf, N. u. O. Sib. Säugeth. 68, t. 2. f. 1, 2, 3, 5 (pelvis and tail).

*Mustela zibellina*, var. *rossica*, Brandt.

*Martes zibellina*, Brisson.

*Viverra zibellina*, Shaw.

*Zibeline*, Buffon, H. N.

*Sable*, Penn.; Bennett, Garden and Menag.

*Hab.* North Europe, Asia.

Skull and the hinder upper grinders, according to M. de Blainville's figure, are like those of *M. abietum vulgare*.

Middendorf (Säugeth. N. u. O. Sib. t. 2) figures the pelvis and tail of *M. zibellina* and *M. martes* of Siberia; he represents the former as much shorter, and composed of thirteen, and the latter much longer and larger, and consisting of seventeen vertebræ.

†† *The upper hinder tubercular grinder quadrate, rather longer on the inner than on the outer side.*

#### 6. MARTES AMERICANA. American Sable.

Brown or yellow; throat yellow; ears and head grey or white; upper tubercular grinder small.

*Mustela americana*, Turton, Syst. Anim. i. 60, 1803; Baird, Mamm. N. Amer. t. 36. f. 2, t. 27. f. 7.

*Mustela martes*, var., J. Sabine; Franklin's Voyage; Richardson's F. B. Amer.

? *Mustela vulpina*, Rafinesque, Silliman's Amer. Journ. Sci. i. (tip of tail white).

*Mustela zibellina*, var. *americana*, Brandt, Zobel.

*Mustela leucopus*, Gerrard, Cat. Bones. B. M. 91.

Var. 1. *abietinoides*. Black-brown; ears pale; head grizzled with white hairs, more or less grey; throat yellow or yellow-spotted; throat-spot large or broken up into small spots; the head sometimes with only a few grey hairs, and the throat with only a few distinct small spots. B.M.

? *M. vulpina*, Rafinesque.

*Hab.* Rocky Mountains (*Drummond & Lord*).

Var. 2. *huro*. Yellow-brown; head and ears whitish; throat pale yellow; legs, feet, and tail blackish. B.M.

*Mustela huro*, F. Cuvier, Dict. Sci. Nat. xxix. 356; Richardson, Zool. Beechey's Voyage.

*Marten* of Hudson's Fur-list.

*Sable* of American traders.

*Hab.* Fort Franklin.

Var. 3. *leucopus*. The head, neck, and chest more white; legs yellow; feet white at the tip.



*Mustela leucopus*, Kuhl, Beitr. 70.

*Mustela leucotis*, Griffith's An. K. ii. 270, t. (misprint?).

M. Brandt observes, "I can find no difference between the Asiatic and American Sables in the characters of the head, ears, tail, or feet; and as, even in respect to colour, the sable of the Nischnaga Tunzusta, sent home by Middendorf, occupies an intermediate position between the dark Asiatic and the yellow American Sables, I am induced to consider the American animal rather as a yellowish or mere yellow-brown and less densely furred variety of the Asiatic Sable than as a distinct species or as a pure Marten (*Mustela martes*)."—Beitr. Säugeth. Russland, 1855.

Dr. Baird observes, "I am myself, however, far from admitting the identity of the American Marten with the Russian Sable, although it occupies a position intermediate between the latter and *M. martes* in size, length of tail, and coloration, as well as intrinsic value of fur. The white-headed varieties of New York are most like the Sable, and the dark-headed one of the western country like the Pine-Marten. I have never seen winter specimens of the latter, nor summer of the former, and am inclined to believe that all may exhibit more white on the head in winter than in summer."—Baird, l. c. 157.

It is curious that both Brandt and Baird seem to have overlooked the small size of the last tubercular grinder, which separates the American from the Old-World Pine-Martens.

The brain-case in the skull of the American specimen we have in the Museum is very thin, and so closely applied to the brain that it shows its convolutions on the outer surface; but this is not shown in the American skull figured by Dr. Spencer Baird. The same is to be observed in the Altaic specimen of *M. abietum*.

There is a series of specimens of the American Pine-Marten in the British Museum, collected by Dr. Lord during his excursion with the Boundary Commissioners. They vary greatly in colour, from pale brown to nearly black; and the throat is variously mottled with yellow.

The specimens from Russia have whitish heads, like the *M. leucopus* of Kuhl.

The stuffed Sables from Russia have short tails; but the tail of one of Dr. Lord's is almost as short: the tail seems to vary in length; but this may depend on the skinning, and, in the stuffed skins, on the preparation of the animals.

\*\* *Tail elongate, slender; skull elongate, narrow; nose produced; upper tubercular grinder massive, broader on the inner side.*  
Pekania.

#### 7. MARTES PENNANTII. The Wood-Shock.

Black; head, nape, and front of back greyish; tail elongate.

*Mustela pennantii*, Erxl. Anim. 79, 1777; Baird, Mamm. N. A. 149, t. 36. f. 1, skull.

*Mustela canadensis*, Schreb. Säugeth. 492, t. 134, 1778; Rich-

ardson, F. B. A. 52; Blainv. Ostéogr. Mustela, t. 13. f. (teeth); Pr. Max. Arch. f. Nat. 1861, 229.

*Mustela melanorhyncha*, Bodd. Elen. Anim. 188, 1784.

*Viverra canadensis*, Shaw, Zool. i. 492, 1800.

*Mustela nigra*, Turton, S. N. i. 60, 1806.

*Mustela piscatoria*, Lesson.

*Viverra piscator*, Shaw, Zool. i. 414, 1800.

*Mustela goodmanii*, Fischer, Syn. Mamm. 217, 1829.

*Gulo castaneus*, H. Smith.

*Gulo ferrugineus*, H. Smith.

*Martes canadensis*, Gray, Cat. M. B. M. 63; Gerrard, Cat. Bones B. M. 91.

*Fisher*, Penn. Quad. 223.

*Wejack*, Hearne.

*Wood-Shock*, Hudson's Bay Comp. List.

*Pekan* (Canadians), Buff. H. N. xiii. t. 42.

*Pekan Weasel*, Penn. Quad. 202, 1781.

*Black Fox*, Lewis & Clark.

The last upper tubercular grinder is large and massive, like that of the European Pine-Martens (*M. abietum*).

b. *Skull swollen, flattened; nose short; upper cutting-teeth erect; tail moderate, not so long as body; subcylindrical.* Foïna.

8. MARTES FOÏNA. Beech-Martens. B.M.

Black-brown; throat white.

*M. martes*, var. *fagorum*, Linn. S. N. i. 67.

*Mustela foïna*, Briss. R. A. 246; Erxl. Mamm. 468; Retz, Fauna, 20; Keyserl. & Blas. W. E. i. 67; Blainv. Ostéogr. Mustela, t. 4 (skeleton), t. 13. f. (teeth).

*Martes fagorum*, Ray.

*Martes domestica*, Gesner.

*Martes foïna*, Nilsson, Skand. Faun. 167; Gerrard, Cat. Bones B. M. 191.

*Fouïne*, Buffon, H. N. vii. t. 18-21.

*Hab.* Europe and Eastern Asia, in houses (England, France).

The tubercular grinder is large, massive, narrow on the inner side, as in the *M. abietum*, but not quite so large as compared with the other teeth.

The pad of the soles always exposed (*Baird*).

c. *Skull swollen, flattened; nose short, broad; upper cutting-teeth projecting; tail elongate, slender.* Charronia.

9. MARTES FLAVIGULA. White-checked Weasel.

Yellowish; head, nape, rump, legs, and tail black; chin and lower parts white.

*Mustela flavigula*, Bodd.

*Mustela hardwickii*, Horsf. Zool. Journ. iv. t. 8.

*Viverra quadricolor*, Shaw, Zool.

*Mustela leucotis*, H. Smith, in Griffith's A. K. t.

*Martes gwatkinsii*, P. Z. S. 1858, p. 516.

*Mustela lasiotis*, Temm.

*Martes flavigula*, Hodgson, P. Z. S. 1856, p. 398; 1858, p. 516; Gray, Cat. Mamm. B. M. 64; Cat. Hodgson's Coll. B. M. 12; Gerrard, Cat. Bones B. M. 91.

*M. elliotii*, Mus. E. Ind. Company.

*Hab.* Nepal Hills.

The tubercular grinder is moderate-sized, transverse, scarcely larger on the inner side; but this is larger, compared with its breadth, than in tubercular grinder of the *Martes americana*.

What is *Mustela martes henricii*, Westermann, Bijdrag. tot de Dierk. 13. t.?

*Hab.* Java, Sumatra, Borneo.

Skulls.	M. abietum.	M. leucopus.	M. melanopus.	M. foina.	M. flavigula.	M. canadensis.
Length of skull .....	in. 1. 3 6	in. 1. 2 10	in. 1. 3 1	in. 1. 3 1	in. 1. 3 4 $\frac{1}{2}$	in. 1. 4 0
— nose from front of orbit	1 0	0 9	0 10 $\frac{1}{2}$	0 10 $\frac{1}{2}$	0 10 $\frac{1}{2}$	1 1
— palate .....	1 9 $\frac{1}{2}$	1 5	1 7	1 6 $\frac{1}{2}$	1 7	2 0
— tooth-line from front of canine.....	1 3	1 0	1 0	1 2	1 1	1 6
— lower jaw .....	2 3	1 7 $\frac{1}{2}$	2 0	1 11	2 0	2 7
— width over ears .....	1 4	1 2 $\frac{1}{2}$	1 6	1 6	1 8	1 7 $\frac{1}{2}$
— of nose in front of orbit	0 10 $\frac{1}{2}$	0 8	0 9	0 9 $\frac{1}{2}$	0 10 $\frac{1}{2}$	0 11

## 2. PUTORIUS.

Skull short, ventricose; teeth 34, false grinders  $\frac{2}{3}$ ; the upper tubercular grinder small, transverse, scarcely larger on the inner than on the outer side; head short, ovate; feet hairy, space between the pads very hairy; body stout; underside blackish.

*Putorius*, Cuvier; Gray, Cat. M. B. M. xx. 64; Schinz, Syn. Mamm. 338.

*Fætorius*, Keys. & Blas.

*Mustela putorius*, Nilsson, Skand. Fauna, 147.

\* *Back uniform.*

### 1. PUTORIUS FÆTIDUS. Polecat.

B.M.

Fur harsh, rigid, brown; skull scarcely contracted behind the orbits; orbits small; feet and tail black; mouth and ears whitish.

*Mustela putorius*, Linn. S. N. 167; Pallas, Zoogr. i. 37; Nilsson, Skand. Faun. 148, illum. t. 30; Blainv. Ostéogr. *Mustela*, t. 4 (skeleton), t. 7 (skull), t. 13 (teeth).

*Mustela fatida*, Klein.

*Putorius typus*, F. Cuvier.

*P. communis*, Cuvier, R.A.

*P. vulgaris*, Gray; Owen, Brit. Foss. Mamm. 122, f. 38, 39 (skull).

*P. fatidus*, Gray, Cat. Mamm. B. M. 64; Gerrard, Cat. Bones B. M. 92.

*Fitchet Weasel*, Penn. B. Z. 136.

Var. 1. *furo*. More or less albino; eyes red.

*Mustela furo*, Linn.

*Furet*, Buff. H. N. vii. t. 26, 27, 28, 29.

Var. 2. *subfuro*, Polecat-Ferret. Yellow; the legs, tail, toes, and tips of the hairs black; head white. Bred from two yellow Ferrets. (*Saffron Walden Museum*.)

*Le Furet putoire*, Buff. H. N. Supp. t. 27.

The skulls vary considerably in the width and depression of the brain-case; but they are never suddenly contracted in front behind the orbit, as the skull of *P. evermannii*.

## 2. PUTORIUS EVERSMAANNII.

Fur soft, black-brown, in winter whitish or yellowish, hairs of back black-tipped; limbs short; the thighs and end of the tail black; the skull broad; brain-case suddenly and strongly contracted in front behind the orbits; orbits large.

*Mustela putorius*, var., Pall. Z. R. A. 89.

*M. evermannii*, Less. Man.; Nordm. Faun. Pont. 16.

*M. putorius*, var. *sibirica*, Fischer, Syn. Mamm.

*M. putorius*, Blyth, J. A. S. B. xi. 281.

*M. putorius tibetanus*, Hodgson, J. A. S. Beng. xxiii. 446, 1849, i.; Horsf. Cat. Mus. I. H. 103, P. Z. S. 1856, 398.

*Hab.* Siberia (*Pallas*), B.M.; Thibet (*Hodgson*), B.M.

The skull is considerably larger than that of the *Putorius foetidus*.

## 3. ?PUTORIUS NIGRIPES.

Yellowish brown above, below white; forehead, feet, and end of tail black. Tail and hair at end one-third the length of body and head; length 19 inches; tail  $5\frac{1}{2}$  inches.

*Putorius nigripes*, Aud. & Bachm. N. A. Quad. ii. 297, t. 93; Baird, N. A. Mamm. 180.

*Hab.* North America, Platte region. Not seen by Dr. Spencer Baird.

\*\* *Back spotted or mottled.*

## 4. PUTORIUS SARMATICUS. Vormela, or Peregusna. B.M.

Fur soft, brown and yellow, varied above; head, belly, feet, and tip of tail deep black; frontal band and ears white.

*Mustela sarmatica*, Pallas, Spic. Zool. xix. t. 41.

*M. peregusna*, Guld.

*M. præincta*, Ranz.

*Putorius sarmaticus*, Gray, Cat. Mamm. B. M. 64.

*Hab.* Russia.

## 3. MUSTELA.

The body elongate, slender. Limbs short; feet moderate; toes moderate, slightly webbed, covered with hair; space between the pads hairy. Tail elongate, slender, subcylindrical, covered with elongate hairs.

Skull elongate, depressed; teeth 34; præmolars 2/3, 2/3; upper tubercular grinder transverse, scarcely longer on the inner edge.

Fur dark above, white or yellow beneath.

*Mustela*, Linn.; Gray, Cat. Mamm. B. M. xx. 65.

*Mustela* (*Mustela*), Nilsson, Skand. Fauna i. 156.

*Putorius* (partly), Cuvier.

*Mustela* (*Gale*), Schinz. Syn. Mamm. i. 342.

\* *Face without pale spot in front of ears.*

† *Back uniform colour; tail black-tipped.*

## 1. MUSTELA ERMINEA. Stoat, or Ermine.

Brown above; upper lip, chin, and lower surface of body, inside of limbs, and feet yellowish white; tail brown, shorter than the body, end black. In winter all yellowish white; end of tail black.

*Mustela erminea*, Linn. S. N. i. 68; Gray, C. M. B. M. 65; Nilsson, Skand. Faun. 157, illum. fig. t. 12; Gerrard, Cat. Bones B. M. 93; Schrenck, Amurland, 40.

*Putorius erminea*, Owen, Brit. Foss. Mamm. 116, f. 40, 41, 42, (skull).

*M. ermineum*, Pallas, Zoogr. i. 90; Buffon, H. N. vii. t. 29. f. 2, t. 31.

*Stoat* or *Ermine*, Penn. B. Zool. i. 89, 67, f. 18.

*Hab.* Europe, England, France; North Africa, B. M.

Var. 1. *africana*. Tail very short, black-tipped, one-sixth the length of body.

*Hab.* North Africa, Algiers (*B. M.*).

Var. 2. *kaneii*.

*Putorius kaneii*, Baird, N. A. Mamm. 172; Arch. f. Naturg. 1859, p. 9.

*Hab.* Kamtschatka; Tchucktchi country, Siberia.

Var. 3. *americana*. Tail more or less elongate, from one-third to one-half the length of the body.

*Putorius noveboracensis*, Dekay, N. Y. Zool. i. 36, t. 12. fig. 2, t. 14. f. 2, 1842; Baird, N. A. Mamm. 166, t. 36. f. 3 (skull); Pr. Max. Arch. f. Naturg. 1861, p. 220.

*Putorius ermineus*, Aud. & Bachm. N. A. Quad. ii. 56, t. 59.

*Mustela cicognani*, Bonap. Fauna Ital., Charlesworth's Mag. N. H. 1838, p. 37; Gray, List Mamm. B. M. 195.

*M. fusca*, Bachman, Journ. A. N. S. Philad. viii. 288.

*M. (Gale) fusca*, Schinz, Syn. Mamm. 243.

*M. vulgaris*, Thompson, Hist. Verm. 30.

*Putorius fuscus*, Aud. & Bachm. N. A. Quad. iii. 234, t. 148.

*P. cicognani*, Baird, M. N. A. 161.

*P. longicauda*, Richardson, Zool. Beechey, t. 10, 1839.

*Mustela (Putorius) erminea*, var. *long-tailed*, Richardson, F. B. A. 46, 1829.

*M. longicauda*, Bonap. Mag. N. H. 1838, p. 38; Gray, List Mamm. B. M. 195.

*Hab.* North America, Carlton House.

B.M.

Bonaparte, Richardson, and Baird have separated the Weasels and Ermines of America and Europe into several species, on minute differences in the length of the tail as compared with the body.

Dr. Spencer Baird, in his work on the Mammals of North America, divides the Stoats into six species, by the length of the tail and the extent of the black on the tail. By his specific characters, the vertebræ of the tail in *P. richardsonii*, *P. noveboracensis*, and *P. longicauda* is about one-half, in *P. cicognani* it is one-third, in *P. ermineus* one-fifth, in *P. kaneii* one-sixth the length of the body.

When the bodies of several English Stoats have been compared, they show how deceptive that character is. I do not say that they may not be distinct; but, if they are, there must be other characters to separate them besides the mere length of the tail. They are spread over a large extent of country, and some of the presumed species have a large range.

The skulls of the English Weasel and Stoat are also found to be rather variable when a large series of them are compared.

They change colour when they live in a cold district, and the fur appears to become finer and denser in the more rigorous climates.

Dr. Spencer Baird described *P. noveboracensis* as having 52 vertebræ, including 4 sacral and 22 caudal; while *P. ermineus* has, according to him, only 19 caudal and 3 sacral, which are the typical numbers in the genus. As this has only been observed on one skeleton, it may be only an accidental variation.

## 2. MUSTELA RICHARDSONII. Richardson's Stoat.

Dark chestnut brown; upper lips and legs entirely brown; chin and under surface white; tail with a long black tip, depressed; distichous. In winter entirely white; tail-end black.

*Mustela richardsonii*, Bonap. Mag. N. Hist. ii. 38.

*M. erminea*, var., Richard. Faun. Bor.-Amer. 146.

*Putorius richardsonii*, Richard. in Zool. Beechey Voy. 10; Gray, Cat. Mamm. List B. M. 195; Baird, Mamm. N. A. 164.

*Mustela erminea*, Thompson, Hist. Verm. 31, 1842.

*Putorius agilis*, Aud. & Bachm. N. A. Quad. 111, 184, t. 140, 1833.

*Hab.* North America: Fort Traveller (*Richardson*); from Halifax to Vancouver's Island (*Baird*.)

I have not seen this species; but Dr. Spencer Baird describes it very particularly. The quantity of white on the upper lip seems to vary. There is in the British Museum an adult female Stoat from Cambridgeshire, which has only a very thin margin of white to the

upper lip. In most specimens of the European and American Ermines the white on the lips is very distinct and well marked.

The specimen formerly named *M. richardsonii*, in the British Museum, has the hinder part of the upper lip white, but the hair is bent back and lost off the front part.

### 3. MUSTELA AGILIS.

Reddish grey; hairs grey, with a broad yellow ring and reddish tip; tail shorter than the body, reddish grey, darker at the tip, beneath greyish white; head black, brown above, with a white border to upper lip.

Length 10 inches; tail 4; head  $1\frac{1}{2}$ .

*Mustela agilis*, Tschudi, Fauna Peruviana, 110 (not Bachm.); Baird, Mamm. N. A. 165.

*Hab.* Peru, Cordilleras.

†† *Back and tail uniformly coloured.* Gale.

### 4. MUSTELA VULGARIS. Weasel.

B.M.

Brown; lower lip and beneath white; upper lip and tail brown; tail less than half the length of the body. Winter-fur pure white.

*Mustela vulgaris*, Briss. R. A. 241; Erxl. M. 471; Gray, C. M. B. M. 65; Blainv. Ostéogr. Mustela, t. 7 (skull), t. 13 (teeth); Nilsson, Skand. 163; Gerrard, Cat. of Bones B. M. 93; Schienc, Amurland, 41.

*Mustela gale*, Pallas, Zoogr. 194 (*albino* in winter).

*M. nivalis*, Linn. Act. Suec. vi. t. 8; S. N. 169.

*Common Weasel*, Penn. B. Z. i. 951, t. 7. f. 17.

*Hab.* North Europe, North Asia, England, France (*B. M.*).

*Var. americana.*

*Putorius vulgaris*, Richardson, F. B.-A. 145.

*P. cicognani*, Richardson, Beechey's Voy. 10.

*Mustela vulgaris*, Max. Reise, ii. 98.

*Mustela pusilla*, Dekay, N. Y. 134, t. 14. f. 1.

*Putorius pusillus*, Aud. & Bachm. N. A. Quad. ii. 100, t. 64; Baird, M. N. A. 159.

*Common Weasel*, Penn. Arctic Zool. 75; Pr. Max. Arch. f. Nat. 1861, p. 229.

*Hab.* North America.

Tip of tail sometimes darker.

### 5. MUSTELA BOCCAMELA.

B.M.

Chestnut; upper lip, inside of limbs, feet, and beneath white; tail almost half as long as the body, scarcely darker.

*Mustela boccamela*, Bechst. Naturg. Deutschl.; Sundevall, K. V. Acad. Hand. 1841, p. 215; Blainv. Ostéogr. Mustela, t. 13, f. (teeth); Kuster, Isis, 1835; Bonap. Fauna Ital. t.

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*M. subpalmata*, Ehrenb. Sym. Mamm. 2 ; Sundevall, K. V. Acad. Hand. 1842, p. 215.

*M. vulgaris*, Rüppell.

*M. erminea*, var., Nilsson, Skand. Fauna, 157.

*Boccamela*, Cetti, Hist. Sardinia, v.

*Hab.* South Europe, North Africa, Algiers (B.M.); Cairo (*Sundevall*).

#### 6. MUSTELA ALPINA.

B.M.

Pale yellow-brown ; upper lip, chin, and beneath yellowish white ; head varied with black-tipped hairs ; tail cylindrical, unicolor, not so long as the body and head.

*Mustela alpina*, Gray, C. M. B. M. 67 ; Gerrard, Cat. Bones B. M. 94.

*M. altaica*, Pallas, Zoogr. Ross.-Asiat. i. t. 98.

*M. gale altaica*, Schinz, Syn. Mamm. 344.

*Putorius alpinus*, Gebler, Mém. Mosc. vi. 213 ; Férussac, Bull. Sci. Nat. 1825, p. 419.

*Hab.* Altai Mountains.

Varies in the darkness of colour of the lower part of the body ; in some specimens it is decidedly paler, with the line of separation well marked.

In some specimens the feet are entirely covered with hair ; and in others the pads are distinct, but covered with hair at the base.

††† *Back streaked.*

#### 7. MUSTELA ALBINUCHA.

Black ; forehead, crown, and nape white ; four stripes on the back, converging in front and behind, pale-brownish white ; tail white, tapering.

*Zorilla albinucha*, Gray, Proc. Zool. Soc. 1864, p. 69, pl. x.

*Hab.* Africa, Angola.

This is a *Mustela* having the coloration of a *Zorilla*.

\*\* *Face with pale spot in front of ears ; back uniform ; tail-end black.* American. Neogale.

#### 8. MUSTELA BRASILIENSIS. Black-faced Weasel. B.M.

Brown ; head and tip of tail blackish ; spot before ears, another on centre of forehead, chin, and throat white ; chest and belly yellow.

*Mustela brasiliensis*, Sewast. Mém. Acad. Pétersb. iv. 356, t. 4 (good), 1813.

*M. (Putorius) brasiliensis*, D'Orb. Voy. Amér. Mérid. t. 13. f. 3 (skull).

*M. frenata*, Licht. Darstell. Säugeth. t. 42 ; Gray, Voy. Sulph. t. f. 2 ; Cat. M. B. M. 65 ; Gerrard, Cat. Bones B. M. 94.

*Putorius frenatus*, Bachm. N. A. Quadr. ii. 71, t. 60 ; Mamm. N. A. 173, t. 77. f. 1, 2 (skull) ; Mexico, 19.



*Mustela javanica*, &c., Seba, Thesaur. 177, t. 48. f. 4.

*M. erminea*, var., Pallas, Zoogr. Ross.-Asiat. 92 (from Seba).

*Mustela gale leucogenis*, Schinz, Syn. Mamm. i. 344 (from Seba).

Var. 1. Spot before ears and that on forehead confluent. B.M.

Var. 2. With a small white spot under the eyes. B.M.

In some specimens the feet are white or brown, with white toes; and in others the feet are brown-yellow.

*Hab.* Mexico, Matamoras (*Baird*); California.

Var. *brasiliana*. Feet white; underside bright yellow. B.M.

*Hab.* Brazil.

Dr. Spencer Baird refers *M. brasiliensis*, Sewastonoff, to this species with great doubt, though it is a very good description, and moderate but characteristic figure.

#### 9. MUSTELA AUREOVENTRIS.

B.M.

Dark brown; head and tip of tail blacker; chin and sides of the throat white; a spot in front of ears, throat, chest, insides of fore legs, and belly golden yellow; whiskers black; tail rather tapering, as long as the body; soles of the hind feet hairy; ears rounded, hairy. Length of body and head 12, tail 8 inches.

Var. Fore feet brown, with one or two toes white.

*Mustela aureoventris*, Gray, Proc. Zool. Soc. 1864, p. 55, pl. VIII. (young); not *M. auriventer*, Hodgson.

*Hab.* Ecuador, Quito (*Gould*); New Granada (*Fraser*).

This may be a darker variety of the *M. brasiliensis*, wanting the spot on the forehead. The young from Quito is much darker than the adult; *M. xanthogenys* is intermediate as regards the spot on the head.

#### 10. MUSTELA XANTHOGENYS. Yellow-cheeked Weasel. B.M.

Brown; tip of tail black; spot before the ears, chest, and beneath yellow; a small spot under each eye and the chin white; feet white.

*Mustela xanthogenys*, Gray, Ann. and Mag. N. H. 1843, p. 118; Zool. Voy. Sulphur, t. 9; Cat. Mamm. B. M. 66.

*Putorius xanthogenys*, Baird, Mamm. N. A. 176.

*Hab.* California.

Very like *M. brasiliensis*; but the head is coloured like the back, and the spot before the ears is yellow. There is a very small white spot over the orbit on one side.

M. de Blainville (*Ostéographie*) figures the upper jaw of a *Mustela* under the name of *M. patagonica*, with small teeth and a very short brim-like transverse tubercular grinder, that is quite unknown to me, and very unlike *M. humboldtii*, figured on the same plate.

#### 4. VISON.

Body elongate, slender. Limbs stout; feet rather hairy; pads

bald, exposed; space between them bald. Tail moderate, shorter than the body, hairy. Skull elongate, depressed. Teeth 34; false grinders  $2/3$ ; the upper tuberculated grinder rather large, inner lobe with one tubercle, outer edge with three.

*Factorius*, Keys. & Blas. 21.

*Mustela*, § *Lutreola*, Schinz, Syn. Mamm. i. 346.

*Mustela*, § *Putorius*, Nilsson, Skand. Faun. 152.

*Putorius* (sp.), Baird.

Body nearly as stout as that of an Otter. Very destructive in farm-yards.

The pads of all the toes are naked, not overgrown with hair; the soles with four pads placed at the base of the digits, the largest at the line of junction between the third and fourth digits, and well furred between the pads (*Baird*, 178). Feet in summer more naked than in winter.

a. *The upper tubercular grinder large, the inner half much larger and longer than the outer one; upper lip brown.* American Vison.

1. VISON LUTREOCEPHALA. American Vison. B.M.

Brown; lower lip and chin more or less white.

Var. 1. Darker; throat and chest not spotted. Vaucouwer's Island (*Dr. Lord*). B.M.

Var. 2. Chin entirely brown. B.M.

*Mustela lutreola*, Foster, Phil. Trans. lxii. 371; Sabine, Franklin Narr. 652, 1823.

*M. vison*, Briss. Quad. 246, 1756; Blainv. Ostéogr. *Mustela*, t. 13 (teeth).

*M. (Putorius) vison*, Richardson, Fauna B.-A. 48; Pr. Max. Arch. Naturg. 1861, p. 228.

*M. (Martes) vison*, Desm. Mamm. i. 183, 1820.

*M. lutrecephala*, Harlan, Fauna Amer. 63.

*M. vison*, var. *americana*, Schinz, Syn. Mamm. 347.

*M. canadensis*, Erxl. Syst. i. 447.

*M. canadensis*,  $\beta$ . *vison*, Bodd. Elench. Anim. 186.

*M. winingus*, Barton, Am. Phil. Trans. vi. 70, 1809.

*M. minx*, Ord, Guthrie's Geog. 281, 298.

*M. (Lutreola) vison*, Wagn. Schreb. Suppl. ii. 241.

*Lutra vison*, Shaw, G. Zool. i. 448.

*Putorius vison*, Gapper, Zool. Journ. v. 202; Aud. & Bachm. N. A. Quadr. i. 250, t. 33; Baird, Mamm. N. A. t. 37. f. 23 (skull).

*Vison*, Buffon, H. N. xiii. 308, t. 43.

*Jackash*, Hearne. *Fontereau*, La Hontan. *Otay*, Sagard. *Mink*, or *Minx*, Fur-traders, N. A.

Var. 3. Small; darker.

*Putorius nigrescens*, Baird, Mamm. N. A. 180; Aud. & Bachm. N. A. Quadr. 2nd edit. iii. 104, t. 124.

*Hab.* North America.

This animal has been confounded with *Mustela lutreola*, which is at once known from the *Vison* by the white spot on the side of the nose and the size of the tubercular tooth.

Dr. Spencer Baird thinks that the *Mustela rufa* of Ham. Smith (Jardine, Nat. Libr. Mamm. xiii. 189) is intended either for the *Vison* or the Pine-Martens (see Mamm. N. A. 17i).

b. *The upper tubercular grinder small, transverse, the inner half scarcely larger than the outer; upper lip white in front.* Old-World. *Lutreola*.

2. VISON LUTREOLA. Mank Nurec.

B.M.

Black-brown; tail-end blacker; spot on side of nose, on upper lip, and chin white.

*Mustela lutreola*, Linn. S. N. i. 66; Retz. Fauna, i. 9; Cuvier, R. A. i. 140; Nilsson, Skand. Faun. 152; Pallas, Spic. Zool. xiv. 46, t. 8. f. 1; Zoogr. i. 80.

*Viverra lutreola*, Linn. Faun. Suec. 5.

*Lutra lutreola*, Shaw, Zool.; Gloger, N. Act. Acad. N. Cur. xiii. 501; Baird, Mamm. N. A. t. 37. f. 23.

*Fœtorius lutreola*, Struck. Arch. Freund. für Natur. Mecklenb. xiii. 139, 1859; Keys. & Blas. E. W. 21.

*Lutra minor*, Erxl. Syst. i. 451.

*Tuhcuri leche*, Vet. Acad. Hand. 1789, p. 302, t. 40.

*Mank*, Nilsson, Illum. Fig. . 2, t. 8.

? *Marsh-Otter*, Langsdorff.

*Hab.* Europe.

3. VISON SIBIRICA. Italse.

B.M.

Pale brown; head blackish, varied; spot on side of nose, on upper and lower lips, and front of chin white; tail-end pale brown, like back. Varies, throat more or less white.

*Mustela sibirica*, Pall. Spic. Zool. xiv. 86, t. 4. f. 2; Gray, List Mamm. B. M. 66; Schrenck, Amurland, 37; Gerrard, Cat. Bones B. M. 94.

*Mustela italsi*, Temm. Faun. Japon. 34; Gerrard, Cat. Bones B. M. 95.

*Mustela natsi*, Temm. Faun. Japon. t. 7. f. 2 (misprint).

*Hab.* Siberia (*B. M.*); Himalaya (*B. M.*); Japan (*B. M.*); China, Formosa (*Swinhoe, B. M.*).

Like *V. lutreola*; but much paler and smaller, and tail rather longer, compared with length of the body. Varies greatly in the quantity of white on the chin and throat. Males much smaller.

4. VISON CANIGULA.

B.M.

Pale reddish brown, scarcely paler beneath; face, chin, throat, side of neck, and chest white; tail as long as the body and head, coloured like the back; feet whitish.

*Mustela canigula*, Hodgson, J. A. S. Beng. xi. 274, 1842; Calcutta Journ. N. H. iv. 287; Gray, Cat. Hodg. Coll. B. M. 13.

Var. (male?). Fur darker; face less white; chest brown-and-white mottled. B.M.

*Mustela hodgsonii*, Gray, Ann. and Mag. N. H. xi. 118, 1843; List M. B. M. 66.

*Hab.* Nepal Hills.

5. VISON HORSFIELDII.

B.M.

Dark red-brown, scarcely paler beneath; under lip white; tail elongate, slender, not so long as the body, rather darker at the end.

Var. 1. Chin white; a small white spot on chest. B.M.

Var. 2. Chin brown; edge of under lip only white. B.M.

*Mustela horsfieldii*, Gray, Ann. and Mag. N. H. 1843, p. 113.

*Hab.* India, Bhootan (B. M.).

Var. 3. Lighter brown. B.M.

*M. italsi*, Verreaux (not Temm.).

*Hab.* Japan? (B. M.).

6. VISON SUBHEMACHALANA.

B.M.

Pale red bay, scarcely paler beneath; nose blackish; small spot on side of nose, the chin, and sides of lower jaw, and two or three subconfluent spots on the chest white; tail elongate, and shorter than the body and head, black at the tip; body and head 13, tail to tip 7 inches.

*Mustela subhemachalana*, Gray, C. M. B. M. 67; Gerrard, Cat. Bones B. M. 95.

*Putorius subhemachalana*, Hodgs. Journ. A. S. B. 1837, p. 363; Wagner, Schreb. Supp. ii. 234.

*Hab.* India, Nepal.

	V. lutreoccephala.		V. lutreola.		V. sibirica.		V. horsfieldii.		V. subhemachalana.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
Length of skull .....	12	9½	12	4	12	3½	1	10	1	11
— palate .....	1	3	1	0	1	0	0	10	0	10½
— tooth-line .....	1	0	0	10	0	9½	0	8½	0	8
— zygoma or orbit .....	1	3	1	0½	1	0	0	9½	0	10½
— lower jaw .....	1	8½	1	4½	1	3½	1	0	1	1
Width over the ears .....	1	2	1	0	1	0	0	10½	0	10
— at front of orbits .....	0	8½	0	7½	0	6½	0	5½	0	6

5. GYMNOPUS.

The body elongate, slender. Limbs short; feet large; toes elongate, broadly webbed nearly to the tips, covered with scattered hair. Tail elongate, slender, covered with long spreading hair. The soles of the hind feet with three oblong pads, and an arched and a bald space behind them; the heel hairy. Teeth 34; premolars

2/3, 2/3; the upper tubercular grinder small, transverse, the inner half rather larger than the outer one.

*Gymnopus*, Gray, Cat. Mamm. B. M. xx. 1842.

\* *Colour uniform above and below; head pale.*

1. GYMNOPUS LEUCOCEPHALUS.

B.M.

Golden fulvous, nearly uniform, scarcely paler beneath; head white; toes elongate, webbed, nakedish.

*Putorius nudipes*, F. Cuv. Mamm. Lith.

*Mustela nudipes*, Desm. Mamm.; Müller, Verhand.; Gerrard, Cat. Mamm. B. M. 94; Blainv. Ostéogr. t. 13 (teeth).

Var. End of tail paler; feet darker; front of the back with a pale vertebral streak, wider and more distinct between the shoulders.

B.M.

*Hab.* Sumatra and Borneo.

Tail of the specimen in the Paris Museum is nearly destitute of hair; the soles of the feet are covered with hair.

The two stuffed specimens in the Museum are nearly alike, but the skull of one is much larger than that of the other; one is 2 inches 4 lines, and the other 2 inches 2 lines long.

\*\* *Belly pale yellow.*

2. GYMNOPUS KATHIAH. Kathiah.

B.M.

Dark brown; upper lip, chin, throat, chest, underside of body, and front of thighs bright yellow; tail dark brown, shorter than the body and head, tapering, and of the same colour to the tip. Length of body and head 10, tail 4 inches; the soles of the hind feet bald, pads well developed, exposed.

*Mustela (Putorius) kathiah*, Hodgson, J. A. S. B. iv. 702, 1835; Gray, Cat. Mamm. B. M. 66; Gerrard, Cat. Bones B. M. 96; Wagner, Schreb. Suppl. ii. 233; Horsf. Cat. Mus. Ind. H. 102, P. Z. S. 1856, p. 398.

*M. (Kathiah) auriventer*, Hodgson, J. A. S. B. x. 909; Gray, Cat. Hodgs. Coll. B. M. 13.

*Hab.* India, Nepal.

3. GYMNOPUS STRIGIDORSUS.

B.M.

Fur dark chestnut-brown, with a very narrow streak of a few longer yellow hairs down the centre of the back; edge of upper lip, the chin, throat, chest, and a narrow streak down the centre of the belly (wider hindwards) yellow, becoming whiter in the older specimens; tail slender, about half the length of the body, dark brown.

*Mustela strigidorsa*, Hodgson, P. Z. S. 1856, p. 398.

*M. strigodorsa*, Hodgson, MS.; Gray, P. Z. S. 1853, p. 181, t. 491.

*Hab.* India, Sikim.

Very like *M. kathiah*, but with a yellow dorsal streak, and the

yellow on the belly much narrower. The soles of the hind feet bald; the pads exposed, distinct, developed.

#### 4. GYMNOPUS AFRICANUS.

Reddish brown; beneath pale yellow, with a narrow central longitudinal reddish-brown ventral streak; tail reddish brown; hairs long.

*Mustela africana*, Desm. N. Dict. H. N. xix. 376; Desm. Mamm. 179.

*Putorius africanus*, A. Smith, South Afr. Journ. ii. 36.

*Mustela (Gale) africana*, Schinz, Syn. Mamm. 345.

The specimen of *M. africana* in the Paris Museum is like *M. erminea*, but lighter, larger, and the belly with only a broad yellow streak on each side, leaving the middle brown; tail uniform reddish brown, like the back, to the end.

	G. leucocephalus.		G. kathiah.	
	in.	l.	in.	l.
Length of skull .....	2	5	1	10½
— palate .....	1	1	0	9½
— tooth-line .....	0	9½	0	7
— zygoma and orbit .....	1	1	0	9½
Width over ears .....	1	0	0	10
— in front of orbit .....	0	7	0	5½
Length of lower jaw .....	1	4	0	11½

B. Subplantigrade. Soles and between the pads hairy; body stout; tail short, bushy; anal glands none; false grinders 3/4. Gulonina.

#### 6. GULO.

*Gulo*, Gesner, Quad. 554; Store; Gray, Cat. Mamm. B. M. xxi. 68; Nilsson, Skand. Fauna, 138.

Body and tail bear-like. Soles densely hairy, with 6 small naked pads. Tail about as long as head, very full and bushy. Teeth 38; false grinders  $\frac{3-3}{4-4}$ .

#### GULO BOREALIS.

Brown, with a blackish dorsal disk.

*Mustela gulo*, Linn. Syst. Nat. i. 67; Gunnerus, Act. Nidros. iii. t. 3. f. 5.

*Ursus gulo*, Cuv. Tab. Elém. 112; Schreb. Säugeth. 525, t. 144, 144\*.

*U. luscus*, Linn. Syst. Nat. i. 71.

*Gulo luscus*, Baird, Mamm. N. A. 181.

*G. borealis*, Retz. Fauna, 25; Nilsson, Skand. Fauna, 139; Illum. Fig. xiii. t. 31.

*G. vulgaris*, Gray.

*G. wolverene*, Gray.

*G. luscus*, Richardson, F. B.-A. 41; Gray, Cat. Mamm. B. M. 68; Blainv. Ostéogr. Mustela, t. 3 (skeleton), t. 7 (skull), t. 13 (teeth); Gerrard, Cat. Bones B. M. 96; Owen, Odont. p. , f. 7.

*Gulo leucurus*, Hedenborg.

*Taxus gulo*, Tiedem. Zool. i. 377; Fischer, Syn. Mamm. 154; Middendorf, N. u. O. Sib. 4; Schrenck, Amurland, 24.

*Gulo arcticus*, Desm. Mamm. 174.

*Ursus (G.) sibiricus*, Pallas, Spic. Zool. xiv. t. 2.

*Glouton*, Buffon, H. N. xiii. 278, Supp. iii. t. 48; Cuvier, Règne Anim. i. 145.

*Gluton*, Penn. Syn. 196.

*Quickhatch* or *Wolverine*, Edw. Birds, ii. 103, t. 103; Ellis, Hudson's Bay, i. 40, t. 4; Penn. Syn. 195, t. 20. f. 2.

*Rossomaka*, Nieremb. Hist. Nat. 188.

*Jürf*, Sundevall, K. Svensk. Vet. Akad. Handl. 1773, p. 222, t. 7, 8.

*Carcajou*, La Hontan.

C. Plantigrade. *Soles of the hind feet bald, callous; body elongate; anal glands distinct; false grinders 2/3; tubercular grinders oblong, band-like; transverse.*

#### 7. GALERA.

Tail elongate; heel hairy; sole with a central longitudinal depression behind, and obscurely divided into four large pads in front. Teeth 34; false grinders, 2/3, 2/3.

*Galera*, Brown, Jam.; Gray, C. M. B. M. p. xx. 67.

*Eraria*, Sund.

*Eira*, H. Smith.

*Galictis*, sp., Wagner, Schreb. Suppl. ii. 214.

GALERA BARBATA. Tiara.

Black-brown; head paler; throat with a large white or yellow blotch.

*Gulo barbatus*, Retzius; Desm. Mamm. 175; Fischer. Syn. Mamm. 155.

*Galictis barbara*, Owen, Odont. t. 128. f. 1, 2, 3; Blainv. Ostéogr. Mustela, t. 13. f. (teeth).

*Gulo canescens*, Ill. Prod.; Licht. Verz. Doubl. 4.

*Galera barbata*, Gray, Cat. Mamm. B. M.; Gerrard, Cat. Bones B. M. 95.

*Galea subfusca*, Brown, Jam. t. 29. f. 1.

*Galictis barbara*, Wagn. Schreb. Suppl. ii. 214; Burmeister. Syst. Uebers. i. 1818; La Plata, ii. 409.

*Mustela barbara*, Linn. Syst. Nat. i. 67; Schreb. Säugeth. 493.

*M. galera*, Erxl.

*M. gulina*, Pr. Max. Abbild.

*M. taira*, Griff. A. K. t.

*Viverra poliocephala*, Traill, Mem. Wern. Soc. iii. 440, t. 23.

- V. vulpecula*, Schreb.  
*Eira ilya*, Ham. Smith, Nat. Lib. xiii. 202.  
*Guiana Weasel*, Penn. Syn. 225.  
*Le Grand Furet*, Azara, Essai, i. 197.  
*Grand Marte*, Buff. H. N. Supp. vii. t. 60.  
*Tayra*, Cuvier, Règne Anim. i. 146.  
*Taira*, Cuvier, Oss. Foss. iv. 481.  
*Huron mago*, Azara.  
 Var. *peruana*, *Galictis barbara*, var., Tschudi, Fauna Peruana ;  
 Arch. f. Naturg. 1844, p. 248.  
 Hab. Tropical America : Trinidad, Hodgkinson MSS.

## 8. GRISONIA.

Tail short ; body slender ; fur black below, white above ; soles of hind feet with an oblong pad behind and four oval pads in front (Zool. Trans. ii. t. 36). Teeth 34 ; false grinders 2/3, 2/3.

- Grisonia*, Gray.  
*Galictes*, Bell, P. Z. S. 1837, p. 45 ; Trans. Zool. Soc. ii. 201 ;  
 1841, t. 35, 36, 37.  
*Galidictes*, Hodgson (not I. Geoff.).  
*Huro*, I. Geoff.  
*Eraria*, sp., Sund.  
*Eira*, sp., H. Smith, Nat. Lib. xiii. 201.

## GRISONIA VITTATA.

Black ; crown and upper parts of body white or yellowish white.

Var. Back blacker.

- Viverra vittata*, Schreb. Säugeth. 447, t. 124.  
*Mustela vittata*, Blainv. Ostéogr. Mustela, t. 13. f. (teeth).  
*Ursus brasiliensis*, Thunb. Mém. Acad. Pétersb. vi. 401, t. 13.  
*Lutra vittata*, Traill, Mem. Wern. Soc. iii. 437, t. 19.  
*Gulo vittatus*, Desm. Mamm. 175.  
*Mustela quiqui*, Molini, Chili, iv. 258 ; Fischer, Syn. 222.  
 ? *M. cuja*, Molini, Chili, 272 ; Fischer, Syn. 218.  
*Viverra cuja*, Shaw, Gen. Zool. i. 433.  
*V. quiqui*, Shaw, Zool. i. 432.  
*Galictis vittata*, Bell, Zool. Journ. ii. 522 ; Trans. Zool. Soc. ii. 203, t. 35 ; Burm. Abh. N. Gesellsch. Halle, ii. 47 ; La Plata, ii. 408.  
*G. allamandii*, Bell, P. Z. S. 1837, p. 47 ; Trans. Zool. Soc. ii. 204, t. 37.  
*Grisonia vittata*, Fraser, Zool. Gard. 1862, p. 8 ; Gray, Cat. Mamm. B. M. ; Gerrard, Cat. Bones B. M. 96 ; Cuvier, Règne Anim. i. 146.  
*Grison*, Buffon, H. N., éd. Allam., xv. 65, t. 5 ; F. Cuv. Mamm. Lith. t.  
*Fouine de la Guyane*, Buff. H. N. Suppl. iii. 170, t. 22 & 25.  
*La cuja*, Molini, Chili, 258.  
*Petit furet*, Azara, Essai, i. 190.  
 Hab. Tropical and South America.  
 Anat. See Martin, P. Z. S. 1833.



Tribe 2. LUTRINA. Head depressed. Feet normal, subdigiti-grade; toes webbed. Tail thick, tapering, depressed. Teeth normal; flesh-tooth acutely tubercular; tubercular grinders oblong, large. The nose convex and hairy beneath, without any central bald longitudinal groove. Aquatic.

*Lutrina*, Gray, Ann. Phil. 1825.

*Lutrinæ*, Baird, M. N. A. 183.

The first upper false grinder is small, subcylindrical, placed on the inner side of the canine tooth; it is often lost early; it is sometimes to be seen on one side, and not on the other; it is normally present in all the species, when perfect. The flesh-tooth of the Otters presents two very distinct forms: in some the inner lobe is moderate, its length only equalling about two-thirds of the outer part of the tooth; in others it is much larger, equal to the whole length of the outer portion of the tooth. The absolute size of the tooth seems to vary in the different species, and also in the different specimens of the same species, as is also the case with the upper tubercular grinder.

A. Tail simple, conical, depressed.

a. The palms and soles of the feet bald between the pads; the palm-pads without any small circular warts on their hinder edges.

\* Muzzle entirely covered with hair; the upper margin of the nostrils only bald.

## 9. BARANGIA.

The nose entirely covered with hair; the narrow upper edge of the nostril only bare; ears short, rounded, hairy. Toes  $5/5$ , rather elongate, broadly webbed, well covered with hair above; claws distinct, exposed, and blunt at the end. Palms and soles bald; the pads of the toes small, the central pads scarcely separated; the wrist-pad large and oblong. Tail conical, depressed, covered with hair. Skull elongate; orbit very imperfect, only defined by a slight prominence on the upper and lower edges; nasal and maxillary bones produced to a line even with the middle of the orbit; intermaxillary very slender. The flesh-tooth acutely tubercular, with the internal lobes on the front part of the inner edge, rounded, slightly more than half the length of the outer edge of the tooth. Tubercular grinder much broader than long.

### 1. BARANGIA SUMATRANA.

B.M.

Chestnut-brown, scarcely paler below; upper lip, chin, and upper part of the throat pale yellow.

*Lutra barang*, F. Cuvier, Dict. S. Nat. xxvii. 246; Gerrard, Cat. Bones B. M. 101.

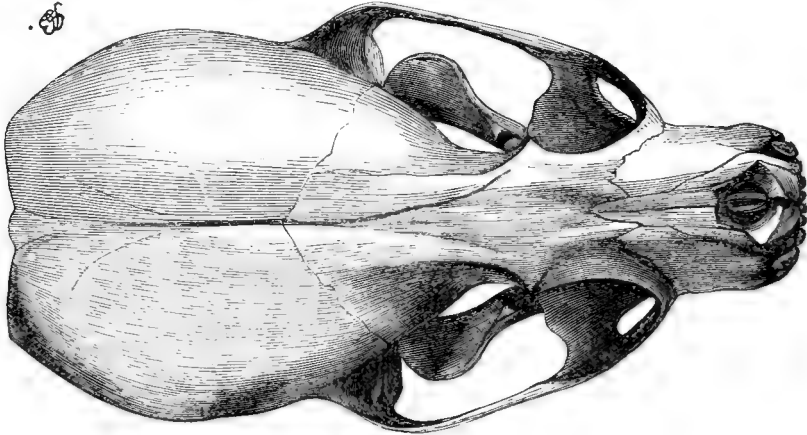
*Barang*, Raffles, Linn. Trans. xiii. 254.

*Hab.* Sumatra (*Raffles*); Malacca (B.M.).

Known from *Lutra leptonyx* (Horsfield) by the hairy nose, the

larger claws, and the more equal toes; the upper surface of the web of the hind feet covered with close hair, the lower surface bald; the fur short, with numerous polished flattened bristles; the under-fur short, close, pale brown.

Skull somewhat like that of *Hydrogale*; but the nose is more produced, and narrower, only as wide as the distance from the front orbit to the intermaxillary suture. The suborbital foramen is not so large, but oblong, transverse, wider at the outer end.



*Barangia sumatrana.*

2. *BARANGIA*? *NEPALENSIS.*

Skull, B.M.

The nose of the skull is considerably longer and wider, the part between the front of the orbits and the suture of the intermaxillary bones being considerably longer than its width in front of the orbits; the nose is arched above. The zygomatic arch is much more bent out, especially at the hinder end. The hinder opening of the palate is wider, and arched in front; the suborbital aperture is oblong, triangular, arched beneath, and nearly as high as wide.

*Hab.* Nepaul (*Hodgson*).

The imperfect skull above described is in Mr. Hodgson's collection, and named *Lutra monticola*; but it is very unlike the skull of either of the two other specimens so named. It agrees with the skull of *Barangia sumatrana* in the entire want of the tubercular process on the side of the frontal bone, which usually defines the hinder upper edge of the orbit; but it differs from it in so many particulars that I am convinced that it must indicate a separate species.

\*\* *The muzzle partially hairy; front and upper edge of the nostrils bald, with the hair coming down in an angle between them in front.*

10. *LONTRA.*

*Lontra*, Gray, List Mamm. B. M. xxi. 70.  
*Suricoria*, Lesson.

The muzzle hairy in the middle in front; upper and front edge of the nostrils bald and callous; the ears oblong, hairy. Toes strong, covered with hair above, half webbed; webs bald; claws strong, acute; palms and soles bald; pads well developed and divided. Tail conical, covered with hair. Skull dilated behind; nose very short, broad; forehead broad, flattened above; hinder edge of orbit marked with acute tubercles above and below; flesh-tooth with a very large rounded internal lobe extending the whole length of the tooth; tubercular grinders rather broader than long.

The under-fur very soft, scattered with short stiffer hairs.

1. LONTRA ENHYDRIS.

B.M.

The hair on the centre of the nose forming a broad erect band; fur dark chestnut-brown; the sides of the face, under the ears, and upper part of the throat yellowish.

? *Lutra enhydris*, F. Cuvier, Dict. Class. H. Nat. xxvii. 243; Fischer, Syn. 226.

*Hab.* Cayenne (B.M.).

M. F. Cuvier does not describe the peculiarity of the muffle; so that I am not certain that this is the species he describes.

2. LONTRA BRASILIENSIS.

B.M.

The hair on the centre of the nose forming a narrow erect band; fur pale brown; upper lip, chin, and beneath rather paler.

*Lutra brasiliensis*, Ray, Blumenb. Abbild. t. 93; F. Cuvier, Dict. Sci. Nat. xxvii. 244.

*Lutra brasiliensis*, Shaw, Zool. i. 446.

*Lontra brasiliensis*, Gray, List B. M. 70; Ann. and Mag. N. H. 118; Gerrard, Cat. Bones, B. M. 100.

*Lontra d'Amérique*, Cuv. Règne Anim. i. 151, t. 1. f. 3.

*Hab.* Brazil (B.M.).

3. LONTRA ? INSULARIS.

Pale chestnut-brown, sides paler; sides of head and belly, lips, chin, throat, and chest yellowish white; under-fur short, very soft; hairs short and very smooth.

*Lutra insularis*, F. Cuvier, Dict. Sci. Nat. xxvii. 345.

*Hab.* Trinidad.

\* Muzzle bald on the upper edge and between the nostrils, forming a cross band with a straight upper and lower edge; orbit of skull defined behind by conical processes.

† Foot oblong; toes short, webbed to the claws, sharply clawed; pads of toes and palm large, close together.

11. LUTRA.

The muzzle bald, oblong-transverse, with a straight upper and lower edge; the upper edge of the nostrils bald; the ears oblong,

hairy. Toes strong, webbed, covered with hair above and bald beneath; toes and palm-pads well developed; claws strong, acute. Tail conical, covered with hair. Skull elongate; orbit defined behind by a well-developed acute tubercle above and below; the flesh-tooth with a large inner lobe.

*Lutra* (*a.* and *b.*), Gray, Mag. Nat. Hist. i. 380, 1837.

† *Forehead and nose of skull flat; the inner lobe of the flesh-tooth large, almost two-thirds the length of the inner margin of the outer portion of the tooth. The hinder dentiferous portion of the maxillary bone, bearing the tubercular grinder, produced to the hinder edge of the orbit.*

‡ *Europe.*

### 1. LUTRA VULGARIS. Otter.

B.M.

The upper edge of the bald muzzle rather produced and angular, nearly as high as broad in the middle, brown, beneath ashy; ears, chin, and throat reddish ashy; edge of ears ashy.

*Lutra vulgaris*, Erxl. Mamm. 488; Nilsson, Skand. Faun. 175; Illum. Fig. t. 20; Keys. & Blas. W. E. 121; Bell, Brit. Quad. 129, f. 4; Gray, List Mamm. B. M. 70; Gerrard, Cat. Bones B. M. 100; Owen, Brit. Foss. Mamm. 119, f. 43, 44 (skull); Odont. t. 128, f. 4, 5, 6; Blainv. Ostéogr. Mustela, t. 8 (skull), t. 5 (skeleton), t. 13 (teeth); Bonap. Icon. t.

*Mustela lutra*, Linn. S. N. i. 66; Retz. F. 18.

*Viverra lutra*, Linn. F. S. 12; Pallas, Zoogr. i. 76.

*La Loutre*, Buff. H. N. vii. 134, t. 2, xiii. 325, t. 45.

*Otter*, Penn. B. Z. i. 92, t. 8. f. 19.

Var. Black-brown; throat paler.

*Lutra roensis*, Ogilby, Proc. Zool. Soc. ii. 110, 1834.

*Hab.* Europe, Bohemia (*B. M.*).

### 2. LUTRA NUDIPES.

Pale red; larger than *L. vulgaris*; the webs of the toes bald. The young mouse-colour.

*Lutra nudipes*, Melchior, Säugeth. des Danischen Staats; Schinz, Syn. Mamm. i. 344.

*Hab.* Denmark, on the sea-coast.

There is a large Otter in the British Museum, which was presented by Mr. G. Vaughan as coming from Canada; but I cannot discover any character by which it can be distinguished from the common European Otter, and I suspect the habitat given is a mistake.

‡‡ *Asia.*

### 3. LUTRA CHINENSIS.

Upper edge of the bald muzzle straight, transverse.

Fur pale brown; ends of ears, lips, cheeks, chin, throat, underpart of the body, undersides of the legs, and underside of the base of the tail pale yellow.

*Lutra chinensis*, Gray, Loudon's Mag. Nat. Hist. 1836, p. 580; Gray, List Mamm. B. M. 71; Horsf. Ann. and Mag. N. H. xvi. 109, 1855; Tyler, Ann. and Mag. N. H. xiv. 772, 1854, P. Z. S. 1856, p. 399.

*L. nair*, Swinhoe, Proc. Zool. Soc. 1861, p. 390. B. M.

*Hab.* China (*Reeves*), B. M.; Formosa (*Swinhoe*), B. M.

The suborbital foramen large, oblong, trigonal, nearly as high as wide in the middle; lower edge arched.

#### 4. LUTRA INDICA.

Bald; muzzle square. Fur pale brown, grizzled with white hairs; lips and under part of the body pale brownish white; under-fur short, with scattered, slender, elongated hairs.

Var. Tip of tail white.

*Lutra indica*, Gray, Loudon's Mag. Nat. Hist. 1837, p. 580.

*L. tavayensis*, Hodgson, J. A. S. B. viii. 319, 1839; Ann. Nat. Hist. iv.; Blyth, J. A. S. B. xi. 99.

? *L. nair*, F. Cuv. Dict. des Sci. Nat. xxvii. 247; Fischer, Syn. 228; P. Z. S. 1850, p. 156.

*Hab.* India, Madras (*Walter Elliot*), B. M.

This may be the same as the former, *L. chinensis*; but I have not been able to examine the skull.

†† *Forehead and nose of skull convex; the inner lobe of the flesh-tooth very large, occupying the whole of the inner side of the outer portion of the tooth; the hinder dentiferous portion of the maxillary bone, bearing the upper tubercular grinder, produced behind the hinder edge of the orbit.* Lutrogaie.

\* *Asia.*

#### 5. LUTRA MONTICOLA.

B. M.

Grey ash ground; greyer beneath.

Inner lobe of the flesh-tooth very large, as long as outer edge.

*Lutra monticola*, Hodgson, Ann. and Mag. N. H. iv., P. Z. S. 1855, p. 126 (not described); Gerrard, Cat. Bones B. M. 100.

*Hab.* Himalaya.

The Museum has received skulls of two distinct species under the above name, one with large and the other with small inner lobe to the flesh-tooth.

The skins belonging to the skull with the large teeth are in a very bad condition; they are probably bleached.

Consult also *Lutra simul*, Horsf. Zool. Journ.; Müller, Verhand. 51; from Sumatra and Borneo, with strong falcate claws. I have not seen this species, nor *Lutra katab* (Hügel, Reise) from Cashmere.

\*\* *America.*

## 6. LUTRA MACRODUS.

B.M.

Dark brown; upper lip, chin, and beneath paler. Fur rather harsh. Upper edge of the bald muzzle straight, transverse; the flesh-tooth with a very large internal lobe, as long as the tooth. Claws large, acute.

*Hab.* Brazil (*Parzudaki*). Male and female.

This Otter is about the size of *Lontra brasiliensis*; but it is at once distinguished from that species by the large size of the naked muzzle and the harshness of the fur. It is very like *L. vulgaris*; but the inner lobe of the flesh-tooth appears considerably larger; and M. Parzudaki assured me that he had received the pair direct from the Brazils, from a collector who shot them.

## 12. NUTRIA.

Like *Lutra* externally, with the bald muffle transverse, narrowed, and arched below. Skull short, broad. Nose broad. Forehead flat; the orbit defined behind by a well-marked conical tubercle above and below. The flesh-tooth with a very large internal lobe, extending the whole length of the tooth. Hinder portion of the palate short.

This genus is at once known from the Otter with the large internal lobes to the flesh-tooth, by the shortness and breadth of the skull and the shortness of the hinder contracted portion of the palate.

## NUTRIA FELINA.

B.M.

Fur dark brown, with scattered, flat, whitish-tipped hairs. Lips, sides, and beneath pale brown. The web of toes scattered with hairs above.

*Lutra felina*, Molina, Hist. Nat. Chili, plate 2 (skull); Shaw, Zool. i. 441; Gerrard, Cat. Bones B. M. 101.

*L. chilensis*, Benn. P. Z. Comm. Sci. ii. 1832; Gerrard, Cat. Bones B. M. 101; Tschudi, Fauna Peruana, 120. B.M.

*Chinchimen*, Molina, 261.

*Lutra californica*, Gray, Mag. N. H. i. 580, 1837; List Mamm. B. M. 71; Baird, Mamm. N. A. 187?. B. M., type.

*L. platensis*, Waterh. Zool. Beag. t. 40. f. 4 (skull); D'Orb. Voy. A. Mérid. t. 12. f. 23; Gerrard, Cat. Bones, B. M.; Verreaux, (skull). B.M.

*Hab.* In the sea, Chili (*Bennett*); Peru, island of Chiloe (*Tschudi*); California (*P. P. King*); Kamschatka (*Verreaux*).

Mr. Tomes observes, "The Otter collected in Guatemala by Mr. Salvin agrees with the description and figure of *L. chilensis* (Waterh.), especially in the inner lobe of the flesh-tooth having the same angular form as in that species. In *L. platensis* the inner lobe of the flesh-tooth approaches more or less to a semicircular form. Dr. Baird figures the flesh-tooth of *L. canadensis* as in *L. platensis*" (P. Z. S. 1861, p. 280).

Consult (1) *Lutra montana*, Tschudi, Fauna Peruana, 120.

*L. supra obscura, fusco-rufa, fusco irrorata, subtus nigricans.*

*Hab.* Peru. Fresh water, 9000 feet above the sea. Length of body 5-6 inches; tail 10 inches.

(2) *Lutra paraguayensis*, Renger, Säugeth. v. Paraguay, 128; Wagner, Schreb. Säugeth. ii. 216; Burm. La Plata, ii. 410.

*Nutria*, Azara, Quad. i. 304.

*Hab.* Paraguay.

(3) *Lutra? aterrima*, Schrenck, Amurland, 43.

*Viverra aterrima*, Pallas, Zoogr. Ross.-Asiat. i. 81.

*Mustela aterrima*, Pallas, Middendorf, Sibirische Reise, i. 70.

*Hab.* Sea of Ochotsk.

- c. *Feet oblong, rather elongate; toes rather slender, free at the end, bluntly or imperfectly clawed; pads of palms large, of toes slender, separate.*

### 13. AONYX.

Muzzle bald, oblong, transverse; upper and lower edge nearly straight. Toes half webbed, index and middle united together to the third joint; claws obsolete or rudimentary and blunt; the inner toe very short, index longer, middle and fourth longest and equal, the fifth shorter than the index. Skull rather short, ventricose, and convex behind; nose short; forehead convex, arched; orbit defined by distinct conical tubercles above and below. Flesh-tooth with a very large internal lobe, nearly as long as the outer portion of the tooth, with two cross ridges on the crown; the upper tubercular grinder large, massive, rather wider than long.

The flesh-tooth of the *Aonyx* is larger and wider than in the Otters with well-developed claws. The outer margin of the tooth is produced outwards beyond the edge of the jaw, and furnished with a distinct margin.

*Aonyx*, Lesson, Man. 157; Fischer, Syn. 228; Gray, Loudon's Mag. N. H. 1857, p. 550; Cat. Mamm. B. M. 71.

*Leptonyx*, Lesson.

*Anahyster*, A. Murray, Proc. Roy. Phys. Soc. Edinb. i. 157 (from skull only).

\* *African. Claws very rudimentary. Anahyster.*

#### 1. AONYX LALANDII.

Brown, beneath paler; sides of the face, to the orbits and ears, throat, chin, and chest yellowish, divided from the darker colour by a defined line; shoulders and fore legs darker.

Very young animals are greyish white; the cheeks, chin, throat, and chest white; the shoulders browner.

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*Lutra inunguis*, F. Cuv. Dict. Sci. Nat. xxvii. 248 ; A. Smith, S. A. Quart. Journ. ii. 36 ; Blainv. Ostéogr. Mustela, t. 8 (skull) ; Peters, Mossamb. 112.

*L. (Aonyx) inunguis*, Fischer, Syn. 228.

*Aonyx inunguis*, Gerrard, Cat. Bones B. M. 101.

*A. lalandii*, Lesson, Man. i. 57 ; Gray, Cat. Mamm. B. M. 71 ; Ann. & Mag. N. H. 1837, p. 119.

*Lutra capensis*, Schinz, Cuv. Thierr. i. t. 214.

Var. ? *Anahyster calabaricus*, A. Murray, Proc. Roy. Phys. Soc. Edinb. 157 (skull, B. M.).

*Lutra gambianus*, Gray, Cat. Mamm. B. M. 111 (skull, B. M.).

*L. poensis*, Waterhouse, P. Z. S. 1838, p.

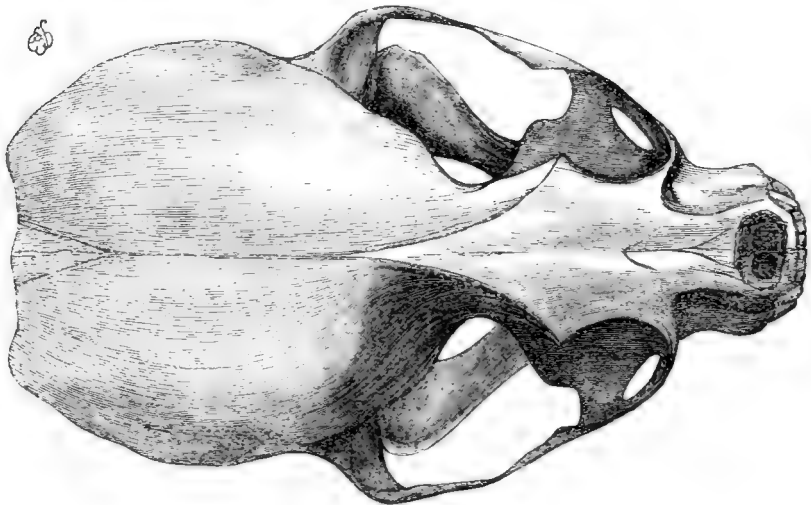
*Hab.* South Africa, in rivers and lakes ; Cape of Good Hope (*A. Smith*) ; Mossambique (*Peters*).

*Lutra poensis* ("Shining brown ; chest, chin, and throat fulvescent ; tail half as long as the animal ; muzzle bare"), from Fernando Po, described from a skin without feet, which is no longer to be found, is perhaps the same as the former.

\*\* *Asiatic.* Claws rudimentary, blunt. Aonyx.

2. AONYX LEPTONYX. Indian Aonyx. B.M.

Brown, rather paler beneath ; cheeks, chest, and sides of the neck paler ; chin and upper part of the throat white.



*Aonyx leptonyx.*

*Lutra leptonyx*, Horsf. Zool. Research. vii. t. ; Fisch. Syn. 277 ; Wagner, in Schreb. Supp. t.

*L. cinerea*, Illiger, in Schinz, Cuv. Thierr. i. 879.

*L. perspicillata*, I. Geoff. Dict. Class. H. N. ix. 519.

*Aonyx horsfieldii*, Gray, Ann. and Mag. N. H. 1837, p. 119.

*A. leptonyx*, Gray, List Mamm. B. M. 71.



*Mustela fusca*, Desch. MS. Icon. Ined.

*M. lutra*, Marsden, Sumatra, t. 12.

*Semul*, Raffles, Linn. Trans. xiii. 254.

*Hab.* Java ; Sumatra.

The inner lobe of the flesh-tooth very large.

### 3. AONYX INDIGITATA.

B.M.

Brown, paler below ; toes very short ; claws short and blunt.

*Lutra indigitata*, Hodgs. Ann. and Mag. N. H. iv. ; Blainv. Ostéogr. t. 24. f. 8 (skull).

*Aonyx indigitata*, Gray, Ann. & Mag. N. H. 1837, p. 119 ; Gerard, Cat. Bones B. M. 101.

*A. sikimensis*, Hodgson, Horsf. Ann. and Mag. N. H. xvi. 109, 1855 ; P. Z. S. 1856, p. 399.

*Hab.* Nepal Hills and Tarai.

Specimen very imperfect. "Colour medial earthy brown ; paler below, especially on the head and neck. Length, snout to vent 24, tail 13, head  $4\frac{1}{2}$ , palm  $2\frac{5}{8}$ , planta  $3\frac{1}{2}$  inches."—*Hodgs. l. c.*

### 4. AONYX AUROBRUNNEA.

B.M.

*Lutra aurobrunnea*, Hodgs. MS. ; Ann. and Mag. N. H. ; Proc. Zool. Soc. 1858, p. 126 ; Gray, Cat. Mamm. B. M. 71.

*Aonyx aurobrunnea*, Gray, Ann. and Mag. N. H. 1837, p. 119.

*Hab.* Nepal.

Specimen in very bad state.

Mr. Hodgson states, "the Otters, in the upper region of the Himalaya, are represented by the small golden and brown species *L. aurobrunnea*, in the central by *L. monticola* and *L. indigitata*, and in the lower by the large Chinese species *L. sinensis*" (Proc. Zool. Soc. 1855, p. 126).

- d. *The under surface of the feet, between the finger-pads and palms, sprinkled with scattered soft hairs ; the inner part of the under surface of the two inner hind toes with a band of close, short, soft hairs ; the muzzle transverse and bald.*

## 14. HYDROGALE.

Like *Lutra* externally ; but the feet large, elongate, very broadly webbed ; the toes, especially of the hinder feet, long ; the pads of the toes and palms are less developed and separated from each other by a greater distance ; the under surface of the feet sprinkled with scattered soft hairs, and the edges of the two inner hind toes have a band of close, short, soft hairs. The skull elongate ; the nose very short ; the forehead narrow ; the orbit scarcely defined behind, without any indication of a tubercle on either the upper or lower edge. The flesh-tooth with the internal lobe shorter than the outer portion of the tooth ; the tubercular grinder rhombic, wider than long ; the hinder portion of the palate rather short, with an arched posterior opening.

The nose of the skull very short, much broader than long from front of orbit to the intermaxillary bone; nose-aperture large, oblique; the hinder and outer portion of the upper jaws hairy; the tubercular grinder produced beyond the back edge of the orbit; nasal bones produced beyond the middle of the orbit; suborbital foramen large, oblong, transverse, occupying half the under edge of the orbit.

HYDROGALE MACULICOLLIS.

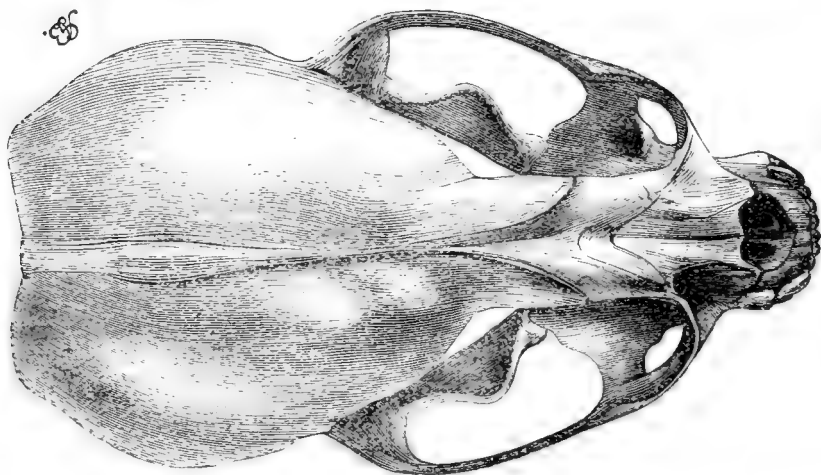
B.M.

Blackish brown; throat, breast, and belly yellow-spotted; upper lip and beneath paler.

? *Lutra maculicollis*, Lichtenstein, Arch. f. Nat. 1835, i. 89, t.

*L. grayi*, J. E. Verreaux, Rev. et Mag. Zool. 1857 (type, B.M.); Gerrard, Cat. Bones B. M. 101.

*Hab.* South Africa, Caffreland; Natal (*Verreaux*, Brit. Mus.).



*Hydrogale maculicollis.*

- e. *The palms and soles of the feet hairy between the pads, the hinder pads with four small circular rugosities; the bald muzzle large, broad, and high, angularly produced above, and continued by a narrow streak to the lips beneath.*

15. LATAX.

The muzzle bald, large, higher than broad, upper edge angular, produced above, the lower one arched; the feet moderately large; toes strong, hairy above, webbed; claws large, acute; tail conical, covered with hair. Under-fur long, very dense, and exceedingly soft, very closely covered with longer silky hair. Skull rather broad, depressed, ventricose behind; the forehead flat, rather broad; orbit defined by a strong acute conical prominence on the side of the forehead behind, above, but not below; the palate rather concave; the flesh-tooth large; the inner lobe as large as the outer section of the tooth; the upper tubercular grinder large, massive, rather broader than long.

*Lataxina*, Gray, List Mamm. B. M. 70.

*Latax*, Gray, Ann. and Mag. N. H. 118 (not Gloger).

*Lutra*, § c, Gray, Loudon's Mag. N. H. 1837, i. 380.

LATAX CANADENSIS.

B.M.

Black-brown, beneath paler; cheeks, lips, chin, and throat pale ashy-brown; front of neck grey-brown.

Very young black above and below, with very short close fur; lips whitish; claws very acute, whitish.

Var. Nearly uniform black; under-fur very soft, brown; the upper and lower lip, chin, and sides of throat brown.

*Lutra canadensis*, Sabine, Franklin's Voy. 653; Schreb. Säugeth. t. 126, 13; Richardson, Faun. Bor.-Amer.; Pr. Max. Arch. für Naturg. 1861, p. 236; Baird, Mamm. N. A. 184, t. 28 (skull); Gerard, Cat. Bones B. M. 101; Gray, Ann. and Mag. N. H. 1837, 119.

*L. brasiliensis*, Harlan, Faun. Amer. 72, 1825; Godmann, Ann. N. H. i. 222, 1831.

*L. hudsonica*, F. Cuv. Supp. Buffon, i. 194, 1831.

*L. vulgaris canadensis*, Wagner, Schreb. Supp. ii. 256.

*L. lataxina*, F. Cuv. Dict. Sci. Nat. xxvii. 243.

*Lataxina mollis*, Gray, List Mamm. B. M. 70.

*Latax lataxina*, Gray, Ann. and Mag. N. H. i. 119, 1837.

*L. canadensis*, var., et *Lataxina mollis*, Aud. & Bachm. N. A. Quad. iii. 976, f. 122, 1853.

*L. californica*, Baird, N. A. Mamm. 187 (not Gray).

*Hab.* North America, Canada.

"Muzzle longer than wide, sending down a naked point along the median line of the upper lip anteriorly. Under surface of the feet so covered with hair towards the circumference as completely to isolate the naked pads of the tips, a hairy stripe extending forward from beneath the carpus to the palm. The naked muzzle is quite large, its posterior outline running up into the forehead, so as to be as long, or rather longer than broad; this outline is decidedly  $\Delta$ -shaped, the acute angle behind. The lines are not quite straight, but slightly sigmoid. The anterior outline of the muzzle is gently semicircular, and anteriorly sends down a narrow point, dividing the hair of the lip over one-sixth of its length. The nostrils are large and open, their posterior line extending not beyond the centre of the naked muzzle."—*Baird, l. c.* 184.

*Lutra californica* of Professor Baird (Mamm. N. A. 187) seems to be a variety of *L. canadensis*, or a new species of this genus. As he describes the feet as hairy, it must be distinct from my *L. californica*, which has the feet entirely bald, and has a skull like *L. chilensis*. He describes—

"Length about  $4\frac{1}{2}$  feet, naked towards the forehead at an obtuse angle; muzzle wider than long; no naked point sent down from its anterior edge; under surface of all the feet but little hairy; the naked terminal pads not isolated from the other bare portions by hair, except in the central digits of the fore foot; the

naked portion of the palms not invaded by hair from the carpal region.

“Colour above liver-brown; the long hairs with lighter tips, and appreciably lighter on the belly; sides and under surface of head and the throat dirty white.”—*Baird*, N. A. Mamm. 187.

Mr. George Barnston, in an interesting paper on the Otters of North America, in the ‘Canadian Naturalist’ for June 1863, describes a small Otter, that destroys the Beavers’ dams in Canada, under the name of *Lutra destructor*, and figures the skull, lower jaw, sole, and hind foot.

“In the *Lutra destructor* the bones of the skeleton and cranium are less massive: the length of the skull being nearly alike (as with two specimens taken for exemplification), there is found in the *L. destructor* a less breadth in the postorbital process of the frontal, and the whole of the nasal bones are narrower and weaker. The outer measurement of the cavity of the brain approaches the oval, being convex in all aspects, and it exceeds the half of the total length of the skull from the occipital to incisors by nearly one-fourth of an inch: whereas the enclosing shell or covering of the brain in *L. canadensis* is almost equally half the length of the whole skull, it is also nearly flat on the top, presenting no rounded surface except close to the occiput, and there is no more decided narrowing of the cavity anteriorly, so that the general outline approximates less to the oval form, and more to the shape of a truncated cone. On the lateral view, with the lower jaw taken off, the skull of the *L. destructor* exhibits somewhat an arched appearance, the malars and facial bones are narrower, and the zygomatic arch rises to two-fifths of the height of the skull in the *L. canadensis*; on the same lateral aspect the plane of the head is straighter, the facial line deeper and broader, and the zygomatic arch raised to a parallel line of one-half the depth of the skull.”

The figure of the hind foot of *L. destructor*, fig. 7, shows “four callosities:” they are to be seen in all the specimens of *L. canadensis* in the British Museum; so that they are not specific, but show that *L. destructor* is most probably a *Latax*, as that is the only genus of Otter that I know having such callosities.

B. Tail elongate, flattened, with a fin on each side; hind feet large, rounded.

#### 16. PTERONURA.

Head large, depressed; eyes small; ears small, round, very hairy inside; muzzle hairy; nostrils with only a slight naked space on their upper edge; feet very large; toes  $5/5$ , distinct, very largely webbed; tail elongate, subcylindrical, flattened, with a fin-like expansion on each side of the hinder half; hind feet large, rounded; claws long, acute; hinder toes very long, two outer ones largest, the others gradually shorter to the inner one. Cutting-teeth  $6/6$ ; upper middle ones larger, equal, conical; the outer ones small, conical; inner elongated; grinders (not examined).

*Pteronura*, Gray, Loudon's Mag. Nat. Hist. 1837, p. 586; Cat. Mamm. B. M. xxi.

*Pteronurus*, Lesson.

*Pterura*, Wiegman; Schinz, Syn. Mamm. i. 356.

**PTERONURA SANBACHII.**

Fur soft, liver-coloured brown; orbits paler; lips, chin, and throat yellow, the latter brown-spotted; length of head  $6\frac{1}{2}$ , body 10, tail 12 inches; width of head from ear to ear  $4\frac{1}{2}$ ; diameter of the fore foot  $3\frac{1}{2}$ ; hind feet 4 inches long and 3 wide.

*Pteronura sanbachii*, Gray, Loudon's Mag. Nat. Hist. 1837. *1. 586 ann NH*

*Pterura sanbachii*, Wiegman, Arch. iv, t. 10; Schinz, Syn. Mamm. 357. *392 1030 cm 1839. E*

*Hab.* Demerara (*Edmonston*, Mus. Roy. Inst. Liverpool).

See also *Lutra solitaria*, Natterer, Schinz, Syn. Mamm. 256 ("Chestnut brown, beneath dirty white; tail conical, graduate, attenuate, slightly fringed each side;" length of body and head 2 feet 1 inch, tail 1 foot 3 inches), which may be the same as the former.

*Hab.* Brazil, Ypanema.

Tribe 3. ENHYDRINA. Head depressed. Hind feet large, elongate, rather fin-like, hairy above and below, oblique, truncated; the outer toes largest; claws small. Tail short, cylindrical. Grinders massive, flat-topped. Flesh-tooth oblong, triangular, transverse; inner side narrow, tubercular: grinders similar, larger, outer edge narrow. *Marine.*

17. ENHYDRIS.

Tail short, cylindrical. Muzzle bald, oblong, triangular. Soles entirely hairy, like the upper surface of the feet; claws acute, small. Skull much dilated behind, and swollen. Teeth 34; pre-molars 3/3, 3/3; grinders very large, massive, flat-topped.

*Enhydra*, Fleming, Phil. Zool.; Gray, Cat. Mamm. B. M. xxi. 72; Baird, Mamm. N. A. 189.

*Enhydris*, Fischer, Syn. Mamm. 228.

*Pusa*, Aken.

*Latax*, Gloger (not Gray).

Professor Lichtenstein's figure of the animal, in the Darst. Säugeth. t. 49, represents the hind feet as too small and too much like those of a common Otter. The hind foot is like a compressed fin, quite as much, and even more so than the case of the Seal. It differs from the foot of the Seal in the toes gradually increasing in length from the inner to the outer one, making the foot appear obliquely truncated. In the Seals, the inner and outer toes are the longest, and the middle ones are the shortest. In some respects the foot of the Sea-Otter resembles that of the Beaver; but it differs in the toes, as well as in being entirely covered, both above and below, with short, close, silky hairs. The front claws are small, short, and very

acute. In the very young animal they are very acute and strongly curved at the tip, so as to be almost subspiral. The hinder claws are small and acute, rudimentary in the very young specimens. The muffle is bald: it forms a bald edge round the nostrils, which are only separated from each other by a rather narrow septum; and it forms a rather triangular bald space over them, the upper edge being sloping on each side, and rather arched in the centre. The figures in Capt. Cook's 'Voyages,' t. 57, give the best idea of this animal, showing the fin-like form of the hind feet; but the tail appears too depressed and Beaver-like.

ENHYDRIS LUTRIS. Kalan, or Sea-Otter. (Pl. VII.) B.M.

Black, grizzled with silver-white hair.

Var. Head white or grey.

*Lutra marina*, Steller, Nov. Com. Petrop. ii. 367, t. 16, 1751; Schreb. Säugeth. t. 128; Blainv. Ostéogr. Mustela, t. 8 (skull).

*Mustela lutris*, Linn.; Shaw, Mus. Lev. t.

*Phoca lutris*, Pallas, Zoogr. R.-Asiat. i. 100.

*Lutra lutris*, F. Cuv. Supp. Buffon, Mamm. p. 204.

*Sea-Otter*, Cook's Voy. ii. 645; Menzies, Phil. Trans. 1796, p. 385; Rich. North. Zool. 59.

*Enhydra marina*, Flem. Phil. Journ. ii. 187, 1821; Owen, Odont. t. 128. f. 13; Martin, P. Z. S. iv. 59, 1836, Osteology; Baird, M. N. A. 189.

*Enhydris lutris*, Gray, Cat. Mamm. B. M. 72.

*E. stelleri*, Lesson, Man. 156; Fischer, Syn. 229.

*E. ? gracilis*, Fischer, Syn. Mamm. 229.

*E. marina*, Hempr. Licht. Darst. Säugeth. t. 19; Eversmann, Reise um die Erde, t. 11, 12; Schrenck, Amurland, 43.

*Latax marina*, Lesson, N. Tab. R. A. 171.

*Sea-Otter*, Penn. Quad. ii.

*Hab.* California.

What is *Lutra lutris*, Geoffroy, F. Cuvier, Dict. Sci. Nat. (xxviii. 247, t. ), *Lutra marina*, Desm. Mamm. 189, Schreb. Säugeth. (t. 129), with the feet one-third of the length of the body, from Kantschatka? Is it a badly described *Enhydris*?

## Section II. PLATYPODA.

*Feet elongate; toes straight; claws exerted, blunt.*

The flesh-tooth of this group is peculiar. In some genera it is of the usual normal shape, with a small internal lobe crowned with a single conical tubercle, as in *Mephitis*, *Zorilla*, and *Mellivora*; in *Conepatus* the inner lobe is broader, and has an elongated arched ridge on its inner edge. In some other genera, where the inner lobe is broad, it is crowned with two tubercles; they are distinct and well developed in *Taxidea* and *Helictis*, confluent, forming an oblique ridge, in *Mydaus*, and rudimentary and marginal in *Arctonyx*.

The genus *Bassaris* of the *Viverridæ* has, like these genera, two conical tubercles on the inner process of the flesh-tooth.

The form of the hinder part, and the position of the hinder opening of the palate, vary in the different genera.

In *Conepatus* and *Mephitis* it is wide and scarcely produced, and nearly in a line with the hinder edge of the grinders.

In *Mellivora* it is wide, but rather further back, in a line with the hinder edge of the orbit.

In *Meles* and *Taxidea* and *Mydaus* it is rather contracted, and placed still further back, being in a line with the middle of the zygomatic arch.

In *Arctonyx* it is produced still further back, the opening being rather behind, in a line even with the condyles; the hinder part of the palate behind the tooth-line is concave below, keeled on the sides above, and swollen on the sides in front.

A. Plantigrade. *Hind feet broad, depressed; soles bald, callous nearly to the heel; toes short, thick; claws thick. Body heavy; tail short; ears short, rounded.*

*Melina*, Gray, Ann. Phil. 1825.

Tribe 4. MELINA. Tubercular grinder large, oblong, elongate; palate produced behind; flesh-tooth with two more or less distinct tubercles on the inner lobe.

a. *Palate much produced behind; hinder opening rather behind, on a line level with the condyles. Nose of skull rather produced.*

#### 18. ARCTONYX.

*Arctonyx*, F. Cuvier, Mamm. Lithogr. 51; Fischer, Syn. Mamm. 152; Gray, List Mamm. B. M. xxi. 70.

*Synarchus*, Gloger, 1842.

Skull elongate, broad and truncated behind. Nose elongate, rather compressed, rounded above. Forehead elongate, rounded on the sides. Orbits small, oblong, very incomplete behind; zygomatic arch strong, wider behind; the suborbital foramen circular; the palate concave in front, much produced behind, concave below, prominent and keeled on the sides; hinder opening far back, in a line with the condyles of the lower jaw; opening angular, acute in front; the bulla of the ear oblong, scarcely raised; the tube of the inner nostril vesicular and very thin at the sides. The cutting-teeth unequal, truncated, worn; the two middle ones smallest; the second on each side rather larger; the lateral pair much larger, very oblique. Canines conical, compressed, nearly straight, worn on the front edge, bent out at the end. False grinders 4; the first very small, sub-cylindrical, separated by a long diastema; the second compressed, trigonal. The flesh-tooth moderate, triangular, nearly as wide in front as the outer side; the outer edge with a compressed tubercle;

inner lobe with two small compressed marginal ridges. Tubercular tooth four-sided, massive, rather longer than broad, truncated in front, and obliquely truncated at the outer hinder side; outer edge with two compressed tubercles. Lower jaw elongate, produced and flattened in front. Cutting-teeth unequal, much worn, rather produced in front. Canines compressed, curved, worn on the front edge. False grinders 2, separated from the canines by a large diastema, compressed. The flesh-tooth large, elongate, oblong-ovate, with two conical tubercles in front, and two pairs of tubercles behind. Tubercular grinder circular.

ARCTONYX COLLARIS. Balisoar.

B.M.

Yellowish, black-washed; throat yellow; feet and a double streak on each side of the head black; tail elongate; ears very short, white-edged.

*Meles taxus*, Hardw. MS.

*Arctonyx collaris*, F. Cuv. Mamm. Lith. t. 51; Owen, Odont. t. 128. f. 12; Gerrard, Cat. Bones B. M. 98.

*A. taxoides* (Balisoar), Blyth, Journ. Asiat. Soc. Beng. 589.

*Arctonix*, Evans, J. A. S. B. vii. t. 43.

*Mephitis assamensis*, M'Clelland, Ind. Rev. 1858, p. 309.

*Meles collaris*, Ogilby, Penny Encyc. iii. 264.

*Sand-Bear*, Bewick's Quad. 257.

*Mydaus collaris*, Gray, Illust. Ind. Zool. t.; Gervais, Soc. Philom. 1842, p. 30; l'Institut, 1842, p. 116.

*Arctonyx isonyx*, Hodgs. P. Z. S. 1856, p. 398, t. 50.

*Hab.* Assam and Arakan.

I can find no difference between the specimen of *A. isonyx* (Hodgson, P. Z. S. 1856, t. 50) and *A. collaris*.

b. *Palate moderately produced behind; hinder opening on a line level with the middle of the zygomatic arch.*

## 19. MELES.

Head pointed; nose prominent; ears rounded. Body thick, heavy. Limbs short; front claws elongate, for digging. Tail short. Skull elongate, rounded behind; orbits incomplete, only contracted above. Teeth 36; false grinders  $3/4$ ,  $3/4$ . Flesh-tooth moderate-sized, triangular. Tubercular grinder very large, four-sided, oblong, rather longer than broad.

*Meles*, Gesner, Quad.; Briss. R. A.; Nilsson, Skand. Faun. 182; Gray, List Mamm. B. M. xxi. 70.

*Taxus*, Cuvier.

The bald soles of the hind feet of *Taxidea leucurus* are oblong, occupying about two-thirds of the length of the foot, hairy behind, with four pads in front; the front and outer one smaller, triangular. The sole of the fore foot is oblong, with four unequal-sized pads in front and one oblong transverse one on the hinder margin (*Hodgson*, J. A. S. B. xvi. p. 2, t. 31. f. 4).



\* *Skull larger ; nose compressed.* **TAXUS.**

1. **MELES TAXUS.** Badger.

B.M.

Yellowish grey, black-washed ; limbs and beneath black ; face white, with a streak enclosing the eyes and ears black.

*Ursus taxus*, Blumenb. Handl. 10.

*U. meles*, Linn. Syst. Nat. i. 70 ; Schreb. Säugeth. 516.

*Meles taxus*, Boddaert, Elench. i. 80 ; Retz. Fauna, 23 ; Schreb. Säugeth. t. 142 ; Fischer, Syn. Mamm. 151 ; Gerrard, Cat. Bones B. M. 99 ; Nilsson, Skand. Faun. 183 ; Owen, Brit. Foss. Mamm. 109, f. 27 (jaw) ; Odont. i. 129. 61. 6 (see *a.* 465) ; Middendorf, N. und O. Sibir. Säugeth. 2 ; Gray, List Mamm. B. M. ; Blainv. Ostéogr. Subursus, t. 2 (skeleton), 6 (skull), 9 (teeth).

*M. europæus*, Desm. N. Dict. Hist. Nat. iii. 465.

*M. vulgaris*, Desm. Mamm. 173.

*Taxus vulgaris*, Tiedm. Zool. i. 376.

*Blaireau*, Buffon, H. N. vii. 104, t. 7, 8.

*Blaireau d'Europe*, Cuvier, R. A. i. 145.

*Common Badger*, Penn. Brit. Zool. 30 ; Bell, Brit. Quad. 122.

*Hab.* North Europe ; North Asia.

Skull ovate-elongate ; face large ; forehead flat ; nose broad, flat above ; orbits incomplete ; supraorbital hole large, subquadrangular ; brain-case ovate, narrow behind, obliquely truncated ; palate rather concave, flat and produced behind, with a sharp keeled ridge on each side behind ; the hinder aperture angular in front, in a line with the middle of the zygomatic arch. Cutting-teeth large, subequal, truncated. Canine conical, slightly curved. False grinders 2 ; front small, conical ; second larger, compressed. Flesh-tooth moderate, trigonal, sides subequal, outer edge with two conical tubercles, outer lobe with two indistinct minute tubercles on the edges. The tubercular grinder large, massive, rather longer than broad, front edge concave, hinder rounded, obscurely truncated on the outer hinder margin, outer margin with three unequal slightly raised tubercles. Lower jaw strong ; chin arched ; cutting-teeth truncated, unequal, the middle one on each side rather behind the others ; canines conical, short, curved ; false grinders 3, first very small, deciduous ; second and third compressed, conical ; flesh-tooth oblong, elongate, with three tubercles in front and two pairs of tubercles behind ; tubercular grinder small, ovate.

Length of skull 5'' 3''', of nose 9''', of palate 2'' 11''', of lower jaw 3'' 9'' ; width over ears 2'' 3''', of nose in front of orbits 1'' 4''.

2. **MELES LEUCURUS.** The Tumpba.

B.M.

*Taxidea leucurus*, Hodgs. Journ. Asiat. Soc. Beng. xvi. 763, tab. 31, 1847 ; Proc. Zool. Soc. 1853, p. 190 ; 1856, p. 398 ; Gray, Ann. and Mag. N. Hist. xii. 221, 1853.

*Pseudomeles leucurus*, Hodgson, MS. 1850.

*Meles leucurus*, Gray, Proc. Zool. Soc. 1853, p. 191 ; 1857, p. 768 ; 1858, p. 190 ; Ann. and Mag. N. H. ; Horsf. Ann. and Mag. N. H. xvi.

108, 1855; Gerrard, Cat. Bones B. M. 99; Blyth, Journ. A. S. B. 1853, p. 589.

*Hab.* Thibet (*Hodgson*).

Very like *Arctonyx collaris*; but the fur of the back is longer and more flaccid, and the chin and throat are black, as well as the belly and legs, which is not the case in that animal. The skull is rather more tapering and more compressed than in the European Badger (*M. taxus*), which it most resembles.

Consult also *Meles albigularis*, Blyth, Journ. Asiat. Soc. Beng. 1853, p. 589, which is unknown to me.

\*\* *Skull short; nose broad.* Eumeles.

### 3. MELES ANKUMA. Ankuma.

B.M.

*Meles ankuma*, Temm. Fauna Japonica, t.; Gray, Proc. Zool. Soc. 1853, p. 191; Gerrard, Cat. Bones B. M. 99.

*M. taxus*, var., Middendorf, N. und O. Sibir. Säugeth. 3.

*M. taxus*, var. *amurensis*, Schrenck, Amurland, xvii. t. 1. f. 1, 4.

*Hab.* Japan.

The skull differs from that of *M. taxus* and *M. leucurus* in being much shorter, and with a rather broad nose (*Gray*, P. Z. S. 1853, p. 191).

### 20. TAXIDEA. American Badger.

Nose prominent. Ears rounded. Body heavy, stout. Limbs short. Feet plantigrade. Toes 5/5; front claws elongate, for digging. Tail short. Fur soft, with longer hairs. Skull broad, depressed, and truncated behind. Teeth 34; false grinders 3/3, 3/3. Flesh-tooth very large, triangular. Tubercular grinder triangular, not exceeding the flesh-tooth in size (see P. Z. S. 1853, p. 191).

*Taxidea*, Waterhouse, Trans. Zool. Soc. ii. 343, t. 59, 1841; Gray, List Mamm. B. M. xix. 70, Proc. Zool. Soc. 1853, p. 191; S. Baird, Mamm. N. A. 201.

Skull depressed, subtriangular, broad and truncated behind; nose short, broad; forehead small and slightly convex; suborbital foramen small, trigonal; orbits incomplete behind. Palate flat, rather produced behind; hinder opening arched, not so wide as the side margin. The auditory bulla large, convex, half ovate, vesicular, thin. The cutting-teeth short, strong; four central truncated, outer large, conical. Canines conical, nearly straight. False grinders two, conical; the hinder larger, with a thickened margin on the inner hinder edge. Flesh-tooth large, triangular, nearly as broad in front as on the outer side; outer side with two compressed confluent tubercles; inner side broad, with two conical tubercles, the hinder small. The tubercular tooth large, broad, subtrigonal, the inner edge long, the outer short, the hinder edge obliquely truncated. Lower jaw strong; condyles transverse; cutting-teeth in a close line, two middle small, two next larger, and outer largest, the four outer obliquely truncated; canines conical, curved; false grinders three, the first and

second small, conical, third compressed, with two confluent tubercles, outer edge thin; flesh-tooth oblong, with a single large tubercle in front and two pairs of others, the hind pair curved; tubercular tooth subconical, with three tubercles.

	in.	lin.
Length of skull .....	4	10
——— of nose .....	1	3½
——— of palate .....	2	6
——— of orbit and zygoma .....	2	5
Width of skull over ears .....	2	6
——— of nose at orbits .....	1	3
——— of skull behind .....	3	0
Length of lower jaw .....	1	5

### TAXIDEA AMERICANA.

B.M.

Grey, black-and-white varied; neck and beneath white; spot before the ears, a narrow streak from nose, above the eyes, to the back, black; feet dark brown.

*Ursus taxus*, Schreb. Säugeth. 520, t. 142; Buffon.

*Meles taxus*, var. *americana*, Bodd. Elench. i. 136.

*M. americanus*, Zimm., from Penn. Arct. Zool. i. 76.

*Ursus labradorius*, Gmelin, S. N. i. 102; Shaw, Zool. i. 469, t. 106.

*Meles labradoria*, Sabine, App. Parry's Travels, 649; Richardson, Fauna Bor.-Amer. 40; Fischer, Syn. Mamm. 151.

*M. jeffersonii*, Harlan, F. Amer. 309.

*Taxidea labradoria*, Waterh. Trans. Zool. Soc. ii. 348, t. 59; Gray, List Mamm. B. M. 70; Gerrard, Cat. Bones B. M. 99; Baird, Mamm. N. A. 202, t. 39. f. 2.

*Meles labradorius*, Schinz, Syn. Mamm. 315.

*Taxus labradorius*, Say, Long's Exped. i. 261, 369, 1823.

*Carcajou*, Buffon, H. N. Supp. iii. 242, t. 49 (not La Houtan).

*Taxidea americana*, Baird, Mamm. N. A. 202.

*American Badger*, Penn. Syn. 204.

? *Brairo* (French Canadians), Lewis & Clarke, Trav. ii. 40.

*Siffleur*, French Canadians.

*Flacyotl*, Hernandez.

Var. *berlandieri*. Smaller; reddish above, with a narrow white dorsal streak.

*Taxidea berlandieri*, Baird, Mamm. N. A. 205, t. 39. f. 1 (Mexico).

Var. *Californica*, pale line continued from nape to base of tail (Bennett, P. Z. S. 1833, p. 42). (Skull, B. M.)

*Hab.* California (*David Douglas*); Texas (skull, B. M.).

### 21. MYDAUS.

Head conical. Nose attenuated. Muzzle rather produced, mobile, obliquely truncated; beneath rather bald, with a distinct central longitudinal bald groove. Nostrils inferior, lateral. Body short; limbs short. Feet plantigrade, soles broad, bald to the heel. Toes

5/5; front claws elongate, strong, unequal; hinder strong, rather acute. Tail short; anal glands distinct. Skull elongate; orbit not contracted behind. Teeth 34; false grinders 3/3, 3/3; grinders 4/5, 4/5; false 2/3, one rooted (*Blainv. Ostéogr. Subursus*, t. 1).

*Mydaus*, F. Cuv.; Gray, Cat. Mamm. B. M. xxi. 69.

*Mephitis*, sp., Desm.

*Mydaon*, Gloger, 1842.

Skull elongate, slender in front; nose elongate, tapering, shelving on the sides; orbit very incomplete, small; suborbital foramen moderate, ovate; zygomatic arch flattened, slender; brain-case ovate, ventricose, truncated behind; palate slightly concave, especially in the middle behind; hinder opening to the nostrils ovate, in a line with the middle of the zygomatic arch; bulla of the ears low, slightly convex. The cutting-teeth broad, in an arched line, truncated, the outer ones rather the largest, with a slight notch in the hinder edge; canine compressed, far from the cutting-tooth; false grinders two, the first small, second compressed; the flesh-tooth roundish, trigonal, outer edge with a compressed marginal tubercle, inner lobe broad, rounded, with two conical tubercles, the hinder small, and united to the ridge on the outer margin; the tubercular grinder oblong subrhombic, rather longer than wide, the front and hinder edges obliquely truncated, with two compressed tubercles on each edge, the inner tubercle largest. Lower jaw rather slender; chin flattened, shelving; the cutting-teeth truncated, the middle on each side rather behind the rest; canine curved; false grinders three, compressed, the front small, the third with a conical lobe on the hinder edge; the flesh-tooth oblong, with three compressed tubercles on each edge, the hinder outer and the front inner being the largest and single, the front outer and hinder inner lobe being double-coned; tubercular grinder moderate, circular.

Length of skull 3'' 2''', palate 1'' 7''', of lower jaw 2'', of nose 1'', width of brain-case over ears 1'' 4½''', of nose at front of orbits 9''.

#### 1. MYDAUS MELICEPS.

B.M.

Brown; crown, nape, dorsal streak, and tip of a very short tail white.

Var. *a*. Dorsal streak broad in front, and continued to tip of tail. B.M.

Var. *b*. Streak interrupted on withers, narrow behind; tip of tail white. B.M.

Var. *c*. Streak dilated into a broad patch over the withers, narrow behind; tail, great part white. B.M.

*Ursus fœtidus*, Desch. MS. Icon. B.M.

*Midaus meliceps*, F. Cuvier, Mamm. Lith. t.; Horsf. Java, t.; Cuvier, Oss. Foss. iv. 474; Gerrard, Cat. Bones B. M. 98; Fischer, Syn. Mamm. 155.

*Mephitis javanensis*, Desm. Mamm. 187; Raffles, Linn. Trans. xiii. 251.

*Mydaus javanicus*, Blainv. Ostéogr. Subursus, t. 1 (skeleton).

*M. javanensis*, Blainv. Ostéogr. Subursus, t. 7 (skull), t. 9 (teeth).  
*Stinkkard* or *Teledu*, Marsden, Sumatra, 117.  
*Hab.* Sumatra (*Raffles*).

Tribe 5. MELLIVORINA. Tubercular grinder transverse, band-like; palate only slightly produced behind; flesh-tooth with a small internal lobe, with a single tubercle. Fur black below, white above.

## 22. MELLIVORA.

*Mellivora*, Stor.; F. Cuv.; Gray, L. M. B. M. v. 68.

*Ratelus*, Gray, Ann. Phil. 1825; Schinz, Syn. 329.

*Lipotus*, Sundevall, Kong. Vet. Acad. Handl. 1841, p. 211.

*Ursitaxus*, Hodgson, Asiat. Research. xix. 60, 1836.

*Melitonyx*, Gloger, 1842.

Head depressed; nose blunt; ears indistinct. Body stout, depressed; legs short, strong; plantigrade. Toes 5/5; front claws elongate, very strong, the bald sole of hind foot occupying the whole undersurface, only slightly divided across about one-third of its length from the front (*Hodgson*, J. A. S. B. t. 31. f. 2). Tail short, subcylindrical. Skull contracted behind; orbits very incomplete, scarcely contracted behind. Teeth 32; premolars 3/3, 3/3; grinders 4/4 (*Blainv.* Ostéogr. Mustela, t. 2).

De Blainville figures the skull and teeth of *M. indica* and *M. capensis*, t. 11 and t. 13; he represents the tubercular grinders of *M. indica* as much smaller than those of *M. capensis*, and the flesh-tooth as more unequally triangular (see t. 13).

The two species are alive in the Zoological Gardens, and have a specific appearance not easy to define in words.

### 1. MELLIVORA INDICA.

B.M.

*Ursus indicus*, Shaw, Zool. 1470.

*Meles indica*, Fischer, Syn. Mamm. 151.

*Indian Badger* (*Ursus indicus*), Hardw. Linn. Trans. ix. 115, t. 9.

*Indian Badger*, Penn. Syn. Quad. 16.

*Ratelus mellivorus*, Benn. Zool. Gard. 13 (fig. good).

*Mellivora ratel*, Gerrard, Cat. Bones B. M. 96.

*Mellivora ratelus*, Indian var., Fraser, Cat. Zool. Gardens, 1862, p. 9; Bartlett, P. Z. S. 1835.

*Ratelus indicus*, Schinz, Syn. Mamm. 329.

*Mellivora indica*, Blainv. Ostéogr. Mustela, t. 6 (skull).

*Mustela indica*, Blainv. Ostéogr. Mustela, t. 13 (teeth).

*Ursitaxus inauritus* (*Bharsiah*), Hodgson, Asiat. Research. xix. 60, J. A. S. Beng. 1836, p. 671.

*Hab.* India (called "Beejoo").

Skull ovate, elongate; nose short, concave on the sides, flat above; forehead short, convex; orbits incomplete; suborbital foramen small, ovate. Brain-case swollen behind and truncated. Palate nearly flat in front, concave behind and slightly produced; hinder opening of the palate large; keeled on the sides, front edge arched; as wide

as long. Four middle cutting-teeth equal, truncated, the side ones conical, with a recurved tip; canines conical, nearly straight; false grinders two, crowded, thick, conical: flesh-tooth trigonal; outer edge rather the longest, with two conical confluent tubercles; the inner lobe anterior, roundish, with an acute conical tubercle: tubercular grinder transverse, band-like; outer half narrow, inner half considerably wider, rounded on the inner edge. Lower jaw strong; chin arched; cutting-teeth crowned, truncated, the middle one on each side behind the others; canines conical, curved back; false grinders three, rather crowded, thick, conical; the flesh-tooth oblong, of moderate size, with three conical tubercles in a single longitudinal series; tubercular grinder none (or small or early deciduous).

	in.	l.
Length of skull . . . . .	5	4
— palate . . . . .	2	4
— lower jaw . . . . .	3	6
— orbit over ears . . . . .	2	3
— nose in front of orbits . . . . .	1	5½

The skull is very like *Gulo* in general form; but the upper flesh-tooth is triangular, and the larger internal lobe in *Gulo* is oblong, longitudinal, with a small internal lobe near the front end.

## 2. MELLIVORA RATEL. Ratel.

B.M.

Skull higher.

*Gulo capensis*, Desm. Mamm. 176.

*Ursus mellivorus*, Cuv. Tab. Elém. 112, 1798.

*Viverra capensis*, Schreb. Säugeth. 450, t. 135.

*V. ratel*, Sparrm. Act. Stockh. 1777, t. 4. f. 2; Owen, Odont. t. 128. f. 10.

*Mellivora capensis*, F. Cuv.; Less. Man. 143, 2nd edit. i.; Blainv. Ostéogr. Mustela, t. 6 (skull), t. 2 (skeleton).

*M. ratel*, Gray, List Mamm. B. M. 68.

*Viverra mellivora*, Blumenb. Naturg. 97.

*Ursus mellivorus*, Blumenb. Naturg. edit. 10, p. 99.

*Taxus mellivorus*, Tiedem. Zool. i. 377.

*Lipotus mellivorus*, Sundevall, Kong. Vet. Acad. Handl. 1841, p. 211.

*Mellivora capensis*, Peters, Mossamb.

*Ratelus capensis*, Schinz, Syn. Mamm. 329.

*Meles mellivora*, Thunb. in Mém. Pétersb. iii. 107.

*Ratelus typicus*, A. Smith, S. Afr. Quart. Journ. ii. 35.

*Mustela capensis*, Blainv. Ostéogr. Mustela, t. 13. f. (teeth).

*Stinkbinksen*, Kolbe.

*Blaireau puant*, La Caille, Voy. 182.

*Fizzler Weasel*, Penn. Syn. 224.

*Honey-Weasel*, Shaw, Zool. i. 395.

*Ratel*, Sparrm. Kong. Vet. Acad. Handl. 1777, p. 49, t. 4. f. 3; Cuv. Règne Anim. i. 146.

*Hab.* South Africa (*Sparrman*); East Africa, Sennaar (*Sundevall*); Tette (called "Seve," *Peters*).

Tribe 6. **MEPHITINA.** Tubercular grinder oblong, quadrangular. Palate scarcely produced behind; nearly on a line level with the hinder end of the tooth-line. Fur black, white-streaked. Skull short.

The flesh-tooth in the three genera which Lichtenstein and most compilers have kept together under the name of *Mephitis* differs very considerably. In *Mephitis* and *Conepatus* it is short and broad; in *Mephitis* the inner lobe has a conical tubercle, and in *Conepatus* it has a long, marginal, semilunar one. In *Zorilla* the flesh-tooth is elongate, slender, much longer than broad, and it has a conical tubercle on its subcentral small inner lobe. The tubercular grinder in the two first genera is broad, massive, and square; in *Zorilla* it is oblong and transverse.

### 23. CONEPATUS.

Head conical; nose produced, hairy, and without any central groove beneath; muzzle produced, bald above, obliquely truncated beneath; nostrils inferior; ears orbicular, scarcely visible. The hind feet large, broad; the soles naked, half the length of the foot, oblong, broad, rugose and warty, rounded behind, divided into two convex parts by a cross groove, scarcely subdivided into smaller pads; front claws very long. Tail short, bushy, subcylindrical. Teeth as in *Mephitis*. Teeth 32; false grinders  $\frac{2}{3}$ ,  $\frac{2}{3}$ ; but flesh-tooth with long, marginal, semilunar tubercle.

*Conepatus*, Gray, Mag. Nat. Hist. 1837; Cat. Mamm. B. M. xxi. 69; Baird, Mamm. N. A. 192.

*Marputius*, Gray, Mag. Nat. Hist. 1837, i.

*Thiosmus*, Licht. Abhand. Akad. Berl. für 1836, p. 214, 1838 (real date); Baird, Mamm. N. A. 191.

*Lycodon*, D'Orbigny.

*Ozolictus*, Gloger, 1842.

It has been supposed that Lichtenstein has the priority for the subgenus *Thiosmus*, because the paper appears nominally in the 'Transactions' for 1836, and my paper in the 'Mag. Nat. Hist.' 1837; but there cannot be a doubt that my paper was anterior, for Lichtenstein quotes it throughout.

### CONEPATUS NASUTUS.

Black, with one or two white dorsal streaks. Tail short, bushy, white or white-and-black varied.

*Mephitis nasuta*, Bennett, Proc. Zool. Soc. 1833, p. 29.

Var. 1. *nasuta*. Black, with a very broad white dorsal streak; from forehead to tail white. B.M.

*Mephitis nasuta*, Bennett, Proc. Zool. Soc. 1833, p. 39; Gray, Mag. N. H. 1837, i.; Fraser, Zool. Typica, t.

*M. mesoleuca*, Licht. Abh. Akad. Berl. 1838, p. 271; Darstell. t. 44. f. 2; Pr. Max. Arch. f. Naturg. 1861, p. 212; Baird, Mamm. N. A. 192.

*Thiosmus mesoleuca*, Less. Tabl. R. A. 66.

*Marputius nasuta*, Gray, Mag. N. H. 1837, i.

PROC. ZOO. SOC.—1865, No. X.

- Viverra putorius*, Mutis, Act. Holm. 1769, p. 68.  
*V. marputio*, Gmelin, S. N. ; Humb. Obs. Zool. 350.  
*Mephitis (Thiosmus) marputio*, Licht. Abh. Ak. Berl. 1836, p. 270.  
*M. (Thiosmus) leuconota*, Licht. Abh. Akad. Berl. 1836, p. 270 (1838), Mus. Berl. ; Baird, Mamm. N. A. 200.  
*M. intermedia*, Saussure, Rev. Zool. 1860, p. 6.  
*M. mesoleuca* ?, Tomes, P. Z. S. 1861, p. 280.  
*M. longicaudata* ?, Tomes, P. Z. S. 1861, p. 280.  
*The Chinche (Viverra chingu)*, Molina, Essai de Chili, 240.  
*Hab.* Mexico ; New Granada ; Santa Fé de Bogota ; California.  
*The Mephitis (Thiosmus) molinæ*, Licht. l. c. p. 272, with the white dorsal streak broken into five oval spots, is probably only an accidental form of this variety.
- Var. 2. *humboldtii*. Black or blackish-brown, with a very broad dorsal streak, like var. 1, with a narrow black streak up the centre of the back, widest in the middle.  
*Conepatus humboldtii*, Gray, Mag. Nat. Hist. i. 581, 1837 ; List Mamm. B. M. 69 ; Gerrard, Cat. Bones B. M. 97.  
*Mephitis humboldtii*, Blainv. Ostéogr. Mustela, t. 13. f. (teeth).  
*Conepatus humboldtii*, Owen, Odont. t. 12, 86, 11,  
*Mephitis patagonica*, Licht. Abhandl. Akad. Berl. 1836, p. 275, t. (1838) ; Burm. La Plata, ii. 409.  
? *Mustela (Lyncodon) patagonica*, D'Orb. Voy. Amér. ix. 3 f. 4 (skull).  
*Yaguare*, Maikel, Falk. Patagon. 128.  
? *Mephitis westermanni*, Reinhardt, K. D. Vidensk. Selsk. Förh. 1856, p. 270.  
*M. conepate*, Desm., Waterh. Cat. Zool. Soc. Mus. 29, 176.  
*Hab.* Magellan Straits. B.M.
- Var. 3. *chilensis*. Black ; back with two broad white streaks, which are confluent on the forehead and continued to the tail ; tail black and white. (In one specimen the lateral streaks are narrow, interrupted on the side of loins, and in another, very young, narrow and not united on the forehead.)  
*Conepatus humboldtii*, var., Gray, Mag. N. H. i. 581, 1837. B.M.  
*C. amazonicus*, Gray, List Mamm. B. M. 69, 1842. B.M.  
*Mephitis furcatus*, Wagner, Schreb. Säugeth. Suppl. ii. 129 ; Tschudi, Arch. f. Naturg. 1842, p. 248.  
*M. chilensis*, F. Cuv. Dict. Sci. Nat. xiii. 126.  
*M. suffocans*, Illiger, Licht. Darstell. t. 48.  
*M. (Thiosmus) amazonica*, Licht. Abhand. Akad. Berlin. für 1836, p. 275, t. (1838). Type, B. M..  
*M. (Thiosmus) chilensis*, Licht. Abhand. Ak. Berl. 1838, p. 272 ; Gray, P. Z. S. 1848. B.M.  
*M. (Thiosmus) quitensis*, Licht. l. c. 273.  
*Gulo quitensis*, Humb. Obs. Zool. 346.  
*Moufette du Chili*, Buffon, H. N. Suppl. vii. 233, t. 57.  
*Mephitis of Chili*, Griffiths, A. K. ii. t.  
*Conepatus chilensis*, Gerrard, Cat. Bones B. M. 97. B. M.



*Marputius chilensis*, Gray, Mag. Nat. Hist. 1837, i. B.M.

*Hab.* Chili (*Bridges*, B.M.); Magellan Straits (*King*, B.M.).

Buffon's figure represents the tail too long and broad; it is a sub-cylindric tuft only, not so long as the body without the head.

Var. 4. *lichtensteinii*. Black; crown and nape with a broad white blotch, separated behind into two narrow nearly parallel white streaks on the middle of the back, reaching nearly to the loins; tail-end half white.

*Hab.* Tropical America.

This specimen is much distorted in stuffing; the tail is elongated by the stretching out of the hinder part of the body, so as to make it look like a *Mephitis*, for which the stuffer evidently mistook it.

From the examination of the stuffed and unstuffed skins, I have considered all the specimens we have in the British Museum to be varieties, because the differences in the coloration appear to pass into one another; but when we have the power to compare the living animal and the skeleton of each, we may discover that some of them are distinct species, having a peculiar geographical range.

Professor Lichtenstein notices another species, under the name of *M. gumilla*, on the authority of a notice of Skunk called "Maskutio" and "Mafutiliqui" in Gumilla's 'Orinoko' (vol. ii. p. 276), which is said to have many decurrent streaks and a villous tail.

#### 24. MEPHISIS.

Nose short, underside hairy, with a distinct central groove; muzzle small; ears ovate, hairy, exposed. Hind feet moderate, subplantigrade; sole bald nearly or quite to the heel, the front portion divided into three large pads, placed in an arch; front claws elongate, arched, strong, white. Tail elongate, as long as, or longer than the body, with long, flaccid, dependent hair. Skull ovate; orbit incomplete. Teeth 34; false grinders 2/3; upper tubercular grinder small, moderate-sized.

*Mephitis*, § 1, Gray, Mag. N. H. 1837; List Mamm. B. M. xxi. 69.

*Mephitis* (partly), Cuvier.

*Mephitis*, § 1 (partly), Lichtenstein.

"The foetid liquid is secreted by two glands, which empty directly into the rectum, and are enveloped in a thick muscular membrane, the contraction of which causes the ejection of the fluid to a considerable distance; it is said, however, to be restrained by holding the animal up by the tail when first discharged; it is said to be phosphorescent at night."—*Baird*, Mamm. N. A. 191. See also "Anal Pouches of the *Mephitis americana*," Warren, Proc. Boston Soc. N. H. ii. 175, 1850; Wyman, Proc. Boston Soc. N. H. 1844, p. 110.

Prof. Lichtenstein divides this into two subgenera—"planta pilosa" for *M. mesomelas*, and "planta subnuda" for *M. chinga* and the other species. I find the extent of the baldness of the sole varies in the different specimens of the same variety, both in the young and old specimens. The form and number of the pads are always alike, only becoming more marked in the older examples.

\* *Tail as long as body.*

1. *MEPHITIS VARIANS.*

B.M.

Black, with two white streaks, converging and united on the crown; tail elongate, bushy; hair flaccid, black, generally white at the base, or all white.

*Mephitis varians*, Gray, Mag. N. H. 1837; Baird, Mamm. N. A. 193; Mexico, 19, 192 (skull).

*M. macroura*, Aud. & Bachm. N. A. Quad. ii. t. 102 (not Licht.).

Var. *a.* Crown white; streak broad, continued from the crown to the end of the tail; face with a narrow white streak.

*Mephitis mesomelas*, Licht. Darstell. d. Säugeth. t. 45. f. 2; Abh. Akad. Berl. 1836, p. 277; Gerrard, Cat. Bones B. M. 97; Baird, Mamm. N. A. 199.

*M. occidentalis*, Baird, Mamm. N. A. 194.

*Moufette de l'Amérique Septentrionale*, F. Cuv. Mamm. Lith.

Var. *b.* Like *a*, but no white streak on the face; back-streaks narrowed and almost interrupted on the loins. B.M.

*Mephitis mephitica*, Baird, Mamm. N. A. 195.

Var. *c.* Like *a*, with face-streak; but back-streak not reaching beyond (and some specimens not even to) the middle of the back, the white on the crown varying in size at the same time. B.M.

*M. varians*, Gray, Mag. N. H. 1837, t.; Baird, Mamm. N. A. 193; Mexico, 192, t. 60. f. 2 (skull); Gerrard, Cat. Bones B. M. 97.

Var. *d.* Like *c*; but no white face-streak; the spot on the crown with a pair of short streaks behind, not reaching to the shoulders.

Var. *e. chinga.* Face-streak broad; crown-spot and dorsal streaks very broad, occupying nearly the whole upper surface of the body, a short black dorsal streak from the base of the tail to or towards the shoulders.

*Mephitis chinga*, Tiedemann, Zool. i. 361; Licht. Darstell. d. Säugeth. t. 45. f. 1; Abh. Akad. Berl. 1836, p. 240; Pr. Max. Arch. f. Naturg. 1861, p. 218.

*M. mephitica*, Baird, Mamm. N. A. i. 195.

*M. chinche*, Fischer, Syn. Mamm. 160.

*Mustela chinga*, Blainv. Ostéogr. Mustela, t. 13 (teeth), t. 1 (skeleton), t. 6 (skull).

*Viverra mephitis*, Griffith, A. K. ii. 298.

*Chincha americana*, Lesson, N. Tab. R. A. 67.

*Mephitis americana*, De Kay, Zool. N. Y. t. 12. f. 1.

*M. americana*, var. *hudsonica*, Richardson, Fauna Bor.-Amer. i. 55.

*Chinche*, Buffon, H. N. xiii. 300, t. 39; Pennant, Arct. Zool. Mamm. 40; F. Cuv. & Geoff. Mamm. Lith. t.

*Skunk*, Kalm, Reise Nörd. Amer. ii. 412.

*Wegak*, or *Skunk*, Hearne, Hudson Bay, 377.

*Enfant du Diable*, Charlevoix, Nouv. Mém. ii. 133.

Speaking of the Skunk, Dr. Baird observes, "The species varies considerably in marking, though individuals from the same locality

are usually quite similar." He also states, in his specific characters, "The dorsal stripe sometimes broader, sometimes wanting, as also the nuchal patch." Dr. S. Baird has kept the *M. mesomelas* distinct because Lichtenstein describes the sole of that species as hairy; but some specimens of *M. varians* are so in the young state.

2. MEPHITIS VITTATA.

B.M.

Black; sides with a white streak from each shoulder; tail elongate; base of tail bushy; hairs flaccid, the greater part of them white at the base.

Var. *a.* Face with a narrow white frontal streak; streaks on sides very broad, arched in front over the shoulder. B.M.

*Mephitis vittata*, Licht. Säugeth. t. 47 (var. ?); Abh. Akad. Berl. 1838, p. 278; Baird, Mamm. N. A. 200.

Var. *b.* Face-streak none; streaks on sides moderate, straight, of same width. B.M.

Var. *c.* Face with a very narrow indistinct streak; fur all black; streaks on sides none, or reduced to a small white spot on the hinder part of one side, not seen on the other; hair on underside of tail white at the base. B.M.

*Mephitis concolor*, Verreaux, MS. ?

B.M.

*Hab.* Mexico (*M. Salle*).

Lichtenstein's figures above quoted (t. 47) represent a variety of this species I have not seen, with spots on the withers, and the tail very long.

\*\* *Tail longer than the body.*

3. MEPHITIS MEXICANA.

Fur very soft, silky; tail elongate, hair flaccid, long, and pendent, black; a narrow streak on the nose, a broad vertebral streak from crown to tail, and a narrow streak on each side of the back.

Var. *a.* With a small white spot on each shoulder.

*Mephitis mexicana*, Gray, Mag. Nat. Hist. i. 581, 1837.

*M. macroura*, Licht. Abh. Akad. Berl. 1838, t. 77; Darstell. t. 46. f. 1, 2; Gerrard, Cat. Bones B. M. 97; Baird, Mamm. N. A. 900.

*Hab.* Mexico.

Skulls.	<i>Mephitis varians, c.</i>		<i>Mephitis varians, b.</i>	
	in.	l.	in.	l.
Length of skull.....	3	0	2	9
— nose.....	0	10½	0	10
— zygoma and orbit.....	1	3½	1	2
— palate.....	1	1½	1	0½
— lower jaw.....	2	1	1	9½
Width of brain-case over ears.....	—	—	1	3½
— nose in front of orbit.....	0	11	0	10½
— tooth-line of canine and grinders.....	0	11	0	10

## 25. SPILOGALE.

Head conical. Nose short, underside with a distinct central groove; muzzle small, bald, rather notched in front; nostrils lateral. Tail short, cylindrical, bushy, not so long as the body, ending in a long pencil of hair. Hind feet moderate; sole bald, flat, the front portion divided into four oblong pads, the central one small and triangular, before the others, hinder part narrow; front claws elongate, brown. False grinders  $\frac{2}{3}$ ; upper tubercular grinder square, moderate size (*Lichtenstein*, Abh. Akad. Berl. 1836, t. 1. f. 2).

*Mephitis*, § 2, Gray, Mag. N. H. i. 1837; List Mamm. B. M. xxi. 69.

## 1. SPILOGALE INTERRUPTA. Little Striped Skunk. B.M.

Black; a spot on forehead, a spot on each temple, four streaks on back of neck and withers, a streak on side of body, that is bent up to the middle of the back behind, an interrupted band across rump, a spot on each buttock, and the base and tip of tail white.

*Mephitis interrupta*, Rafinesque, Ann. of Nat. iii. No. 4, 1818; Licht. Abh. Akad. Berl. 1836, p. 281, t. 2. f. 1 (tail not good).

*M. bicolor*, Gray, Ann. N. H. i. 583, 1837 (B.M.); Baird, Mamm. N. A. 197, t. 19 (Mexico).

Var. Tail-end black.

*Mephitis zorilla*, Licht. Abh. Akad. Berl. 1836, p. 281, t. 2. f. 2 (not Darstell.).

*Le Zorille*, Buffon, H. N. xiii. 302, t. 41.

*Hab.* North America, California (*Douglas*).

Prof. Lichtenstein has described two species—one with an oval nose-spot and white tail, the other with a small triangular frontal spot and black tail. I have only seen three specimens: one had a black, the other a white, and the last a black and white tail. They each had a different-sized and -shaped nose-spot.

Professor Lichtenstein has determined that the *Zorille* of Buffon is the American animal. It had been previously regarded as the Meer-cat of South Africa. It is figured by Buffon as from America; but his figure does not accurately represent either species.

B. Subdigitigrade. *Hind feet rather narrow; soles hairy, with a narrow, elongate, triangular bald space behind the palm-pads; toes unequal; claws elongate, slender; tubercular grinders band-like, transverse.*

Tribe 7. ZORILLINA. Flesh-tooth elongate, with a small, anterior, inner lobe with a single tubercle.

## 26. ZORILLA.

Head conical. Nose acute, hairy, with a central groove below. Muzzle small, bald, notched in front; nostrils lateral. Ears rounded, covered with hair. Fore feet strong; toes unequal, three middle

longest; claws elongate, compressed, acute. Hind foot digitigrade; sole flat and bald in front, with four unequal, large, convex pads, the hinder part compressed and covered with hair; toes unequal, the two middle longest and unequal; claws acute, short. Tail elongate, covered with long flaccid hair. Teeth 34; false grinders  $3/3$ ,  $3/3$ ; upper tubercular grinder short, oblong, transverse (*Licht. Abh. Akad. Berl.* 1836, t. 1. f. 3, skull).

*Zorilla*, Gray, List Mamm. B. M. xx. 67.

*Ictonyx*, Kaup; Sundevall, Kong. Vet. Akad. Hand. 1841, p. 214 (1842).

*Rhabdogale*, Wagner, Wiegmann; Schinz, Syn. Mamm. 332.

### 1. ZORILLA STRIATA. The Zorille.

Black; spot on forehead and each temple and four stripes on the back (which are diluted on the sides, only leaving a broad black patch on middle of the back, and then curving to the base of the tail) white; tail black-and-white varied.

*Viverra zorilla*, Thunb. Act. Petrop. iii. 306; Gmelin, S. N.

*Mustela zorilla*, Cuv. Tabl. Elém. 116 (1798).

*Viverra striata*, Shaw, Zool.

*Mustela zorilla*, Cuvier, R. A.; Fischer, Syn. Mamm.; Blainv. Ostéogr. Mustela, t. 13. f. (teeth).

*Zorilla capensis*, Waterh. Cat. Zool. Soc.; Gerrard, Cat. Bones B. M. 95.

*Putorius zorilla*, A. Smith, South-African Journ. ii. 36.

*Mephitis africanus*, Licht. Abh. Akad. Berl. 1836, p. 294.

*M. zorilla*, Licht. Darstell. d. Säugeth. t. 48. f. 2 (not Abhand.).

*Zorilla leucomelas*, F. Cuv.

*Rhabdogale mustelina*, Wagner, Schreb. Suppl. ii. 219, t. 133 a; Peters, Mossamb. i. p.

*Ictonyx capensis*, Sundev. K. Vetén. Acad. Hand. 1841, p. 214.

? *Mephitis libyca*, Ehrenb. Sym. Phys.

*Zorilla striata*, Gray, List Mamm. B. M. 67.

*Mustela libyca*, Blainv. Ostéogr. Mustela, t. 13. f. (teeth).

*Putois du Cap, ou Zorille*, Buffon, H. N. xii.

*Muis-hond*, Cape Colonists.

Var. *senegalensis*. White streaks broader, leaving only very narrow dark dorsal ones; tail whiter. B. M.

*Hab.* Africa, Cape of Good Hope (*Thunb.*), Senegal.

### 2. ZORILLA FRENATA. B.M.

Brown; fur elongate, very soft, fluffy; lips, chin, a broad band encircling the face, two broad bands diverging from the crown and two narrower diverging from shoulders, and some spots on the hinder part of the back white; tail white-and-black varied.

*Mephitis (Ictonyx) frenata*, Sundevall, Kong. Vet. Acad. Hand. 1841, t. 4. f. 1.

*M. africana*, var., Licht.

*Mustela zorilla*, var., Rüppell.

? *Rhabdogale multivittata*, Wagner, Schreb. Säugeth. Supp.  
*Hab.* Sennaar.

See also *Zorilla vaillantii*, Loch (Rev. Zool. 497), from Algeria, which I have not seen.

Tribe 8. HELICTIDINA. Flesh-tooth trigonal, with a broad internal lobe with two conical tubercles. Tail cylindrical.

### 27. HELICTIS.

Head tapering; nose acute, conical; muzzle bald, obliquely truncated; underside hairy, with a central groove; nostrils inferior; ears ovate. Body slender; legs short; toes 5/5; front claws elongate, curved; hinder short and acute; sole of hind foot hairy behind, bald in front, and rhombic, for half the length of the foot, with three large oblong pads on the front and three small ones on the hinder edge; toes elongate; thumb short, far back, like *Herpestes*. Tail moderate, subcylindrical. Teeth 38; premolars  $\frac{4-4}{4-4}$ ; grinders 5/6 (*Hodgson*, J. A. S. B. t. 31. f. 6).

*Helictis*, Gray, Proc. Zool. Soc. ii. 94, 1833; List Mamm. B. M. xxi. 68; Isis, 1834, p. 829.

*Melogale*, I. Geoff.; Guérin, Mag. Zool. v. 1, t. 16, 1835.

*Rhinogale*, Gloger, 1842.

*Mydaus*, sp., Temm. & Müller.

*Galictis*, Wiegmann.

The external appearance of the species of this genus is very similar, and there appears to be an indication of the differences in colours passing into one another.

The skulls of the species are very distinct. 1. The skull short and ventricose; nose short, thick; the hinder part of the palate flat, with a broad opening, as wide as long on the sides, the front edge arched. *H. orientalis*. 2. Skull elongate; the nose produced, attenuated; the hinder part of the palate concave, and contracted behind the aperture; longer than wide; the front edge arched. *H. moschata* and *H. nipalensis*.

The teeth and size of the aperture in front of the orbits also differ thus in the different species:—1. The flesh-tooth large, with three lobes on the outer edge, the front one small, with two acute tubercles on the broad inner lobes; the aperture in the front of the orbits moderate. *H. orientalis* and *H. nipalensis*. 2. The flesh-tooth small, shaped like those of the other species, but rather more slender; the aperture under the front of the orbits very large. *H. moschata*.

\* *Flesh-tooth large; aperture in front of orbits moderate.*  
*Melogale.*

1. HELICTIS ORIENTALIS. Nyentek. B.M.  
 Brown, paler beneath; cheeks, upper lip, chin, throat, sides of

neck, chest, three spots across forehead, and a narrow streak from nape to middle of the back yellowish white; end of tail grey; feet brown.

*Gulo orientalis*, Horsf. Java, t.; Desm. Mamm. Suppl. 537.

*Mydaus macrurus*, Kuhl, Temm. Monogr. pl. 20; Fischer, Syr. Mamm. 155.

*M. orientalis*, S. Müller.

*Melogale fusca*, I. Geoff., Guér. Mag. Zool. 1835, t. 16; Wagner, Schreb. Suppl. t.

*Helictis orientalis*, Gray, Cat. Mamm. B. M. 195; Gerrard, Cat. Bones B. M. 98.

*Hab.* Java (*Horsfield*, called "Nyentek").

2. **HELICTIS NIPALENSIS.** The Oker. B.M.

Grey-brown; forehead and nape darker; cheek, band between orbits, chin, throat, sides of neck, chest beneath, and a streak from nape to loins white; end of tail greyish. Teeth large.

*Gulo nipalensis*, Hodgson, J. A. S. B. 1836, p. 237; 1837, p. 560.

*Helictis nepaulensis*, Gray, Proc. Zool. Soc. 1853, p. 191; 1856, p. 398; List Mamm. B. M. 69.

*Helictis nipalensis*, Gerrard, Cat. Bones B. M. 98.

*Hab.* Nipal (*Hodgson*); Tibet.

\*\* *Flesh-tooth small; aperture in front of orbits very large.*

3. **HELICTIS MOSCHATA.** *Helictis.* B.M.

Brown; spot on crown, temples, broad band across forehead, a small spot on cheek and on side of nose, the chin, throat, chest, and beneath white. Teeth small; upper tubercular grinder transverse, narrow, oblong.

*Helictis moschata*, Gray, P. Z. S. ii. 94; Cat. Mamm. B. M. 68; Gerrard, Cat. Bones B. M. 98.

*Melogale personata*, I. Geoff.; Guérin, Mag. Zool. 1835; Voy. de Bélanger, t. 5.

*Mustela personata*, Blainv. Ostéogr. Mustela, t. 13. f.

*Hab.* China (*John Reeve*); Pegu (*I. Geoff.*).

4. **HELICTIS SUBAURANTIACA.** B.M.

Brown; face white-varied; with a white streak from the crown to the middle of the back. Upper tubercular grinder transverse, broadly oblong in shape.

*Helictis subaurantiaca*, Swinhoe, Proc. Zool. Soc. 1862, p. 355, pl. XLIV.

*Hab.* Formosa.

This species is nearly identical in external appearance and colouring with the *H. orientalis*; but it has the small tooth, elongate nose, the large suborbital aperture, and narrow hinder opening to the palate of *H. moschata*. It differs from *H. moschata* in its teeth—the flesh-tooth and the tubercular tooth being relatively rather larger—and

especially in the tubercular tooth being longer and more massive, being a broad oblong instead of a narrow one.

	Helicis orichthalis.		H. nipalensis.		H. moschata.		H. subaurantiaca.	
	in.	l.	in.	l.	in.	l.	in.	l.
Length of skull (rather imperfect) .....	22	10	3	0	3	1 $\frac{1}{2}$	2	11
— nose .....	0	10	1	0	1	0 $\frac{1}{2}$	1	0
— zygoma and orbits .....	1	5	1	3	1	2 $\frac{1}{2}$	1	3
— palate .....	1	4	1	5 $\frac{1}{2}$	1	5 $\frac{1}{2}$	1	5 $\frac{1}{2}$
Width of brain-case over ears .....	1	2 $\frac{1}{2}$	1	3	1	3	1	3
— nose at front of orbit .....	0	8	0	8 $\frac{1}{2}$	0	8 $\frac{1}{2}$	0	7 $\frac{1}{2}$
Length of tooth-line of canine and grinders	0	9 $\frac{1}{2}$	1	0	1	1	0	11
— lower jaw .....	1	9	1	10 $\frac{1}{2}$	2	0	1	10 $\frac{1}{2}$

6. DESCRIPTIONS OF FOUR NEW SPECIES OF MARINE SHELLS FROM SOUTH AUSTRALIA. BY GEORGE FRENCH ANGAS, C.M.Z.S.

NASSA COMPACTA, Angas.

*N. t.* "N. incrassatæ" *simillima, sed valde minor; sculptura expressa, costis xi.—xiii. anfr. ult. radiantibus, liris spiralibus in spira v.—vi.; castanea, seu fascia lata peripheriali albida; canali intus pallida.*

Long. .3, long spir. .17, lat. .18 poll., div. 55°.

*Hab.* St. Vincent's Gulf, South Australia.

A pretty little banded species, allied to the British *N. incrassata*, Müll.

PATELLA LATISTRIGATA, Angas.

*P. t.* "P. limbatæ" *simillima, sed magis elongata, hepatica, strigis fusco-nigris latissimis paucis radiata; costis circ. xii.—xiv. irregularibus rotundatis ornata; spathula intense fusconigra, candido marginata.*

Long. .7, lat. .45, alt. .2 poll.

*Hab.* Aldinga Bay, South Australia.

ACMÆA SCABRILIRATA, Angas.

*A. t. parva, tenui, subovata, paullum planata; extus colore albedo seu griseo, rufo-fusco varie maculata seu penicillata, interdum strigata; liris radiantibus acutissimis, plus minusve distantibus, minutissime granulosis, elegantissime ornata; interstitiis planatis, latissimis; vertice antrorsum adunco, ad trientem seu quadrantem longitudinis sito; intus nitidissime cæruleo-viridi, rufo-fusco varie ornata; margine lato, tessellato seu penicillato; spathula rarius conspicua.*

Long. .5, lat. .4, alt. .13 poll.

*Hab.* Port Lincoln, Hobson's Bay (*Archer*).



This small and tender but exceedingly beautiful species is generally more or less abraded, but when perfect is easily recognized by the sculpture, which consists of distant, extremely slender riblets, each of which consists of, or is surmounted by, a series of minute granules. A rare variety is striped like the young of *A. pelta* (*A. strigillata*, Nutt.); but in general it is more or less mottled, sometimes delicately pencilled, like *A. fascicularis*, Menke, from the Gulf of California.

ACMÆA SUBUNDULATA, Angas.

*A. t. parva, tenui, ovali, altiore; extus colore pallide fusco-corneo, fusco varie maculata seu strigata, liris radiantibus obsoletis vix undata; striis incrementi confertissimis; vertice haud adunco, plus minusve antico, ad trientem seu ad duas inter quinque partes longitudinis sito; intus fuscescente, fusco-nigro varie maculata seu strigata, nitida; spathula plerumque tenebrosa; margine haud conspicuo.*

Long. .52, lat. .4, alt. .22 poll.

*Hab.* Port Lincoln, Hobson's Bay (*Archer*).

*Var. t. intus pallidiore, strigis radiantibus angustis.*

7. ON THE MARINE MOLLUSCAN FAUNA OF THE PROVINCE OF SOUTH AUSTRALIA: WITH A LIST OF ALL THE SPECIES KNOWN UP TO THE PRESENT TIME; TOGETHER WITH REMARKS ON THEIR HABITATS AND DISTRIBUTION, ETC. BY GEORGE FRENCH ANGAS, C.M.Z.S.

Having paid considerable attention to the marine conchology of South Australia during a residence of some years in that province, and possessing in my own collection examples of nearly every species enumerated in the following list, I have endeavoured to work up my materials, however imperfect, into a list of species *bonâ fide* inhabitants of that portion of Australia\*. As so many of the earlier authors have described shells, giving either an unknown habitat or a wrong locality, it is of importance that those who, from personal observation, are in a position to do so, should give to the scientific world the benefit of their researches, especially when they are able to correct errors and add to our knowledge of the geographical distribution of species.

The province, or colony, of South Australia, properly so called, includes all that indented coast-line extending from the mouth of the Glenelg, near Cape Northumberland, on the south-east, to the head of the Great Australian Bight on the north-west, ranging from 129° to 141° of longitude east from Greenwich, and occupying a belt of latitude between 32° and 38° S. This extent of coast includes the two deep gulfs of Spencer and St. Vincent, Kangaroo

\* Those species marked with an asterisk (\*) are recent additions to science, and are described from the type specimens in my collection.—G. F. A.

Island, Port Lincoln, and Encounter Bay, and presents every diversity of shore, from bold rocky headlands to sandy flats and muddy estuaries. Within this area there have been collected already upwards of 230 species of univalves and about 100 species of bivalves, all of which are now described; but, doubtless, when the dredge has been more generally used, and the coasts better explored, these numbers will be greatly increased.

Sixty-five of the species enumerated in the following list were unknown to science until described from my specimens, during the last eighteen months, by Messrs. H. & A. Adams, H. Crosse, myself, and others; to these will be added somewhere about a dozen new species of bivalves, in the second part of this paper.

The coasts of South Australia are particularly rich in *Trochidæ*, of which family no less than fifty species are included in this list. No large species of *Terebra* have as yet been found, and only one of the subgenus *Euryta*. According to our present knowledge, the genera *Dolium*, *Strombus*, *Solarium*, *Trichotropis*, *Struthiolaria*, *Ovulum*, *Aporrhais*, *Terebellum*, and *Dentalium* do not appear to be represented at all; while we have numerous species of the following genera, viz. *Voluta*, *Columbella*, *Fusus*, *Coninella*, *Triton*, *Haliotis*, *Fissurella*, and *Chiton*. Amongst the *Chitonida* is a new form—*Stenochiton* (Ad. & Ang.). There are four species of *Scalaria*, three of *Conus*, five of *Cypræa*, and only one *Oliva*. The *Pleurotomidæ* are pretty numerous; and many others will probably be discovered when dredging has been better attended to, as this family belongs more especially to deep water. Of the genus *Siphonaria* there are four or five species.

Amongst the bivalves, the truly Australian genera *Myadora* and *Chamostrea* yield one species each. The *Veneridæ* are tolerably abundant, including the lovely *V. lamellata*. So are the *Mactridæ* and *Tellinidæ*, of which there are several species inhabiting the sandy shores of the gulfs and Encounter Bay, amongst which the handsome *Tellina albinella* is the most conspicuous and abundant. *Pecten bifrons*, *Solemya australis*, *Sunetta alicia*, and *Crassatella castanea* are all interesting South-Australian species. No examples of the genus *Trigonia* have yet been met with. Both the edible and pearl oysters occur plentifully near Port Lincoln; and the *Pinna* abounds on the sandy and muddy flats at the heads of the gulfs.

## CEPHALOPODA.

### Fam. ARGONAUTIDÆ.

#### 1. ARGONAUTA ORYZATA.

*Argonauta oryzata*, Meuschen, Mus. Gevers. 252. n. 133.

*A. tuberculata*, Shaw, Nat. Misc. xxiii. t. 995.

*A. tuberculosa*, Lam. Anim. sans Vert. vii. 632, pl. 2.

*A. nodosa*, Solander, MS., Portland Cat. 76. 2120. 17.

*Hab.* Spencer's Gulf and Kangaroo Island.

At certain seasons of the year, during the prevalence of strong

northerly winds, the shells of the female Argonaut are washed on shore in considerable numbers at Thistle Island, near the entrance of Spencer's Gulf. Many of these shells contain the animal in a living state; but they soon fall a prey to the Seagulls, by whom they are greedily devoured.

Fam. AMMONIIDÆ.

2. AMMONIA LEVIS.

*Lituus lævis*, Gray, Cat. Moll. Brit. Mus. (Cephalopoda), part 1, p. 116.

*Hab.* Pelagic, throughout the Southern Seas.

This species, in regard to the shell, appears to resemble very strongly that commonly known as the *Spirula peroni* of Lamarck.

At Encounter Bay, and on the exposed sandy beaches between it and Cape Northumberland, the dead shells are frequently washed on shore.

In the South Pacific Ocean the *Spirulæ* exist in great abundance. On the smooth black sands along the west coast of New Zealand their shells lie scattered in infinite numbers; and after an easterly gale they are almost as frequent on many parts of the New South Wales coast.

On one occasion only I had the good fortune to meet with the perfect animal enclosing the shell; it was thrown up, after a severe storm, on Bondi Beach, near Port Jackson, and it is now preserved in alcohol in the Sydney Museum.

GASTEROPODA.

Fam. MURICIDÆ.

3. MUREX (PTERONOTUS) TRIFORMIS.

*Murex triformis*, Reeve, Conch. Icon. pl. 13. f. 53.

*M. acanthopterus*, var., Sowerby, Conch. Illustr. f. 51.

*Station.* On oyster-banks, from 2 to 10 fathoms.

*Hab.* Port Lincoln, Spencer's Gulf.

This fine species varies considerably both in form and colour; the prevailing hue is of a purplish black, but examples sometimes occur where the entire shell is of a cream-colour, with the varix of the outer lip beautifully laminately frilled. It occurs also at King George's Sound.

4. MUREX SEROTINUS.

*Murex serotinus*, A. Adams, Proc. Zool. Soc. 1851, p. 268.

*Station.* Amongst rocks, at low water of spring tides.

*Hab.* Aldinga Bay, St. Vincent's Gulf.

But one specimen was obtained, alive, at the above locality.

5. MUREX SCALARIS.

*Murex scalaris*, A. Adams, Proc. Zool. Soc. 1853, p. 71.

*Station.* Dredged, along with horny zoophytes and nullipores, at a depth of 7 or 8 fathoms.

*Hab.* St. Vincent's Gulf.

This rare species bears a resemblance to *M. cristatus*, Brod., from the Adriatic. It was described by Mr. Adams from a specimen in the Cumingian collection, obtained at Moreton Bay by the late Mr. Strange.

#### 6. MUREX PUMILUS.

*Murex pumilus*, A. Adams, Proc. Zool. Soc. 1853, p. 70.

*Station.* Unknown.

*Hab.* St. Vincent's Gulf.

Two specimens were found of this minute species, washed on shore on the eastern side of St. Vincent's Gulf.

This species was obtained by Mr. A. Adams in the China Seas.

#### 7. \*TYPHIS YATESI.

*Typhis yatesi*, Crosse, Journ. de Conch. 1865, p. 54, pl. 2. f. 3.

*Station.* Unknown.

*Hab.* St. Vincent's Gulf.

Only a single example of this beautiful addition to the limited genus *Typhis* has hitherto been obtained. I found it on the beach near Holdfast Bay. It probably inhabits deep water.

#### 8. \*TROPHON PAIVÆ.

*Trophon paivæ*, Crosse, Journ. de Conch. 1864, p. 278, pl. 11. f. 7.

*Station.* Under stones, at low water of spring tides.

*Hab.* Yorke's peninsula.

#### 9. FUSUS CREBRILIRATUS.

*Fusus crebriliratus*, Reeve, Conch. Icon. pl. 5. f. 20.

*Station.* On sandy bottoms, amongst *Zostera*, 2 to 5 fathoms.

*Hab.* St. Vincent's and Spencer's Gulfs. Common.

#### 10. FUSUS PYRULATUS.

*Fusus pyrulatus*, Reeve, Conch. Icon. pl. 13. f. 50.

*Station.* Deep water.

*Hab.* Spencer's Gulf. Rare.

This species is also found in Tasmania.

#### 11. FUSUS USTULATUS.

*Fusus ustulatus*, Reeve, Conch. Icon. pl. 17. f. 66.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf. Rare.

#### 12. FUSUS MARMORATUS, var.

*Fusus marmoratus*, Phil. Abbild. und Besch. Conch. Fusus, pl. 3. f. 7.

*Station.* Deep water.

*Hab.* Lincoln.

This species, of which a single specimen was dredged at Port Lincoln, appears to be a variety of *F. marmoratus* of Philippi.

13. *FUSUS* (*NEPTUNEA*) *DILATATUS*.

*Fusus dilatatus*, Quoy, Voy. de l'Astr. ii. p. 498, pl. 34. f. 15-17.

*F. adustus*, Phil.

*Station.* Deep water.

*Hab.* Encounter Bay.

This fine species is one of rare occurrence in South Australia.

14. \**FUSUS* (*NEPTUNEA*) *TASMANIENSIS*.

*Fusus tasmaniensis*, Ad. & Ang. Proc. Zool. Soc. 1863, p. 421, pl. xxxvii. f. 1.

*Station.* Deep water.

*Hab.* Hardwick Bay, Spencer's Gulf.

Mr. Cuming possesses this species from Tasmania. The specimens from Spencer's Gulf are smaller in size, and of a yellowish orange-colour, banded with chestnut.

15. \**FUSUS* (*TRITONIDEA*?) *LINCOLNENSIS*.

*Fusus lincolnensis*, Crosse, Journ. de Conch. 1865, p. 53, pl. 2. f. 4.

*Station.* Dredged from an oyster-bank, 6 fathoms.

*Hab.* Port Lincoln, Spencer's Gulf.

15 a. \**SIPHONALIA FUSCOZONATA*.

*Siphonalia fuscozonata*, Angas, Proc. Zool. Soc. 1865.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

This shell resembles *Peristernia*, but without the distinct fold of that genus.

Fam. *PLEUROTOMIDÆ*.

16. *DRILLIA* (*CRASSISPIRA*) *HARPULARIA*.

*Pleurotoma harpularia*, Des Moulins; Reeve, Conch. Icon. pl. 15. f. 124.

*P. harpula*, Valenc.

*Station.* Deep water.

*Hab.* Found washed up on the beaches, at Salt Creek, St. Vincent's Gulf.

17. \**BELA AUSTRALIS*.

*Bela australis*, Ad. & Ang. Proc. Zool. Soc. 1863, p. 420.

*Station.* Deep water.

*Hab.* Aldinga and Rapid Bays.

18. *CLATHURELLA SPURCA*.

*Clathurella spurca*, Hinds, Moll. Voy. Sulphur, pl. 5. f. 14.

*Station.* Dredged in deep water.

*Hab.* St. Vincent's Gulf.

This species occurs also in the Philippines (*Cuming*)

## 19. \*CLATHURELLA LALLEMANTIANA.

*Pleurotoma lallemantiana*, Crosse, Journ. de Conch. 1865.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

## 20. \*CYTHARA COMPTA.

*Cythara compta*, Ad. & Ang. Proc. Zool. Soc. 1863, p. 419, pl. xxxvii. f. 5.

*Station.* Deep water.

*Hab.* Rapid Bay, St. Vincent's Gulf.

A single specimen of this species was dredged by me in Port Jackson, New South Wales.

## 21. \*CYTHARA BELLA.

*Cythara bella*, Ad. & Ang. Proc. Zool. Soc. 1863, p. 419, pl. xxxvii. f. 6.

*Station.* Deep water.

*Hab.* Rapid Bay, St. Vincent's Gulf.

Two examples only of this delicately tinted shell have been met with.

## 22. MANGELIA PURA.

*Mangelia pura*, Reeve, Conch. Icon. f. 63.

*Station.* Deep water.

*Hab.* Aldinga Bay, St. Vincent's Gulf.

Mr. Reeve gives no locality with his description of this species.

## 23. \*MANGELIA INSCULPTA.

*Mangelia insculpta*, Ad. & Ang. Proc. Zool. Soc. 1863, p. 420, pl. xxxvii. f. 8.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

## 24. MANGELIA CAVERNOSA.

*Mangelia cavernosa*, Reeve, Conch. Icon. pl. 2. f. 8.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

This species occurs also in the Philippines (*Cuming*).

## 25. MANGELIA LINEATA.

*Mangelia lineata*, Reeve, Conch. Icon. pl. 6. f. 42.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

Reeve's description has no locality.

## 26. \*MANGELIA VINCENTINA.

*Pleurotoma (Mangelia) vincentina*, Crosse, Journ. de Conch. 1865.

*Station.* Deep water.

*Hab.* Rapid Bay, St. Vincent's Gulf.

## Fam. TRITONIDÆ.

## 27. TRITON BARTHELEMYI.

*Triton barthelemyi*, Bernardi, Journ. de Conch. 1857, p. 55, pl. 1. f. 1.

*Station.* Amongst rocks at low tides.

*Hab.* Cape Northumberland; Gipps Land, Victoria.

This large species bears considerable affinity to *T. spengleri*, Lam., from New South Wales; they differ, however, in the form of the aperture, in the number and character of the transverse ribs, and in the shape and sculpture of the upper whorls.

## 28. TRITON SUBDISTORTUS.

*Triton subdistortum*, Lam. Anim. sans Vert. (Deshayes's edit.) ix. p. 638.

*Station.* Amongst rocks at extreme low tides.

*Hab.* Port Elliot, South Australia.

This species appears to range from King George's Sound to Tasmania. It is not found on the coast of New South Wales north of Cape Howe.

## 29. \*TRITON WATERHOUSEI.

*Triton waterhousei*, Ad. & Ang. Proc. Zool. Soc. 1864, p. 35.

*Station.* Dredged on an oyster-bank.

*Hab.* Port Lincoln, and Encounter Bay.

This shell differs from *T. spengleri* in the squamato-pilose epidermis, in the broad flattened varix of the outer lip, and in the double liræ of the whorls.

## 30. TRITON (SIMPULUM) QUOYI.

*Triton quoyi*, Reeve, Conch. Icon. pl. 19. f. 93.

*Station.* From 1 to 3 fathoms, on sandy shores, amongst the *Zostera*, or grass-wrack, so common in the gulfs beyond tide-marks.

*Hab.* St. Vincent's and Spencer's Gulfs.

I have received a large variety of this species from Tasmania.

## Fam. BUCCINIDÆ.

No typical form of *Buccinum* has, as yet, been found on the South-Australian coast. The species known all belong to the genus *Cominella* of Gray, included under the subfamily *Nassinæ*.

## 31. COMINELLA COSTATA.

*Buccinum costatum*, Quoy et Gaim. Voy. de l'Astrol. Zool. ii. p. 417, pl. 30. f. 17-20.

*Station.* Crawling on the sands at low spring tides.

*Hab.* St. Vincent's and Spencer's Gulfs.

This shell, in a young state, is very variable in colour. *B. acutinosum*, Reeve, a closely allied species to *B. costatum*, does not appear to me to belong to the South-Australian fauna; it is probably from the west coast of New Holland.

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32. *COMINELLA ALVEOLATA.*

*Buccinum alveolatum*, Kiener, Icon. Coq. Viv. p. 32, pl. 10. f. 34.

*Station.* Under stones at low water.

*Hab.* Yorke's Peninsula. Abundant.

This species ranges from Port Lincoln, through Bass's Straits, to Tasmania, in all of which localities it occurs plentifully wherever the conditions of the coast suit its station. The shells vary considerably both in colour and markings.

33. \**COMINELLA ANGASI.*

*Buccinum angasi*, Crosse, Journ. de Conch. 1864, p. 275, pl. 11. f. 5.

*Station.* Probably deep water.

*Hab.* St. Vincent's Gulf.

34. \**COMINELLA ADELAIIDENSIS.*

*Buccinum adelaidense*, Crosse, Journ. de Conch. 1864, p. 276, pl. 11. f. 6.

*Station.* At the roots of mangroves in the mud.

*Hab.* Port Adelaide Creek, South Australia.

There are two varieties of this species—one of a dark brown, and the other of a pale fawn-colour.

35. *COMINELLA SUTURALIS.*

*Cominella suturalis*, A. Adams.

*Station.* Probably deep water.

*Hab.* St. Vincent's Gulf.

This pretty species ranges to the westward as far as King George's Sound.

36. *COMINELLA EBURNEA*, var.

*Buccinum eburneum*, Reeve, Conch. Icon. pl. 12. f. 93.

*Station.* Probably deep water.

*Hab.* St. Vincent's Gulf, &c.

37. \**COMINELLA FILICEA.*

*Buccinum filiceum*, Crosse et Fischer, Journ. de Conch. 1864, p. 346, pl. 3. f. 15, 16.

*Station.* Under rocks and stones at low tide.

*Hab.* East side of Yorke's Peninsula.

I have only met with one living example of this species in South Australia. It occurs also in Sydney Harbour (Port Jackson), where I have taken at least a dozen specimens by turning over the stones at extreme spring tides.

38. *NASSA (PHRONTIS) FASCIATA.*

*Nassa fasciata*, Desh. Anim. sans Vert. x. p. 172.

*Buccinum fasciatum*, Lam.

*Station.* On the edge of the Laminarian zone, creeping upon the sand, and amongst the grass-wrack, in great numbers.

*Hab.* St. Vincent's and Spencer's Gulfs, &c.



39. \**NASSA* (*PHRONTIS*) *MUNIERIANA*.

*Nassa munieriana*, Crosse, Journ. de Conch. 1864, p. 345, pl. 13.  
f. 6.

*Station.* Amongst the grass-wrack.

*Hab.* St. Vincent's and Spencer's Gulfs. Rare.

40. *NASSA* (*NIOtha*) *PAUPERATA*.

*Nassa pauperata*, Lam. Anim. sans Vert. x. p. 183.

*Station.* Abundant in company with *N. fasciata*.

*Hab.* St. Vincent's and Spencer's Gulfs, &c.

This common species is also found on the coasts of Tasmania. There are two varieties—one all white, the other broadly banded on the whorls with chestnut-brown.

41. \**NASSA* (*HIMA*) *COMPACTA*.

*Nassa compacta*, Angas, Proc. Zool. Soc. 1865, p. 154.

*Station.* On sandy mud, low water.

*Hab.* St. Vincent's Gulf.

A small species, somewhat resembling the British *Nassa incrasata*, Müll.

42. \**PURPURA* *FLINDERSI*.

*Purpura flindersi*, Ad. & Ang. Proc. Zool. Soc. 1863, p. 421,  
pl. xxxvii. f. 22.

*Station.* Under loose fragments of rock at low tides.

*Hab.* Salt Creek and Wool Bay, east coast of Yorke's Peninsula.

This curious cancellated *Trophon*-like species has hitherto only been met with on Yorke's Peninsula.

43. *PURPURA* (*POLYTROPA*) *TEXTILIOSA*.

*Purpura textiliosa*, Lam. Anim. sans Vert. x. p. 77.

*Station.* Amongst rocks at low water.

*Hab.* Aldinga Bay; Yorke's Peninsula; Kangaroo Island.

Allied to *P. ægrota* of Reeve, from Swan River.

44. \**PURPURA* (*STRAMONITA*) *HUMILIS*.

*Purpura humilis*, Crosse, Journ. de Conch. 1865, p. 51, pl. 2. f. 2.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

45. \**RICINULA* (*SISTRUM*) *ADELAIDENSIS*.

*Purpura adelaidensis*, Crosse, Journ. de Conch. 1865, p. 50, pl. 2.  
f. 1.

*Station.* On rocks at low water.

*Hab.* Holdfast Bay; Aldinga Bay; Rapid Bay.

46. \**ADAMSIA* *ADELAIDÆ*.

*Adamsia adelaidæ*, Ad. & Ang. Proc. Zool. Soc. 1863, p. 421,  
pl. xxxvii. f. 2.

*Station.* Unknown.

*Hab.* St. Vincent's Gulf.

The only other known species of *Adamsia* is *A. typica*, Dunker, which is from the coast of New South Wales.

Fam. DACTYLIDÆ.

47. OLIVA AUSTRALIS.

*Olivæ australis*, Duclos, Mon. Oliv. pl. 8. f. 3, 4.

*Station.* On sandy bottom, 5 to 10 fathoms.

*Hab.* St. Vincent's Gulf.

This species, the only representative of the genus in South Australia, occurs also at King George's Sound and Swan River.

Fam. FASCIOLARIIDÆ.

48. FASCIOLARIA FUSIFORMIS.

*Fasciolaria fusiformis*, Valenc.; Kiener, Icon. Coq. Viv. p. 13, pl. 4. f. 2.

*Station.* On sandy bottoms, amongst the grass-wrack, 2 to 5 fathoms.

*Hab.* Spencer's and St. Vincent's Gulfs.

This large species varies considerably in size and form. Some specimens are slightly coronated at the upper part of the whorls; and the live shells are covered with a uniform olive-brown epidermis. Specimens containing the animal are frequently washed on shore near the "semaphore" at Port Adelaide.

49. FASCIOLARIA CORONATA.

*Fasciolaria coronata*, Lam. Anim. sans Vert. ix. p. 435.

*Station.* Deep water.

*Hab.* Port Elliot; Encounter Bay; Guichen Bay.

This species, like the *F. fusiformis*, is very variable in its growth. Mr. Reeve's figures (14 *c* and 14 *d*, in plate 6 of the Conch. Iconica) represent the South-Australian form of the species very faithfully; but the shell from the Philippine Islands, given under the same name (figs. 14 *a* and 14 *b*), appears to be another species.

Fam. VOLUTIDÆ.

50. LYRIA LYRIFORMIS.

*Voluta lyræformis*, Brod. Zool. Journ. iii. 83, t. 3. f. 3.

*Harpula lyræformis*, Swains. Malac. 318.

*Station.* On banks of sandy mud, 2 to 5 fathoms.

*Hab.* St. Vincent's Gulf; Port Lincoln; Kangaroo Island.

The Port Lincoln specimens are smaller and less richly coloured than those from St. Vincent's Gulf.

51. VOLUTELLA PAPPILLOSA.

*Voluta papillosa*, Swains.; Bligh, Cat.; Sow. Thes. Conch. p. 207, t. 48. f. 30.

*Station.* Deep water.

*Hab.* Kangaroo Island; Encounter Bay.

This rare and ponderous species occurs also in Tasmania.

52. *VOLUTELLA FULGETRUM.*

*Voluta fulgetrum*, Sow. Tank. Cat. no. 2149, t. 4, 5.

*Station.* On sand-banks from 2 to 10 fathoms.

*Hab.* Port Lincoln; Encounter Bay.

This fine species varies both in size and markings. The typical specimens are richly painted with broad, irregular, zigzag, chestnut streaks on a flesh-coloured ground; whilst examples frequently occur which are delicately reticulated, with only a few spots here and there round the whorls.

53. \**VOLUTA (ALCITHOË) KREUSLERÆ.*

*Voluta kreusleræ*, Angas, Proc. Zool. Soc. 1865, p. 55.

*Station.* Deep water.

*Hab.* South Australia.

This species is an interesting addition to the Australian Volutes. In its general character it somewhat resembles *V. pacifica*, Solander, (belonging to H. & A. Adams's section *Alcithoë*,) from which, however, it differs in the greater length of the spire, in the narrowness of its form, and in having the lower whorl encircled with three bands of orange-brown spots.

54. *AMORIA EXOPTANDA.*

*Voluta exoptanda*, Sowerby, MS.; Reeve, Conch. Icon. pl. 10. f. 22.

*Station.* Probably deep water.

*Hab.* Encounter Bay.

A broken specimen of this extremely rare Volute was found upon the beach near Encounter Bay.

55. *AMORIA UNULATA.*

*Voluta undulata*, Lam. Anim. sans Vert. x. p. 401.

*Station.* On sandy bottoms at extreme low water of spring tides.

*Hab.* Port Lincoln and Encounter Bay.

This species is rather plentiful at Port Lincoln. It must not, however, be confounded with a Tasmanian species hitherto known also as *V. undulata*, which is now considered to be distinct, and has been lately accorded specific rank by Mr. Sowerby, under the name of *V. angasi*, in the "Completion of the late G. B. Sowerby's Monograph of *Voluta*, in Thesaurus," fig. 99, sp. 73.

MITRIDÆ.

56. *MITRA GLABRA.*

*Mitra glabra*, Swainson, Exotic Conch. pl. 24.

*M. buccinata*, Quoy.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf; Guichen Bay.

This fine species ranges from Tasmania to Swan River. I possess a specimen from the beach at Holdfast Bay, in St. Vincent's Gulf, that measures nearly 4 inches in length.

57. MITRA AUSTRALIS.

*Mitra australis*, Swains. Zool. Illus. 1st series, pl. 18.

*M. melaleuca*, Quoy.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf; Encounter Bay; Guichen Bay.

This species is of rare occurrence. It is found also in Tasmania.

58. \*MITRA ROSETTÆ.

*Mitra rosettæ*, Angas, Proc. Zool. Soc. 1865, p. 55.

*Station.* Deep water.

*Hab.* Encounter Bay.

59. COLUMBELLA (MITRELLA) SEMICONVEXA.

*Columbella semiconvexa*, Sow. Thes. Conch. pl. 38. f. 103, 104.

*Station.* Under stones at low water.

*Hab.* Yorke's Peninsula; Kangaroo Island; Lacépède Bay.

Of this very variable species, a fine large variety, of an orange-red colour, is found at Lacépède Bay.

60. COLUMBELLA (MITRELLA) AUSTRALIS.

*Columbella australis*, Gaskoin, Proc. Zool. Soc. 1851, p. 5.

*Station.* Under stones at low water.

*Hab.* Yorke's Peninsula.

61. \*COLUMBELLA (MITRELLA) YORKENSIS.

*Columbella yorkensis*, Crosse, Journ. de Conch. 1865, pl. 2. f. 6.

*Station.* Under stones at low water.

*Hab.* Yorke's Peninsula.

62. \*COLUMBELLA (MITRELLA) INFUMATA.

*Columbella infumata*, Crosse, Journ. de Conch. 1863, p. 84, pl. 1. f. 3.

*Station.* Under stones and amongst weed.

*Hab.* Salt Creek, Yorke's Peninsula.

63. COLUMBELLA (MITRELLA) MENKEANA.

*Columbella menkeana*, Reeve, Conch. Icon.

*Station.* Beyond tide-marks, amongst *Zostera*.

*Hab.* St. Vincent's Gulf.

An elegant fusiform species.

64. COLUMBELLA (MITRELLA) LINCOLNENSIS.

*Columbella lincolnsis*, Reeve, Conch. Icon.

*Station.* Under stones at low water.

*Hab.* Port Lincoln; Yorke's Peninsula.

## 65. COLUMBELLA (MITRELLA) DERMESTOIDES.

*Buccinum dermestoides*, Kiener.*Station.* Under stones beyond tide-marks.*Hab.* Port Lincoln; also Port Jackson, New South Wales.

## 66. \*COLUMBELLA (MITRELLA?) INTERRUPTA.

*Columbella interrupta*, Angas, Proc. Zool. Soc. 1865, p. 56.*Station.* Dredged in 4 fathoms.*Hab.* Yorke's Peninsula.

A beautiful little species, finely pencilled, with two broad, green, scalloped bands.

## Fam. ACTÆONIDÆ.

## 67. \*RINGICULA AUSTRALIS.

*Ringicula australis*, Crosse, Journ. de Conch. 1865, pl. 2. f. 5.*Station.* Unknown.*Hab.* Head of Spencer's Gulf, in shell-sand.

## Fam. NATICIDÆ.

## 68. NATICA (NEVERITA) CONICA.

*Natica conica*, Lam. Anim. sans Vert. viii. p. 632.*Station.* Crawling on the sands at low-water mark.*Hab.* St. Vincent's and Spencer's Gulfs. Common.

## 69. NATICA (NEVERITA) BACONI.

*Natica baconi*, Reeve, Conch. Icon. pl. 10. f. 37 a & b.*Station.* On sandy shores exposed to the surf, beyond tide-marks.*Hab.* Encounter Bay.

## 70. RUMA UMBILICATA.

*Natica umbilicata*, Quoy, Voy. Astrol. ii. p. 224, pl. 66. f. 22, 23.*Station.* Creeping on the sands at edge of low-water mark.*Hab.* Salt Creek, Yorke's Peninsula.

Found also in Tasmania, where it attains a larger size.

## 71. NATICINA PICTA.

*Naticina picta*, Reeve, Conch. Icon.*Station.* On sand, deep water.*Hab.* Spencer's and St. Vincent's Gulfs.

## 72. NATICINA NITIDA.

*Naticina nitida*, Reeve, Conch. Icon.*Station.* Deep water.*Hab.* Yorke's Peninsula; St. Vincent's Gulf.

This species is also found in the Philippines.

## 73. CATINUS ZONALIS.

*Sigaretus zonalis*, Quoy, Voy. de l'Astrol. v. p. 2, pl. 66. f. 1-3.*Station.* Half buried on sandy flats below tide-marks.*Hab.* Port Lincoln; St. Vincent's Gulf; Encounter Bay.

## Fam. CASSIDIDÆ.

## 74. CASSIS FIMBRIATA.

*Cassis fimbriata*, Quoy, Voy. de l'Astrol. ii. p. 596, pl. 43. f. 7, 8.

*Station.* On sandy bottoms in deep water.

*Hab.* St. Vincent's Gulf.

A fine, large, characteristic species, which is occasionally cast on shore after heavy gales.

## 75. SEMICASSIS SEMIGRANOSA.

*Cassis semigranosa*, Lam. Anim. sans Vert. x. p. 37.

*Station.* Sandy bottoms, deep water.

*Hab.* Aldinga Bay; Encounter Bay.

Specimens from Tasmania, where it is not uncommon, are of a larger size than those found in South Australia.

## 76. SEMICASSIS (CASMARIA) PAUCIRUGIS.

*Cassis paucirugis*, Menke, Moll. Nov. Hollandiæ, p. 23. no. 107.

*Station.* Deep water.

*Hab.* Encounter Bay; Guichen Bay.

This species ranges from Swan River to Tasmania.

## Fam. SCALIDÆ.

## 77. SCALA ACULEATA.

*Scalaria aculeata*, Sow. Proc. Zool. Soc. 1844, p. 12; Thes. Conch. pl. 32. f. 35-37.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

## 78. \*SCALA DELICATULA.

*Scalaria delicatula*, Crosse et Fisch. Journ. de Conch. 1864, p. 347, pl. 3. f. 9, 10.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

## 79. \*SCALA CONSORS.

*Scalaria consors*, Crosse et Fisch. Journ. de Conch. 1864, p. 347, pl. 3. f. 11, 12.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

## 80. SCALA (OPALIA) GRANULOSA.

*Turritella granulosa*, Quoy.

*Scalaria granulosa*, Sow. Thes. Conch. p. 104, pl. 35. f. 144.

*Station.* Deep water.

*Hab.* Aldinga Bay; Guichen Bay.

## Fam. TEREBRIDÆ.

## 81. \*EURYTA PULCHELLA.

*Euryta pulchella*, Ad. & Ang. Proc. Zool. Soc. 1863, p. 418,  
pl. XXXVII. f. 14.

*Station.* Probably deep water.

*Hab.* Rapid Bay.

Only one example of this pretty little species has hitherto been obtained.

## Fam. EULIMIDÆ.

## 82. \*EULIMA AUGUR.

*Eulima augur*, Angas, Proc. Zool. Soc. 1865, p. 56.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

## Fam. PYRAMIDELLIDÆ.

## 83. CINGULINA CIRCINATA?

*Cingulina circinata*, A. Adams, Ann. Mag. Nat. Hist. Dec. 1860.

Specimens from shell-sand seem to agree with the description of the above species, which was found by Mr. A. Adams in the China Seas.

## 84. \*CINGULINA SPINA.

*Turritella spina*, Crosse et Fisch. Journ. de Conch. 1864, p. 347,  
pl. 3. f. 13, 14.

*Hab.* St. Vincent's Gulf, in shell-sand.

## Fam. CONIDÆ.

## 85. CONUS (CHELYCONUS) ANEMONE.

*Conus anemone*, Lam. Anim. sans Vert. vii. p. 479.

*Station.* Under stones and in crevices of rocks at low spring tides.

*Hab.* Spencer's and St. Vincent's Gulfs.

A dwarf variety occurs plentifully at Salt Creek, Yorke's Peninsula.

## 86. CONUS (CHELYCONUS) NOVÆ-HOLLANDIÆ.

*Conus novæ-hollandiæ*, A. Adams, Proc. Zool. Soc. 1853, p. 119.

*Station.* Same as the preceding.

*Hab.* Rapid and Encounter Bays; Guichen Bay.

This species ranges from Swan River to Tasmania.

## 87. CONUS (STEPHANOCONUS) RUTILUS.

*Conus rutilus*, Menke, Moll. Nov. Holl. p. 57. no. 133.

*Station.* Under stones, deep water.

*Hab.* St. Vincent's Gulf. Rare.

Although this interesting little species is described by authors as

of a "uniform fiery red," I have occasionally met with specimens of a beautiful purple colour.

Fam. CYPRÆIDÆ.

88. ARICIA THERSITES.

*Cypræa thersites*, Gaskoin, Proc. Zool. Soc. 1848, p. 90.

*Station.* On clusters of zoophytes, at the depth of 2 or 3 fathoms, in sheltered places.

*Hab.* Salt Creek, Yorke's Peninsula.

This fine *Cypræa* is not only peculiar to South Australia, but extremely limited in its habitat, the above-named locality being the only place where it has hitherto been met with. Two or three specimens of a very beautiful jet-black variety have been found.

89. CYPRÆA ANGUSTATA.

*Cypræa angustata*, Gmelin, Wood's Cat. t. 17. f. 32.

*Station.* Deep water, and on rocky coasts.

*Hab.* Guichen Bay.

This is truly a Tasmanian species, not extending into the South-Australian gulfs, where several allied species have their habitat. It is larger and of a more rounded form than *C. comptoni*, and the base is white.

90. CYPRÆA COMPTONI.

*Cypræa comptoni*, Gray.

*Station.* On sandy muddy flats, from 2 to 4 fathoms.

*Hab.* Port Lincoln; St. Vincent's Gulf; Port Adelaide Creek.

The animal of *C. comptoni* is of a bright orange-colour, whilst that of *C. bicolor* of Gaskoin is of a pale lemon. The shell in many specimens is entirely of a dark purple colour; in others it is of a rich brown, sometimes faintly banded, with the margins of the base paler, and spotted.

91. CYPRÆA PIPERITA.

*Cypræa piperita*, Solander, MS.; Gray, Zool. Journ. i. p. 498.

*Station.* On sandy muddy flats, along with *C. comptoni*.

*Hab.* Port Lincoln.

This species is closely allied to *C. comptoni*, but may be distinguished by its more solid and gibbous form, smaller size, and having the orange flesh-tint of *C. bicolor*.

92. CYPRÆA BICOLOR.

*Cypræa bicolor*, Gaskoin, Proc. Zool. Soc. 1848, p. 91.

*Station.* Similar to the two preceding ones.

*Hab.* Kangaroo Island; Port Adelaide Creek.

This very pretty species is more cylindrical than either of its allies, and may easily be distinguished by its interrupted bands of flesh-colour, whilst the back of the shell is more or less spotted or reticulated throughout.



## Fam. CANCELLARIIDÆ.

## 93. CANCELLARIA UNDULATA.

*Cancellaria undulata*, Sow. Proc. Zool. Soc. 1848, p. 136.

*Station.* Deep water.

*Hab.* Port Elliot, Encounter Bay.

This fine species is very closely allied to *C. granosa*, Sow., from New South Wales. It differs from the latter, however, in having a smaller spire and finer striæ.

## 94. CANCELLARIA SPIRATA.

*Cancellaria spirata*, Lam. Anim. sans Vert. ; Sow. Thes. Conch. (*Cancellaria*), pl. 93. f. 22.

*Cancellaria excavata*, Sow.

*Station.* Deep water.

*Hab.* Encounter Bay.

This beautiful species I believe to be the true *C. spirata* of Lamarck. Mr. Sowerby's *C. excavata* (from South Australia also) I regard as synonymous. The specimens of the latter in Mr. Cuming's collection appear to be only dead and beach-worn examples of *C. spirata*.

## Fam. CERITHIIDÆ.

## 95. BITTIUM GRANARIUM.

*Cerithium granarium*, Kiener, Icon. Coq. Viv. p. 72, pl. 19. f. 3.

*Station.* Under stones, low water.

*Hab.* St. Vincent's Gulf.

This species is abundant in Port Jackson, New South Wales.

## 95 a. BITTIUM TURRITELLA.

*Cerithium turritella*, Quoy, Voy. Astrol. iii. p. 131, pl. 55. f. 8.

*Station.* Low water, on the sands.

*Hab.* Yorke's Peninsula, and head of Spencer's Gulf.

## 96. \*BITTIUM LAWLEYANUM.

*Bittium lawleyanum*, Crosse, Journ. Conch. 1863, p. 87, pl. 1. f. 4.

*Station.* Unknown.

*Hab.* Head of Spencer's Gulf.

A very closely allied species, which may prove to be only a variety of this, occurs in Port Phillip Harbour: I have found specimens of it on the beach near Melbourne. This shell has more the appearance of a little *Turritella* than a *Bittium*.

## 97. \*POTAMIDES MONACHUS.

*Cerithium monachus*, Crosse et Fisch. Journ. de Conch. 1864, p. 347, pl. 3. f. 17, 18.

*Station.* 3 to 6 fathoms, on sandy mud.

*Hab.* Yorke's Peninsula; Adelaide Creek.

On the beach at St. Kilda, near Melbourne, I met with numerous dead specimens. This aberrant form of *Cerithiidæ* seems to ap-

proach nearer to the genus *Potamides* than any other. When in a living state, the ribs have an epidermal fringe of hairs, like *Trichotropis*.

Fam. CERITHIOPSIDÆ.

98. \*TRIPHORIS PFEIFFERI.

*Triphoris pfeifferi*, Crosse, Journ. de Conch. 1865, p. 47, pl. 1. f. 14, 15.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

99. \*TRIPHORIS ANGASI.

*Triphoris angasi*, Crosse, Journ. de Conch. 1865, p. 46, pl. 1. f. 12, 13.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

100. TRIPHORIS FESTIVUS.

*Triphoris festivus*, A. Adams, Proc. Zool. Soc. 1851, p. 278.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf; Port Lincoln.

Fam. LITTORINIDÆ.

101. LITTORINA UNIFASCIATA.

*Littorina unifasciata*, Gray.

*Station.* On stones between tide-marks.

*Hab.* Common on all the Australian coasts, from Sydney to Swan River.

102. LITTORINA PHILIPPII.

*Littorina philippii*, Carp. Cat. Mazatlan Shells, no. 398.

*Station.* On stones and mangrove-trees.

*Hab.* Port Adelaide Creek.

This species is identical with Dr. P. P. Carpenter's shell from Mazatlan.

103. LITTORINA UNDULATA.

*Littorina undulata*, Gray, Zool. Beechey's Voy. p. 140.

*Station.* On stones between tide-marks.

*Hab.* Guichen Bay, and Yorke's Peninsula. It also occurs at King George's Sound.

104. RISELLA MELANOSTOMA.

*Trochus melanostomus*, Gmel. 1789, p. 3581. no. 90.

*Risella melanostoma*, Crosse, Journ. de Conch. 1864, pl. 11. f. 1.

*Station.* On stones between tide-marks.

*Hab.* South Australia.

Common in Port Phillip; on rocks at St. Kilda.

## 105. RISELLA AURATA, var.

*Trochus auratus*, Quoy, Voy. de l'Astrol. iii. p. 276, pl. 62. f. 19.

*Risella lutea*, H. & A. Adams, Gen. Moll. pl. 33. f. 5.

*Station.* On stones between tide-marks.

*Hab.* Holdfast Bay; Aldinga Bay. Common.

## 106. RISELLA PLANA.

*Trochus planus*, Quoy, Voy. de l'Astrol. p. 274, pl. 62. f. 13, 14.

*Station.* On stones just below high-water mark.

*Hab.* All parts of the coast.

This species has a wide range. It is found abundantly on the coast of New South Wales.

## 107. \*RISELLA BRUNI.

*Risella bruni*, Crosse, Journ. de Conch. 1864, p. 239, pl. 11. f. 3.

*Station.* Adhering to small flat fragments of rock and coral uncovered by the tide.

*Hab.* Head of Spencer's Gulf.

## Fam. PLANAXIDÆ.

The only species of this family hitherto met with in South Australia belong to Mr. A. Adams's genera *Alaba* and *Diala*, which are nearly related to *Litiopa*.

## 108. \*ALABA PULCHRA.

*Alaba pulchra*, A. Adams, Ann. Nat. Hist. Oct. 1862, p. 296.

*Station.* Amongst seaweed and *Zostera*, in 2 fathoms' water.

*Hab.* Port Adelaide, amongst the seaweed brought up in shrimp-ing-nets.

## 109. ALABA MONILE.

*Alaba monile*, A. Adams, Ann. Nat. Hist. Oct. 1862, p. 296.

*Station.* Unknown.

*Hab.* Port Lincoln, in shell-sand.

## 110. \*ALABA PAGODULA.

*Alaba pagodula*, A. Adams, Ann. Nat. Hist. Oct. 1862, p. 297.

*Station.* Unknown.

*Hab.* St. Vincent's Gulf, in shell-sand.

## 111. \*DIALA LAUTA.

*Diala lauta*, A. Adams, Ann. Nat. Hist. Oct. 1862, p. 298.

*Station.* Amongst seaweed, in 2 fathoms.

*Hab.* St. Vincent's Gulf. Often in shell-sand at the head of Spencer's Gulf, along with *Truncatella* and *Bittium* in vast numbers.

## 112. DIALA SUTURALIS.

*Diala suturalis*, A. Adams, Ann. Nat. Hist. Oct. 1862, p. 298.

*Station.* Unknown.

*Hab.* St. Vincent's Gulf, in shell-sand.

113. *DIALA RUFILABRIS.*

*Diala rufilabris*, A. Adams, Ann. Nat. Hist. Oct. 1862, p. 298.

*Station.* Unknown.

*Hab.* Port Lincoln.

## Fam. RISSOIDÆ.

114. *RISSOINA D'ORBIGNYI?*

*Rissoina d'orbignyi*, A. Adams, Proc. Zool. Soc. 1851, p. 265.

This species, which occurs in shell-sand, appears to be identical with *R. d'orbignyi* of A. Adams; but all the specimens are too much worn to be identified with certainty.

## Fam. TURRITELLIDÆ.

115. *TORCULA CLATHRATA.*

*Turritella clathrata*, Kiener, Icon. Coq. Viv. p. 38, pl. 14. f. 1.

*Station.* Deep water.

*Hab.* St. Vincent's and Spencer's Gulfs. Found also in Tasmania; and Twofold Bay, New South Wales.

Mr. Reeve gives a figure of this species from a specimen in the Metcalfe collection, "habitat unknown" (Conch. Icon., *Turritella*, f. 37).

## Fam. VERMETIDÆ.

116. *TENAGODA AUSTRALIS.*

*Siliquaria australis*, Quoy et Gaim. Voy. de l'Astrol.

*Station.* Gregarious, imbedded in the roots of *Fuci*.

*Hab.* St. Vincent's Gulf.

117. *TENAGODA TAHITENSIS.*

*Tenagoda tahitensis*, Mörch.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

117a. *THYLACODES SULCATUS.*

*Thylacodes sulcatus*, Mörch, Proc. Zool. Soc. 1862, p. 68.

*Serpula sulcata*, Lam. Anim. sans Vert. 1818, v. p. 367.

*Vermetus novæ-hollandiæ*, Rouss.; Chenu, Ill. pl. 1. f. 4.

*Station.* On *Pinnæ*.

*Hab.* Head of Spencer's Gulf.

## Fam. CALYPTREIDÆ.

118. \**CRYPTA (IANACHUS) IMMERSA.*

*Crepidula immersa*, Angas, Proc. Zool. Soc. 1865, p. 57.

*Station.* Attached to dead shells in deep water.

*Hab.* St. Vincent's and Spencer's Gulfs.

## Fam. CAPULIDÆ.

## 119. CAPULUS DANIELI.

*Capulus danieli*, Crosse, Revue et Mag. de Zool. 1858, pl. 3. f. 2.

*Station.* Adhering to Pectens and other shells in deep water.

*Hab.* St. Vincent's Gulf; Port Lincoln.

This beautifully coloured species appears to be identical with the one from New Caledonia, described and figured by M. Crosse in the 'Revue et Mag. de Zool.' At Port Lincoln there occurs a pure-white variety.

## 120. CAPULUS SUBFUSCUS.

*Capulus subfuscus*, Gray, MS.; Brit. Mus. Coll.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

## 121. COCHLOLEPAS FOLIACEA.

*Hipponyx foliacea*, Quoy, Voy. de l'Astrol. iii. pl. 72. f. 41-45.

*Station.* On stones, below tide-mark.

*Hab.* St. Vincent's Gulf.

## 122. AMALTHEA CONICA.

*Amalthea conica*, Schum.

*Station.* Parasitic on *Fasciolaria*, *Fusus*, and *Haliotis excavata*.

*Hab.* Spencer's and St. Vincent's Gulfs.

This shell is very variable both in form and sculpture. The *Amalthea australis* of Quoy is probably the same species.

## Fam. NERITIDÆ.

## 123. NERITA (THELIOSTYLA) ATRATA.

*Nerita atrata*, Chem. Conch. v. pl. 190. f. 1954, 1955.

*N. punctulata*, Quoy.

*Station.* On rocks between tide-marks.

*Hab.* All parts of the coast.

This black species is abundant on all parts of the southern coast of Australia, including Tasmania and New Zealand.

## Fam. TROCHIDÆ.

This family is better represented in South Australia than any other, as far as the number of species is concerned. The beautiful genus *Eutropia* (Pheasant-Shells) has its metropolis on these shores, all the large species being peculiar to extra-tropical Australia. The genera *Elenchus*, *Thalotia*, *Clanculus*, and *Trochocochlea* are also well represented, being characteristic southern forms.

## 124. EUTROPIA TRITONIS.

*Buccinum tritonis*, Chemnitz.

*B. australe*, Gmelin, Linn. Syst. Nat. p. 3490.

*Phasianella bulimoides*, Lam.

*P. varia*, Encyc. Méthod. pl. 449. f. 1.

*P. picta*, De Blainville.

*P. australis*, Deshayes.

*Station.* On sandy bottoms, amongst the vast meadows of *Zostera* that fringe the Laminarian zone.

*Hab.* St. Vincent's and Spencer's Gulfs.

This is the largest species known, and its variations of painting, in pattern and colour, are endless. Mr. Reeve's *P. venusta* is, I am pretty certain, only an ordinary variety of *Eutropia tritonis*. The species ranges from Swan River eastward to Port Phillip and Western Port; but in St. Vincent's Gulf, where it is very abundant, it appears to attain its extreme development, both as regards size and variety of markings. When the living shell is first taken from the water, nothing can exceed the depth and brilliancy of its colours; but after the animal is removed, and the shells are exposed to the air, they fade rapidly—more so, indeed, than those of any other mollusk with which I am acquainted. Although hundreds of bushels of these shells are cast on shore after a gale of wind, and many of them contain living animals, it is difficult to meet with a single perfect specimen, the delicate outer lip being generally fractured.

#### 125. EUTROPIA SANGUINEA.

*Phasianella sanguinea*, Reeve, Conch. Icon. pl. 3. f. 3.

*Station.* Deep water.

*Hab.* Encounter Bay, Kangaroo Island, and Guichen Bay.

#### 126. EUTROPIA ZEBRA.

*Phasianella zebra*, Gray, MS. in Brit. Mus.; Reeve, Conch. Icon. pl. 3. f. 4.

*Station.* Deep water.

*Hab.* Rapid Bay. Rare.

#### 127. EUTROPIA VENOSA.

*Phasianella venosa*, Reeve, Conch. Icon. pl. 3. f. 5.

*Station.* Deep water.

*Hab.* Port Elliot, Encounter Bay.

A fine, solid, characteristic species, with the last whorl much inflated. Rare.

#### 128. EUTROPIA VENTRICOSA.

*Phasianella ventricosa*, Quoy et Gaim. Voy. de l'Astrol. pl. 59. f. 8, 9.

*Station.* Deep water.

*Hab.* Encounter Bay; Guichen Bay. Rare.

#### 129. EUTROPIA RETICULATA.

*Phasianella reticulata*, Reeve, Conch. Icon. pl. 3. f. 7.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

I obtained only one specimen of this shell, which entirely agrees with Mr. Reeve's *P. reticulata*.

130. *EUTROPIA NIVOSA*, var.

*Phasianella nivosa*, Reeve, Conch. Icon. pl. 4. f. 8.

*Station.* Deep water.

*Hab.* Aldinga Bay. Rare.

131. \**EUTROPIA ANGASI*.

*Phasianella angasi*, Crosse, Journ. de Conch. 1864, p. 344, pl. 13. f. 5.

*Station.* Deep water.

*Hab.* Port Elliot. Very rare.

132. *LUNELLA UNDULATA*.

*Turbo undulatus*, Chemn. Conch. Cab. x. pl. 169. f. 1640, 1641.

*Station.* Amongst rocks at low tides.

*Hab.* On rocky coasts throughout the colony.

Generally distributed throughout extra-tropical Australia, from Swan River to New South Wales; abundant in Tasmania.

133. *SENECTUS CIRCULARIS*.

*Turbo circularis*, Reeve, Conch. Icon. pl. 10. f. 46.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf. Very rare.

134. *NINELLA STRAMINEA*.

*Helix stramineus*, Martyn, U. C. t. 71.

*Turbo torquatus*, Gmel. Syst. Nat. p. 3597.

*Turbo lamellosus*, Brod. Zool. Journ. v. p. 331.

*Station.* Rocks at low water.

*Hab.* General on rugged coasts.

This species ranges all along the southern coast of Australia. The typical form is abundant in New South Wales and New Zealand; whilst the specimens from South Australia belong to the sulcate variety (*T. lamellosus*, Brod.). The animal of this species is used as an article of food by the New Zealanders and the aborigines of New South Wales.

135. *UVANILLA SQUAMIFERA*.

*Trochus squamiferus*, Koch, in Phil. Abbild. und Besch. Conch. pl. 4. f. 9.

*Trochus fimbriatus*, var. *philippi*.

*Station.* Dredged in 2 to 3 fathoms.

*Hab.* Port Adelaide Creek.

This is a good species, quite distinct from *T. fimbriatus* and *T. urvillei* of Philippi; the latter is only the young state of *T. tentorii-formis*, Jonas.

## 136. LIOTIA AUSTRALIS.

*Delphinula australis*, Kiener, Icon. pl. 4. f. 7.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf; also Tasmania.

The type specimen was collected by Baudin, and is in the Mus. Royal, Paris.

## 137. LIOTIA SIDEREA.

*Delphinula siderea*, Reeve, Conch. Icon. pl. 5. f. 23.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

## 138. \*LIOTIA ANGASI.

*Liotia angasi*, Crosse, Journ. de Conch. 1864, p. 343, pl. 13. f. 4.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf; also Port Jackson, New South Wales.

## 139. CLANCULUS UNDATUS.

*Trochus undatus*, Lam. Encyc. Méth. pl. 447. f. 3.

*Station.* Deep water.

*Hab.* Rivoli Bay.

This is by far the largest species of *Clanculus* occurring in South Australia.

## 140. CLANCULUS CONSPERSUS.

*Clanculus conspersus*, A. Adams, Proc. Zool. Soc. 1851, p. 163.

*Station.* Under stones beyond tide-marks.

*Hab.* St. Vincent's Gulf; Tasmania.

## 141. \*CLANCULUS YATESI.

*Clanculus yatesi*, Crosse, Journ. de Conch. 1863, p. 379, pl. 13. f. 1.

*Station.* Same as the preceding species.

*Hab.* St. Vincent's Gulf.

## 142. CLANCULUS VARIEGATUS.

*Clanculus variegatus*, A. Adams, Proc. Zool. Soc. 1851, p. 160.

*Station.* Under rocks and stones at low tide.

*Hab.* Guichen Bay; Port Elliot.

Mr. Cuming has this species from the Philippines.

## 143. CLANCULUS GIBBOSUS.

*Clanculus gibbosus*, A. Adams, Proc. Zool. Soc. 1851, p. 162.

*Station.* Under rocks and stones, low tides.

*Hab.* Guichen Bay (large specimens); Port Jackson (small variety); New Ireland (*Jukes*).

## 144. CLANCULUS RUBENS.

*Clanculus rubens*, A. Adams.



*Station.* Stones beyond tide-marks.

*Hab.* St. Vincent's Gulf.

This pretty little red species occurs somewhat plentifully on the shores of the gulf, in a dead state.

145. *CLANCULUS NODO-LIRATUS.*

*Clanculus nodo-liratus*, A. Adams, Proc. Zool. Soc. 1851, p. 163.

*Station.* Same as preceding.

*Hab.* St. Vincent's Gulf; Port Phillip.

146. *CLANCULUS MACULOSUS.*

*Clanculus maculosus*, A. Adams, Proc. Zool. Soc. 1851, p. 160.

*Station.* Same as preceding.

*Hab.* St. Vincent's Gulf. Rare.

147. *EUCHELUS BACCATUS.*

*Monodonta baccata*, Menke, Moll. Nov. Holl. p. 14. no. 51.

*Station.* Under stones, low water.

*Hab.* St. Vincent's and Spencer's Gulfs.

148. *THALOTIA CONICA.*

*Thalotia conica*, Gray.

*Station.* Feeding amongst the *Zostera*, beyond tide-marks, in great abundance, on sandy shores.

*Hab.* St. Vincent's Gulf.

149. \**THALOTIA ABNORMIS.*

*Trochus abnormis*, Crosse, Journ. de Conch. 1864, p. 341, pl. 13. f. 2.

*Station.* Amongst the *Zostera*.

*Hab.* St. Vincent's Gulf.

150. *THALOTIA PICTA.*

*Trochus pictus*, Wood, Ind. Test. Suppl. pl. 5. f. 28.

*Station.* Amongst rocks beyond tide-marks.

*Hab.* St. Vincent's Gulf.

151. *THALOTIA PULCHERRIMA.*

*Trochus pulcherrimus*, Wood, Ind. Test. pl. 6. f. 45.

*Station.* Deep water.

*Hab.* Holdfast Bay; Aldinga Bay.

152. \**THALOTIA RAMBURI.*

*Trochus ramburi*, Crosse, Journ. de Conch. 1864, p. 342, pl. 13. f. 3.

*Station.* Amongst rocks beyond tide-marks.

*Hab.* Middleton, near Port Elliot, Encounter Bay.

This lovely species, remarkable for its deep coral-red colour, marked with white longitudinal flames, occurs pretty freely at the above-named locality.

## 153. ZIZIPHINUS ARMILLATUS.

*Trochus armillatus*, Wood, Ind. Test. Suppl. pl. 9. f. 5.

*Station.* Deep water.

*Hab.* Encounter and Guichen Bays.

This fine species is also found in Tasmania.

## 154. ZIZIPHINUS CHLOROSTOMUS.

*Trochus chlorostomus*, Menke, Moll. Nov. Holl. p. 17.

*Station.* Deep water.

*Hab.* Salt Creek and Troubridge Shoal, east coast of Yorke's Peninsula; Spencer's Gulf. Rare.

A beautifully sculptured and delicately coloured species, differing from the typical form in having the outer lip somewhat thickened, and strongly crenulated or grooved within, as in *Thalotia* and *Elenchus*. This species ranges westward towards Swan River.

## 155. ZIZIPHINUS NOBILIS.

*Trochus nobilis*, Philippi, Küster, Conch. Cab. p. 86, pl. 15. f. 6.

*Station.* Probably deep water.

*Hab.* St. Vincent's Gulf. Very rare.

I obtained a single specimen only of this very charming species on the beach at Aldinga Bay. It is also found at Swan River, on the west coast of New Holland.

## 156. \*ZIZIPHINUS BLANDIANUS.

*Trochus blandianus*, Crosse, Journ. de Conch. 1864, p. 339, pl. 13. f. 1.

*Station.* Probably deep water.

*Hab.* St. Vincent's Gulf. Very rare.

A very interesting species (somewhat similar in character to *Z. chlorostomus*), of which a single example only has been found.

## 157. \*CANTHIRIDUS DECORATUS.

*Canthiridus decoratus*, Ad. & Ang. Proc. Zool. Soc. 1864, p. 37.

*Station.* Deep water.

*Hab.* Yorke's Peninsula. Very rare.

## 158. ELENCHUS BADIUS.

*Trochus badius*, Wood, Ind. Test. Suppl. pl. 6. f. 46.

*Station.* Deep water.

*Hab.* Encounter Bay; also Port Phillip and Tasmania.

## 159. ELENCHUS LINEATUS.

*Monodonta lineata*, Lam. Hist. Anim. sans Vert. vii. p. 38.

*Station.* Deep water.

*Hab.* Aldinga Bay.

Some of the specimens of this species from Tasmania are beautifully variegated.

## 160. ELENCHUS APICINUS.

*Monodonta apicina*, Menke, Moll. Nov. Holl. p. 15.

*Station.* Deep water.

*Hab.* Aldinga Bay.

An exquisite species, with the pearly interior of a cerulean-blue colour.

## 161. ELENCHUS LEUCOSTIGMA, var.

*Trochus leucostigma*, Menke, Phil. Abbild. t. 7. f. 7.

*Canthiridus variegatus*, Gray.

*Station.* Deep water.

*Hab.* Encounter Bay (red variety).

## 162. ELENCHUS VIRGULATUS.

*Trochus virgulatus*, Phil.

*Station.* Crawling amongst the *Zostera* beyond tide-marks.

*Hab.* St. Vincent's Gulf.

## 163. ELENCHUS BELLULUS.

*Trochus bellulus*, Dunker, Phil. Abbild. t. 7. f. 6.

*Station.* Same as the preceding.

*Hab.* St. Vincent's Gulf.

This species, so remarkable for its porcelain-like style of painting, is very common in St. Vincent's Gulf.

## 164. ELENCHUS IRISODONTES.

*Trochus irisodontes*, Quoy et Gaim. Voy. de l'Astrol. iii. p. 246, pl. 63. f. 7-12.

*Monodonta virgata*, Menke.

*Station.* Along with *E. bellulus*.

*Hab.* St. Vincent's Gulf; also Tasmania.

Of this pretty green species, with the outer coat removed, the natives of Tasmania formerly made pearly necklaces with which to adorn their persons.

## 165. LEIOPYRGA PICTURATA.

*Leiopyrga picturata*, H. & A. Adams, Ann. and Mag. Nat. Hist., Jan. 1863, p. 19.

*Station.* 3 to 4 fathoms, on sand.

*Hab.* St. Vincent's Gulf.

This species is also found in Middle Harbour, Port Jackson, New South Wales. *Leiopyrga cingulata*, A. Adams, occurs at Port Es-sington.

## 166. BANKIVIA PURPURASCENS.

*Bankivia purpurascens*, Beck; Deshayes, Manuel de Conch.

*B. varians*, Gray, MS. Brit. Mus.

*Station.* 3 or 4 fathoms, on sand.

*Hab.* St. Vincent's and Spencer's Gulfs.

This species is very abundant on all the shores of extra-tropical

Australia. It varies in colour from grey to white, brown, purple, and rose, besides being banded and striped in an infinity of patterns. *B. major*, A. Adams, occurs in Tasmania.

167. *MINOLIA VITILIGINEA*.

*Trochus vitiligineus*, Menke, Moll. Nov. Holl. p. 18.

*Station*. Deep water.

*Hab*. Yankalilla, St. Vincent's Gulf.

A rare and beautiful species, delicately painted with olive and rose-colour. A small variety occurs in Middle Harbour, Port Jackson, in 3 to 4 fathoms.

168. *GIBBULA PREISSIANA*.

*Trochus preissii*, Menke, Moll. Nov. Holl. p. 17.

*Station*. Deep water.

*Hab*. Aldinga Bay; St. Vincent's Gulf.

169. *TROCHOCOCHLEA TÆNIATA*.

*Trochus tæniatus*, Quoy et Gaim. Voy. de l'Astrol. p. 249, pl. 63. f. 15-17.

*Station*. On seaweed in estuaries.

*Hab*. Salt Creek, Yorke's Peninsula.

170. *TROCHOCOCHLEA STRIOLATA*.

*Trochus striolatus*, Quoy et Gaim. Voy. de l'Astrol. p. 253, pl. 63. f. 18-22.

*Station*. On rocks and stones, low water.

*Hab*. All parts of the coast.

This species is also Tasmanian.

171. *TROCHOCOCHLEA CONSTRICTA*.

*Monodonta constricta*, Lam. Hist. Anim. sans Vert. vii. p. 36.

*M. interrupta*, Menke.

*Station*. On stones between tide-marks.

*Hab*. Yorke's Peninsula; Aldinga Bay; also Tasmania and Bass's Straits.

172. *LABIO AUREUS*.

*Labio aureus*, Jonas, Zeit. f. Malak. 1844.

*Station*. On stones and seaweed in deep water.

*Hab*. St. Vincent's Gulf; Tasmania (large specimens).

173. *DILOMA ODONTIS*.

*Trochus odontis*, Wood, Ind. Test. Suppl. pl. 6. f. 37.

*Station*. On rocks at low water.

*Hab*. St. Vincent's Gulf; Port Phillip, and Tasmania.

174. *STOMATELLA IMBRICATA*.

*Stomatella imbricata*, Lam. Encyc. Méth. pl. 450. f. 2.

*Station.* Under stones at low water.

*Hab.* Spencer's and St. Vincent's Gulfs, and Kangaroo Island.

This species is frequent also in Port Jackson and all along the coast of New South Wales.

175. *GENA AURICULA.*

*Stomatia auricula*, Lam. Encyc. Méth. pl. 450. f. 1.

*Station.* Under stones at low water; and on sandy mud at 4 to 5 fathoms.

*Hab.* Salt Creek, Yorke's Peninsula.

This species is abundant under stones in Port Jackson, New South Wales. The variations in colour are endless.

Fam. HALIOTIDÆ.

176. *HALIOTIS RUGOSO-PLICATA.*

*Haliotis rugoso-plicata*, Chem. Conch. Cab. x. p. 311, pl. 116. f. 1604.

*H. australis*, Gmel.

*Station.* On rocks, low water.

*Hab.* Aldinga Bay; Kangaroo Island.

177. *HALIOTIS EXCAVATA.*

*Haliotis excavata*, Lam. Anim. sans Vert. ix. p. 25.

*Station.* Deep water, adhering to stones and oyster-shells.

*Hab.* Port Lincoln; Holdfast Bay; Kangaroo Island.

This species is frequently covered with the parasitic *Amalthea conica*.

178. *HALIOTIS NÆVOSA.*

*Haliotis nævosa*, Martyn, Univ. Conch. v. t. 11. f. 63.

*H. ruber*, Leach.

*Station.* On rocks at low tides.

*Hab.* Port Elliot; Kangaroo Island.

179. *HALIOTIS COCCORADIATA.*

*Haliotis coccoradiata*, Reeve, Proc. Zool. Soc. 1846, p. 55.

*Station.* Under stones, low water.

*Hab.* St. Vincent's and Spencer's Gulfs.

This pretty little species is also found in New South Wales.

180. *HALIOTIS ALBICANS.*

*Haliotis albicans*, Quoy et Gaim. Voy. de l'Astrol. iii. p. 311, pl. 68. f. 1, 2.

*Station.* On rocks exposed to the surf on bold coasts.

*Hab.* Kangaroo Island, &c.

181. *PADOLLUS RUBICUNDUS.*

*Padollus rubicundus*, De Montfort.

*P. scalaris*, Leach.

*Haliotis tricostalis*, Lam.  
*H. canaliculata*, Schreb. & Wag.  
 Station. Deep water.  
 Hab. St. Vincent's Gulf.

182. PADOLLUS EMMÆ.  
*Haliotis emmæ*, Gray, MS. Brit. Mus.  
 Station. Deep water.  
 Hab. Port Lincoln; Guichen Bay.

183. PADOLLUS (SULCULUS) PARVUS.  
*Haliotis parva*, Linn. Syst. Nat. p. 1256.  
*H. canaliculata*, Lamarck.  
 Station. Deep water.  
 Hab. St. Vincent's Gulf. Very rare.

184. TEINOTIS ELEGANS.  
*Haliotis elegans*, Koch; Philippi, Abbild. und Besch. Conch.,  
*Haliotis*, pl. 1. f. 1, 2.  
 Station. Unknown.  
 Hab. St. Vincent's Gulf. Very rare.

#### Fam. FISSURELLIDÆ.

185. FISSURELLA NIGRITA.  
*Fissurella nigrita*, G. B. Sowerby, Proc. Zool. Soc. 1834, p. 127.  
 Station. Deep water.  
 Hab. Encounter Bay; also Tasmania.

186. \*FISSURELLA OMICRON.  
*Fissurella omicron*, Crosse et Fisch. Journ. de Conch. 1864,  
 p. 348, pl. 3. f. 4-6.  
 Station. Under stones, low tides.  
 Hab. Spencer's Gulf.

187. \*FISSURELLA CONCATENATA.  
*Fissurella concatenata*, Crosse et Fisch. Journ. de Conch. 1864,  
 p. 348, pl. 3. f. 1 & 3.  
 Station. Under stones, low tides.  
 Hab. Port Lincoln.

188. GLYPHIS JUKESI.  
*Fissurella jukesi*, Reeve, Conch. Icon.  
 Station. Dredged at 3 fathoms.  
 Hab. Port Lincoln; Port Adelaide Creek.

Of this large, elegant, and richly sculptured species two examples were obtained by the author—one at each of the above-named localities.

## 189. MACROCHISMA PRODUCTA.

*Macrochisma producta*, A. Adams, Proc. Zool. Soc. 1850, p. 202.

*Station.* Deep water.

*Hab.* Port Lincoln.

## 190. EMARGINULA CANDIDA.

*Emarginula candida*, A. Adams, Thes. Conch. pt. 22.

*Station.* Under stones, low-water spring tides.

*Hab.* St. Vincent's Gulf.

This species also occurs in Port Jackson.

## 191. EMARGINULA (HEMITOMA) AUSTRALIS.

*Emarginula australis*, Quoy, Voy. de l'Astrol.

*Station.* Deep water.

*Hab.* St. Vincent's and Spencer's Gulfs.

## 192. EMARGINULA (HEMITOMA) RUGOSA.

*Emarginula rugosa*, Quoy, Voy. de l'Astrol.

*Station.* Under rocks and stones, low water.

*Hab.* Port Lincoln, &c.

This species, which varies considerably, and has been described under several different names by authors, is found also in Tasmania and New South Wales. The young shells are green.

## 193. SCUTUS UNGUIS.

*Parmophorus unguis*, Linn.

*Station.* Under rocks at low water.

*Hab.* Port Lincoln. Rare.

*Scutus elongatus*, Lam. (a nearly allied species), is abundant in New South Wales.

## 194. TUGALIA PARMOPHORIDEA.

*Emarginula parmophoridea*, Quoy, Voy. de l'Astrol. iii. pl. 68. f. 15, 16.

*Station.* Deep water, under stones.

*Hab.* Port Lincoln; also New Zealand.

## 195. TUGALIA CICATRICOSA.

*Tugali cicatricosa*, A. Adams, Proc. Zool. Soc. 1851, p. 89.

*Station.* Deep water.

*Hab.* Port Lincoln, one specimen dredged; Philippines (*Cuming*).

## Fam. PATELLIDÆ.

## 196. PATELLA LIMBATA.

*Patella limbata*, Phil.

*Station.* On rocks between tide-marks.

*Hab.* Port Lincoln.

A large coarse species, somewhat allied to *P. tramoserica* of New South Wales.

196a. \**PATELLA LATISTRIGATA*.

*Patella latistrigata*, Angas, Proc. Zool. Soc. 1865, p. 154.

*Station*. On stones between tide-marks.

*Hab*. Aldinga Bay.

197. \**PATELLA ALTICOSTATA*.

*Patella alticostata*, Angas, Proc. Zool. Soc. 1865, p. 56.

*Station*. On rocks at low water.

*Hab*. Port Lincoln.

198. \**PATELLA GEALEI*.

*Patella gealei*, Angas, Proc. Zool. Soc. 1865, p. 57.

*Station*. On rocks at low water.

*Hab*. St. Vincent's Gulf.

Fam. *ACMÆIDÆ*.199. *ACMÆA CONOIDEA*.

*Patelloida conoidea*, Quoy, Voy. de l'Astrol. iii. pl. 71. f. 5-7.

*Station*. On stones at low water.

*Hab*. Port Lincoln.

200. \**ACMÆA CALAMUS*.

*Patella calamus*, Crosse et Fisch. Journ. de Conch. 1864, p. 348,  
pl. 3. f. 7, 8.

*Station*. On stones at low water.

*Hab*. Port Lincoln.

201. \**ACMÆA SCABRILIRATA*.

*Acmæa scabrilirata*, Angas, Proc. Zool. Soc. 1865, p. 154.

*Station*. On stones at low water.

*Hab*. Holdfast Bay, St. Vincent's Gulf; Hobson's Bay, Victoria  
(*Archer*).

202. \**ACMÆA SUBUNDULATA*.

*Acmæa subundulata*, Angas, Proc. Zool. Soc. 1865, p. 155.

*Station*. Between tide-marks.

*Hab*. Port Lincoln; Hobson's Bay, Victoria (*Archer*).

Fam. *CHITONIDÆ*.203. *LOPHYRUS MURICATUS*.

*Lophyrus muricatus*, A. Adams.

*Station*. Under stones at low water.

*Hab*. Port Lincoln. Rare.

204. *LOPHYRUS TULIPA*.

*Chiton tulipa*, Quoy, Voy. de l'Astrol.

*Station*. Under stones at low water.

*Hab*. Port Lincoln.



205. *LEPIDOPLEURUS LONGICYMBA.*

*Chiton longicymba*, Blainv. ; Sow. Conch. Ill. f. 67.

*Station.* Under stones at low water.

*Hab.* Common on most rocky shores. At Yorke's Peninsula a small green variety occurs abundantly, under small stones near Salt Creek. At Aldinga Bay, most of the specimens taken have a broad white dorsal stripe.

This species is frequent in Sydney Harbour ; also in Tasmania, in company with the nearly allied *C. fruticosus*, Gould. Both species are subject to great variation in colour and style of painting.

206. \**LEPIDOPLEURUS VARIEGATUS.*

*Lepidopleurus variegatus*, H. Ad. & Ang. Proc. Zool. Soc. 1864, p. 192.

*Station.* Under stones, low water.

*Hab.* Yorke's Peninsula. Rare.

207. \**LEPIDOPLEURUS SPECIOSUS.*

*Lepidopleurus speciosus*, H. Ad. & Ang. Proc. Zool. Soc. 1864, p. 192.

*Station.* Rocks and stones, low water.

*Hab.* Port Lincoln.

208. \**LEPIDOPLEURUS LIRATUS.*

*Lepidopleurus liratus*, H. Ad. & Ang. Proc. Zool. Soc. 1864, p. 192.

*Station.* Under stones, low water.

*Hab.* Yorke's Peninsula. Rare.

209. \**CHÆTOPLEURA CONSPERSA.*

*Chætopleura conspersa*, H. Ad. & Ang. Proc. Zool. Soc. 1864, p. 193.

*Station.* Under rocks.

*Hab.* Port Lincoln.

A beautiful and rare species.

210. \**LORICA ANGASI.*

*Lorica angasi*, H. Adams, Proc. Zool. Soc. 1864, p. 193.

*Station.* Deep water.

*Hab.* Rapid Bay. Rare.

Another fine species of *Lorica* (*L. cimolia*, Reeve) occurs in Port Jackson.

211. *PLAXIPHORA CILIATA.*

*Chiton ciliatus*, Sow. Conch. Ill. f. 79.

*Station.* On rocks, low water.

*Hab.* Guichen Bay.

This is the largest of the South-Australian *Chitonidæ*.

212. *PLAXIPHORA PETHOLATA.*

*Chiton petholatus*, Sow. Conch. Ill. f. 65, 66.

*Station.* On rocks at low tide.

*Hab.* Port Lincoln ; Aldinga Bay, &c.

## 213. \*STENOCHITON JULOIDES.

*Stenochiton juloides*, Ad. & Ang. Proc. Zool. Soc. 1864, p. 193.

*Station.* Deep water, adhering to *Zostera*.

*Hab.* St. Vincent's Gulf.

This very interesting new form is the only species at present known belonging to the genus *Stenochiton* of H. Adams & Angas.

## 214. \*HANLEYA VARIABILIS.

*Hanleya variabilis*, H. Ad. & Ang. Proc. Zool. Soc. 1864, p. 194.

*Station.* Under stones, low water.

*Hab.* Yorke's Peninsula.

## 215. ACANTHOCHITES SCUTIGER.

*Acanthochites scutiger*, Adams & Reeve, Voy. Samarang.

*Station.* Under stones.

*Hab.* Port Lincoln.

## 216. CRYPTOPLAX GUNNI.

*Chitonellus gunni*, Reeve, Conch. Icon. f. 5.

*Station.* Adhering to the under surface of large stones at very low tides.

*Hab.* Port Lincoln.

This species is also found in New South Wales and Tasmania.

## Fam. CYLICHNIDÆ.

## 217. \*UTRICULUS EUMICRA.

*Bulla eumicra*, Crosse, Journ. de Conch. 1865, pl. 2. f. 7.

*Station.* Unknown.

*Hab.* Spencer's Gulf, on the beach, in shell-sand.

## Fam. BULLIDÆ.

## 218. BULLA AUSTRALIS.

*Bulla australis*, Quoy, Voy. de l'Astrol. pl. 26. f. 38, 39.

*Station.* On sandy mud, 2 to 5 fathoms.

*Hab.* Spencer's and St. Vincent's Gulfs.

This common species ranges throughout the southern shores of Australia, from Swan River to Port Jackson.

## 219. HAMINEA CYMBALUM.

*Bulla cymbalum*, Quoy, Voy. de l'Astrol. ii. pl. 26. f. 27.

*Station.* Deep water.

*Hab.* Port Lincoln.

## 220. HAMINEA BREVIS.

*Bulla brevis*, Quoy, Voy. de l'Astrol. iii. pl. 26. f. 36, 37.

*Station.* Deep water.

*Hab.* Port Lincoln.

## 221. AKERA SOLUTA.

*Bulla soluta*, Chemn. ; Mart. Hist. Conch. x. t. 46. f. 1359-1361.

*B. ceylanica*, Brug. Encyc. Méth. i. p. 376.

*B. flexilis*, Brown.

*Station.* Sandy mud, 2 fathoms.

*Hab.* Port Lincoln ; Hardwick Bay ; Botany Bay, New South Wales ; Zanzibar (*Thorne*) ; Philippines (*Cuming*).

## Fam. PHILINIDÆ.

## 222. \*PHILINE ANGASI.

*Bulla angasi*, Crosse, Journ. de Conch. 1865, pl. 2. f. 8.

*Station.* Sandy and muddy flats beyond tide-marks.

*Hab.* St. Vincent's and Spencer's Gulfs.

This species has a wide range, being found also in Port Jackson and at Swan River.

## Fam. LOPHOCERCIDÆ.

## 223. \*CYLINDROBULLA FISCHERI.

*Cylindrobulla fischeri*, Ad. & Ang. Proc. Zool. Soc. 1864, p. 37.

*Station.* Unknown.

*Hab.* Spencer's Gulf, in shell-sand.

The only other described species of this genus inhabits Guadeloupe, and is of a green colour.

## Fam. AMPHIBOLIDÆ.

## 224. AMPULLARINA QUOYANA.

*Ampullarina quoyana*, Desh.

*Station.* In mangrove-creeks, on the mud.

*Hab.* Port Adelaide, and head of Spencer's Gulf.

## 225. AMPULLARINA FRAGILIS.

*Ampullacera fragilis*, Quoy, Voy. de l'Astrol.

*Paludina fragilis*, Sow.

*Station.* In mangrove-creeks, on the mud.

*Hab.* Port Adelaide.

## Fam. SIPHONARIIDÆ.

## 226. SIPHONARIA BACONI.

*Siphonaria baconi*, Reeve, Conch. Icon. *Siphonaria*, pl. 6. f. 30.

*Station.* On stones at low water.

*Hab.* Yorke's Peninsula.

## 227. SIPHONARIA DIEMENENSIS.

*Siphonaria diemenensis*, Quoy, Voy. de l'Astrol. ii. p. 327, pl. 25. f. 1-12.

*Station.* On rocks and stones between tide-marks.

*Hab.* Spencer's and St. Vincent's Gulfs ; also Tasmania.

## 228. SIPHONARIA SCABRA.

*Siphonaria scabra*, Reeve, Conch. Icon. *Siphonaria*, pl. 1. f. 1.

*Station.* On rocks between tide-marks.

*Hab.* Spencer's and St. Vincent's Gulfs.

This common species is abundant in Port Jackson.

## 229. SIPHONARIA LUZONICA.

*Siphonaria luzonica*, Reeve, Conch. Icon. *Siphonaria*, pl. 6. f. 29.

*Station.* Near low water.

*Hab.* St. Vincent's Gulf.

Mr. Cuming has specimens from the Philippines.

## HETEROPODA ?

## Fam. IANTHINIDÆ.

## 230. IANTHINA VIOLACEA.

*Ianthina violacæa*, Bolten, Verg. p. 93. no. 953 (1798).

*Station.* Pelagic.

*Hab.* South Australia; Indian and Pacific Oceans.

## 231. IANTHINA EXIGUA.

*Ianthina exigua*, Lam. Anim. sans Vert. vi. p. 206.

*I. bifida*, Nuttall, Jay's Cat. p. 295.

*I. capreolata*, Montrouzier, Journ. de Conch. 1860, pl. 2. f. 4.

*Station.* Pelagic.

*Hab.* South Australia; New South Wales; New Zealand; New Caledonia (*Montrouzier*); Sandwich Islands (*Nuttall*).

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February 14th, 1865.

Dr. J. E. Gray, F.R.S., in the Chair.

The Secretary read the following letter, addressed by Dr. H. Burmeister, of Buenos Ayres (Foreign Member), to Dr. J. E. Gray, containing the description of a new species of Whale, proposed to be called *Balænoptera patachonica*, together with some particulars as to specimens of certain other Cetacea in the Museum of Buenos Ayres.

Dr. Gray stated, in reference to the new Whale, that it was of much interest as being the first well-described Fin-Whale from the southern hemisphere. Dr. Gray considered it evidently a typical species of the genus *Physalus*, distinguishable from all the northern species by the shortness of the lateral rings compared with the diameter of the bodies of the cervical vertebræ.

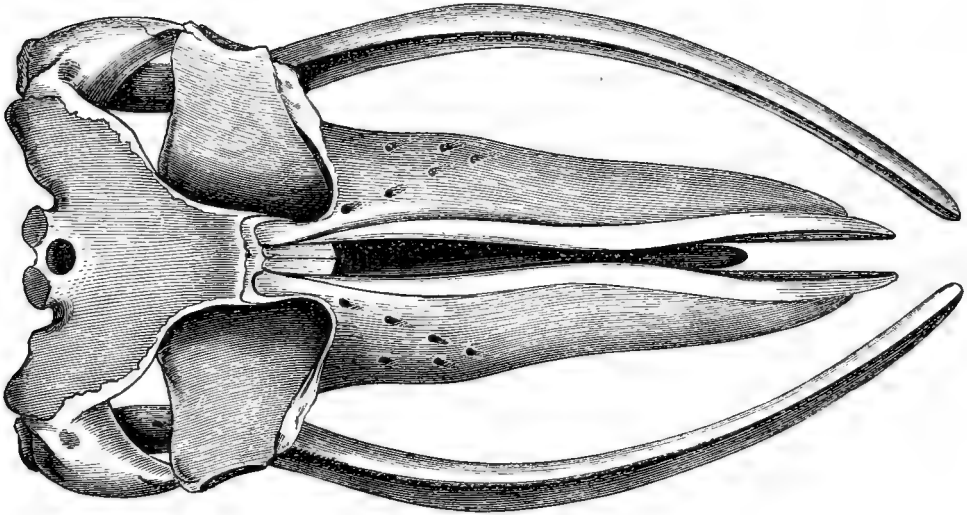
“Buenos Ayres, 22nd December, 1864.

“I now send you drawings of the Whale in the Buenos Ayres Museum, drawn by myself, and, as I believe, exact to nature.

“Fig 1. The skull. We have two specimens—one complete, the other consisting only of the hinder part, without the jaws. In the former the upper jaws are no longer in position, but separated from the cranium, and therefore little importance can be attached to the width of the opening between the intermaxillary bones in the anterior part of the cleft between them; it may be somewhat exaggerated. All the other parts are entirely exact from nature, and well preserved.

“Length of the intermaxillary, 7 feet 2 inches; length of the maxillary, 7 feet; length of the under jaw, 10 feet 2 inches. Breadth of the frontal bones between the orbits, 5 feet; breadth of the vertex behind, 2 feet 8 inches.

Fig. 1.



Skull seen from above.

“The baleen is entirely black, without any other colour. We have two kinds in the Museum—one 5½ feet and the other 1 foot 8 inches in length. This last only may be from the *Balænoptera*; the other perhaps from a *Balæna*, because it is much more slender and more fringed.

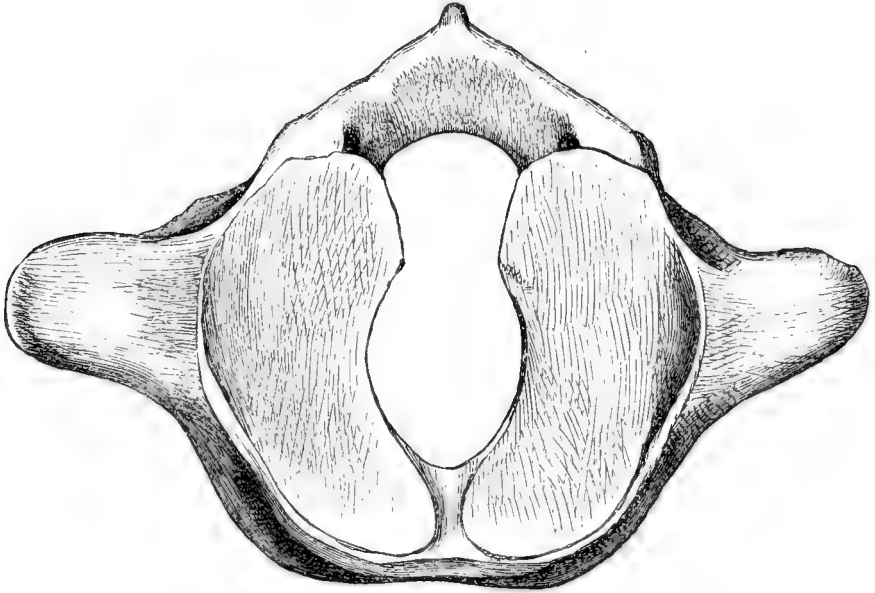
“Comparing my drawing (fig. 1) with that of Cuvier from the Cape *Balænoptera* (Oss. Foss. pl. 26. fig. 2), you will find that the suture between the frontal bone and the parietal is situated much more towards the external part of the frontal bone, being in my skull exactly in the angle where both bones are united, and therefore not seen from above in my drawing. Another difference of the species is indicated by the longitudinal carina in the vertex of the Cape species, there being no trace of such carina in either of my specimens.

“Unfortunately the tympanic bones are wanting in both, and I can tell you nothing of them. But the zygomatic bone is preserved,

and is of the same form as that figured in Cuvier's work, figs. 1 and 3, but somewhat smaller than the latter figure.

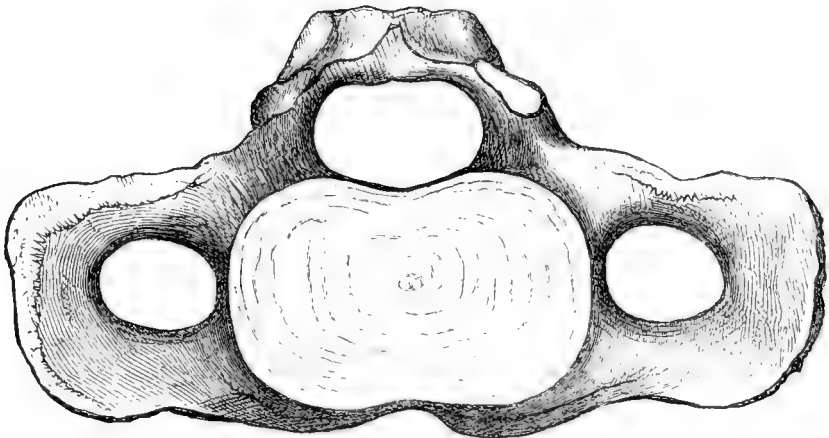
“The seven cervical vertebræ are free, separate from each other, and the body of every one has the epiphyses on each side, the specimen being that of a young individual. But in the atlas and front side of the axis these epiphyses do not exist. I send you drawings of the first (fig. 2), the second (fig. 3), the fourth (fig. 4), and the sixth (fig. 5) vertebræ; the third exactly resembles the fourth, and the fifth only differs in a small opening in the lateral arc, indicated in my drawing of the fourth, on the left side. The seventh has no inferior

Fig. 2.



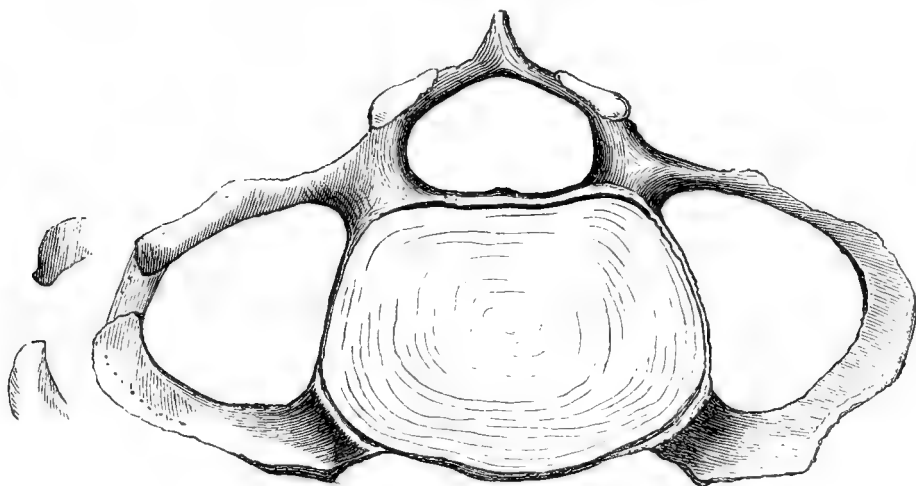
First cervical vertebra.

Fig. 3.



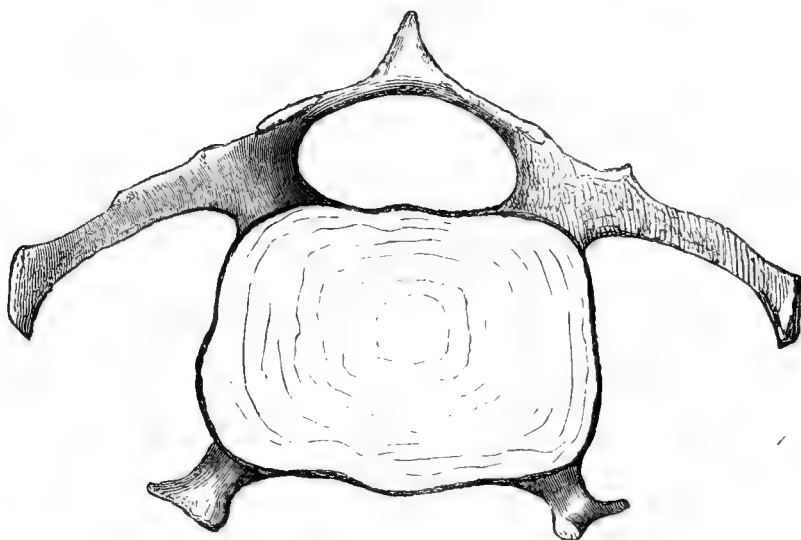
Second cervical vertebra.

Fig. 4.



Fourth cervical vertebra

Fig. 5.



Sixth cervical vertebra.

process at all, but a much stronger superior one, of the same form. All the five vertebræ after the second are very thin, 2 inches in diameter, the third being the thinnest of all, and the following ones somewhat thicker; the seventh is  $2\frac{1}{4}$  inches in thickness.

“Of costal or dorsal vertebræ we have fourteen, very well indicated by the flattened end of the transverse processes being united with the ribs. The first of these dorsal vertebræ is very thin, 3 inches in diameter; and the second somewhat thicker,  $3\frac{1}{2}$  inches; after these

the bodies are much stronger, from 6 to 8 inches in diameter. The three first dorsal vertebræ have transverse processes more rounded, and directed forward. After the third they are more flat and broad, and directed transversely to the sides. After these fourteen vertebræ follow twelve others with thinner transverse processes, rounded and sharp at the end, and with bodies of much larger diameter—from 10 to 12 inches. Then follows a strong vertebra, the thirteenth, 12 inches in diameter, with a smaller and shorter transverse process, which seems to me the first caudal; but as the epiphysis is wanting, there is no attachment for the hæmapophysis on its hinder end. Indeed its body is flattened on the under side, not carinated as the body of the antecedent; which also seems to me to prove that it is the first caudal. Of hæmapophyses we have four in the Museum, of unequal size, the first 5 inches high, the largest 8 inches, and 3 to 4 inches broad between the laminæ.

“The ribs are not perfect as regards number, but the first seven or eight are preserved. I send you drawings of the upper and lower extremities of the first four (figs. 6, 7, 8, 9).

Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



“The sternum is wanting, and of the os hyoideum we have only the corpus, of precisely the same form as that figured in Cuvier’s *Oss. Foss.* pl. 25. f. 14.

“Of the pectoral fin we have only the scapula, of which I send you a drawing (fig. 10); both processes are well developed and somewhat compressed.

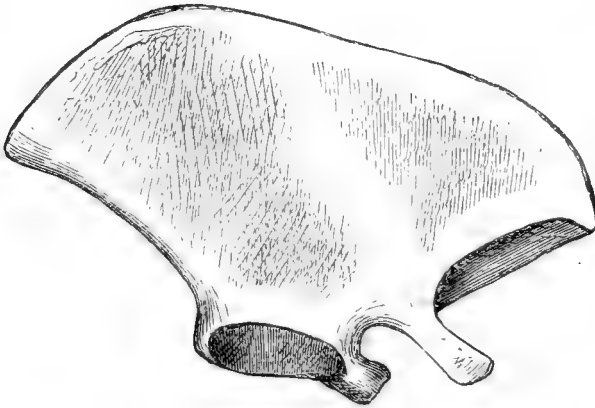
“The animal was found some leagues from Buenos Ayres, on the banks of the River Plata, where it came ashore some thirty years ago. It was brought to the gardens of Rosas, at Palermo, where the skeleton was exhibited a long time, till, after the fall of the tyrant, it was transferred to the Museum. The parts now deficient were then lost.

“I suppose that the species might be the same as that you have



indicated in your synopsis as *Balænoptera australis*, Desmoulins (Voy. Ereb. and Terror, Mamm. p. 20); but as I have never seen that animal, I am unable to speak concerning its external appearance. Therefore I believe it is better to describe the species in question under a new name, and I propose to you, if you please to accept it, that of *Balænoptera patachonica*.

Fig. 10.

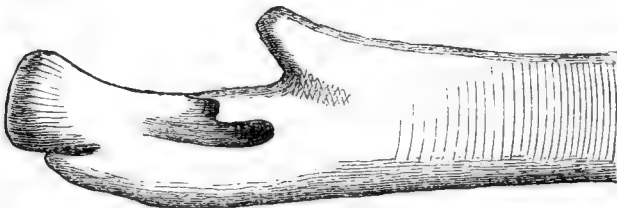


Scapula.

“Since I have received the excellent books you sent me, and for which I give you my best thanks, I have found in them figures of the two skulls of Dolphins in the Buenos Ayres Museum. The larger is your *Delphinus eurynome* (p. 38, pl. 17), and the smaller your *Delphinus microps* (p. 72, pl. 25). Both are inhabitants of the Atlantic in our latitude. The new *Phocæna* is wanting in your list. I propose to give the name *Phocæna spinipinnis* to it, from the numerous spines on the dorsal fin. We have the entire animal, with the skull, which I will examine when it is taken from the dry skin in which it is enclosed. By the next French steamer I will send you an accurate drawing and complete description of it.”

“P.S.—I have told you nothing of the under jaw of *Balænoptera patachonica*, because the surface of the bone is much destroyed by long exposure to the air, rain, and sun; but the hinder part, with the coronoid process, is represented in fig. 11.”

Fig. 11.



A letter was read, addressed to the Secretary by Prof. J. J. Bianconi, of Bologna, stating that, in the course of researches upon the osteology of the extinct genus *Apyornis*, he had come to the conclusion that that form belonged to the Vulturidæ, and not to the Struthious birds.

Mr. Alfred Newton exhibited a specimen of *Porzana carolina*, lent to him by Mr. H. S. Eyre, who had shot it, in October last, on the Kennet, near Newbury. Mr. Newton remarked that though the species of the family *Rallidæ* were, as compared with other birds, very short-winged, yet experience showed that in their flight they were gifted with considerable powers of endurance. For instance, the common Corn-Crake (*Crex pratensis*) had been known to occur once in the Bermudas, and several times on the eastern coast of the United States, as well as once in Greenland, where the species now exhibited had also been observed. In the British Museum, too, there was an example of *Tribonyx ventralis*, which was obtained by the Antarctic Expedition, when at sea, between Tasmania and Auckland Island.

Mr. Fraser read the following list of species of Mollusks recently collected by Mr. R. Swinhoe in Formosa, stating that the list had been furnished to him by Mr. Cuming, C.M.Z.S., and was that of the collection spoken of by Mr. Swinhoe in Proc. Zool. Soc. 1864, p. 382:—

- |  |  |
|--|--|
| 1. <i>Argonauta argo</i> , Linn.               | 21. <i>Ostrea glomerata</i> , Gould.             |
| 2. <i>Haliotis diversicolor</i> , Reeve.       | 22. <i>Ostrea</i> — ?                            |
| 3. <i>Unio swinhoei</i> , H. Adams<br>(new).   | 23. <i>Vusum corniger</i> , Lam.                 |
| 4. <i>Meretrix petechialis</i> , Lam.          | 24. <i>Purpurea</i> — ?                          |
| 5. <i>Pullastra philippii</i> , Desh.          | 25. <i>Lunella porcata</i> , Reeve.              |
| 6. <i>Sunetta cumingii</i> , Hanley<br>(new).  | 26. <i>Cantharidus rubiginosa</i> , Rve.         |
| 7. <i>Psamnotæa violacea</i> , Lam.            | 27. <i>Murex adustus</i> , Reeve.                |
| 8. <i>Pollicipes mitella</i> , Linn.           | 28. <i>Pentadactylus albolabris</i> ,<br>Blainv. |
| 9. <i>Septifer excisus</i> , Wiegman.          | 29. <i>Morula tuberculata</i> , Blainv.          |
| 10. <i>Crochicula fuminea</i> , Müll.          | 30. <i>Purpura bitubercularis</i> ,<br>Lam.      |
| 11. <i>Venus squamosa</i> , Lam.               | 31. — <i>hippocastanum</i> , Lam.                |
| 12. <i>Pullastra flammiculata</i> ,<br>Lam.    | 32. <i>Polydonta dentarium</i> , Chemn.          |
| 13. <i>Meretrix petechialis</i> , Lam.         | 33. <i>Chlorostoma argyrostoma</i> ,<br>Chemn.   |
| 14. <i>Cyclina chinensis</i> , Chemn.          | 34. — <i>funerale</i> , A. Adams.                |
| 15. <i>Circe gibbosa</i> , Lam.                | 35. <i>Stella columellaris</i> , Philippi.       |
| 16. <i>Meretrix albida</i> , Lister.           | 36. <i>Turbo japonicus</i> , Reeve.              |
| 17. <i>Tapes indicus</i> , Sow.                | 37. <i>Polydonta maculata</i> , Linn.            |
| 18. <i>Arca decussata</i> , Sow.               | 38. <i>Melo indicus</i> , Brod.                  |
| 19. <i>Paludina chinensis</i> , Gray.          | 39. <i>Nerita stella</i> , Chemn.                |
| 20. <i>Lithophaga canaliferus</i> ,<br>Hauley. | 40. — <i>albicilla</i> , Linn.                   |
|  | 41. — <i>polita</i> , Linn.                      |

- |   |   |
|---|---|
| 42. <i>Nerita longii</i> , Récluz.                | 71. <i>Natica petiveriana</i> , Récluz.                                   |
| 43. <i>Littorina undulata</i> , Gray.             | 72. <i>Cypræa helvola</i> , Linn.   |
| 44. — <i>carinifera</i> , Menke.                  | 73. — <i>caput-serpentis</i> , Linn.                                      |
| 45. <i>Clanculus unedo</i> , A. Adams.            | 74. — — — ?.  |
| 46. <i>Cerithium bornii</i> , Sow.                | 75. — <i>vitellus</i> , Linn.   |
| 47. <i>Cerithidea rhizoporarum</i> ,<br>A. Adams. | 76. — <i>cicercula</i> , Linn.  |
| 48. <i>Umbonium</i> (new species).                | 77. — <i>nucleus</i> , Linn.  |
| 49. <i>Triton pilearis</i> , Lam.                 | 78. <i>Patella rudis</i> .  |
| 50. <i>Planaxis sulcata</i> , Lam.                | 79. <i>Melania tenuisulcata</i> , Dun-<br>ker.                            |
| 51. <i>Monodonta melanochloris</i> ,<br>Philippi. | 80. <i>Neritina interrupta</i> , Récluz.                                  |
| 52. <i>Patella rudis</i> .                        | 81. <i>Fasciolaria trapezium</i> , Lam.                                   |
| 53. — (young shells).                             | 82. <i>Vertagus obeliscus</i> , Brug.                                     |
| 54. — <i>achates</i> , Reeve.                     | 83. <i>Helix swinhoii</i> , Pfr. (new).                                   |
| 55. — <i>argentea</i> , Quoy &<br>Gaim.           | 84. — <i>luhuana</i> , Sow.   |
| 56. } — <i>araneosa</i> , Gould.                  | 85. — <i>mackenzii</i> , Val.   |
| 57. } — — —                                       | 86. — (new), allied to <i>H.</i><br><i>chinensis</i> .                    |
| 58. } — <i>argentea</i> , Quoy &<br>Gaim.         | 87. — <i>similaris</i> , Férussac.  |
| 59. } — — —                                       | 88. —, allied to no. 88.  |
| 60. <i>Scutellina crenulata</i> , Brod.           | 89. — <i>redfieldii</i> , Pfr.  |
| 61. <i>Patella testudinaria</i> , Linn.           | 90. — (new), allied to <i>H.</i><br><i>trifasciata</i> .                  |
| 62. <i>Siphonaria cancer</i> , Reeve.             | 91. — <i>melanostoma</i> , Sow.   |
| 63. <i>Ostrea tulipa</i> , Lam.                   | 92. <i>Cyclophorus</i> , allied to <i>C. ex-</i><br><i>altatus</i> , Pfr. |
| 64. <i>Mitra procissa</i> , Reeve.                | 93. <i>Limnæa</i> (new?).   |
| 65. <i>Pyrene discors</i> , Gmel.                 | 94. <i>Conus textilis</i> , Linn.   |
| 66. <i>Conus flavidus</i> , Lam.                  | 95. <i>Cerithium carbonarium</i> , Phi-<br>lippi.                         |
| 67. — <i>minimus</i> , Linn.                      | 96. — <i>bifasciatum</i> , Sow.   |
| 68. <i>Columbella pardulina</i> , Lam.            |   |
| 69. <i>Cypræa eglantina</i> , Duclos.             |   |
| 70. <i>Natica ala-papilionis</i> , Chem.          |   |

Dr. A. Günther gave an account of the present state of his researches into the British species of Salmonoid fishes, which he had undertaken whilst engaged in preparing the catalogue of the specimens of this family in the collection of the British Museum. Dr. Günther stated that the genus *Salmo* was essentially an arctic group, inhabiting the northern portions of both hemispheres, and becoming more abundant in species upon receding from subtropical into temperate latitudes. Dr. Günther was disposed to believe that the species of this genus to be found within British waters would be ultimately found to be much more numerous than had been hitherto suspected. From the materials at present at his command, he had already been able to distinguish what he believed would turn out to be four new species of the non-migratory group of true *Salmo*, besides identifying several others heretofore imperfectly distinguished. Dr. Günther requested the assistance of the Fellows of the Society and their friends in furnishing him with series of specimens of our native Salmon and Trout from every part of the British islands,

stating that in this difficult group of fishes no certain conclusions could be arrived at without a large number of specimens for comparison. Dr. Günther exhibited the subjoined table as giving a list of the British species of *Salmo* with which he was acquainted :—

Subgenus I. CHARRS (*Salvelini*).

1. *willughbii* ..... Windermere, &c.
2. *perisii* ..... Llanberis Lakes, N. Wales.
3. *alpinus* ..... Scotland.
4. *grayii* ..... Lough Melvin, Ireland.
5. *colii* ..... Lough Eske and Lough Dan, Ireland.

Subgenus II. SALMONS (*Salmones*).

a. *Migratory Species.*

1. *salar* ..... True Salmon of British rivers.
2. *cambricus* ..... "Sewin" of South Wales.
3. *trutta* ..... "Sea Trout" of Scotland.

b. *Non-migratory Species.*

4. *fario* ..... England.
5. *gaimardi* ..... Scotland and N. W. England.
6. *nigripinnis*, sp. nov. .. Mountain-lochs of Wales (and Scotland).
7. *levenensis* ..... Loch Leven, Scotland.
8. *ferox* ..... "Gt. Lake Trout" of Scotland and Wales.
9. *orcadensis*, sp. nov. .... Lakes of Orkneys.
10. *brachypoma*, sp. nov. .. Firth of Forth.
11. *stomachicus*, sp. nov. .. Ireland.

The following papers were read :—

1. DESCRIPTION OF TWO NEW AUSTRALIAN BIRDS.

BY JOHN GOULD, ESQ., F.R.S., ETC.

1. MALURUS LEUCONOTUS.

The entire head, neck, under surface, rump, and tail deep blue ; back, shoulders, greater and lesser wing-coverts, and secondaries silky white ; primaries brown ; bill black ; feet brownish black.

Total length  $5\frac{1}{2}$  inches ; bill  $\frac{1}{2}$  ; wing 2 ; tail  $3\frac{7}{8}$  ; tarsi  $\frac{7}{8}$ .

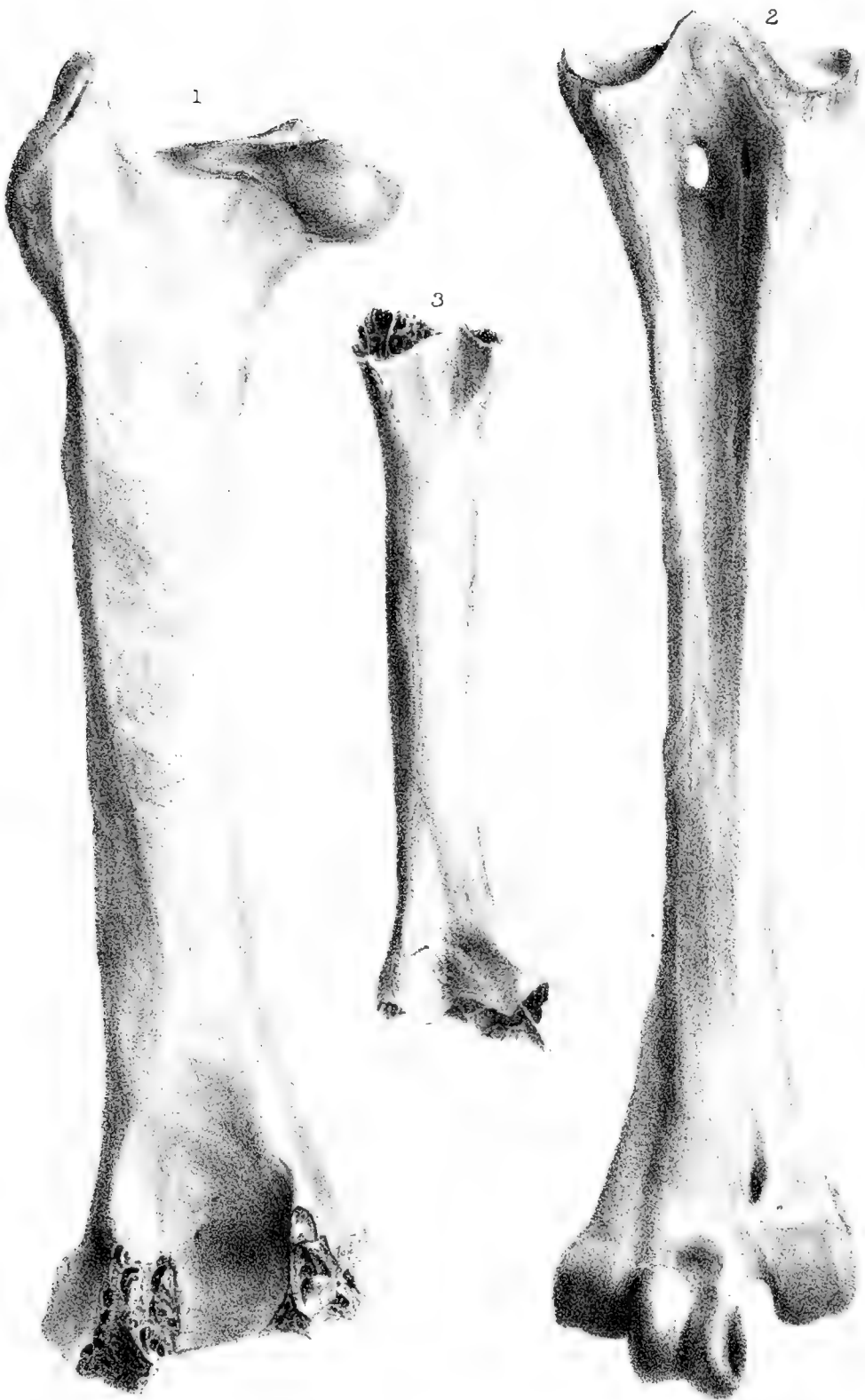
*Hab.* Interior of Australia ; precise locality unknown.

*Remark.*—In size this new species is very similar to *M. lamberti*, while in its colouring it assimilates to *M. leucopterus* ; from both, however, it may be at once distinguished by the whiteness of its back, which has suggested the specific name I have assigned to it.

2. ARTAMUS MELANOPS.

Lores, face, rump, and under tail-coverts black ; stripe over the eye, ear-coverts, sides of the face, throat, and under surface delicate vinous grey ; two middle tail-feathers black, the remainder black





J. Erxleben ad nat. del. et lith.

M & H Hanhart, Imp.<sup>t</sup>

DIDUS NAZARENUS. *Bartlett.*

largely tipped with white; upper surface of the wings grey, their under surface white; bill leaden grey, darkest at the tip; feet blackish brown.

Total length  $6\frac{3}{4}$  inches; bill  $\frac{3}{4}$ ; wing  $4\frac{3}{4}$ ; tail, 3; tarsi  $\frac{3}{4}$ .

*Hab.* Central Australia.

*Remark.*—This large and fine species is unlike every other known member of the genus. It is most nearly allied to *A. albiventris*, but differs from that bird in the jet-black colouring of its under tail-coverts, and from *A. cinereus* in its smaller size and the greater extent of the black on the face. The specimen from which the above description was taken has been kindly sent to me by Mr. S. White, of the Reed-beds, near Adelaide, South Australia, who informs me that it was shot by him at St. Becket's Pool, lat.  $28^{\circ} 30'$ , on the 23rd of August, 1863, and who in the note accompanying it says, "I have never seen this bird south. It collects at night, like *A. sordidus*, and utters the same kind of call. It seems to be plentiful all over the north country. I saw it at St. Becket's Pool, feeding on the ground, soaring high in the air, and clinging in bushes, like the others. The two sexes appeared to be very similar in outward appearance. The stomachs of those examined were fleshy, and contained the remains of small Coleoptera.

2. ON SOME RECENTLY DISCOVERED BONES OF THE LARGEST KNOWN SPECIES OF DODO (*DIDUS NAZARENUS*, BARTLETT).  
BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

(Plate VIII.)

The three bones which I now have the pleasure of exhibiting have been recently received by me from my brother Mr. Edward Newton, a Corresponding Member of this Society, who himself found two of them in a cave on the south-west side of the island of Rodriguez, which he visited on the 2nd of November last. The third was obtained on the same island, about the same time, by Captain Barkly, a son and aide-de-camp of the Governor of Mauritius. All three belong, without doubt, to the largest known species of Dodo, to which Mr. Bartlett (P. Z. S. 1851, p. 284) applied the name *Didus nazarenus*, and which was so unaccountably overlooked by Messrs. Strickland and Melville in their excellent monograph of the curious group *Didinæ*. These authors, as Mr. Bartlett showed (*loc. cit.*), did not distinguish between this very large bird and the smaller and more slender "Solitaire" (*Pezophaps solitaria*), which, if we are to trust the evidence before us, was, equally with *Didus nazarenus* and *D. ineptus*, an inhabitant of Rodriguez.

The two bones found by my brother were picked up near the entrance of a very dry cave, where little, if any, stalagmitic deposit was forming, at least at the time of his visit. One is a perfect left *tarso-metatarsus*, and the other a left *humerus*, wanting its extremities, as is so often the case in specimens of this bone found under circum-

stances which lead to the belief that the bird to which it belonged had been eaten by men or dogs.

The bone found by Captain Barkly is a right *femur*. Though nearly perfect, it seems to have been much exposed to the action of the weather, and, in consequence of its condition, it has sustained a little damage by the crumbling away of some part of its extremities. This has probably happened since its discovery; but one advantage results from the circumstance—namely, that the cellular structure of the bone is thereby rendered plainly visible.

I proceed to give the dimensions of these specimens, and, for convenience of comparison, I shall, as far as possible, follow Dr. Melville's plan of measurement ('The Dodo and its Kindred,' page 116).

Fragment of left *Humerus*. (Pl. VIII. fig. 3.)

	inches.	lines.
Transverse diameter of shaft . . . . .	0	6
Antero-posterior diameter of shaft . . . . .	0	4 $\frac{2}{3}$

Left *Tarso-metatarsus*. (Pl. VIII. fig. 2.)

Length from middle trochlear groove to inter-condyloid tubercle . . . . .	} 6	10	
external trochlear to external condyloid fossa		6	4
internal trochlear to internal condyloid fossa		6	7
Breadth of upper extremity . . . . .	1	6	
Antero-posterior diameter of the same . . . . .	1	3	
Breadth of lower extremity . . . . .	1	7	
Projection of ento-calcaneal process . . . . .	0	8	

Right *Femur*. (Pl. VIII. fig. 1.)

Length from inter-condyloid notch to upper surface of neck	6	0
upper edge of trochanter major to external condyle . . . . .	} 6	9
Transverse diameter of shaft . . . . .		0
Antero-posterior . . . . .	0	7 $\frac{1}{2}$
Transverse diameter of upper extremity . . . . .	2	0 $\frac{2}{3}$
Transverse diameter of lower extremity . . . . .	1	10

All those specimens, unlike those in the Paris Museum, are entirely free from incrustation.

I believe there are no other examples of the *humerus* and *femur* of this species in this country. The specimen of the *tarso-metatarsus* figured in illustration of Mr. Bartlett's paper, to which I before referred (P. Z. S. 1851, Aves, pl. XLV. fig. 1) is, as I learn from Mr. Gerrard, now in the British Museum, and there are other examples of it in the Andersonian Museum at Glasgow.

I must here tender my thanks to Mr. W. K. Parker for the kind assistance he has rendered me in accurately measuring these bones.

And now I wish to make one suggestion. It is well known that at Oxford there is an old picture of a Dodo, painted by one of the Saverys, which seems hitherto to have been referred without hesi-



tation to *Didus ineptus*. Mr. Strickland, in speaking of it, says:—"A remarkable feature in it is its colossal scale, the Dodo standing about 3 feet 6 inches high, and being double the size which the picture in the British Museum, the description of eye-witnesses, and the existing remains warrant us in attributing to the bird. It is difficult to assign a motive to the artist for thus magnifying an object already sufficiently uncouth in appearance" ('The Dodo,' &c. p. 31). Is it not possible that the artist may in this painting have taken a life-sized portrait of the large species (*Didus nazarenus*, Bartlett) to which these bones belong?

In conclusion, I have to state that I should be very glad if these remarks were the means of exciting further search for the remains of the Dodo and its allies. In Rodriguez the bones must be far from scarce, and, as the present instance shows, they may be found with little trouble. My brother picked up two of them, as I have said, in a cave during a very hasty visit. It is a matter of the greatest regret that a regularly organized search is not instituted by some resident in that island, or by some visitor to whom time is no object. We may depend upon it that a rich reward awaits the careful explorer of the Mascarene caverns and alluvial deposits.

### 3. DIAGNOSES OF NEW FORMS OF MOLLUSCA FROM THE VANCOUVER DISTRICT. BY PHILIP P. CARPENTER, B.A., PH.D.

#### TEBEBBATULA UNGUICULA, n. s.

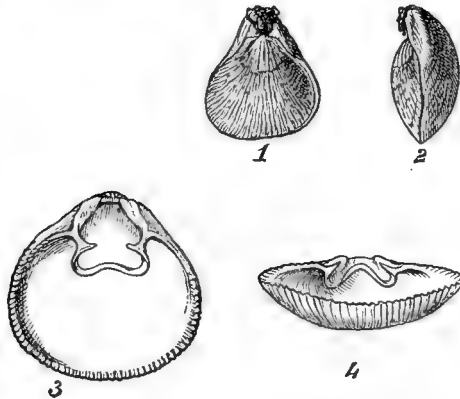
*T. t. juniore* "Terebratulinae capiti-serpentis" *simillima, sed latiore, subtriangulata; punctis valde conspicuis; costis conspicuis, interdum obtusioribus, aliis intercalantibus; intus, amento suboctiformi, postice aperto, cruris diagonalibus cardini affixis: testa adulta valva inferiore subrotundata, marginem versus haud planata; umbone valde tumente, latiore; striis radiantibus, ut in "T. capite-serpentis" conspicuis; marginibus crenulatis, haud undatis; intus amento majore, bisinuato, dorsaliter haud continuo, calcaribus duobus munito.*

Long. .6, lat. .5, alt. .3 poll.

*Hab.* San Diego, 6 fm.; Monterey, not rare in 20 fm., (in California State Geological Survey) *Cooper*. Neeah Bay (valve), *Swan*. Vancouver, *Forbes*.

The specimens sent by Dr. Cooper were all of small size, and, from the intercalation of riblets near the margin, clearly immature. They presented the incomplete loop of the restricted genus to which Dr. Cooper affiliated them. Notwithstanding, as both Davidson and Woodward state that the young of the British species has the loop similarly open, it remained doubtful whether this might not prove conspecific. Messrs. Reeve and Hanley unhesitatingly pronounced them to be "*caput-serpentis*, jun.," the latter gentleman stating that they presented the peculiar form of that species which belongs to the Mediterranean examples. Dr. Forbes, however, was fortunate enough to

obtain an adult shell, which passed into the Cumingian Collection. Having removed the animal matter with great care, the loop was found to retain the form seen in the young shell, only perhaps still more open. This is the first recent species of the genus which has been discovered with a sculptured surface, and affords an instructive lesson not to rely on external characters.



*Terebratulula unguicula*: 1, 2, outside views of Mr. Cuming's adult specimen, natural size: 3, 4, inside views of the upper valve, slightly magnified.

The outline of the adult is much rounder, and the margin blunter, than in *T. caput-serpentis*. Inside, the noncompletion of the somewhat  $\omega$ -shaped loop is a very obvious character. This is large in proportion, extending to about two-fifths of the length and one-third of the greatest breadth of the shell. It is bent upwards in the middle, as seen from the partly opened valves; with a double wave at the sides, as seen from the direction of the opposite valve. Two spurs ascend from the crests of the side waves, as though preparing to complete the loop. The similar *Terebratella angustata* from Japan, when of the same size as Dr. Cooper's specimens, has the loop quite continuous\*.

#### Subgenus NETTASTOMELLA†.

*Pholadidea*: *valvis postice in calycem testaceum planatum prolongatis*; *calyce coriaceo nullo*.

NETTASTOMELLA DARWINII, Sby. (diag. auct.).

*N. t. minore, elongata, tenuissima*; *parte postica costis radiantibus acutioribus circ. vii. et laminis concentricis acutissimis, distantibus, antice continuis, elegantissime ornata*; *rostris pla-*

\* Dr. Cooper having forwarded for my inspection a large and beautifully perfect specimen of the true *Waldheimia californica*, I have compared it with the series of the very variable *W. globosa* in the Smithsonian Museum, undoubtedly from Orange Harbour. In shape, and in the form of loop, I can detect no difference. The Californian shell, however, has a strong brownish-red tinge, and does not display the beautiful veining of the Maghellan species.

† Th. νῆπτα, a duck, στόμα, mouth. The name *Netastoma*, given in the 'Brit. Assoc. Report,' 1863, being preoccupied in another subkingdom, according to Dr. Cooper, it is thought necessary to vary the termination.

*natis, postice divergentibus, striis incrementi crebris acutis, aliter haud sculpta; parte antica t. jun. aperta, adultæ clausa; clausis tenuissimis, secundum incrementa undulatis, super umbones prolongatis, umbilicos postice formantibus; epidermide fugaci, tenui, pallide viridi.*

*Hab.* Monterey, Rich.; Vancouver, Lord; S. Diego, Cooper.

= *Pholas darwini*, Sby.

= *Jouanettia darwini*, Mus. Cuming.

= *Parapholas penita*, Tryon, Mon. Phol.

This remarkable shell differs from *Jouanettia* in having both valves equal; from *Pholadidea* proper in having no coriaceous cup, its place being supplied by a flattened prolongation from each valve, like a duck's bill in miniature. In Mr. Lord's specimen (preserved in the British Museum), though the valves are closed, the prolongations are widely divergent, as when the bird utters its cheerful "quack." The loose, thin epidermis appears to have covered the bill as well as the valves. Mr. Tryon had probably not seen a specimen, else he could hardly have affiliated so very different a shell to *Pholadidea penita*. The original specimen is said to have come from Chili.

#### DARINA DECLIVIS.

*D. t. tenuissima, planata, elliptica, Machæraformi, utroque latere hiante; cinerea, epidermide fortiore induta; marginibus regulariter excurvatis; umbonibus haud conspicuis, ad duas inter quinque partes longitudinis postice sitis: intus cartilagine spathula elongata, dorsum versus utraque valva decliviter sita, a ligamento lamina extante tenuissima separata; dente cardinali laminato, extante, curtio; lateralibus vix conspicuis; sinu pallii ovali, fere ad medium porrecto.*

Long. 1.77, lat. .85, alt. .34 poll.

*Hab.* Vancouver's Island (Forbes).

The only other species of *Darina* known is from the Straits of Maghellan. The northern shell may have been passed over as the young of *Machæra patula*, to which it bears a strong external resemblance.

#### SAXIDOMUS BREVISIPHONATUS.

*S. t. subovali, tenuiore, subplanata, albida, epidermide pallide olivacea induta; tota superficie rugis concentricis, crebris, valde obtusis, et undis incrementi interdum majoribus, ornata; marginibus subæqualiter excurvatis, maxime ventrali: intus cardine tenuiore, dente antico elongato; sinu pallii parvo, ad trientem interstitii porrecto, latiore.*

Long. 2.65, lat. 2.05, alt. 1.15 poll.

*Hab.* ?Vancouver, ?Japan (Mus. Cuming).

A very distinct species, in shape and hinge not unlike *Callista*, but without lunule. It is more rounded and flatter than the three typical Californian species, and known at once by the very small mantle-bend. From four to six blunt riblets are seen on each of the very

blunt waves of growth. The shell was sent me as from Dr. Forbes's Vancouver collections, and is so quoted in the Br. Assoc. Rep. 1863, p. 607; but Mr. Cuming subsequently stated his belief that it came from Japan. It may be allowable to state that many of the species included in *Saxidomus* by authors are more correctly rough forms of *Tapes*, of the *decussata*-type; the true *Saxidomi* differing from that genus (as *Callista* does from *Venus*) in having an additional pseudo-lateral anterior tooth. This is very evident in the young shell, which has a much rounder outline than the adult, and can scarcely be distinguished from *Callista*, except by the absence of lunule.

4. NOTICE OF THE SKULL OF A NEW SPECIES OF BUSH-GOAT  
(*CEPHALOPHUS LONGICEPS*), SENT FROM THE GABOON BY  
M. DU CHAILLU. BY DR. J. E. GRAY.

M. Du Chaillu has lately sent to the British Museum several skins and skeletons of the Gorilla (showing how abundant it must be at the Gaboon), the skin and skeleton of a Chimpanzee, three skeletons of the African Manatee, and the head of a Bush-Goat or *Cephalophus*.

The skull of the *Cephalophus* on examination proves quite distinct from any that has previously occurred to me; and as it indicates the existence of a large species of the genus, I have sent a notice of it to the Society in hope that we may before very long have a complete specimen of the animal to describe.

CEPHALOPHUS.

Section I. *Horns decumbent.*

CEPHALOPHUS LONGICEPS.

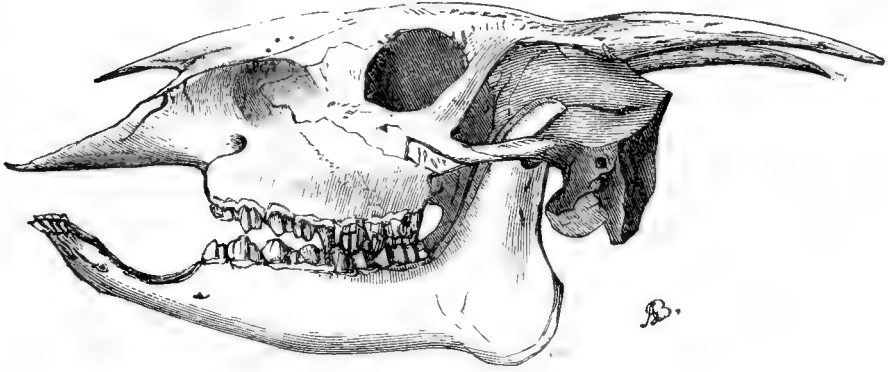
The skull elongate; face elongate, compressed in front of the eyes; the nose in front of the eyes narrow, sides only very slightly tapering; nasal bone very long, produced between the frontal behind, much longer than the medial suture of the frontal. The horns elongate, conical, diverging at the tips, decumbent, in a line with the forehead; forehead convex between the orbits.

Length of skull 10 inches 9 lines; width at zygoma 4 inches 7 lines; length of horn-cores 5 inches; length of lower jaw 9 inches.

The only species with which the animal can be compared, on account of its size, is *C. sylvicultrix*; but the skull of the latter is short and ventricose, and that of *C. longiceps* is elongate and slender. The face of *C. sylvicultrix* is short, and the nose between the impression for the suborbital glands broad and tapering; the forehead is much more convex and rounded. The following are the measurements of the skull of an adult male:—Length of skull 10 inches 1 line; width at zygoma 4 inches 7 lines; length of lower jaw 8 inches 9 lines.

The skull of *C. longiceps* resembles in general form and some

other particulars the figure of the skull of the male *C. altifrons*, figured by Dr. Peters (Reise n. Mossamb. t. 38. f. 1). But that skull is not above half the size of the one here described; and the form of the core of the horns is different, the one being conical and elongate, and the other angular and converging at the tip.



Skull of *Cephalophus longiceps*.

The skull of the larger species of *Cephalophi* may be divided into two groups, according to the position of the horns, as compared with the frontal line.

In some the horns are decumbent and bent back, being nearly in a line with the forehead, as in *Cephalophus coronatus*, *C. sylvicultrix*, *C. ogilbyi*, *C. natalensis* (figured in Cat. Ungulata, B.M. t. x. f. 1), *C. longiceps*, and *C. altifrons*, Peters. In others the horns are ascending, placed at an obtuse angle with regard to the line of the forehead, as in *Cephalophus grimmius* and *C. ocellaris* of Peters (Reise nach Mossambique, Säugeth. t. 39, 40).

The forehead of all the *Cephalophi* with decumbent horns is convex and rounded; but in *C. ogilbyi* it is very much rounded—more than in any other species I know; it is much higher than the base of the horn. In the species which Dr. Peters has called *C. altifrons* it does not appear to be so high as usual in the genus. In *C. grimmius*, with ascending horns, it is flat between the eyes. The following observation is founded on the comparison of a series of skulls of males:—The skulls differ in the length of the face, thus:—In *C. natalensis* the face is short; the distance from the orbit to the upper end of the intermaxillary bone is shorter than the length of the intermaxillary bone. In *C. sylvicultrix*, *C. ogilbyi*, and *C. ocellaris* the distance above defined and the length of the intermaxillary are nearly equal. In *C. grimmius* they are rather longer. In *C. longiceps* the distance from the front edge of the orbit to the tip of the intermaxillary is much longer than the length of the intermaxillary.

In some skulls the nasal bones are the same length as the upper suture of the frontal one, as in *C. natalensis*, *C. sylvicultrix*, and *C. ogilbyi*. In *C. altifrons*, according to Dr. Peters's figure, they are

shorter. In *C. coronatus* and *C. rufilatus* they are much shorter—only about two-thirds the length. In one skull of *C. grimmius* they are longer, and in another skull shorter, and in *C. longiceps* much longer.

The above observations are made only on a few, sometimes only on one specimen of the species; and when I have three or four specimens of the same species, as is the case with *C. grimmius*, the skulls present some variations in the form of the nasal bones and in the length of the intermaxillaries as above noted.

Dr. Peters figures as the skull of a young female of *C. altifrons* a skull of a very different form from that of the skull with the horns of the male above referred to. I have not observed such a difference in the skulls of the females of any of the species of *Cephalophus* that have occurred to me. I have some doubt if it does belong to the same species, as the figure of the young female animal is very like the skull of a female *C. grimmius*, which is an animal that has ascending horns in the male.

5. ON THE ANATOMY OF A FIN-WHALE (*PHYSALUS ANTIQUORUM*, GRAY) CAPTURED NEAR GRAVESEND. BY JAMES MURIE, M.D., LATE ASSISTANT IN THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS, LONDON, AND PATHOLOGIST, GLASGOW ROYAL INFIRMARY.

In May 1859, my friend Mr. Frank Buckland informed me that a large Whale had been captured in the Thames, near Gravesend; and as we both were desirous of examining such an animal, we at once proceeded to the place in question. It proved to be a fine adult male of the above species.

The history of its capture, as related to us, is briefly as follows:—The gigantic creature, on endeavouring to make its way up the river, had been observed near Thames Haven by some members of the Coast Guard, who attacked and finally succeeded in killing it by inflicting three severe sword-wounds. The body was towed up the river, and hauled ashore in the vicinity of Gravesend, where it was exhibited for some days.

The fleshy parts of the carcase were purchased by Mr. Blaker, an oil-merchant, in order to be boiled down. While the animal was being cut in pieces for this purpose, I had an opportunity of examining the body and viscera, and I obtained some portions which now form preparations in the Museum of the Royal College of Surgeons.

The skeleton was purchased by Mr. George Jones, the proprietor of the Rosherville Gardens, where it is at present exhibited. My thanks are due to that gentleman for his courtesy in allowing me to make a full examination of it.

In the first place, with respect to the dimensions of the animal, the following table expresses certain of the external proportions of the body, measured from the same points as those selected by Mr.

Heddle in his description of a female specimen of *Physalus duguidii* (P. Z. S. 1856, p. 188), which was of nearly equal size.

From these parallel columns the correspondence between the relative dimensions of the two species will readily be perceived.

	Physalus antiquorum.		Physalus duguidii.	
	ft.	in.	ft.	in.
Length from tip of beak to end of tail .....	60	0	50	0
Head, from tip of beak to centre of orbit (along upper jaw)	11	7	9	5
Head, from tip of beak to centre of orbit (along lower jaw)	13	0	11	3
Centre of orbit to anterior portion of pectoral fin .....	8	2	5	3
Between dorsal fin and root of tail .....	10	0	14	0
Girth of body behind the pectoral fin.....	38	0	23	0
Girth of body at posterior termination of ridges .....	18	0	19	3
Girth of body at the penis (and close behind dorsal fin) ..	16	0	11	7

Mr. Blaker estimated the weight of the animal at 45 tons, and was of opinion that about 4 tons of oil might be extracted from the carcase. Thus it would appear that the weight of the *Physalus antiquorum* is inconsiderable, when compared with that of a *Balæna mysticetus* of equal length—the probable weight of the latter, according to Scoresby\*, being 70 tons; and of this he allows 30 tons for the blubber alone.

With regard to colour, the head and back were black; the chest and throat of a brownish shade, and having the usual plaited character of the *Balænopteridæ*. Some of the crests of the ridges were deep brown, with the grooves or furrows of a lighter hue, even to yellowish white; other ridges had light-coloured crests, with their corresponding furrows greyish black. From the posterior termination of these folds backwards the skin was yellowish white. The pectoral fins were dingy black above, whitish beneath, as also was the skin of the body beneath their bases; this was most marked behind, where the whitish colour was continuous with that posterior to the ridges.

In the specimen of *Physalus* minutely described by Mr. Heddle (P. Z. S. 1856, p. 193), after mentioning that the back is black, with some grey spots, and the belly white, he further says, “When viewed obliquely, on the other hand, the whole dark portion of the animal seemed a dull leaden grey—a deception arising, no doubt, from the refraction of the light from the polished surface.”

In the present specimen I observed something similar, which I am inclined to believe was caused by the fact that the epidermis consisted of several layers—the deeper and thicker intensely black, but the more delicate and superficial of a much lighter greyish brown hue, allowing, however, under certain circumstances, the deep black colour to show through, at other times reflecting its own paler tint.

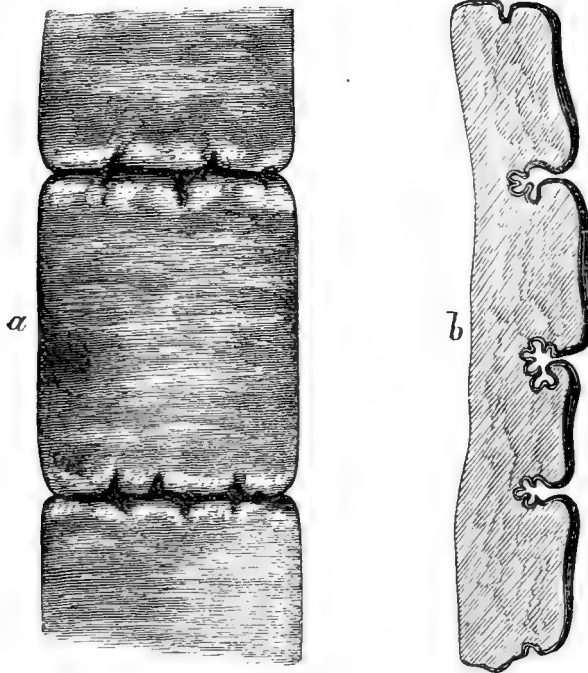
Of the parallel ridges with their corresponding furrows I counted on the one side as many as between forty-five and fifty, which would

\* ‘Arctic Regions,’ Edinb. 1820, vol. i. p. 462.

give a total of somewhere about one hundred. Although parallel to each other and to the long diameter of the body, they were not in perfect straight lines, but adapted themselves to the curve of the throat and chest, being shortest as they ascended towards the back. They commenced a short distance from the mouth or lower lip, and did not extend quite so far back as the penis.

The breadth of each of these folds varied from 2 to 5 inches, and their height was about an inch. The interspaces or furrows were one or more inches wide, according to the manner in which the part was stretched. Here and there these plications joined each other at acute angles.

Fig. 1.



- a.* Skin, showing larger-sized folds, with intervening furrows and wrinkles.  
*b.* Vertical section through four of the smaller ridges and grooves.

A vertical section of the skin showed that the crown of each ridge had a thick cap of hard cuticle covering it, and which was of greatest depth at its centre, shelving off on either side (see fig. 1 *b*). The furrows themselves were lined with thinner soft cuticle, and, as best seen in the smaller grooves, they became widened at the bottom, where the skin was raised in several puckering or folds. These last, as well as numerous wrinkles of the free edges of some of the ridges, no doubt admitted of the easy distention of the parts. The woodcuts (fig. 1 *a* and *b*), drawn from nature, show these several points. Heddle has given a couple of linear diagrams to illustrate



the mode of distention of the skin of the animal he dissected (P. Z. S. 1856, p. 192, pl. XLV. f. 8); but these will be found on comparison hardly to show the true manner in which distention is permitted.

A similar vertical section through the skin, as deep as the muscle, revealed the small depth of the blubber, from 2 to at most 4 inches, and that between it and the true skin there was scarcely any appreciable difference, so intimately and continuously were the fibres interwoven. The only difference was in the rather wider meshes inwardly, the interspaces there containing oil, although in very limited quantity.

The pectoral fins were flattened, narrow-pointed, and curved; in appearance they were not unlike the figures given by Eschricht\* of the fin of *Pterobalæna minor* (*Balænoptera rostrata*, Fab.).

In position, and while attached to the body, one measured along the border of the anterior curve 75 inches, and in the posterior marginal curve 57 inches. When cut off, the measurement from the articulation of the shoulder-joint to the terminal point in a direct line was 85 inches.

The dorsal fin was falciform, laterally compressed, and erect; its height 15 inches, and its antero-posterior length at the base 13 inches.

The tail in extent across to the extremity of either fluke was 133 inches, and its breadth at the root 37 inches.

I am not aware that the exact manner in which the tail acts in this tribe of animals is perfectly agreed upon among writers; for although John Hunter† expresses himself to the effect that the motion of the tail is similar to that of an oar in sculling a boat, and again, that from its horizontal position the animal is impelled up and down in the water, thus giving the necessary opportunity of breathing, yet Dr. Knox‡ admits the difficulty in understanding the mode of progression, and further states that this takes place by a series of bounds, caused by the spring of the incurved tail, the immense strength of the flexors and extensors giving it such a counter force against the water as to impel the animal along and upwards according to circumstances.

That each of these mechanical applications of the tail to certain motions does take place is more than likely, although at first it does not seem so very clear how the mere flapping of a horizontal tail produces a steady onward gliding movement, which no doubt occurs without the necessity of continually rising and falling in the water.

The Sperm Whale, according to Beale§, "when undisturbed, passes tranquilly along just below the surface of the water, at the rate of about three or four miles an hour, which progress he effects by a gentle oblique motion from side to side of the 'flukes,' precisely in

\* Untersuchungen über die Nordischen Wallthiere, 1849, tab. 8. figs. 1, 2.

† 'Observations on the Structure and Economy of Whales,' Palmer's edition of his works, 1837, vol. iv. p. 331.

‡ 'Cat. Prep. of Whales,' No. 4. I am indebted to the kindness of Dr. Gray for a perusal of this scarce pamphlet, which contains much information on the anatomy of Cetacea.

§ 'Nat. Hist. of the Sperm Whale,' p. 39.

the same manner as a boat is sculled by means of an oar over the stern. . . . . When desirous of proceeding at a greater rate, the action of the tail is materially altered; instead of being moved laterally and obliquely, it strikes the water with the broad flat surface of the flukes in a direct manner upwards and downwards."

The first part of Beale's description seems to me pretty well to explain the manner of action of the tail in gentle forward movement; for if we take it as a mere dynamical agent, then, according to the law of forces, the lobes of the tail, striking the water between the horizontal and vertical, would cause the body of the animal to move in the diagonal of these\*. We have then to consider if the lobes do strike the water in this oblique manner.

In illustration of its probability, I may mention that in this specimen I noticed that as the lobes of the tail began to dry by the heat of the atmosphere they assumed opposite concavo-convex curves, so as to produce a very close resemblance both in curve and angle to the blades of a screw propeller. If this is what usually takes place in the movement of the tail, then one can readily understand that in the act of striking downwards and upwards with but a very slight lateral movement the water would receive an oblique stroke between the horizontal and vertical; in fact it would produce a more or less scooping, spiral, screw-like action, the consequence of which would be movement in the diagonal of the parallelogram of the resisting forces, from side to side, above downwards and below upwards.

As a further demonstration that something like this occurs, I may state that I observed in the mode of progression of the Porpoise lately exhibited in the Society's Gardens a movement in the tail more or less resembling this. As the creature swam horizontally, and within a short distance of the surface, it struck the water up and down, but with an inclination of the lobes to the one or other side, adding to the obliqueness of the stroke by rolling its body slightly, so that the tail struck the water rather slantingly than directly up and down. When simply raising itself towards the surface (as, for instance, in breathing), or in descent, then the stroke seemed more flat, and the body, along with the tail, bent in a curve according as the movement was elevation or depression.

In *Physalus*, the arch of the mouth, both antero-posteriorly and transversely, is much less than in the true *Balæna*; the length of the whalebone is also correspondingly shorter. In our specimen of *P. antiquorum*, the transverse curve of the former was about 72 inches at its widest, that is including the bony palate and the filaments of whalebone on either side; but towards the beak it became flattened and so narrowed that the chord of the arch was but 10 inches. The free palate itself in the middle of the mouth had a breadth of 12 inches.

The outward exposed parts of the baleen *in situ* on one side measured from the beak to the angle of the mouth in a direct line 126

\* See article "Motion," 'Cyclop. Anat. and Physiol.,' vol. iii. p. 438.

inches; after removal from the jaw, and taken along the great curve of its free brush-like margin, the length was 169 inches.

On the left side I counted 360 of the outer baleen-plates. The greatest length of a single one was 30 inches, the breadth of the same 11 inches; towards the beak, however, the baleen altered into mere hair-like bristles only 5 inches long, and which were continuous with the baleen of the opposite side. Knox, in his dissection of *Balæna maximus* (*P. antiquorum*), counted 314 external or labial plates of baleen on each side; and he gives as the measurements of the largest one, 26 inches in length and 15 in breadth\*. The soft, broad, fleshy nidus of the baleen, in apposition with the upper jaw, tapered at each end, and altogether had a length of 149 inches. The results of a series of its transverse measurements, made from behind forwards, were as follows—viz., at the extreme posterior end, 6 inches, then 8, and at widest 14 inches, narrowing from this to 7, and at the most anterior portion only 1 inch across.

The œsophagus was certainly 7 feet, possibly 8 feet long. The closed fist could be passed with ease through any part of its course: one portion had an internal circumference of 9 inches. In some places there were numerous glandular openings, each sufficient in size to admit a pin's head, and aggregated together, forming elongated diamond-shaped patches. Upon the surface of the mucous membrane, in irregular quantities, were scattered, rough, warty-like, whitish bodies, equal in size to millet-seeds. This might have been a pathological condition.

The stomach consisted of four separate cavities, communicating with each other by round, somewhat constricted openings, as in the Porpoise. I did not, however, ascertain the exact position these cavities bore towards each other *in situ*; but I made a rough sketch of the whole when removed from the body and cut open, which is represented in the accompanying woodcut (fig. 2).

The first cavity, a large globo-pyriform bag, had a greater curvature measuring 99 inches, and an upper lesser curvature of 30 inches. The opening of the œsophagus and that leading into the second cavity were each 15 inches in circumference, and situated on opposite sides of the lesser curvature. The mucous membrane towards the greater curvature had its rugæ thrown into polygonal folds, which above dwindled into mere puckerings. This stomach contained some cream-coloured, gelatinous, glairy fluid and fragments of *Medusæ*, as also what I took to be remnants of *Entomostraca*.

The second cavity was more cylindrical in form, and of considerable length—97 inches. The plications of its mucous membrane followed its long diameter, and these were in thicker ridges than in the first cavity. There were no evident remains of food in this division of the stomach; at the same time its mucous surface was reddish and partly covered with a brown slimy substance.

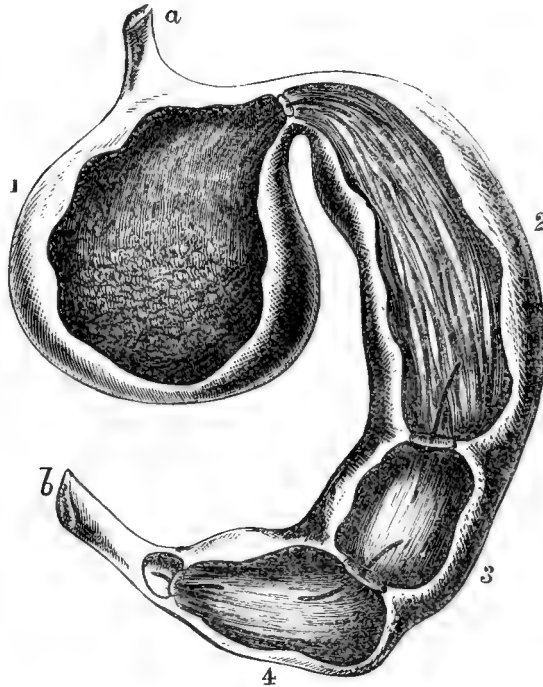
The third cavity was shorter than either of the preceding ones, and a trifle less so than the fourth. It was 30 inches long, with a

\* Cat. Prep. Whales, No. 8.

circumference of 24 inches, and somewhat of a barrel-shape within. The mucous rugæ were in bands, extending transversely to its long diameter, and of a pinkish hue. It likewise was empty.

The fourth cavity was just 2 inches longer than the one before and of a similar shape, its circumference 25 inches, contracting at the intestinal outlet to 14 inches. It had no visible contents; the mucous membrane was stained of a yellowish biliary colour.

Fig. 2.



Stomach: 1, 2, 3, 4, the first, second, third, and fourth cavities; an indicator is passed through the contracted orifices of each. *a.* Œsophagus; *b.* Small intestines.

The small intestines commenced by a narrowing of the last stomach, the pyloric orifice being surrounded by a fold of mucous membrane. They continued with an approximate circumference of from 7 to 11 inches for a total length of 248 feet. The intestines were void of contents, except a sprinkling on their surface of a white powdery-looking substance. The mucous membrane was of a yellowish-red tinge; its folds were of two kinds, the one in longitudinal fringes, crossed by innumerable transverse ones, the whole forming a series of cavities of two sizes. The average size of the one kind of these cavities was 6 inches by 2, of the other, the smaller-sized, from 2 to 3 inches in the one direction, and in the other but one-half that size, while the free fold itself had a general depth of from 1 to 2 inches.

Eschricht\* has described and figured a singular arrangement of the mucous folds of the intestine in *Megaptera longimana*, which is very similar to the above; besides, he also figures a still more curious pouch-like character in the *Hyperoodon*†. John Hunter‡ had previously described this structure in the *Hyperoodon*; and he remarks that "in the Bottlenose the inner coat, through nearly the whole trace of the intestine, is thrown into large cells, and these again subdivided into smaller, the axis of which cells is not perpendicular to a transverse section of the intestine, but oblique, forming pouches with the mouths downwards, and acting almost like valves when anything is attempted to be passed in a contrary direction." Admirable preparations of the same exist in the collection at the College of Surgeons (Physiol. Series, nos. 709–712).

The opening of the hepatic duct was immediately below the junction of the last cavity of the stomach with the small intestines.

The accurate entire length of the large intestines was not ascertained; but as the first piece examined measured 22 feet 2 inches, and another portion 10 feet, it may reasonably be inferred that the total length was little, if at all, short of 40 feet. The cæcum was of moderate dimensions, with an internal circumference of  $15\frac{1}{2}$  inches. The folds of its mucous membrane were placed transversely, and each had a depth of from 2 to 3 inches; these continued onwards to the colon and rectum, where they were not so large or closely set together. Yellow-coloured fæces filled in great part the colon and rectum; and over the mucous surface of these, small oval-shaped entozoa (*Echinorhynchus*?) swarmed in myriads.

Circumstances prevented the larynx from being very carefully examined; its measurements were as follows:—

	inches.
Internal circumference a foot below its chink .....	$39\frac{1}{2}$
Internal circumference at the epiglottis .....	$42\frac{1}{2}$
Across the base of the epiglottis itself .....	13
Opening of the vocal cords antero-posteriorly .....	12
Opening of the vocal cords transversely at anterior end ....	7
Opening of the vocal cords transversely at posterior end ....	3
Trachea immediately above bifurcation, behind forwards ....	10
Trachea immediately above bifurcation, transversely.....	15
Trachea, fibro-elastic tissue behind cartilages .....	5

The heart agreed closely with that of ordinary mammals, varying only slightly in the number and disposition of the chordæ tendineæ. As it lay on the ground it measured from base to apex 32"; breadth at middle 35", and at the base 42". The different segments of the semilunar valves were 9" by 7" in dimensions respectively. There were no corpora aurantii. The aorta 27" in circumference; the walls nearly an inch thick. The ductus arteriosus existed as a thick roundish elastic cord placed a little obliquely in relation to the pul-

\* *Loc. cit.* p. 100, tab. 2. figs. 3 & 4.

† *Ibid.* p. 42, tab. 2. figs. 3 & 4.

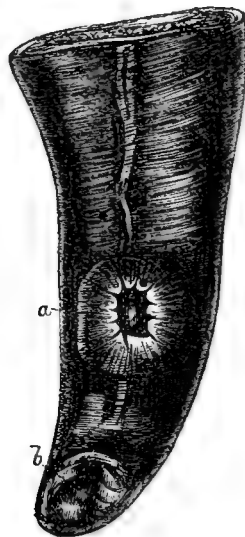
‡ *Loc. cit.* vol. iv. p. 361.

monary artery and aorta; longer above than below, on account of the divarication of these vessels. Length of its upper border  $3\frac{1}{2}$ " , of the lower 2" ; circumference 7" . Its canal was sufficiently closed to prevent the passage of blood, by reason of the elasticity of the walls; but a probe the thickness of a quill could be pushed through the entire distance.

The kidneys, lobulated, had each lobule averaging the size of a plum. One kidney was 60 inches long by 17 broad, the other 66 inches by 15, both elongated and oval-shaped, their extremities decreasing to a transverse diameter of 8 inches.

As is usual in Cetacea, the penis was conical; and when we examined the animal, it was not retracted, but hung loosely from the abdomen. In length it was 48 inches; at its widest, circumference 25 inches, tapering to less than two at the point. At this last the termination of the canal of the urethra opened rather on the under surface (fig. 3 *b*); the opening was crescentic, with the horns forwards, and on the roof a slightly depending ridge of mucous membrane. Behind this, at the distance of  $1\frac{1}{2}$  inch, existed a second opening into the urethra (fig. 3 *a*), subcircular in form, nearly equal in size to the first, and with indented edges. Around this, for almost the size of a shilling piece, the cuticle exhibited a minute linear-rayed appearance, not unlike certain forms of cicatrices. From the internal lining of the opposite surface of the mucous membrane a nipple-like process protruded, dividing the canal as it were into two passages. This projection appeared to be part of a longitudinal ridge of the mucous membrane, extending along the roof of the canal of the urethra.

Fig. 3.



Whether this very unusual second perforation of the urethra was normal, or only the result of injury or of pathological origin, I will

not pretend to state with certainty, although I am inclined to believe it to have been of the latter nature; nevertheless I have thought it of sufficient import to be figured, so that the attention of future observers may more readily be called to notice if such a structure exists in any specimen that may be dissected by them.

Transverse sections of the penis at various points showed, as in ordinary Cetacea, the usual absence of median division in the corpus cavernosum; at the root, however, there was an approach to separation by the aggregation of the vessels into two circular groups; but towards the anterior extremity or point these were scattered more equally among the strong fibrous trabeculæ. The canal of the urethra for its whole length was on the under side of the corpus spongiosum: in this respect it differed from that of the Porpoise, which Hunter (*loc. cit.* p. 388) has described as being at first in its centre, and then coming to be on its under side. At the root the canal was roundish, but towards the free extremity more triangular in form. The strong, firm, fibrous sheath surrounding the corpus cavernosum was an inch thick in most parts. The glans penis was represented, for a considerable distance backwards, by a thick layer of vessels, chiefly veins, each, on section, of a slit-like shape, with pointed ends, and arranged with their broad surfaces superimposed upon one another on the fibrous sheath, excepting on its under side. Their appearance in the transverse section was not unlike the open vascular sinuses of a pregnant uterus when cut vertically.

The foregoing are the principal observations which I had the opportunity of making on this specimen while in the fresh condition; but I think it may be as well to add some notes on the osteology, as a contribution towards a fuller knowledge of its anatomy. This subject has already been partially treated by Cuvier, Van Beneden, Dr. Gray, and others; but so much remains to be done to complete the anatomy of species of the group, that any details as to the structure of a single individual can hardly be deemed superfluous.

Mr. Flower has made some original and highly useful observations on the condition of the bony epiphyses as a guide to age in the Cetacea (*P. Z. S.* 1864, p. 384); and, availing myself of his remarks, I agree with him in classing the Rosherville specimen of *Physalus antiquorum* in the third or last stage, that is, a perfect adult, although the animal was no more than 60 feet long. For, on examination, I find all the epiphyses of the vertebræ are firmly ankylosed, so much so that the line of junction is with difficulty made out. The same may be said of the upper and lower epiphyses of the humerus. The proximal epiphyses of the radius and ulna are likewise firmly adherent to the shaft by bony union; but, on the other hand, the distal epiphyses of these bones are only united at their periphery, for a broken portion in each discloses the centre to be incompletely ossified, and not attached to the diaphysis of the bone. The sutures of the skull are also well-nigh obliterated, excepting such as remain more or less persistently separable.

The general appearance of the skull shows no points strikingly different from what is usually found in *P. antiquorum*; and the

figure given by Eschricht and Reinhardt\* of the skull of *Balænoptera musculus*, J. Müll. (= *Physalus antiquorum*, Gray) may be said to convey a fair idea and representation of it.

The two outer borders of the superior maxillaries at the base of the beak run nearly parallel for about their posterior half, whence they incline gently towards each other; but in the anterior fourth they approach more quickly to the narrowed tip of the beak. The nasal processes of the same bones are flattish, and at the nasal fossa have a sharp internal edge; but on reaching the posterior end of the premaxillaries they slope outwards and downwards, forming the posterior superficial curve of the rostrum; at the tip of the beak, however, they again become nearly horizontal.

The premaxillaries, on the other hand, at their posterior ends are almost vertical, and look towards each other in the nasal fossa, while they become horizontal in the middle of the beak, and shelve outwards at the tip. The frontal bone in the median line of the skull is represented merely by its nasal tuberosity, which is wedged in behind the nasal bones; but the orbital plates occupy a great flattish expanse on either side, and look directly upwards. The cavity of the orbit is ovoid, with a height of  $7\frac{1}{2}$  and a breadth of 10 inches.

The malar bones are present, flattened, and of a comparatively small size; their maxillary process is broader than their zygomatic. The prominence of the cranium formed by the supra-occipital presents a very slight concavity, with just an appreciable median ridge. Posteriorly the occipital region shelves sharply downwards and backwards, and has a considerable concavity. The occipital foramen and condyles are directed straight backwards. This posterior occipital inclination does not seem so sharply defined in the young skull of a *Physalus antiquorum* in the Museum of the College of Surgeons (no. 2446 A, Osteological Series). The vomer reaches within a foot of the anterior tip of the premaxillaries; along with the superior maxillaries, it forms a marked palatine ridge in the roof of the mouth.

The inferior maxillary bones have acuminate coronoid processes, which are bent outwards at their extremities. The condyles are set backwards and a little outwards, externally overlapping the groove of the neck. The rami are strong and with a moderate lateral curve.

The following are a series of measurements of the skull, taken in inches, and in the manner followed by Mr. Flower (P. Z. S. 1864, p. 411); so that the dimensions of the cranium of this specimen may readily be compared with the examples of *Physalus antiquorum* given in the above paper.

	inches.
Length of skull in straight line . . . . .	168
Breadth of condyles . . . . .	12
Breadth of squamosals (greatest breadth of skull) . . . . .	82
Orbital process of frontal, length . . . . .	30
Orbital process of frontal, breadth at base . . . . .	$25\frac{1}{2}$
Nasals, length . . . . .	$8\frac{1}{4}$

\* Om Nordhvalen, 1861, tab. 3. fig. 3.



	inches.
Nasals, breadth of the two at posterior end . . . . .	4 $\frac{1}{4}$
Nasals, breadth of the two at the anterior end . . . . .	7
Length of beak, from curved border of maxillary to tip . . . .	116
Length of maxillary . . . . .	132
Projection of premaxillary beyond maxillary . . . . .	6 $\frac{1}{4}$
Breadth of maxillaries across orbital processes, following curve	81
—— of beak at base, following the curve. . . . .	55
—— of beak, one-quarter of its length from base. . . . .	42
—— of maxillary at the same point . . . . .	14
—— of premaxillary at the same point . . . . .	6 $\frac{1}{2}$
—— of beak at middle, following the curve. . . . .	33
—— of maxillary at middle . . . . .	10
—— of premaxillary at middle . . . . .	5 $\frac{1}{4}$
—— of beak at three-fourths of its length from base . . . .	23
—— of maxillary at same point . . . . .	5 $\frac{1}{2}$
—— of premaxillary at same point . . . . .	5 $\frac{1}{2}$
Length of lower jaw in a straight line . . . . .	156
Height at coronoid process. . . . .	19
Height at middle. . . . .	12

The total number of the vertebræ present is 58; but evidently a few of the terminating caudal are wanting. The vertebræ are as follows:—7 cervical, 15 dorsal, 15 lumbar, and 21 caudal. The cervical, as usual in this Whale, are all free. The atlas is similar to that of an animal of the same species from Devonshire, figured by Dr. Gray in his recent paper on the "British Cetacea" (Proc. Zool. Soc. 1864, p. 217, fig. 9), and answers well to his description, except that the transverse processes are somewhat more horizontal, bulbous, and truncated at their outer ends. It may further be remarked that Dr. Gray's figure of the atlas of *Physalus duguidii* (*loc. cit.* p. 220, f. 13) agrees rather with the Rosherville specimen.

The axis does not quite agree with either of the figures given by Dr. Gray of species of this genus (*loc. cit.* figs. 10 & 14); but, of the two, the resemblance is greater to the Devonshire specimen of *P. antiquorum*; the perforations of the lateral processes, however, are rather larger and more oval. The rudiment of an odontoid process exists in a raised, flattened, circular prominence. The expansions of the transverse processes point backwards, and reach so far as to enclose those of the three succeeding vertebræ; they are thin towards their free outward extremities. The neural arch is broad, and its laminæ prolonged; so that it projects in a shelving manner over the next vertebra. The spine is bifid, and the prominences on either side are strong and massive, while the median groove is marked by a slightly raised ridge.

The third vertebra is thinner in every way; in this respect it agrees with the fourth and fifth. The body is tolerably square, less deep than broad; the anterior articulating surface single and convex, the posterior broadly concave; the transverse process ring-shaped, compressed antero-posteriorly, and with a backward-arched curve,

very thin at the tip. The perforation is bluntly heart-shaped, with the apex outwards; the upper and inner angle sharpest, curving round the body more than in the lower one. The neural spine is only indicated by a central ridge.

The fourth is very similar to the third. The transverse process is not so sharply bent backwards, but it is slightly wider; the bony ring is broader and thicker. The fifth agrees in general with the preceding; its transverse process is a little longer than in the fourth, the lower bone of the ring less curved, broader, and with a wider expansion at its inferior angle. The neural arch diminishes in breadth, but the spine is more prominent. Dr. Gray's figure of the fifth cervical vertebra of *P. antiquorum* (P. Z. S. 1864, p. 217, fig. 11) does not quite correspond to the one under description: what he gives as that of *P. duguidii* closely resembles our specimen, except that the lateral processes do not form a complete ring.

In the sixth the body is thicker and flatter; the abutments of the ring of each lateral process do not pass outwards perpendicularly to one another, the upper being in advance of the under; the lower is also much thicker. The perforation assumes more the shape of an equilateral triangle than in the third, fourth, and fifth. On the right side its processes of bone are not completely united, being apart from each other for about the extent of an inch; the edges taper towards each other in such a manner as to show this to be a natural deficiency, and not caused by injury. The neural arch is broad, bi-concave behind, and overlapping the next vertebra as in the other cervical.

The seventh cervical, in some respects, makes an approach to the first dorsal vertebra. It has a thicker and rounder body than the sixth cervical. The lateral process is not developed below, being merely indicated by a slight tubercle on the body of the vertebra. The single transverse process is directed almost straight outwards from the body; it is thick and strong, broadest and compressed from before backwards at the tip. The spine of the neural arch begins to be prominent, pointed upwards and a little forwards.

*Comparative Measurements of the Cervical Vertebrae, in inches.*

No. of vertebra.	Greatest width, between extreme points of transverse processes.	Greatest width of body.	Greatest height of body.	Thickness of body.	Length of transverse process.	Greatest vertical width of transverse process.	Foramina of transverse process, greatest width laterally.	Foramina of transverse process, greatest height vertically.	Neural spine, greatest height.	Neural spine, greatest breadth antero-posteriorly.
1st .....	24	11 $\frac{1}{3}$	10 $\frac{1}{2}$	3 to 4	4 $\frac{1}{3}$	3	..	..	1	4 $\frac{3}{4}$
2nd .....	42	14	9	2 $\frac{3}{4}$ to 4	18 $\frac{1}{3}$	10	7 $\frac{1}{3}$	3 $\frac{1}{4}$	4	5
3rd .....	32	12	8 $\frac{1}{4}$	2 $\frac{1}{4}$	12	10	8 $\frac{1}{3}$	6	1 $\frac{1}{4}$	3 $\frac{1}{4}$
4th .....	33	11 $\frac{1}{2}$	..	2 $\frac{1}{4}$	12	10	8 $\frac{1}{4}$	6	1 $\frac{1}{4}$	2 $\frac{1}{2}$
5th .....	35	11	..	2 $\frac{1}{4}$	12	9	8 $\frac{1}{3}$	6 $\frac{1}{4}$	1 $\frac{1}{4}$	2 $\frac{1}{4}$
6th .....	32 $\frac{1}{2}$	11	8	2 $\frac{3}{4}$	12	9	8 $\frac{1}{4}$	6 $\frac{1}{2}$	1 $\frac{1}{4}$	2 $\frac{1}{4}$
7th .....	30	11	7 $\frac{3}{4}$	3	10 $\frac{1}{3}$	1 $\frac{1}{2}$	..	..	1 $\frac{1}{2}$	2 $\frac{1}{2}$

The fifteen dorsal vertebræ have not such varied characters as the cervical. Their bodies are large, thick, and cylindrical, tolerably equal in size, the average height being about 8 inches, with a width of  $11\frac{1}{2}$  and a thickness or antero-posterior extent of 11 inches; the articulating surfaces are flattened. The transverse processes come from the upper portion of the bodies. Excepting the few first, these are thin, broad, straight, and flattened from above downwards; slightly narrowed at their necks, widening and thickening at the outside free margins, which are curved and hollowed according to the extent of indentation or groove for the attachment of the rib.

The laminæ forming the arch are broad (particularly in the front vertebræ), and meet rather high, at an acute angle, forming a large triangular cavity for the spinal cord. The spinous process is of considerable size, averaging 11 inches in length and 7 inches in breadth, rather widest at the truncated extremity. Among the first dorsal vertebræ it is inclined forwards, in those further behind sharply backwards, and in the few last so much so as to rake far behind the body. In the anterior vertebræ the metapophyses of Owen\* arise from the body, where the lamina and transverse process meet, but in the posterior vertebræ from the lamina alone. They are narrower at their necks than at their free extremities, and have a direction upwards and forwards. Their average height and breadth is from 4 to 5 inches.

*Series of Measurements to illustrate the comparative Dimensions of the Dorsal Vertebræ, in inches.*

Dorsal vertebræ.	Greatest width, between extreme points of transverse processes.	Greatest height, from base of body to tip of neural spine.	Greatest width of body.	Greatest height of body.	Greatest thickness of body.	Length of transverse process.	Breadth of transverse process at neck.	Breadth of transverse process at tip.	Breadth of neural spine at tip.	Breadth of neural spine at base.	Height of metapophyses.	Width of metapophyses.
1st....	32	14 $\frac{1}{4}$	11 $\frac{3}{4}$	7 $\frac{1}{2}$	3 $\frac{1}{2}$	12	2	1 $\frac{1}{4}$	4	..	1 $\frac{1}{2}$	1 $\frac{1}{4}$
3rd ..	28 $\frac{1}{2}$	18 $\frac{1}{4}$	12 $\frac{1}{2}$	7 $\frac{1}{2}$	5 $\frac{1}{2}$	10 $\frac{1}{2}$	3 $\frac{1}{2}$	5	5 $\frac{1}{4}$	..	3 $\frac{3}{4}$	1 $\frac{1}{2}$
5th ..	31 $\frac{1}{2}$	22 $\frac{1}{4}$	11 $\frac{1}{2}$	7 $\frac{3}{4}$	6 $\frac{3}{4}$	11 $\frac{3}{4}$	4 $\frac{1}{2}$	6	7	..	1 $\frac{1}{2}$	2 $\frac{1}{4}$
7th ..	32 $\frac{1}{2}$	23 $\frac{1}{4}$	10 $\frac{3}{4}$	8	7 $\frac{1}{4}$	13 $\frac{1}{2}$	4 $\frac{1}{3}$	7 $\frac{1}{2}$	8	6	4	4 $\frac{1}{4}$
9th ..	39	23 $\frac{1}{2}$	11 $\frac{1}{4}$	8 $\frac{1}{2}$	8 $\frac{1}{4}$	13 $\frac{1}{4}$	5	7 $\frac{3}{4}$	8 $\frac{1}{2}$	5 $\frac{3}{4}$	5	5
11th ..	39 $\frac{1}{2}$	24	11 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	14	5	7 $\frac{3}{4}$	7 $\frac{1}{2}$	6	5 $\frac{1}{2}$	5 $\frac{1}{2}$
13th ..	39 $\frac{1}{2}$	24 $\frac{1}{4}$	11 $\frac{1}{2}$	9	8 $\frac{3}{4}$	14	5 $\frac{1}{4}$	7 $\frac{1}{2}$	8	6	5	5 $\frac{3}{4}$
15th ..	34 $\frac{1}{2}$	23	11 $\frac{1}{2}$	8 $\frac{1}{4}$	8 $\frac{3}{4}$	14 $\frac{3}{4}$	5 $\frac{1}{4}$	8	8 $\frac{1}{4}$	6 $\frac{1}{2}$	5	5

The most striking differences in the dorsal vertebræ are as follows:—In the first the transverse process is compressed antero-posteriorly, as in the seventh cervical; the articulation for the rib is at its outer extremity, and inclined towards the under surface. In the second the neural spine is large, triangular, the apex pointing forwards and upwards. The metapophysis begins to be of marked di-

\* See Prof. Owen's article "On the Megatherium," Phil. Trans. 1851, p. 739.

mensions. The articulating facet for the second rib is on the under surface of the transverse process. In the third the neural spine is more blunted than in the second; the transverse process becomes flattened from above downwards, not before backwards as in the two first. The fourth dorsal has a broader truncated spine looking directly upwards; its transverse process is completely flattened, but thick at the outer point for the attachment of the rib. The remainder of the dorsal vertebræ differ so little from each other as not to require any special notice.

The lumbar vertebræ present few special differences from the dorsal, only varying somewhat in the proportions of their several parts. The average thickness of the body in each is about  $9\frac{1}{2}$  inches, but in the last five it is an inch more. The same might be said of their height, while their width is above 12 inches. The spinal canal is lessened in size towards the last. The neural spine slopes rather more backwards than in the dorsal, its truncated extremity is straight and looking directly upwards; but in the last one the truncation is more oblique, the posterior angle of the spine less inclined upwards, but more backwards and downwards. The metapophyses at first are subquadrate, and arise from the base of the neural laminae; but in the more posterior vertebræ they become conical, are given off higher, and, instead of a direction forwards, rather come to point upwards. The transverse processes are very uniform, flat, thin, straight, and of nearly an equal breadth throughout. Their average length is 14 inches, diminishing to 12 inches in the five hinder vertebræ; and their breadth is at narrowest 5 inches, increasing outwardly to 8 inches.

*Series of Measurements to illustrate the comparative Dimensions of the Lumbar Vertebræ, in inches.*

Lumbar vertebræ.	Greatest width, between extreme points of transverse processes.	Greatest height, from base of body to tip of neural spine.	Greatest width of body.	Greatest height of body.	Greatest thickness of body.	Length of transverse process.	Breadth of transverse process at neck.	Breadth of transverse process at tip.	Length of neural spine.	Breadth of neural spine at base.	Breadth of neural spine at tip.	Height of metapophyses.	Width of metapophyses.
2nd ..	$41\frac{1}{2}$	25	$11\frac{3}{4}$	$8\frac{3}{4}$	$9\frac{1}{4}$	$14\frac{3}{4}$	$4\frac{3}{4}$	$6\frac{3}{4}$	$13\frac{1}{2}$	$6\frac{1}{4}$	$9\frac{1}{4}$	$4\frac{3}{4}$	$4\frac{1}{2}$
4th ..	42	25	12	9	$9\frac{1}{2}$	$14\frac{1}{2}$	5	8	13	6	$9\frac{1}{4}$	$4\frac{1}{2}$	5
6th ..	40	26	$12\frac{1}{4}$	10	$9\frac{1}{2}$	14	$5\frac{1}{2}$	$8\frac{1}{4}$	14	$5\frac{1}{2}$	10	$3\frac{3}{4}$	$4\frac{3}{4}$
8th ..	39	25	$12\frac{1}{2}$	9	$9\frac{1}{2}$	14	$5\frac{1}{4}$	8	$13\frac{1}{4}$	$6\frac{1}{2}$	$9\frac{1}{2}$	$3\frac{1}{4}$	$5\frac{1}{4}$
10th ..	$38\frac{1}{2}$	$25\frac{1}{2}$	$12\frac{3}{4}$	10	$9\frac{3}{4}$	$12\frac{1}{2}$	$5\frac{1}{2}$	$7\frac{1}{2}$	$14\frac{1}{4}$	6	$9\frac{1}{4}$	$3\frac{1}{4}$	6
12th ..	36	$24\frac{1}{2}$	$12\frac{1}{3}$	$10\frac{3}{4}$	10	$12\frac{1}{2}$	$5\frac{1}{2}$	$8\frac{1}{4}$	14	6	9	$2\frac{1}{2}$	$5\frac{3}{4}$
14th ..	30	$28\frac{1}{2}$	13	$10\frac{3}{4}$	$10\frac{1}{2}$	..	..	..	14	$6\frac{1}{2}$	9	$3\frac{1}{4}$	5

The caudal vertebræ present are twenty-one in number. The three most anterior of these are chiefly distinguished from the last lumbar by the attachment of the chevron bones; but those behind by degrees alter in form till at length there remains only a small

roundish body without processes. This general alteration commences by the neural spine decreasing in length and breadth, and likewise by the transverse processes becoming very much shortened, at the same time broadened and with a direction pointing forwards. While also the neural spine diminishes, it is set more slantingly backwards, and the metapophyses (Owen), which in the anterior vertebræ are in comparison insignificant in size, assume extravagant proportions, and ultimately in the posterior vertebræ are the largest of the two; they shift their position so as to reach the summit of the neural laminae, and towards the last actually take the place of the neural spine.

The bodies of the first twelve caudal vertebræ are rather increased in depth below, the transversely ovoid form in the lumbar being here more triangular or carinated ventrally.

The special differences among the caudal vertebræ are in the first to the fifteenth having parapophyses and facets for the attachment of the chevron bones. In the fourth the neural spine shortens very considerably; the metapophyses are strong and point upwards; the lower groove in the body is deepened, and there are four parapophyses, the two posterior having articulating facets. From the seventh to the eleventh vertebræ there is a wonderful decrease in the size of the neural spine and transverse processes, which latter are reduced to a mere ridge in the eleventh; these last have all, nevertheless, a perforation through them. In the twelfth, thirteenth, and fourteenth vertebræ the neural spines diminish to little better than mere prominences, the metapophyses being the larger of the two. The parapophyses (two from each body) are perforated laterally at the middle. The transverse processes are only indicated by a slight elevation of the bone, which is pierced by a small foramina in the twelfth and thirteenth; but in the fourteenth this is altered to a groove. The fifteenth, sixteenth, and seventeenth present only ovoid or compressed discoidal bodies, processes or prominences being wanting; on their outer sides, however, there are scattered several large foramina. In the remaining vertebræ, which include the eighteenth, nineteenth, twentieth, and twenty-first caudal, the minimum of size is reached. Their bodies are short, thick, and somewhat quadrangular, with no processes, though in the last there is a slight prominence on its neural aspect. Besides a lateral depression and perforation, they have on the under surface a single central foramina; this exists from the fifteenth vertebra on till the twenty-first, where there are two.

*Series of Measurements to illustrate the comparative Dimensions of the Caudal Vertebrae, in inches.*

Caudal vertebrae.	Greatest width, between extreme points of transverse processes.	Greatest height, from base of body to tip of neural spine or metapophyses.	Greatest width of body.	Greatest height of body.	Greatest thickness of body.	Length of transverse process.	Greatest breadth of transverse process.	Length of neural spine.	Breadth of neural spine.	Greatest height of metapophyses.	Greatest breadth of metapophyses.
1st.....	28	30	12 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{1}{4}$	7	6 $\frac{1}{2}$	14	6 $\frac{3}{4}$	4 $\frac{1}{4}$	3 $\frac{1}{4}$
3rd .....	26	27 $\frac{1}{2}$	12 $\frac{1}{2}$	12	10 $\frac{1}{2}$	6	6 $\frac{1}{4}$	12	5	4	3 $\frac{1}{2}$
5th .....	23 $\frac{1}{2}$	22 $\frac{1}{2}$	13	12 $\frac{1}{2}$	10 $\frac{1}{2}$	5	5 $\frac{1}{2}$	7	3 $\frac{3}{4}$	3 $\frac{1}{2}$	3 $\frac{1}{4}$
7th .....	18	20 $\frac{1}{2}$	13	11 $\frac{1}{4}$	10 $\frac{1}{2}$	4	4	6	2 $\frac{1}{2}$	4	4
9th .....	15	19	13	11 $\frac{1}{4}$	10	2 $\frac{1}{2}$	6	3 $\frac{3}{4}$	2	3 $\frac{1}{2}$	3 $\frac{3}{4}$
11th .....	12 $\frac{1}{2}$	15 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{3}{8}$	9	1 $\frac{1}{2}$	5	3	1	2 $\frac{3}{4}$	2 $\frac{1}{2}$
13th .....	10	14	10	10 $\frac{1}{2}$	8	$\frac{1}{2}$	3	1 $\frac{3}{4}$	1	2 $\frac{1}{4}$	2

The bodies of the remaining caudal vertebrae are as follows :—

	Greatest width.	Greatest height.
16th .....	7 $\frac{3}{4}$	3 $\frac{3}{4}$
17th .....	7 $\frac{1}{2}$	3 $\frac{1}{2}$
18th .....	6	3 $\frac{1}{4}$
19th .....	5	3
20th .....	4	2
21st.....	3 $\frac{1}{2}$	2

The number of the chevron bones is fourteen ; but from the corresponding vertebral facets one would believe them to have been originally fifteen. The first and second have moderate-sized laminae ; a sharp-edged keel, long and tapering in front, shorter and more rounded behind ; both processes more produced in the first bone. The third, fourth, fifth, and sixth are considerably larger, each somewhat oblong in shape, their depth being greatest ; the antero-posterior projections not prominent. In the seventh the laminae are very much stronger and thicker, the articulating facets of great breadth, considering the size of the bone. In the eighth, ninth, and tenth there is a slight return to the shape of the first and second. The laminae, however, are broader in comparison with these last : the keel is roughened at the junction with the laminae ; at the same time it is thinner, deeper, and shaped not unlike the sternum of a bird, sharp pointed in front ; it is not so long and tapering as in the two first ; the posterior projection likewise is concave instead of convex. The laminae of the eleventh and twelfth are much shorter in depth ; the keel processes not prominent, although the bones are longest in this diameter. On the whole, they are solidified, and of an opposite oblong form to the third, fourth, fifth, and sixth. The thirteenth and fourteenth bones diminish much in size, but they are thicker in proportion ; they approach the triangular in figure ; the front articulations are very long and sloping, and these occupy the greater part

of the upper and anterior surfaces. The keel in both is very thick, in the fourteenth grooved on its under edge.

The following numbers represent, in inches, the greatest vertical and horizontal diameters of the whole of these chevron bones:—

	Greatest height.	Greatest length.
First .....	$9\frac{1}{2}$	$13\frac{3}{4}$
Second .....	$9\frac{3}{4}$	$9\frac{3}{4}$
Third .....	12	$10\frac{1}{2}$
Fourth .....	$11\frac{1}{2}$	10
Fifth .....	$10\frac{1}{2}$	10
Sixth .....	9	11
Seventh .....	10	10
Eighth .....	10	8
Ninth .....	9	8
Tenth .....	8	$7\frac{1}{2}$
Eleventh .....	7	$7\frac{3}{4}$
Twelfth .....	6	$7\frac{1}{2}$
Thirteenth .....	$5\frac{1}{2}$	6
Fourteenth .....	$3\frac{1}{2}$	$5\frac{1}{2}$

There are fifteen ribs on either side; they pass by a series of graduated changes in thickness, breadth, and curve from the first to the fifteenth.

The general form of the first, looking upon its broad surface, is that of a slightly unequal arch. From its indistinct angle it makes a short quick turn towards the head, while the sternal end slopes with a wide bend to form the opposite longer limb of the arch. The head and sternal ends have each a slight twist inwards and backwards; so that although nearly flat, the whole rib is not entirely in a vertical plane. The head itself is simple, somewhat roundish, broad, and undivided (fig. 4, no. 1). The articular surface extends the whole length of the broad terminal edge. There is a wide groove between the tuberosity and rudimentary angle. The sternal end of the rib is broadened and terminally truncated.

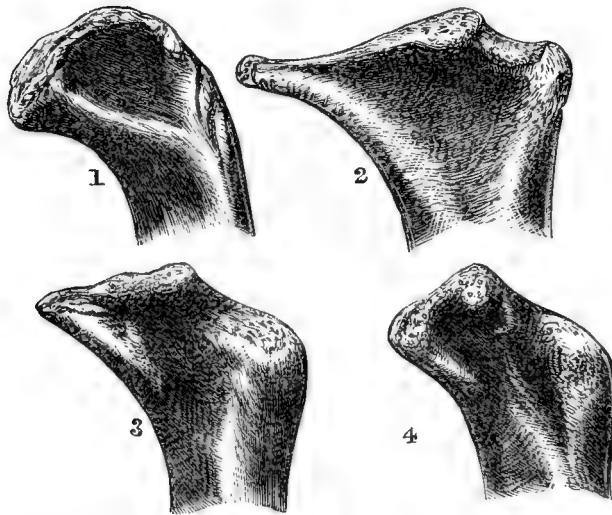
Specimens of the first rib of this species hitherto described differ from each other in the development of the capitular process. The Rosherville and Antwerp specimens\* have the head rounded and broad; the specimen at the Alexandra Park and another lately exhibited near the Eastern Counties Railway, but now in the possession of the College of Surgeons, have, on the other hand, the process developed to a remarkable extent.

In the second rib the head is somewhat triangular in shape, terminating inwards in an elongated beak-like capitular process; the whole set at right angles to the long diameter of the body of the rib (fig. 4, no. 2). Its entire upper surface forms the articulating surface, which is concave. The tuberosity is well marked, as also the angle of the rib. The body of this rib is almost a third longer than the

\* W. H. Flower, "On the Skeletons of Whales in the Museums of Holland and Belgium," Proc. Zool. Soc. 1864, p. 415.

first one, and it makes a long sweeping curve which terminates in a tapering manner, truncated, however, at the very extremity; the lower portion is twisted forwards from the general plane of the rib. The second rib, unlike the first, appears to be pretty constant in shape in different individuals.

Fig. 4. Heads of the first four ribs.



The outlines of the heads of the first and second ribs of *Benedenia knoxii*, figured by Dr. Gray (P. Z. S. 1864, p. 214, fig. 8 b, 1, 2), are very like those of this Rosherville specimen. In *Megaptera* (p. 210, fig. 7 a) and in *Sibbaldius* (p. 224, figs. 16, 17, 18), however, they are quite characteristic of the genus.

The body of the third rib is on the whole much the same as the second, except that the sternal extremity tapers more gradually. The capitular process, so marked in the second, is here shortened, the head becoming rhomboidal in shape (fig. 4, no. 3). The articulating surface is not so extensive, and the tuberosity is less prominent; the angle is at a greater distance from the vertebral extremity, and the neck is more marked. The fourth rib follows the general pattern of the second and third; but the head alters more in a line with the body (fig. 4, no. 4). The articulating surface is shorter, more vertically placed, and less pointed below and within; the angle is more bulky, but not so sharp. The sternal tapering end is enlarged in width, and it has an increased backward curve.

The fifth is narrower, but very similar to the fourth. The angle increases in distance, but is less acute. The sternal extremity is considerably bent inwards towards the cavity of the thorax. The sixth and seventh decrease in width; otherwise the curves are very similar to the fifth. The eighth, ninth, and tenth agree pretty much with each other; the body becomes more rounded. The angle nearly disappears in the eleventh. The twelfth is like the eleventh, but



more slender. The thirteenth is compressed from before backwards. The fourteenth is thinner and more delicate, though almost as broad as the three ribs that go before it; it is not ridged, but there is a slight break in the posterior border of the upper curve (as likewise in the thirteenth), which in the next or last rib takes a backward arch.

The fifteenth, like the first and second, has individual peculiarities. The body of the rib is well developed, and not much shorter than the fourteenth and the others in advance. It has a roundish head; and the neck is so twisted that what is the outer surface in the ribs before it, here comes to look backwards; and at this part it is flattened. There is no angle. The upper third of the body is bent in an arched form backwards and slightly outwards; then the rib broadens and flattens, while the backward arch is reversed forwards, forming in the middle a wide anterior sweep, which, as it approaches the free abdominal extremity, curves again backwards, tapering to a falciform termination. The rib has thus three grand curves and twists, giving it a remarkable, sinuous character.

The accompanying table shows at one view the relative proportions of the ribs on one side; and in this manner the peculiarities of each are well demonstrated.

Ribs.	Greatest length following outer border of arch.	Greatest length in a straight line.	Diameter of chord.	Greatest breadth of head.	Breadth of neck.	Breadth about the middle of rib.	Breadth of free point.
1st.....	53	43	10	6	5	4½-5	5¾
2nd.....	68	61	16	9½	6	4½-5	3¼
3rd.....	82	72	17	6	5	4½-5½	4
4th.....	88	78	..	5	4½	5-4	3½
5th.....	90	80	23	4½	3¾	4½-3½	3¾
6th.....	91	80½	24	3¾	3	3½-4	3
7th.....	92	81	..	4	3	3-3½	3
8th.....	89	80	16½	4	2½	3-2½	2½
9th.....	86	77	15½	3¾	3	3½	1½
10th.....	..	75	..	4	2½	3-2½	1½
11th.....	..	72	..	4	2½	3-2½	1½
12th.....	..	65	..	2½	2	3½-2½	1¼
13th.....	..	63	..	2¼	2	2¾-2¼	1¼
14th.....	..	63	..	..	..	..	..
15th.....	..	63½	..	1½	1¼	2¾	1½

The sternum is a strong solid bone; somewhat cruciform, widest transversely, with concave borders. The anterior projection is broadly rounded; the lateral projections are flatly conical; the posterior is somewhat similar, but narrower, circular, and taper-pointed. In front the central surface is slightly hollowed, the anterior and posterior processes are moderately bent forwards; so that on looking on the sternum sideways it has a concave appearance in front, with the lateral expansions thrown backwards. Its greatest length is 17", and breadth 22". Across the base of the anterior projection there is a breadth of 9", of the lateral processes 5¾", and of the posterior

5"; while the length of this last is 8". The thickest part of the bone is as much as 2 inches. In *Physalus antiquorum* the sternum appears to vary considerably in its shape, size, and relative proportions. For example, the specimen now at the College of Surgeons is 17" long by 21" broad, that at the Alexandra Park 24" long by 21 $\frac{3}{4}$ " in breadth, and the Antwerp specimen 24" long by 19" broad (Flower, *loc. cit.* p. 415).

The scapula is broad and flat, with only the rudiment of a spine, represented by a ridge which forms part of the anterior border. The base or spinal border is a long depressed arch; the anterior border is nearly straight, the posterior one more concave. The inner surface has eight diminutive ridges, spread fan-like for the attachment of the subscapularis muscle. The greatest breadth of the bone, in a direct line between the angles of the spinal border, is 47"; the length in the opposite direction, to the glenoid cavity, 27 inches. The coracoid process is acuminate and pretty solid; length 6", basal breadth 3 $\frac{1}{4}$  inches. The acromion juts out in a direction almost parallel with the coracoid process and spinal border; it is 10" long, and 4 $\frac{1}{2}$ " at its widest, which is towards the outer end, where it is flattened, and with a moderate bend towards the ribs. The glenoid cavity is shallow and oval-shaped; the antero-posterior diameter 10", and the transverse 7 inches. Circumference round the neck of bone 29 $\frac{1}{2}$  inches.

The humerus is very thick, and oblong in shape, with a massive rounded head, at the base of which is a groove just sufficient to indicate a neck. The shaft alters little in thickness; it is flattened outwardly with a central oval depression 3 by 2 $\frac{1}{2}$  inches in diameter; the opposite surface of the bone has a bulky prominence. The condyles are lost in two broad articulating facets, which approach each other in a very open V-shaped manner; there is a third facet (the trochlea) in lateral juxtaposition with the olecranon process. The dimensions of the humerus are as follows:—Greatest length 19", the same on the ulnar side 17", and on the radial side 16 $\frac{1}{2}$ "; greatest breadth at the head 12 $\frac{1}{2}$ "; breadth of the narrowest portion of the shaft 9 $\frac{1}{2}$ ", and at the lower part (condyles) 10 $\frac{1}{2}$ "; circumference of neck 29 $\frac{1}{2}$ ", the same at middle of shaft 25".

The radius has a straight, smooth, compressed shaft, a little widened at either extremity; the head and neck are not well defined. Its measurements are:—greatest length 30"; breadth at head 7 $\frac{1}{4}$ ", circumference of same 19 $\frac{1}{2}$ "; diameter at middle of shaft 5 $\frac{1}{4}$ ", circumference of same 13 $\frac{1}{4}$ "; diameter of shaft at lower extremity 17 $\frac{1}{4}$ ", circumference of same 17 $\frac{3}{4}$ ".

The ulna, like the radius, is compressed both in the shaft and extremities, but most considerably at the lower end. The olecranon is prominent, and placed laterally and posteriorly to the shaft of the bone; it has a flattened semilunar shape. In greatest breadth the ulna is 32"; the circumference at the neck of the shaft 13 $\frac{1}{2}$ "; the diameter at the middle of the shaft is 4", the circumference of the same 10 $\frac{3}{4}$ "; width at the lower extremity 6", circumference of same 14". The greatest length of the olecranon process, taken diagonally,

is 9"; the outer side of the same, parallel with the diameter of the shaft, 6", and the outer curve of the same process 10". Breadth of the olecranon at middle 4"; the same tangentially at the neck and its circumference 15".

The five carpal bones have a very considerable thickness in relation to their breadths, and each has five articulating facets. The comparative superficies of three of these taken separately are, of one of them in length and breadth  $3\frac{1}{2}$ " by 3", thickness  $1\frac{1}{2}$ "; of a second 3" by 3" in diameter, and  $2\frac{1}{2}$ " thick; of the third 3 by 2", and  $2\frac{1}{2}$ " thick. The metacarpal bones and phalanges are so imperfect and badly mounted that no dependence can be placed either on their number or position.

The hyoid bone presents no marked divergence from the shape usual in *Physalus*. The body is compressed and with an anterior convexity. The anterior cornua are W-shaped, and with a moderate-sized notch, which is more pointed and narrower than in *Sibbaldius*. The thyrohyals are large, and thrown backwards from the body as much as 8 inches at their tips; they are thickest at their middle, and abruptly truncated at their extremities: these also differ from those of *Sibbaldius* both in general thickness and in the direction in which they are produced from the body of the bone. The measurements of the hyoid are the following:—Greatest width in a straight line 34", and following the outer curve 39"; greatest length from before backwards  $10\frac{3}{4}$ ". Length of body to fork of cleft  $7\frac{1}{2}$ "; breadth of the body 6". Small or anterior cornua, in length  $3\frac{1}{4}$ ". Greater cornua (thyrohyals), breadth tangentially at the roots 6"; circumference at same 13", and at their tips 9". The whole bone is light in comparison with its size.

The pelvic bones are wanting.

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February 28, 1865.

Dr. J. E. Gray, F.R.S., in the Chair.

Mr. Fraser exhibited two eggs of the Rose-crested Cockatoo (*Cacatua rosacea*, Lath.), which had been laid a few days since by a bird in captivity, being, as he believed, the first record of the kind. Mr. Fraser remarked that the bird was very tame, and a good talker (thus answering the oft-repeated inquiry whether hen Parrots talk), and that his friend, William Goodwin, Esq., also had a very good talking Lesser Sulphur-crested Cockatoo (*Cacatua sulphurea*, Gmel.), which had laid two eggs in 1839.

A letter was read from Dr. John Kirk, Corresponding Member, containing the following reply to the observations of Dr. W. Peters, Foreign Member, in the 'Society's Proceedings,' 1864, p. 377, relating to *Gerrhosaurus robustus*:—

“ From a letter of Dr. W. Peters in the ‘ Proceedings of the Zool. Soc.’ 1864, p. 377, I find that a casual word of mine has given that gentleman some annoyance which on my part was not intended.

“ On handing over the Reptiles collected by me in Eastern Tropical Africa to the British Museum, Dr. Gray remarked that one of them, *Gerrhosaurus robustus*, was, according to Dr. Peters, named ‘*Caaiia*’ by the natives of Tete.

“ I had not then seen Dr. Peters’s paper ‘ On the Reptiles of Mosambique,’ and I remarked that this word meant in the native language ‘ I don’t know.’ To this I attached no importance, nor was it meant for publication; still less was I aware that the word ‘*Caaiia*’ had been a misprint.

“ Dr. Livingstone writes me thus:—‘ Mr. Moffat has been collecting words in the Sechuana language for the last forty-three years, and finds new ones every week. In eight years I had upwards of seven thousand, and rejected many hundreds either as uncouth or to me quite useless. I think there were eleven names for a lion, and no end of words meaning different shades of fools’!

“ Dr. Peters has referred me to a vocabulary of the Mozambique languages, published by Dr. Wm. H. J. Black, from manuscripts of his and from other materials, now including minerals. Only about 900 words are given here, whereas, judging from what Dr. Livingstone says of the Sechuana, this dialect must contain an equal number of terms; and no one could, in my opinion, in nine months collect even the common expressions. Let me assure Dr. Peters that there is no necessity for supposing that the language has changed since 1845, because one word is omitted from his vocabulary.

“ The word ‘*penu*,’ which Dr. Peters gives as signifying ‘ I don’t know,’ does so only inferentially, and means literally ‘ perhaps,’ ‘ it may be,’ ‘ possibly.’ There are other expressions more definite, and in common use.

“ In regard to the last part of Dr. Peters’s letter, I will remark that the majority of Tette fowls live in the huts of the people, and not on perches. And I may remind him of the wide-spread idea in Africa that the bite of the Chameleon (*Chamæleon dilepis*) is venomous to man, although it possesses no means of inflicting more than a slight squeeze with its weak jaws. He will therefore possibly concede that the same people may believe that the *Gerrhosaurus* kills fowls.”

The following papers were read:—

1. DESCRIPTION OF A NEW SPECIES OF PORPOISE IN THE MUSEUM OF BUENOS AYRES. BY DR. H. BURMEISTER, F.M.Z.S.

*PHOCÆNA SPINIPINNIS*, sp. nov.

The animal has the general figure of the common European species, but differs entirely in the position of the dorsal fin, which is placed further backwards, and has spines on the upper edge.

The whole body is black, without any other colour, and the sur-

face of the skin is transversely striated with fine excavated lines, like the inside of the human hand. The upper lip is somewhat shorter than the under, and the figure of the mouth, on both sides, rather curved behind; the length of the opening is  $8\frac{1}{2}$  centim. on each side. From the hinder corner of the mouth the eye is distant 7 centim., and from the eye to the beginning of the pectoral fin is 16 centim. The opening of the nose has the form of a broad transverse ridge, somewhat curved forwards; it is 3 centim. broad, and 16 centim. distant from the top of the upper lip. The figure of the whole body is fusiform, but much more elongated behind than before; it measures from the top of the upper lip to the notch of the tail-fin 162 centim., and the circumference of the thickest part of the body, at the middle, is 102 centim.

Fig. 1.

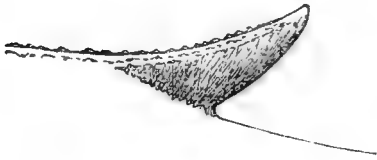
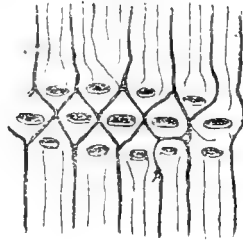


Fig. 2.



The distance from the nasal aperture to the beginning of the dorsal fin is 84 centim.; but the elevation of this fin is so gradual, that it is difficult to say exactly where it begins. The figure of the whole fin is triangular, somewhat curved forwards near the end, and its height 14 centim. (see fig. 1). This curving forwards is a peculiar and very distinguishing character of the species, as is also the clothing of the anterior margin of the fin with small spines. These spines are not different from the skin, but elevations of the skin itself, like small angles, of an elongated-oval form. I have figured part of the middle (where the spines are most elevated) as seen from above (see fig. 2), to show that every spine is surrounded by a ridge of the skin, and that from the sides of the lateral spines other ridges begin. Some small spines begin in the middle of the back, at the distance of 25 centim. in front of the fin, as a single line of moderate spines; but soon another line begins on each side, so that in the beginning of the fin there are already three lines of spines. These three lines are continued over the whole rounded anterior margin of the fin, and are augmented on both sides by other small spines irregularly scattered, so that the whole number of spine-lines in the middle of the fin is five. Towards the end of the fin they become smaller, and on the rounded tip of the fin there are no spines at all.

From the hinder margin of the dorsal fin to the notch of the tail-fin is 54 centim. The tail-fin is 39 centim. broad, and each fluke 20 centim. long on the anterior margin. This margin is somewhat curved backwards, and the hinder margin sinuated.

The underside of the body is somewhat more curved and extended than the upper side, and the tail more descending.

The anus is situated under the beginning of the dorsal fin, 70 centim. distant from the notch of the tail-fin.

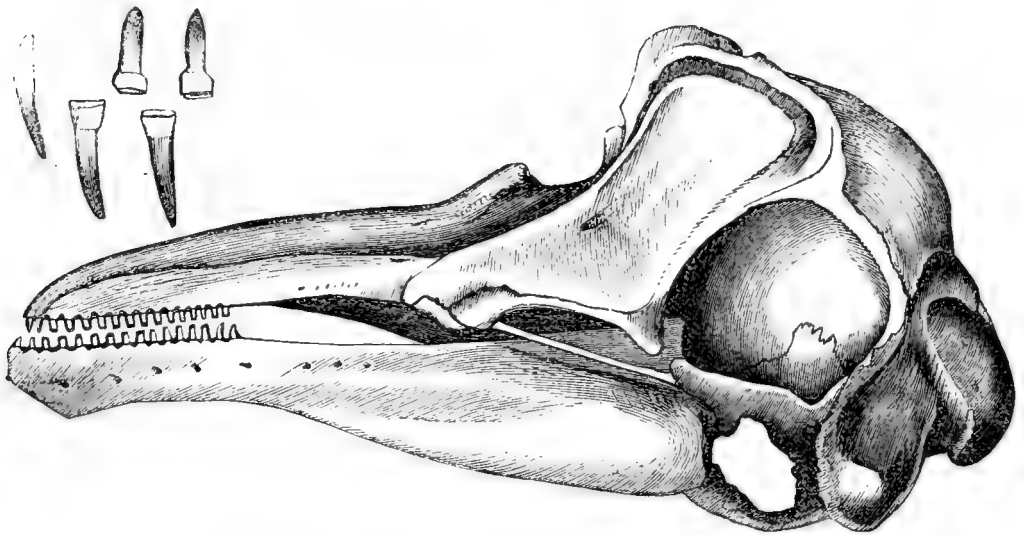
The individual seems to be a very young one, because all vestiges of genital organs are wanting in the exterior. The anus has a dozen radial folds, of which the largest, 6 centim. long, runs forwards; all are very deep, and transversely ridged.

The pectoral fin is falcated, 26 centim. long and 10 broad. At its proximal end there are many fine ridges in the skin, and in the middle part are ridges indicating the finger-bones beneath.

The skull proves that the animal is a very young one, and that it has come perhaps only to half its natural size; because all the bones are very weak, not perfectly ossified, and the vomer entirely cartilaginous. It has the general figure of the skull of the European *Phocæna*, differing principally in the form of the hinder part of the intermaxillary bones, which is more abruptly elevated in this new species than in the European (see figs. 4 & 5).

Fig. 3.

Fig. 4.

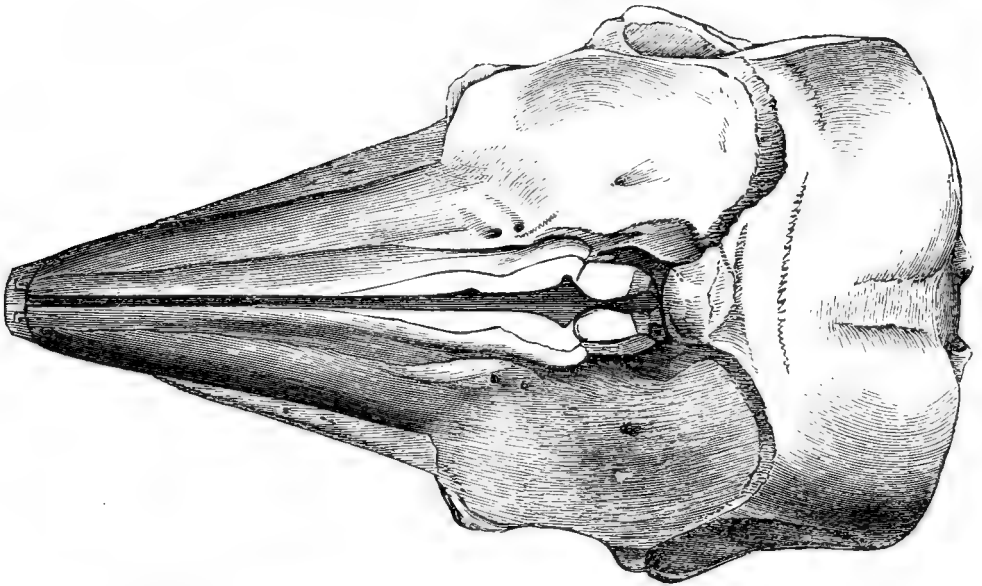


Side view of the skull of *Phocæna spinipinnis*, reduced one-third.

The upper jaw has sixteen small teeth, and the lower jaw seventeen, on each side, there being no vestige of an alveolar ridge behind them in either jaw. The first teeth are smaller and conical, the hinder broader and truncated, as seen in figures 3 & 4. This is another character distinguishing it from the European species, the skull of a young individual of the latter, which I examined, had twenty-four teeth in the upper jaw, and twenty-five in the lower, in both extending more towards the hinder part of the jaw than in the new species.

The specimen of *P. spinipinnis* which is preserved in the public Museum of Buenos Ayres, was captured in the mouth of the River

Fig. 5.



Skull of *Phocæna spinipinnis*, seen from above, reduced one-third.

Plata, and was afterwards exhibited in Buenos Ayres to the public, some years before I came to this country.

Length of the whole skull, 29 centim.

Breadth between the orbits, 17 centim.

Length of the external margin of the upper jaw, 12 centim. ; of the lower jaw, 22 centim.

*Note.*—The tympanic bone is lost ; the figure is therefore defective in this part.

2. LIST OF THE LAND AND FRESHWATER SHELLS OF THE ZAMBESI AND LAKE NYASSA, EASTERN TROPICAL AFRICA, COLLECTED BY JOHN KIRK, M.D., F.L.S., &C. BY DR. H. DOHRN.

[The following list of land and freshwater shells, collected by me on the Zambesi and Lake Nyassa, has been drawn up by Dr. H. Dohrn, who has kindly undertaken their examination and description.

The *Unionidæ* of the lake having previously been described and figured by Isaac Lea, in a paper read before the Academy of Natural Sciences of Philadelphia, April 12th, 1864, are not here included. They numbered six species, and one still remains undescribed.

Of the twenty-four species noticed in this list by Dr. Dohrn, seven prove new to science, thirteen have been known before, and four belong to difficult families. To each species I have added the localities where found.

I take this opportunity to correct an error in the "List of Mammalia met with in Zambesia," where no. 24 should be *Lycan venaticus* instead of *Otocyon lalandii*, as there given.—J. K.]

## 1. HELICEA.

## 1. HELIX MOSAMBICENSIS, Pfr.

From Mozambique, Zambesi, near Tete, and Lake Nyassa, under the bark of trees and among rocks.

## 2. STREPTAXIS KIRKII, Dohrn, n. sp.

*Testa perforata, depresso-piriformis, tenuis, subtiliter oblique striata, epidermide cereo-albida induta; spira obtuse conoidea, lateralis; sutura impressa, submarginata; anfr. 6, convexiusculi, superi regulares, 2 ultimi lateraliter valde deviantes, penultimus latere aperturali deplanatus; apertura subverticalis, lunaris, edentula; peristomium simplex, mediocriter expansum, margine columellari reflexo.*

Diam. maj.  $\frac{5}{16}$ , min.  $\frac{3}{16}$ , alt.  $\frac{3}{16}$ , apert. diam.  $\frac{1}{8}$  poll.

From a small rocky island in Lake Nyassa, named "Mumba," in lat. 14° south. Only dead shells were found, imbedded under decaying vegetable matter.

## 3. ENNEA LÆVIGATA, Dohrn, n. sp.

*Testa sinuate rimata, cylindrica, solidula, lævigata, sub epidermide cereo-albida; apex obtusus; sutura impressa, simplex; anf. 8-9, vix convexi, ultimus antice subascendens, basi angulatus et bisrobiculatus; apertura vix obliqua, oblongo-rotundata, plicis 5 coarctata, 1 lamelliformi subverticali in angulo insertionis, 1 profunda transversa ad columellam, 1 parva dentiformi in margine sinistro, 2 valde appropinquatis in margine dextro, supera majore, tuberculata, infera minore; peristomium undique reflexum expansiusculum.*

Long.  $\frac{5}{16}$ , lat.  $\frac{1}{8}$ , apert. diam.  $\frac{3}{32}$  poll.

*Hab.* Cum præcedente.

## 4. ACHATINA LAMARCKIANA, Pfr.

## 5. ACHATINA PANTHERA, Fér.

Both from Mozambique and Zambesi.

## 6. BULIMINUS STICTUS, Martens.

## 7. BULIMINUS CATENATUS, Martens.

Both species found under the bark of trees during the dry season, along with *Helix mosambicensis*.

## 8. BULIMINUS KIRKII, Dohrn, n. sp.

*Testa rimato-perforata, oblongo-conica, tenuis, dense et subtiliter striata, subdiaphana, griseo-cornea; spira turrato-conica, apice obtusulo; anf. 7, modice convexi, ultimus spira brevior, basi rotundatus, circa umbilicum subcristatus; columella verticalis; aper-*



*tura vix obliqua, ovalis; peristomium simplex, vix expansum, margine collumellari late dilatato.*

Long.  $\frac{1}{16}$ , diam.  $\frac{7}{16}$ ; apert.  $\frac{7}{16}$  longa,  $\frac{5}{16}$  poll. lata.

Found in Mozambique, on the mainland, near Cabaçeira.

## 2. CYCLOSTOMACEA.

### 9. CYCLOSTOMUS CALCAREUS, Sowerb.

Near Tete, and on the Nyassa Lake, commonly in rocky places.

## 3. LIMNÆACEA.

### 10. PHYSOPSIS AFRICANA, Krauss.

### 11. LIMNÆA NATALENSIS, Krauss.

Both from Lake Nyassa.

Besides these, there are in the collection two species of *Planorbis*, one *Limnæa*, and one *Physa* which I could not name, but which I would not undertake to describe as new, not being sufficiently supplied with literature on this very difficult family.

## 4. AMPULLARIACEA.

### 12. LANISTES PURPUREUS, Jonas.

Mozambique, in a lagoon near Cabaçeira Grande.

### 13. LANISTES OVUM, Peters.

The Zambesi and Lake Nyassa (unusually large specimens).

### 14. LANISTES NYASSANUS, Dohrn, sp. nov.

*Testa imperforata, globosa, crassa, olivacea, nitida, striis incrementi sculpta; spira valde depressa, interdum plana; anfractus convexiusculi, interdum ad suturam obtusi angulati, ultimus magnus, ventrosus, supra deplanatus, angulatus, tum convexus, basi attenuatus; columella arcuata, callosa; apertura obovata, intus carnea, nitidissima; operculum castaneum, corneum.*

Diam. maj. 3, min.  $2\frac{3}{4}$ ; apert. diam. maj. 2, min.  $1\frac{1}{2}$  poll.

This large shell was found in considerable numbers near the south end of Nyassa, and among the roots of Papyrus near the small Lake Pamolombue, through which the Shiré flows after leaving the great lake. It was not found on the Zambesi or in any other locality.

## 5. PALUDINACEA.

### 15. PALUDINA BULIMOIDES, Oliv.

River Rovuma.

### 16. PALUDINA POLITA, Frauenfeld.

Lake Nyassa.

I feel inclined to suspect that the *Paludina bulimoides* has been mixed up with the shells from the lake, being the only North-African form which I found among them. Should it nevertheless

really occur there, it would turn out to be the only freshwater shell occurring in the Nile and the South-African rivers, with the exception of the following :—

17. *MELANIA TUBEBCULATA*, Mueller,

Which is an inhabitant of Syria, India, Ceylon, &c. &c., as well as of Lake Nyassa.

18. *MELANIA NODICINCTA*, Dohrn, n. sp.

*Testa turrita, solida, olivacea, longitudinaliter et transverse costata, costis transversis arcuatis, nodiferis, anfractuum superiorum nodis tri- vel quadri-seriatis, in anfractu ultimo nodulorum serie una accedente, basi liris angustis 8-10 circumscripta; sutura distincte impressa; anfractus subplani, lente accrescentes; apertura piriformis, labri parte basali modice producta.*

Long.  $1\frac{3}{8}$ , diam. anfr. ult.  $\frac{7}{16}$ ; apert. long.  $\frac{7}{16}$ , lat.  $\frac{1}{4}$  poll.

Among rushes and papyrus near the south end of Lake Nyassa, and in the upper part of the River Shiré, where it flows from it.

19. *MELANIA VICTORIÆ*, Dohrn, sp. nov.

*Testa turrito-pyramidata, solida, pallide olivacea, punctis castaneis adpersa, sublævigata; sutura distinctissima, duplicata; anfractus plani, ultimus medio angulatus, basi 6-8 sulcis circumdatus; apertura intus cærulescens, piriformis; labrum basi valde productum.*

Long.  $\frac{7}{8}$ , diam. anfr. ult.  $\frac{5}{16}$ ; apert. long.  $\frac{1}{4}$ , lat.  $\frac{3}{16}$ , poll.

From the rapids above the Victoria Falls of the Zambesi, where it occurred in numbers with a *Paludina* and *Unio*, both of which were lost.

6. VENERIDÆ.

20. *CYRENA ASTARTINA*, Martens.

Lake Nyassa, the Shiré, and Zambesi.

I regret very much that there are no *Unionidæ* in the collection which I got for examination. All I can state from the above list is, that the conchological fauna of Lake Nyassa seems to belong to the same region with Natal; but most of the freshwater species from the lake having turned out to be hitherto unknown, and some of the other species having been found by Capt. Speke and others far more northwards, it is rather difficult to come to any conclusion from the present collection.

## 3. ON THE OSTEOLOGY OF MICROGLOSSA ALECTO.

BY W. K. PARKER, F.Z.S.

Having been busy of late with the study of the skull and its development in the Ostrich tribe, I am the more sensitive to the peculiar ornithic excellences of the Parrot family. Indeed, but for their *livery*, it could hardly have been supposed that these opposite creatures belonged to one *house*: they are the most perfectly antithetical of all the feathered tribes.

Judged by the mere power of flight, the Parrots would not be accounted worthy to stand in so high a position; but this is only one, among many, of the talents possessed by birds of noble degree.

Like all those who glory in "high degree," the Parrots have a poor relation or two to abate their pride. The Owl-billed Parrot (*Strigops habroptilus*) of New Zealand is as lowly as "the younger son of a younger brother." If birds were to be classified by the sternum only, then the *Strigops* should be put near the *Apteryx*, and the Tinamou attached to the train of the Peacock.

If birds be ranked according to the degree of their intelligence, then, without controversy, the familiar Crows and Starlings, Finches, and Singing-birds may take the highest room; but if power of flight, mere brute strength, and savage audacity shall be considered most decent and becoming to a bird, then let the Eagles and Falcons sit on the throne of the feathered kingdom. But there are qualities, dear to the morphologist, in which the Parrots have the preeminence, and stand higher, as Birds, than all other birds; and although, all things considered, the Crow is the best type and model with which to compare the whole plumy brotherhood, yet in many things the Parrot is a bird of birds; he is an ultra-type, and sets bounds to the class to which he belongs.

But this bird, with the wise and solemn face of an Elephant, has, like us, its chief and best qualities resident in its head; and if the skull of an Ostrich be compared with that of the most psittacine of the Parrots, the difference will appear almost as great as exists between a *larva* and an *imago*.

The type under consideration is one in which the characters of the Parrot, and indeed the characters of a Bird, as such, are carried to their highest pitch. I have long been familiar with this highest kind of Psittacine skull in the genera *Plyctolophus* and *Calyptorhynchus* (see Cat. Mus. Coll. Surg. vol. i. pp. 277, 278, nos. 1440 & 1445), and have recently discovered it in the Grass-Parakeet (*Melopsittacus undulatus*); but the genus *Microglossa* carries it to the fullest degree.

The teleologist might write a fair volume on the fitnesses displayed in the skull of this bird; but the adaptive conditions are of secondary importance to him who would trace the clue of morphological unity through the mazes of nature's unutterable variety.

The first thing that strikes the eye of the observer is the cleaving of a great transverse cleft through the whole face, in front of the eyes, leaving the enormously developed intermaxillary apparatus, en-

closing the vestibular parts of the olfactory organs, on one hand, and the skull, maxillary apparatus, and true olfactory region, on the other. Then we see that not only is the eye bounded beneath by a blending of the lachrymal with the postfrontal, but the latter is anchylosed to the squamosal also; and thus, with the true zygomatic arch below, we have three pairs of facial bridges. But the deep, steep-sided, beautifully arched intermaxillaries, the fair, broad forehead, the well-roofed eyebrows, the perfectly bony orbit, and a mandible such as the eye searches for in vain elsewhere—all these are outstanding characters in the highest type of Parrots, and, above all, in the genus *Microglossa*.

The huge, mobile face is but one bone in the adult, and yet it is composed of a great variety of parts that have become blended into one thick mass, perfectly void of sutures. The nasals, intermaxillaries, prevomers (the vomer is not developed in the Psittacidæ), the nasal septum, the inferior turbinals, and the alæ nasi, all these go to form this large compound bone. There are, therefore, six splint bones; and the axial bones are four for the septum, two (at least) for the inferior turbinals, and two for the alæ nasi, thus making eight more, or fourteen bones in all. The highly complex skull also is completely fused into one bone, and it has in it the separate parts that form the auditory and olfactory sense-capsules. But the original attachment of the pieces of the arrested palato-pterygoid arch is loosened so as to let the ascending (proximal or orbital) process of the palatine lie half an inch below its proper foundation, viz. the pars plana or antorbital. Anteriorly, the palatine is thick and transversely expanded, and its convex elliptical end fits in a glenoid cavity in the end of the prevomer of the same side. Further back, at its proximal plate, it is two-thirds of an inch high, it scarcely becomes less than half an inch; and its emarginate hinder end reaches to behind the "membrana tympani," full a quarter of an inch behind the somewhat slender rod-like pterygoids. The latter bones, although an inch in length, are thus completely overlapped by the palatines. The small, late-appearing mesopterygoids have early coalesced with each other, and they have united also with the front corner of the basicranial edge of the left palatine. The malar bone articulates, like its axis, the palatine, with the prevomer. The eipterygoid process of the pterygoid is obsolete; the metapterygoid process of the quadrate bone is small, conical, and anteriorly placed, as in its autogenous counterpart in the non-venomous Serpents. The hinge-convexity of the quadrate bone is semicircular; the cupped process for the jugal is large and projecting; and a well-developed, outstanding, oval condyle is received by the cup at the end of the pterygoid. The heads of the os quadratum—answering to the crura of our anvil-bone ("incus")—are well developed, but do not stand as in other birds; for that which is related to the symplectic cartilage of the stapes is directly *inside* the outer or prootic head. In birds generally, this incus-head projects far backwards, overlapping the opisthotic, and overshadowing the auditory "fenestræ," to articulate with the exoccipital. The splints of the lower jaw, ten in

number, have all become one piece, as unlike as possible to the simple Meckelian rod on which they were modelled. The symphysis is an inch in extent, and the bone is transversely flattened below, so as to be an inch wide at what should be the intermandibular angle; this is, there, a gently concave transverse margin having a rounded edge. The greatest height of the mandible is  $1\frac{1}{4}$  inch; the angular process passes further back than the exoccipital. The occipital condyle is an extremely neat hemisphere. The scooped occipital plane forms a very obtuse angle with the basis cranii, which latter region is very small, triangular, and protected by sharp ridges that meet at the fore angle of the coalesced basitemporals, below the small, closely placed Eustachian openings. At first the "rostrum" of the basisphenoid is sharply carinate, then it becomes thick, rounded, and covered with articular cartilage, under which the palatines and anterior ends of the pterygoids glide. The height of the skull is so great that, although the hemispheres of the brain lie down between the eyes more than in most birds, yet the compressed rostrum of the basisphenoid and the lower edge of the perpendicular ethmoid do, together, make a great keel, larger than the sternal keel of the Love-bird (*Agapornis pullaria*). The anterior pterygoid processes are thrown out of relation to the pterygoids, which grow no spur to answer to them; they are dull forthstanding prickles. The exoccipitals are not nearly so much scooped to make a drum-cavity as in the smaller Parrots; the tympanics, like the columellæ, are lost. The main piece is large in some of the smaller kinds. In front of the great cranio-facial hinge, the nasals and nasal processes of the intermaxillaries are converted into the merest swollen sponge; behind the hinge, on each side, the lachrymals are also swollen; but the frontals dip to form a valley between the orbits. Then there is a pair of frontal, and another pair of parietal, smooth, large, rounded swellings, with a shallow, equally smooth valley between them. The width of the head is nearly two inches at the point where the postorbital process of the frontal melts into the postorbital spur of the alisphenoid (post-frontal proper). Below and behind this point it is more than two inches wide. The junction of the thick quadrate splint (squamosal) with the post-frontal spur is so extensive as almost to cover in the small heart-shaped "temporal fossa." This bridge of bone is half an inch across. The optic foramina are about one-third of an inch apart; the olfactory fissures are at the same distance. There is an elegant, small, shell-like middle turbinal on the front of the self-developed "*pars plana*," or antorbital, and the simple crus of the ethmoid curls upon itself, so as to form an upper turbinal. There are evidently full two coils to the inferior turbinals, which are ossified in a fenestrate manner, as in mammals, and which project far beneath the alæ nasi. These latter are ossified separately in the Parrots, and then, in many instances as in this, acquire an adhesion with the nasals and the inferior turbinals. The outstanding spurs of the antero-inferior septal bone increase the complexity of the nasal labyrinth.

The sternum has its fenestræ nearly filled up. The sternal keel

is, as in Parrots and many of their nearest allies, coincident with the upturned, somewhat bifurcate episternal process. This is perfectly normal; for the keel, the episternal process, and the coracoid grooves really belong to the shoulder-girdle; together they form the true episternum or manubrium. This might be called "omo-sternum," in contradistinction to the rib-sternum ("pleuro-sternum"), or that which relates to the *inner* cartilaginous belts, which grow directly from the *centra* of the vertebræ\*. The furcular bone is only apparently simple, although in this specimen of *Microglossa* no sutures can be seen. In the Ash-coloured Parrot (*Psittacus erythacus*), however, and in the East-Indian *Palæornis torquata*, the thick, broad end of each ramus is seen to be a separate piece. This is also to be seen in the Toucan (*Ramphastos toco*) and in the Kingfisher (*Alcedo ispida*), but is still better developed in all the "Raptors" and Totipalmatæ, in the *Balæniceps* and *Umõretta*, and, in a less degree, in most typical Herons. I have already spoken of this part (P. Z. S. 1864, p. 339 *et seq.*), and may now say that it is a rudiment of the so-called "clavicle" of the Batrachian, Chelonian, and African Ostrich, and is well seen as a distinct bone in the shoulder-girdle of the Salmon tribe and some other allied Fishes. In Birds this rudiment is *proximal*; in Mammals, generally, it is *distal* or sternal; but I have found such a piece at both ends of the clavicle in certain Insectivora, *e. g.* the Mole (*Talpa europæa*), and in the Shrew (*Sorex tetragonurus*). In Lizards the counterpart of this cartilage is the anterior boundary of the coraco-acromial fenestræ. The supposed rudiment of the clavicle in certain small Parrots, *e. g.* the Love-Bird (*Agapornis pullaria*) and the Grass-Parakeet (*Melopsittacus undulatus*), is an ossification of this acromial cartilage. In *Psephotis multicolor* neither this nor the furcular bone is present.

#### 4. NOTE ON THE BREEDING OF A GROUND-PIGEON IN THE SOCIETY'S MENAGERIE. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

In the 'Proceedings' of this Society for 1863 (p. 377) I gave a short notice of a Ground-Pigeon of the genus *Phlogænas*†, of which the Society had then recently received four living examples, together with a figure of the bird drawn from life (pl. xxxiv.), and, supposing it to be undescribed, proposed to call it *Phlogænas bartletti*. One of these fine birds having recently died, an opportunity has occurred of making a more careful examination of it than was possible when the bird was alive.

\* I would remark that, to trace the affinities of the Parrot tribe, we should take such forms as the Common Grey Parrot (*Psittacus erythacus*), *Nestor*, *Psephotis*, &c., in which the Psittacine characters are somewhat enfeebled. I have not found any other "family" so isolated as this.

† This term is written by Reichenbach (its proposer) *Phlegænas*; but *Phlogænas* (φλογῆς and οὐῖας) would seem to be more correct.

I now find that the species is not new to science, but has been already described some years since. It is the *Pampusanna criniger* of Pucheran, in the "Zoologie" of the 'Voyage au Pôle Sud' (iii. p. 118), and is figured in the Atlas of the same work (pl. 27. fig. 2). It must therefore stand as *Phlogœnas crinigera*, Pucheran\*. Its native country is "Soog," one of the Sooloo Islands. A single specimen of it is in the Paris Museum. The difficulty of recognizing living birds, and the want of the 'Voyage au Pôle Sud' in the Society's library, are the only excuses I can offer for having given a second name to this species.

As I have already stated, four specimens of this beautiful Pigeon were purchased by Mr. Bartlett at Liverpool, in August 1863. In the following spring the single male paired with one of the three females, and bred five times during the summer of 1864. The female deposited only one egg on each occasion, making a very slight nest of small sticks in a flat basket placed 8 feet above the ground in the Western Aviary. The period of incubation was fifteen days. Two of the young birds were successfully reared, and are now in adult plumage; two others died immature, and are now in the British Museum. On the remaining occasion the egg was addled.

The bird I now exhibit is the breeding female, which unfortunately died a short time since; but as the old male has mated with another female, and the young male likewise shows symptoms of wishing to pair, there seems every prospect of continuing to propagate this highly interesting species in our aviaries.

It is generally supposed that all the Columbæ lay *two* eggs each time they breed, but this is certainly not the case. The Passenger Pigeon (*Ectopistes migratorius*), the Grey Pigeon (*Columba maculosa*), the Naked-eyed Pigeon (*C. gymnophthalma*), and the two Crowned Pigeons (*Goura coronata* and *G. victoriæ*†) all lay but one egg when they breed in our aviaries; and I suspect this is the case with other species.

Although I have paid no special attention to the birds of the order Columbæ, I may take this opportunity of remarking that I consider Bonaparte in error in separating, so far as he has done, the Ground-Pigeons of the New World (*Starnœnas* and *Geotrygon*‡) and their allies from those of the Old. The habits, attitudes, and *poses* of the members of the two groups (for instance, those of *Geotrygon sylvatica* and *Phlogœnas crinigera*) are very noticeably similar; and I know of no material difference in their structure.

The sterna of these two species also present a great resemblance, and differ from those of the typical Columbæ (*C. œnas*, *C. palumbus*, &c.) in several particulars. The rami of the furcula are much more slender, the hyposternal processes more elongate, and the outer

\* Cf. Bp. Consp. ii. p. 88.

† Compare Mr. Mitchell's notes on the breeding of this species, P.Z.S. 1849, p. 170.

‡ I see no grounds for retaining these two genera as distinct. The "Mountain-Witch" of Jamaica (*Geotrygon sylvatica*, Gosse) cannot, in my opinion, be separated generically from the *Starnœnas cyanocephala* of Cuba.

fissure is extended much further towards the anterior extremity of the sternum, and so increased in width as to leave the body of the sternum very narrow, and to give it altogether a much more elongated outline. These peculiarities will be at once evident upon examination of the accompanying figures, which represent the sternum of *Phlogœnas crinigera* (fig. 1 from above, and fig. 2 from one side). On one side it will be noticed that the small inner fissure has closed up, leaving only a small foramen. This is the normal form in the more typical *Columbæ*; but in *Treron*, *Goura*, and *Carpophaga*, as far as I am acquainted with the structure of their forms, the fissures remain permanently open.

Fig. 1.

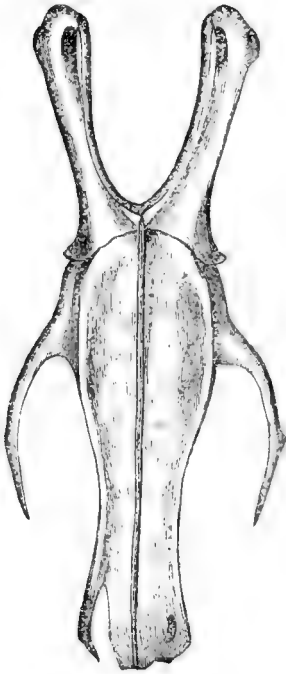
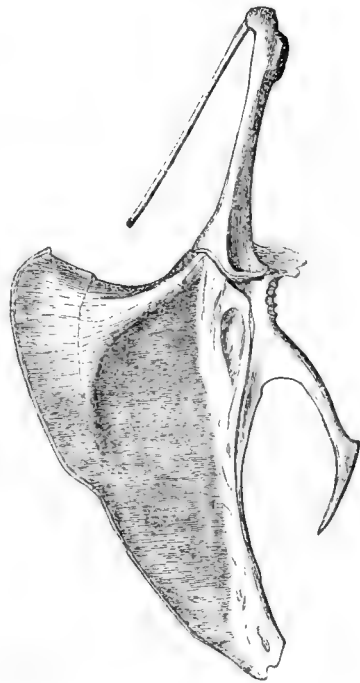


Fig. 2.

Sternum of *Phlogœnas crinigera*.

5. OBSERVATIONS ON THE ANATOMY OF NYCTICEBUS TARDIGRADUS. BY ST. GEORGE MIVART, F.L.S., LECTURER ON COMPARATIVE ANATOMY AT ST. MARY'S HOSPITAL; AND JAMES MURIE, M.D., FORMERLY ASSISTANT IN THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS, LONDON.

The careful and elaborate joint memoir on the genus *Stenops*, by Professors J. L. C. Schroeder Van der Kolk<sup>1</sup> and W. Vrolik,

<sup>1</sup> "Recherches d'Anatomie comparée sur le genre *Stenops* d'Illiger," in 'Bijdragen tot de Dierkunde, uitgegeven door het Koninklijk zoologisch Genootschap.' Erste Deel. Amsterdam, 1848-1854.



published as the result of reiterated observations, and as the final settlement of points previously disputed between them, might perhaps have been expected to have rendered unnecessary any further publication of anatomical facts respecting the genus therein described, excepting details of an obscure or recondite character.

Nevertheless our dissection of a specimen of *Nycticebus tardigradus*, recently received from the Society's Gardens has been the occasion of observations which we consider are worthy of special mention.

The disposition and arrangement of the muscles and tendons so differ from the description given by these authors, that we cannot consider them as merely the result of individual variation.

We are, indeed, inclined to think that, in the memoir on the genus *Stenops*, the authors have not sufficiently distinguished, or been so precise in noting, the special differences of the three forms included by them in that genus, as is desirable in such interesting animals.

In their memoir seventy muscles in all have been mentioned, but of many of these there is no more than a passing notice. We have therefore endeavoured to supplement what they have given meagrely, adding an account of other muscles not alluded to by them.

To each of the latter we have appended an asterisk, to distinguish them from those already mentioned by the authors.

*Muscles of the Head and Neck.*—The *digastric* we found exceedingly strong. It arises from the mastoidal region, and is inserted as usual. There is a distinct median tendon as in *Tarsius*<sup>1</sup> and *Cheirromys*, but without the "two fasciculi of muscular fibres"<sup>2</sup> to the posterior bellies existing in the latter genus.

The muscles attached to the ventral surface of the neck are remarkable. Their great length and thickness have been mentioned by Profs. S. Van der Kolk and Vrolik, but they are spoken of only as "*muscles longs du cou (mm. longi colli).*"

It is not, however, the *longus colli* which is so very much enlarged, but the *rectus capitis anticus major*; and it attains a truly prodigious size. It arises from the front of the bodies of the vertebræ as low down as the sixth dorsal, and is inserted into the basioccipital for almost the whole length of that bone, also into the transverse processes of the axis and other cervical vertebræ (fig. 1, *R. c. a. maj.*).

Meckel<sup>3</sup> is silent as to the conditions of this and the following muscles in the Primates; but he notices a similar excess of this muscle over the *longus colli* in the Beaver. In *Tarsius*<sup>4</sup> this muscle is large, but does not come from the dorsal vertebræ; but in *Ateles belzebuth*, Kuhl<sup>5</sup> describes it as arising from the side of the third thoracic vertebra.

The *rectus capitis anticus minor* is pyramidal in shape, and arises

<sup>1</sup> Burmeister, 'Tarsius,' p. 34, t. 5. fig. 13, 14, π.

<sup>2</sup> Owen, Trans. Zool. Soc. vol. v. p. 58.

<sup>3</sup> Anat. Comp., traduit par MM. Riester et Alph. Sanson, 1830, vol. vi. p. 173.

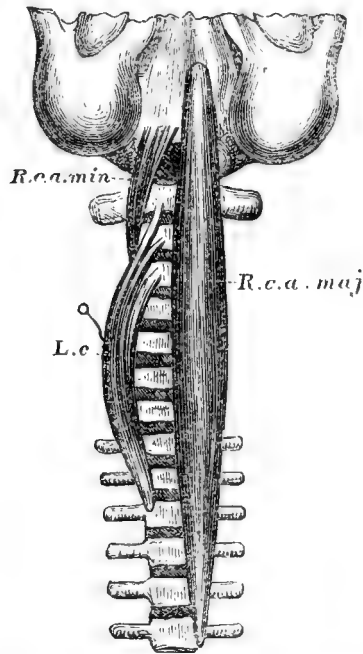
<sup>4</sup> Burmeister, *op. cit.* p. 39, t. 5. fig. 14 n.

<sup>5</sup> Beiträge z. Beschreibung meherer Mammalien, p. 9.

from the transverse processes of both the axis and atlas, as in *Tarsius*<sup>1</sup>. It is inserted into the exoccipital just within the mastoidal region of the periotic (fig. 1, *R. c. a. min.*).

The *longus colli* arises from the fronts of the bodies of the four anterior dorsal vertebræ, and is attached to the bodies and transverse processes of all the cervical vertebræ, three distinct tendons going to the bodies of the atlas, axis, and third cervical vertebra (fig. 1, *L. c.*).

Fig. 1.



Deep muscles in front of the neck.

*R. c. a. maj.* Rectus capitis anticus major. *R. c. a. min.* Rectus capitis anticus minor. *L. c.* Longus colli.

*Muscles of the Trunk.*—The two *\*rhomboid* muscles are represented by a single one, which is largely developed. It arises from the spinous processes, from the fifth cervical to the fifth dorsal inclusive, and is inserted into the spinal border of the scapula from its anterior end to near its posterior extremity.

The *\*levator anguli scapulæ* is a very strong muscle, and arises from the transverse processes of all the cervical vertebræ except the first. It is inserted as usual.

Meckel<sup>2</sup> says, "*Dans les Loris il se rend seulement à l'atlas.*" If such is the case in *Loris gracilis*, it is far from being so in *Nycticebus*.

The *levator posticus scapulæ* of Burmeister<sup>3</sup> was absent.

<sup>1</sup> Burmeister, *op. cit.* p. 39, t. 5. fig. 14 o.

<sup>2</sup> Anat. Comp. vol. vi. p. 236.

<sup>3</sup> *Op. cit.* p. 47, t. 4. fig. 1. no. 4.

The \**splenius* is exceedingly large, and there is no *splenius colli*, thus confirming Meckel's<sup>1</sup> observations.

The \**complexus* is also very strong, extending down to the spinous processes of the three first dorsal vertebræ. We did not find the division spoken of by Meckel<sup>2</sup> as existing in *Loris*.

The \**cervicalis ascendens* is, as usual, continued from the sacrolumbaris, and is inserted into the transverse processes of the two first dorsal and the last cervical vertebræ.

The \**transversalis cervicis* is continued upwards from the longissimus dorsi, but takes fresh origin from the three first ribs. It is inserted into the outer ends of the transverse processes of the cervical vertebræ, from the seventh to the second inclusive.

Meckel<sup>3</sup> differs from Burdach<sup>4</sup> as to what goes to form the *cervicalis ascendens*. Our observations agree with the latter author.

The \**levator claviculæ*, which is not noticed in the memoir on the genus *Stenops*, we find to be a long but slender muscle. It arises from the transverse process of the atlas, and is inserted into the outer end of the clavicle, and not into the acromion process. At its insertion, the fibres are in close union with those of a portion of the deltoid.

This muscle was noticed by Kuhl<sup>5</sup> in *Ateles* in the year 1820, and appears to be the levator anticus scapulæ of Burmeister<sup>6</sup>; it is the *acromio-trachélien* of Cuvier<sup>7</sup>, the *clavio-trachélien* of Church<sup>8</sup>, and spoken of as an undetermined muscle by Meckel<sup>9</sup>.

The *omo-hyoid* has no median tendon, but is a strong muscle. It arises from the os hyoides, and is inserted into the anterior margin of the scapula at the inner end of its middle third.

*Muscles of the upper Extremity.*—The *pectoralis major* arises from the whole length of the sternum and the sterno-clavicular articulation. It has not the clavicular fasciculus noticed by Profs. S. Van der Kolk and Vrolik in their memoir, and which has also been found strongly marked in *Cheiromys*<sup>10</sup>. This muscle hardly seems to merit the epithet "*très-faible*" given by Meckel<sup>11</sup> to it in the *Loris*.

The *coraco-brachialis* consists of a long and a short portion. The former arises by a strong tendon from the coracoid process, and is inserted into the anterior surface and inner border of the humerus, down to the middle of the upper surface of the condyle. The latter or short portion, which is muscular at its origin, also arises from the coracoid process, just internal to the tendon of the long

<sup>1</sup> Anat. Comp. vol. vi. p. 141.

<sup>3</sup> *Loc. cit.* p. 149.

<sup>2</sup> *Loc. cit.* p. 146.

<sup>4</sup> "Beiträge zur vergleich. Anat. des Affen," in 'Berichte von der König. Anat. Anstalt zu Königsberg,' p. 21.

<sup>5</sup> *Loc. cit.* p. 15.

<sup>6</sup> Tarsius, p. 46, t. 4. figs. 1 and 3.

<sup>7</sup> Leçons d'Anat. Comp. 2nd edit. 1835, vol. i. p. 371.

<sup>8</sup> Nat. Hist. Review, 1861, p. 512.

<sup>9</sup> *Loc. cit.* p. 236.

<sup>10</sup> Owen, *l. c.* p. 60, pl. xxii. xxiii. fig. 1. no. 17.

<sup>11</sup> *Loc. cit.* p. 276.

portion, and is inserted into the inner side of the neck of the humerus, between the conjoined tendons of the teres minor and subscapularis and that of the teres major. It is just in front of the external head of the triceps, and has the tendon of the latissimus dorsi passing immediately before it.

S. Van der Kolk and Vrolik say nothing of the short head. With reference to the action of this muscle, it is probable that, besides mere flexion mentioned by them, the *short* slip has an influence in the rotation of the limb.

Meckel<sup>1</sup>, in contradistinction to the *Loris* says, in "les *Makis*" it is divided, thereby implying that in the first it is single.

Kuhl<sup>2</sup>, as early as 1820, noticed the division of this muscle in *Ateles*. Cuvier, in his 'Leçons'<sup>3</sup>, has also mentioned its bifurcation in Monkeys. Burdach<sup>4</sup> describes a double head in the *Simiadae*; Burmeister<sup>5</sup> in *Tarsius*; and Prof. Owen<sup>6</sup> notices in *Cheiromys* a condition very similar to that existing in our *Nycticebus*. The shorter portion is apparently described by W. S. Church<sup>7</sup> as a slip of the biceps.

The *biceps* is described in the joint memoir as having two heads, uniting obliquely below, and having a common insertion into the radius. In the earlier paper on the *Quadrumana*, by one of the authors, W. Vrolik<sup>8</sup>, it is described as consisting of but one portion in *Stenops*; but he does not mention which species he refers to. Meckel<sup>9</sup> likewise asserts that there is but one head in *Loris*. This last is the condition it presented in our specimen, the muscle arising by a long and remarkably strong tendon from the margin of the glenoid cavity, and with its usual insertion. In both *Tarsius*<sup>10</sup> and *Cheiromys*<sup>11</sup> there are two heads.

The *flexor sublimis digitorum* is a slender and double-bellied muscle, there being a distinct tendon in its middle<sup>12</sup>. It arises from the internal condyle and intermuscular fascia, and gives from the distal end of the lower muscular belly a very small tendon which joins the flexor profundus, as noticed by S. Van der Kolk and Vrolik. Just below this four other tendons (of about equal size, excepting that to the index, which is considerably more slender) are given off and go to the second, third, fourth, and fifth digits respectively. They bifurcate, as usual, to give passage to the tendons of the flexor profundus, except the tendon of the index, which does not split, but joins the deep tendons opposite the base of the proximal phalanx of the index (figs. 2 & 3, *F. s*).

A similar connexion exists between the superficial and deep flexors

<sup>1</sup> Anat. Comp. vol. vi. p. 281.

<sup>2</sup> Kuhl, *loc. cit.* p. 16.

<sup>3</sup> Vol. i. p. 395.

<sup>4</sup> *Loc. cit.* p. 25.

<sup>5</sup> *Op. cit.* p. 49, t. 3. fig. 2. nos. 14 and 14 b.

<sup>6</sup> Trans. Zool. Soc. vol. v. p. 60, pl. xxiii. fig. 1, nos. 14 and 14 b.

<sup>7</sup> Nat. Hist. Review, 1861, p. 514.

<sup>8</sup> Todd's Cyclop. Anat. and Physiol. vol. iv. p. 218.

<sup>9</sup> Anat. Comp. vol. vi. p. 291.

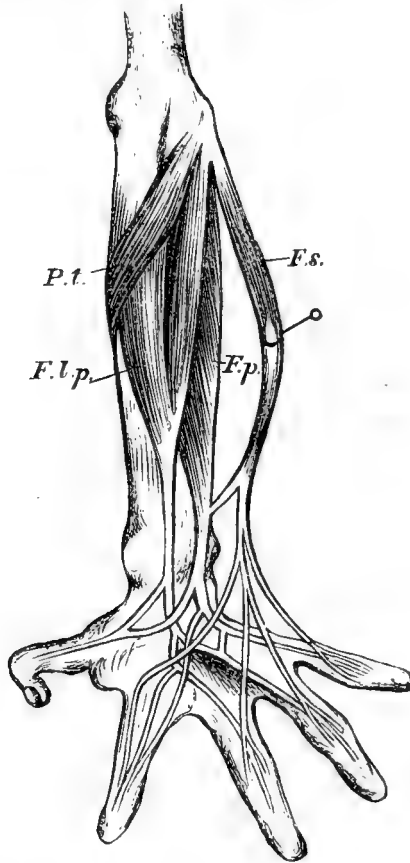
<sup>10</sup> Burmeister, p. 51, t. 3. figs. 1, 2. no. 2 a, b.

<sup>11</sup> Owen, *l. c.* p. 60, pls. xxii. xxiii. fig. 1. no. 20.

<sup>12</sup> Previously noticed by Meckel, *loc. cit.* p. 340.

in *Cheiromys*<sup>1</sup> and *Tarsius*<sup>2</sup>. Meckel<sup>3</sup> also describes in *Loris* “*un faisceau charnu considérable*” as connecting these muscles.

Fig. 2.



Long flexor muscles and tendons of the hand.

*P. t.* Pronator teres. *F. s.* Flexor sublimis digitorum. *F. p.* Flexor profundus digitorum. *F. l. p.* Flexor longus pollicis.

The *flexor profundus digitorum* is a considerably larger muscle than the preceding. It arises from the upper two-thirds of the anterior surface of the ulna and the adjacent part of the interosseous ligament. The muscular fibres give origin to a strong tendon, which bifurcates, after being joined by the slip from the flexor sublimis, as above mentioned. One branch goes to the pollex, uniting with a tendon of the flexor longus pollicis; the other branch sends a very delicate tendon to join the deep tendon of the index, and then subdivides, one subdivision constituting the perforating division of the fifth digit, the other subdivision uniting with the perforating tendon of the fourth digit (figs. 2 & 3, *F. p.*).

<sup>1</sup> Owen, *l. c.* p. 63, pl. xxiii. fig. 4 *e.*

<sup>2</sup> Burmeister, p. 59, t. 3. fig. 3.

<sup>3</sup> Anat. Comp. vol. vi. p. 341.

Prof. S. Van der Kolk and Vrolik fail altogether to distinguish the flexor profundus digitorum from the flexor longus pollicis, and omit all notice of the arrangement and distribution of the tendons except that of the pollex.

In the Hunterian Lectures, 1864, Prof. Huxley<sup>1</sup> described these muscles in *Nycticebus tardigradus*, and with that description our observations agree, except as regards the very delicate tendon which we found joining the index tendon of the flexor longus pollicis.

The \*flexor longus pollicis is a very distinct muscle, and as large as both the flexor sublimis and flexor profundus taken together. It consists of two separate bellies, one of which arises from the inner condyle and intermuscular septa, the other from the middle third of the anterior surface of the radius and from the interosseous ligament. These two muscular bundles join and give origin to a very large tendon, which bifurcates, the smaller portion joining the tendon of the flexor profundus to form the long flexor tendon of the pollex; the other portion again divides, one part again subdividing, its two subdivisions constituting the long flexor tendons of the index and third digits respectively, the other part joins the tendon of the flexor profundus to form the long perforating tendon of the fourth digit, as before mentioned (figs. 2 & 3, *F. l. p.*).

Fig. 3.

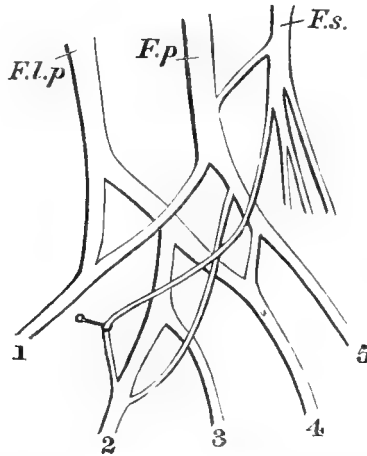


Diagram of the tendons of the palm of the hand. The numbers correspond to the digits, the letters to the same muscles as in fig. 2.

This agrees well with Professor Huxley's description already referred to. From what Meckel<sup>2</sup> says, it would appear that in *Loris* this muscle is united with the preceding, as in so many other of the Primates, including *Tarsius*<sup>3</sup>.

<sup>1</sup> Med. Times and Gaz. 1864, Aug. 6th, vol. ii. no. 736, p. 145.

<sup>2</sup> Anat. Comp. vol. vi. p. 341.

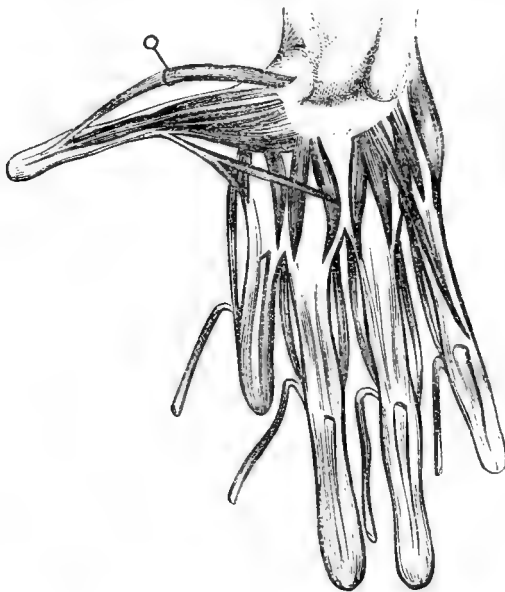
<sup>3</sup> Burmeister, p. 60, t. 3. fig. 3, no. 34.

In *Cheiromys*<sup>1</sup> there is a very interesting intermediate condition. The arrangement much resembles that existing in *Nycticebus*; but the two muscles are not nearly so distinct. There is only one tendon to the pollex, and the muscular fibres arising from the middle of the ulna join the part which answers to the flexor longus pollicis.

The *extensor communis digitorum* and *extensor minimi digiti* appear to be represented by only one muscle, which arises by a diminutive tendon from the external condyle of the humerus. The muscular fibres give origin to a tendon which soon becomes divided into two; the radial one of these again subdivides into four very fine tendons, one going to the index, another (the broadest) bifurcating, its branches going to the third and fourth digits respectively; another (the third subdivision) goes to the fourth digit, and the last to the fifth digit.

The ulnar main division of the common tendon goes to the fifth digit only. This last perhaps answers to the *extensor minimi digiti*, or that portion of the *extensor communis* recorded by Professor Owen<sup>2</sup> as existing in *Cheiromys*, and sending subsidiary tendons to the fourth and fifth digits.

Fig. 4.



Enlarged view of the palmar surface of the hand, to show the small muscles of the pollex and fifth digits; also the interossei and insertions of the lumbricales.

The *extensor indicis* is a very small muscle arising from the middle of the ulna at its radial side, and from the interosseous membrane. It gives origin to two tendons, one going to the index, the

<sup>1</sup> Owen, Trans. Zool. Soc. vol. v. p. 63, pl. xxiii. fig. 4.

<sup>2</sup> *Loc. cit.* p. 62, pl. 23. fig. 2. no. 27a.

other to the fourth digit in the right hand, but in the left hand to the fifth and index.

This muscle, being quite single in our specimen, differs from that described by Meckel<sup>1</sup> as existing in *Loris*.

The *extensor ossis metacarpi-pollicis* shows no trace of subdivision in its tendon, nor any indication that it really includes (as implied in the memoir) the *extensor primi internodii*.

The *extensor carpi ulnaris* arises by two distinct heads, one from the posterior and lower surface of the external condyle, the other (fully half an inch broad) from the posterior surface of the ulna. These heads unite at an acute angle, and give origin to a tendon which has the usual insertion.

*Muscles of the Abdomen.*—As regards the *psaos* and *iliacus*, we were unable to determine satisfactorily their precise limits and subdivisions; nevertheless we are certain that neither the conditions described by S. Van der Kolk and W. Vrolik, nor those given by Meckel<sup>2</sup> as existing in *Loris*, correspond with those in our specimen. The most internal portion, far from being "*la plus forte*," is the most slender. It is undoubtedly the *psaos parvus*, and arises by fleshy fasciculi from the sides of the bodies of the second and third lumbar vertebræ, but very soon becomes entirely tendinous. Its long thin tendon, having an aponeurotic extension proceeding from the inner border, goes towards the pelvis, is closely applied to the muscle beneath, and finally inserted into the ilio-pectineal eminence immediately above the acetabulum. In *Tarsius*<sup>3</sup> the tendon of the *psaos parvus* bifurcates.

The large muscular mass beneath the above tendon appears to represent the *iliacus*. It arises, however, from the sides of the bodies of the lumbar vertebræ below the third, and from the front of the sacrum (being separated from the pyriformis at its origin by the sacral plexus), but it has no origin from the ilium; the insertion is normal.

Another large muscle, which we suppose must be considered as the *psaos magnus*, arises behind the last described (the ventral surface of the body being towards the observer), from the bodies and transverse processes, at their bases, of the two last dorsal and six upper lumbar vertebræ, and is inserted as usual. At its origin it has numerous tendons interspersed in its muscular substance, and is closely connected with the next to be described.

This muscle, which we provisionally call *\*quadratus lumborum*, arises from the two transverse processes of the lumbar vertebræ, from about the fourth downwards, and is inserted into the crest of the ilium immediately above what appeared to be the *scansorius*. Above it is so closely connected with the *psaos magnus* that the correct determination of their limits requires further examination.

The superficial abdominal muscles present nothing worthy of remark, excepting the *rectus*. This is continued forward as a narrow band on each side of the sternum, parallel with and about one-fifth

<sup>1</sup> Anat. Comp. vol vi. p. 324.

<sup>2</sup> Loc. cit. p. 374.

<sup>3</sup> Burmeister, p. 67, t. 4. fig. 2. no. 1.



of an inch distant from it, as far as the first rib, into which it is inserted.

*Muscles of the lower Extremity.*—The *gluteus minimus*, the entogluteus of Owen<sup>1</sup>, is a very small fan-shaped muscle, arising from the junction of the ilium and ischium, behind the acetabulum, and is inserted into the trochanter.

This appears to be the muscle described by W. S. Church<sup>2</sup> as the gemellus superior; but in our *Nycticebus* there is a distinct gemellus superior between the gluteus minimus and the tendon of the obturator internus.

The *pyriformis* is very largely developed. It arises from the anterior (abdominal) surface of the sacrum, and is inserted into the great trochanter. The sciatic nerve passes out beneath its inferior border.

The authors of the joint memoir, though they mention by name, give no description of this muscle; neither does Professor Owen in his monograph so often quoted. Meckel also says nothing of its existence in *Loris*. Burmeister<sup>3</sup> gives a long description of apparently the same muscle in *Tarsius*, and remarks that it must have a powerful action in rotating the thigh outwards.

The *gracilis* has indeed a very extensive origin; but it nevertheless is quite single, and shows no trace of the division described by Meckel<sup>4</sup> as existing in *Loris*. It is inserted by a distinct but short tendon into the inner border of the tibia, beneath the sartorius.

The *\*pectineus* arises from the anterior surface of the pubis, and is inserted into the inner side of the femur. Professor Vrolik, in his article on the *Quadrumana*<sup>5</sup>, denies the existence of a pectineus in *Stenops*; but Meckel asserts that in *Loris* it is very strong.

The *biceps femoris* arises by a long and narrow tendon from the posterior end of the tuberosity of the ischium, beneath the semitendinosus. The fibres expand distally in a fan-like manner, and are inserted by an aponeurosis into the head of the fibula and the fascia of the leg.

The *semimembranosus* arises from the ischium at its junction with the pubis, immediately beneath the origin of the semitendinosus, with which it is very closely connected. Passing downwards, it ends in a long tendon, which goes beneath the internal lateral ligament of the knee-joint, and is inserted into the inner side of the tuberosity of the tibia.

The description of this muscle in *Loris*, as given in the French translation of Meckel, is too ambiguously worded for us to be able to decide whether it agrees with our observation.

The *tibialis anticus* is a very large and powerful muscle, and arises from fully the upper half of the anterior surface of the tibia, and has its usual insertion (figs. 5 & 6, *T. a*). There is no trace

<sup>1</sup> Cheiromys, p. 66.

<sup>2</sup> Nat. Hist. Review, Jan. 1862, p. 87.

<sup>3</sup> *Op. cit.* p. 69, t. 3. fig. 4, and t. 4. fig. 5, no. 7.

<sup>4</sup> *Loc. cit.* p. 397.

<sup>5</sup> Cyclop. Anat. and Physiol. vol. iv. p. 218.

whatever of any division of the tendon of this muscle, *à fortiori* not of its muscular part.

The *extensor longus digitorum* is a very slender muscle, the smallest of the leg-extensors and flexors of the lower limb; yet it has a double origin, as also in *Cheiromys*<sup>1</sup>. The smaller head arises by a thin muscular bundle from the outer side of the tuberosity of the tibia, with also a small pencil of fibres coming from the inner side of the head of the fibula; the larger origin consists of a rhomboidal, flat, muscular fasciculus attached to the inner side of the middle third of the fibula. The muscle gives a tendon which splits into four subdivisions, sending one to each of the four outer digits, that to the index being the smallest.

The *extensor longus hallucis* is of about equal magnitude with the preceding, but quite distinct from it. It arises from more than the upper half of the external margin of the tibia. Its tendon is inserted into the proximal end of the last phalanx of the hallux (fig. 6, *E. l. h.*).

In *Loris*, according to Meckel<sup>2</sup>, this muscle seems to be confounded with the *extensor longus digitorum*.

The *peroneus longus* is remarkable for its great extent, covering about one-half of the anterior surface of the leg; but there is nothing unusual in its origin or insertion (fig. 6, *P. l.*).

The *\*peroneus quinti digiti* is very distinctly developed, the muscular fibre being of considerable length. It arises between the *peroneus longus* and *peroneus brevis*, completely hidden by them, and is inserted by an extremely delicate tendon into the proximal end of the second phalanx of the fifth digit (fig. 6, *P. q. d.*). This muscle, we believe, was first described under the above name by Professor Huxley<sup>3</sup>, in his Hunterian Lectures for 1864; but it has been noticed by Meckel<sup>4</sup> among the extensors of the digits.

Burdach<sup>5</sup> has also described it under the name *peroneus tertius*; and W. S. Church<sup>6</sup> likewise refers to it under the same designation. But this muscle can scarcely be the homologue of the *peroneus tertius* of Man, inasmuch as it arises not on the tibial side of the *peroneus brevis*, but on the fibular side. Moreover Professor Huxley remarks, it is sometimes represented in Man by a slip from the tendon of the *peroneus brevis*.

The *gastrocnemius*.—It is difficult to understand how Professors S. Van der Kolk and W. Vrolik can have asserted that “*les jumeaux et le muscle soléaire sont très-forts,*” unless they have mistaken one head of the *flexor longus digitorum* for part of the *gastrocnemius*. It is the more probable that they have done so, as they have described the *semimembranosus* as “*embrassant les jumeaux,*” whereas it is the *flexor communis longus* which this muscle directly embraces. So far from being “*très-fort,*” the *gastrocnemius* is exceedingly

<sup>1</sup> Owen, *l. c.* p. 68, pl. 25. figs. 1, 3. no. 35.

<sup>2</sup> *Anat. Comp.* vol. vi. p. 499.

<sup>3</sup> *Med. Times and Gaz.*, 9th July, 1864, p. 40.

<sup>4</sup> *Anat. Comp.* vol. vi. pp. 438 and 440.

<sup>5</sup> *Loc. cit.* pp. 46–55.

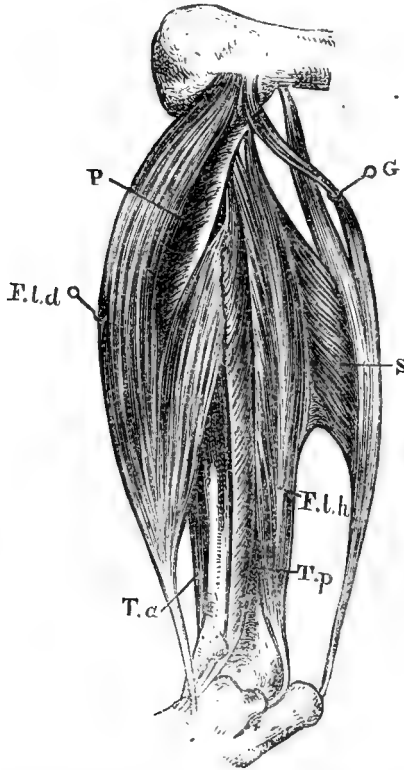
<sup>6</sup> *Nat. Hist. Review*, Jan. 1862, p. 92.

weak and slender. It arises by the usual two heads, the inner one being very much higher than the outer one. It has the ordinary insertion by the tendo Achillis, which is moderately developed, the gastrocnemius being muscular almost its entire length (fig. 5, *G*).

The *soleus* appears to be represented by a flat rhomboidal band of muscular fibre without any tendon. It arises from the posterior margin of the head of the fibula and the inner border of the flexor longus hallucis for about half its length, then joins the outer border of the gastrocnemius for above half an inch (fig. 5, *S*). In *Loris*, according to Meckel<sup>1</sup>, it arises from almost the whole of the fibula.

We were unable to find any trace of a *plantaris* muscle.

Fig. 5.



Hind limb between knee and ankle.

*P.* Popliteus. *G.* Gastrocnemius. *S.* Soleus. *F.l.d.* Flexor longus digitorum.  
*F.l.h.* Flexor longus hallucis. *T.a.* Tibialis anticus. *T.p.* Tibialis posticus.

The *\*popliteus* is rather well developed. It arises from the posterior surface of the tibia as far inwards as the internal lateral ligament (fig. 5, *P*). It is inserted by a very strong tendon (containing a large sesamoid bone), which passes behind, rather than beneath, the external lateral ligament, into the depression outside the outer condyle. In *Tarsius*, according to Burmeister<sup>2</sup>, this muscle is in-

<sup>1</sup> Anat. Comp. vol. vi. p. 421.

<sup>2</sup> *Op. cit.* p. 75, t. 4. fig. 5. no. 23.

serted into the sesamoid bone of the outer head of the gastrocnemius.

The *flexor longus digitorum* presents perhaps the most interesting peculiarities of any of the muscles of this animal. These peculiarities are passed over in silence by Professors Van der Kolk and Vrolik, which makes it the more probable that part of this muscle has been confounded by them with the gastrocnemius.

The spontaneous flexion of the digits of this creature is very remarkable; and, as has been noticed by Professor Huxley<sup>1</sup> in his account of the nearly allied form, *Arctocebus*, it requires considerable effort to extend the toes, which when left to themselves become again bent.

We observed, in suspending the dead specimen by the feet from our fingers, that instead of falling to the ground, the body remained suspended, the toes forcibly contracting, grasping firmly the fingers, the animal thus hanging quite securely by the digits of its feet.

Various modifications, doubtless, concur in producing this very strong and ready flexion of the digits; but the peculiar origin of the *flexor longus digitorum*, there is little doubt, greatly contributes, if not mainly conduces, to this phenomenon. This muscle has three distinct origins—the first from the internal condyle of the femur as high as the inner head of the gastrocnemius, and from the inner surface of the tendon of that inner head (fig. 5); the second part arises from the inner border of the tibia, in close union with the aponeurosis of the sartorius and semitendinosus. The fibres from these two origins unite to form one fleshy belly, which constitutes the greater part of the muscle. The third part arises from the posterior surface of the tibia, beginning above immediately below the popliteus (fig. 5). Its fibres constitute the second belly of the muscle—an elongated rhomboidal mass which, uniting with the larger belly immediately above the common tendon, passes down behind the internal malleolus, and, after giving off a small tendon to the hallux, bifurcates, the inner portion giving rise to two tendons, one going to the middle digit, the other forming part of the deep index-tendon. The outer portion also gives rise to two tendons, going to the fourth and fifth digits respectively (fig. 6, *F. l. d.*).

The origin of this muscle from the proximal bone of the limb (the femur) has the effect of flexing the digits by the mere extension of the leg on the thigh. Professor Huxley, in his present Hunterian Course of Lectures, dwelt upon the passive mode of suspension of *Pteropus* by its hinder extremities, and also noticed in the same the origin of the *flexor longus digitorum* from the femur. This similar condition must, doubtless, have a similar effect, and greatly contribute in *Pteropus*, as in *Nycticebus*, to the effortless suspension of the body.

Meckel<sup>2</sup> describes the muscle under the name of the “*plantaire grêle*,” and says it arises in the ordinary way from the internal condyle of the femur; but the plantaris, as far as we know, arises constantly and exclusively from the *fibular* side. This fact tells against

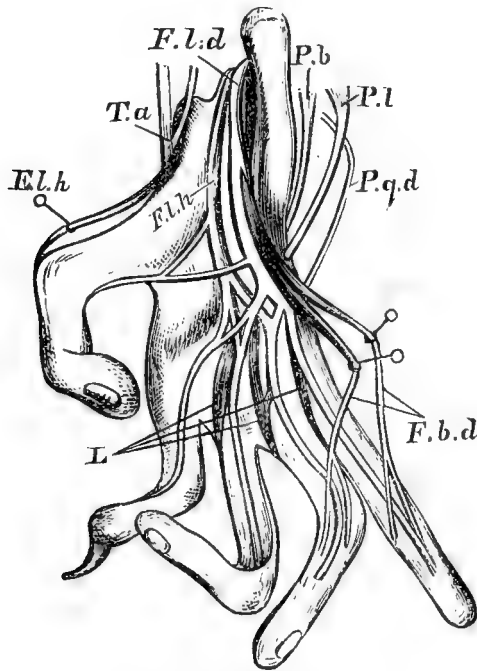
<sup>1</sup> Proc. Zool. Soc. 1864, p. 319.

<sup>2</sup> Anat. Comp. vol. vi. p. 456.

the possibility of the plantaris in any way contributing to form this so largely developed flexor longus digitorum.

An interesting similarity with reference to the distribution of the tendons exists in *Cheiomys*<sup>1</sup>, except that there is no tendon given off to the hallux.

Fig. 6.



Flexor tendons of the foot.

*F. l. d.* Flexor longus digitorum. *F. l. h.* Flexor longus hallucis. *F. b. d.* Flexor brevis digitorum. *L.* Lumbricales. *P. b.* Peroneus brevis. *P. l.* Peroneus longus. *P. q. d.* Peroneus quinti digiti. *T. a.* Tibialis anticus. *E. l. h.* Extensor longus hallucis.

The *flexor longus hallucis* is a powerful muscle, but smaller than the preceding. It arises by two heads—one from the posterior surface of the fibula, the other, a very small fasciculus, from the tendon of the popliteus (fig. 5). Its strong tendon gives off a slip to the hallux, joining that going to the same digit from the flexor longus. It then bifurcates, one part joining that branch of the flexor longus which goes to the index and middle digits, and forms its share of each of their tendons; the other joins a tendon of the flexor longus, and forms with it the perforating tendon of the fourth digit (fig. 6, *F. l. h.*).

A very similar arrangement exists in *Cheiomys*<sup>2</sup>; only this muscle exclusively furnishes the hallux-tendon.

The *flexor brevis digitorum* is very narrow; it arises from the plantar surface of the tendon of the flexor longus, and ends in two

<sup>1</sup> Owen, *loc. cit.* p. 67, pl. 25. fig. 2. no. 32.

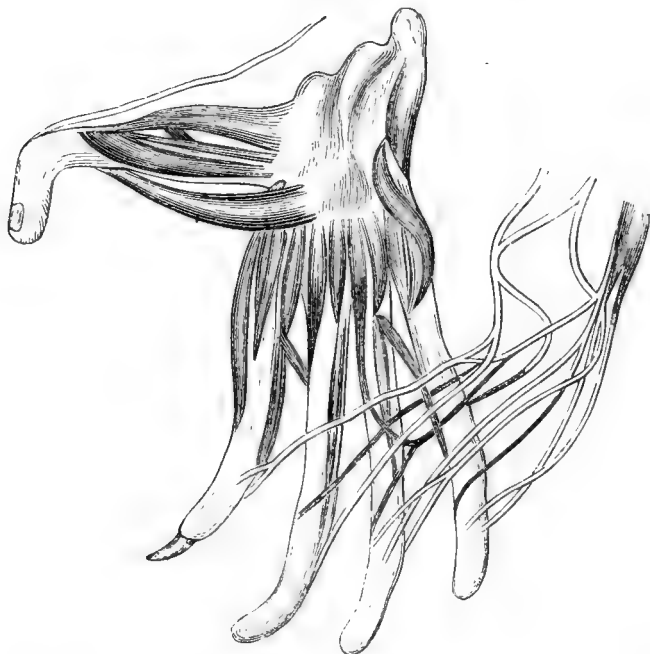
<sup>2</sup> *Ibid.* no. 31.

fleshy bellies, each giving off two slender and perforated tendons which go to the fourth and fifth digits respectively (fig. 6, *F. b. d*).

We did not observe an *accessorius*.

The small muscles of both hand and foot, which belong to the first and fifth digits respectively, we found to exist as mentioned by our authors: and with regard to the interossei of the hand and foot, these are represented (as they appeared to us) in the woodcuts (figs. 4 & 7); but we refrain from giving a detailed description of them, as a fresh dissection would be required to confirm and satisfy ourselves as to the perfect accuracy of our observations upon them.

Fig. 7.



Enlarged view of the plantar surface of the foot, to show the small muscles of the hallux and fifth digits, the interossei, and the lumbricales attached to the flexor tendons.

On carefully comparing the brain of our specimen with the description of Professors Van der Kolk and Vrolik, and likewise with the careful and minute account given by Mr. W. H. Flower<sup>1</sup>, of the brain of *Nycticebus javanicus*, we found it to agree completely with the statements of the latter author, except that the posterior parts of the Sylvian fissures converged instead of being parallel.

A slight difference existed in form and dimensions; but these, doubtless, were due to its having been previously preserved in alcohol.

The viscera agree with Professors Van der Kolk and W. Vrolik's account of them. It may be worth while at the same time to men-

<sup>1</sup> Trans. Zool. Soc. vol. v. p. 103.

tion that the liver, which, according to our authors, offers "*de grandes différences individuelles*," in our specimen showed a very interesting uniformity in the number and relative dimensions of its lobes.

It corresponded with the conditions represented and described by Professor Huxley<sup>1</sup> as existing in the allied form of *Arctocebus*.

The liver in *Loris* does not seem to be very different, according to Buffon<sup>2</sup> and Martin<sup>3</sup>. In *Cheiromys*<sup>4</sup> there is also a singular resemblance to *Nycticebus tardigradus* in the form and divisions of this organ.

This extends even to the direction of the fundus of the gall-bladder, which, according to Professor Peters<sup>5</sup>, in a paper read at Berlin in April 1864, is in *Cheiromys* directed in the normal manner, instead of the abnormal manner peculiar to the other Madagascar *Lemuroidea*.

The cæcum has the elongated prolongation (like, if not really and essentially, a vermiform appendix) which is figured and described in the memoir.

The comparatively small zoological importance of this character is, however, shown by the fact that in *Cheiromys* a condition exists very similar to that presented by *Nycticebus*, while in the closely allied genus *Arctocebus*<sup>6</sup> and in *Loris*<sup>7</sup> there is no trace of any such prolongation.

The generative organs present no difference, worthy of remark, from the description already given in the memoir on *Stenops*, the uterus being bicorned, and the clitoris very large and perforated by the urethra. The kidneys, suprarenal capsules, and bladder are similar to those of *Arctocebus*<sup>8</sup>, except that the ureters do not enter so low down towards the neck of the bladder.

If we sum up the results of our investigation upon the anatomy of *Nycticebus tardigradus*, we are led to note the interesting peculiarities offered by the muscles of the limbs,—on the one hand, the reappearance and, as it were, exaggeration of that anthropoid muscle, the flexor longus pollicis; on the other hand, its resemblance, by the interlacements of its tendons with those of the flexor profundus, to the conditions always offered by the foot in Primates—a resemblance which has already been noticed by Professor Huxley in his Hunterian Lectures for 1864.

We are also struck with the almost atrophied gastrocnemius, but concomitantly augmented flexor longus communis, which last, inverting the analogy of the flexor longus pollicis, resembles a hand-flexor in its origin from the proximal bone of the limb.

Likewise are we impressed with the very large size of the rectus

<sup>1</sup> Proc. Zool. Soc. 1864, p. 330, fig. 9.

<sup>2</sup> Hist. Nat. tome xiii. p. 216.

<sup>3</sup> Proc. Zool. Soc. 1833, p. 23.

<sup>4</sup> Owen, *loc. cit.* p. 73.

<sup>5</sup> See Notice in Nat. Hist. Review, Jan. 1865, p. 149.

<sup>6</sup> Huxley, Proc. Zool. Soc. 1864, p. 329, fig. 9.

<sup>7</sup> Buffon, Hist. Nat. vol. xiii. pl. 31. fig. 2.

<sup>8</sup> Huxley, Proc. Zool. Soc. 1864, p. 332, fig. 11.

anticus major, and the generally extensive development of the muscles of the ventral surface of the spine.

All these peculiarities of muscular structure must be considered in connexion with the singular movements which this animal is capable of making, and which it habitually employs in its arboreal manner of life. We allude especially to its Sloth-like mode of progression, and its great power of slowly and easily raising up the head and anterior part of the body while hanging suspended by its posterior extremities alone.

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March 14, 1865.

Dr. J. E. Gray, F.R.S., in the Chair.

Mr. Sclater called the attention of the Meeting to several recent additions to the Society's Menagerie, amongst which were—

1. A three-banded Armadillo (*Tylopeutes conurus*, Is. Geoffr.), received from the Acclimatization Society of Paris. This little animal (which differed from the ordinary form of the species in the entire absence of the rudimentary first digit, having but three front toes) was very remarkable for its curious manner of progression. In walking, only the pointed tips of the elongated nails of the second and third digits of the front feet touched the ground, and the body was often supported merely on the tip of the third digit only.

2. A male Siamese Pheasant (*Euplocamus prælatus*), received in exchange from the Acclimatization Society of Paris.

Mr. Sclater exhibited some specimens of eggs laid by birds living in the Society's Menagerie, amongst which were those of Scemmering's Pheasant (*Phasianus scemmeringii*) and the Horned Tragopan (*Cerionis satyra*). Mr. Sclater remarked that the eggs of the former bird closely approximated to those of the other species of true *Phasianus*. The eggs of the Tragopan much resembled those of the Impeyan Pheasant (*Lophophorus impeyanus*), being of a creamy white, minutely freckled and blotched with two shades of pinkish grey, and measuring 2.45 by 1.8 inch.

Mr. Alfred Newton exhibited specimens of several new or little-known birds' eggs, and gave descriptions of others, amongst which were those of *Elanoides furcatus*, *Nucifraga caryocatactes*, *Didunculus strigirostris*, *Phalaropus fulicarius*, *Opisthocomus cristatus*, *Mareca americana*, and *Fulix affinis*. Mr. Newton believed that the eggs of the Nutcracker (*Nucifraga caryocatactes*), which had been obtained from the island of Bornholm, were the first really authentic examples of this species that had reached this country.

A communication was read from Mr. G. S. Brady, describing



sixty-six new or imperfectly known species of Marine *Ostracoda*, and accompanied by elaborate drawings of the various species.

This paper will be published in full in the Transactions.

The following papers were read:—

1. ON SOME POINTS RELATING TO THE ANATOMY AND HABITS OF THE BACTRIAN CAMEL (*CAMELUS BACTRIANUS*), AND ON THE PRESENCE OF INTESTINAL GLANDS NOT BEFORE NOTICED. BY EDWARDS CRISP, M.D., F.Z.S., ETC.

I shall endeavour, in this paper, to notice chiefly certain parts of the anatomy of this animal which, as I believe, have escaped the observation of, or have not been fully investigated by previous inquirers; or if investigated, the mode of research has been different to that which I have pursued. This leads me to mention two practices that I have for a long time followed, and which, as far as I know, I was the first to adopt, and the utility of which, I think, is especially apparent in an investigation like the present. These consist in the filling of some of the hollow organs—as the various portions of the intestinal tube, for example—with water, to ascertain their capacity, and in the distention of some parts with liquid plaster of Paris to show their form and to exhibit injections of the blood-vessels or absorbents in a better manner. A part of the injected stomach of a Llama (before the Society) treated in this way, to show the form of the water-bags and the course of the vessels supplying them, well exemplifies the advantage of this method.

The *Camelidæ* are some of the most interesting animals, not only as regards their structure, but also in reference to their habits and utility, with which the anatomist has to deal. Their history is too well known to need repetition here; but it will not be out of place to notice the Camels (one- and two-humped) now in the Society's Gardens. These consist of an old male Bactrian Camel with one of the humps down\*, of a female of the same species born in the Crimea in 1855, and of a male Camel about forty years of age. I learn that, since the formation of the Society (1826), one Bactrian Camel died of dropsy, and that two Camels have been born in the Society's collection; one of these died, and the other was reared and afterwards sent to Edinburgh. A Camel (Bactrian) was born in Edmunds's travelling menagerie last year. I believe the only place in Europe where Camels are now bred for profit is Pisa. Of all the animals in our menageries, probably the Camel is the most healthy. To return to the Camels in the gardens of the Society, I learn from the keeper that their consumption of food is about equal to that of the Horse, and that they do not drink, even in hot weather, more

\* It is well known that these humps often diminish in size, and that the fatty matter of which they are composed is again replaced; but Mr. Bartlett informs me, "from inquiries he has made of many persons connected with travelling menageries, that when the hump falls in this manner it never recovers its erect position."

than six gallons \* daily, and in winter about three gallons. There is one remarkable feature in the male Camel that is not, I think, generally known. On the back of the neck, just behind the ears, are two glandular elevations that furnish, especially during the rutting season, a very offensive secretion. This, as will be seen by the paper smeared with it, is of a dark colour, and very like the sepia of the Cuttlefish (*Octopus*), and might, I believe, be used advantageously as a pigment. I find that this secretion is from a large number of agminated glands seated under the skin in the situation above named. They are about  $\frac{1}{5}$ th of an inch in length and  $\frac{1}{7}$ th of an inch in breadth, and are represented in Plate IV.

In speaking of the generative function, with which these glands are intimately connected, let me notice the mode of copulation of the *Camelidæ*, known to many. The male, often after very ungallant usage to his spouse, compels her to drop down in her usual position when at rest, and in this way copulation is accomplished. In my paper "On the Dentition and Mode of Copulation of the Elephants" (*Lancet*, 1854, p. 198), I believe that I was the first to point out the mode of copulation of these animals. The female places her head upon the ground, elevates her haunches, and thus the act of copulation is affected. I am not acquainted with any other quadrupeds in which the females assume the position I have described in the Elephants and Camels, including the Llamas.

One great source of difficulty in this investigation has been the confusion that has arisen respecting the names of the two species of Camel, Dromedary and Camel being applied to both by different authorities. It would be well, I think, if the term Dromedary were abandoned, and the names One- or Two-humped Camel used in its place.

Daubenton, in Buffon's 'Histoire Naturelle,' 1744, vol. xi. p. 255, has given a long description of the anatomy of the Camel, with a number of measurements of the bones and of various parts. He represents the stomach as consisting of five compartments; and he gives the length of the alimentary canal, exclusive of the cæcum, as eighty French feet. He says that the two races (Camel and Dromedary) mix, and that their progeny is the most vigorous.

Sir E. Home (*Phil. Trans.*, 1806) describes the stomach of a Camel that was killed at the London College of Surgeons, 1805. "The animal was supplied with a large quantity of water before death, and this fluid was found in a pure state in the water-bags; these cavities, moreover, contained none of the food."

In the first volume of our 'Proceedings,' part 2, 1832, p. 126, Mr. Spooner gives some notes on the Dromedary (*Camelus dromedarius*, Linn.)—the animal I have before spoken of that died of dropsy. "In the structure of the stomach he found nothing to add to the accounts already given by Daubenton and Sir E. Home. He stated, however, that the cells of the first stomach contained food, and, like

\* The Elephant, as I am informed by the keeper, will sometimes in hot weather drink twenty pailfuls of water daily, although the capacity of its stomach is only about one-third that of the Camel.

John Hunter, he had some doubt as to the correctness of the supposed water-holding function of these cells." Prof. Owen remarked "that he had found food in the water-cells of Llamas; but he thought it probable that this had been forced into them by moving the animals after death."

In the Hunterian Museum (556 to 559) are preparations of the water-cells of the Llama and Camel, with a description by Professor Owen.

Cuvier ('Leçons d'Anatomie Comparée,' 1836, tom. iv. p. 72) gives a very short account of the stomach of the Camel, which he describes as having four cavities. The total length of the intestinal tube in the Dromedary (one-humped) is given as 38·456, the proportion to the body being 1 : 15·5. In the Camel, the total length of the intestinal canal is 42·213, the proportion to the length of the body being 1 : 12·3 (Table, p. 193).

I am not acquainted with any recent writer who has given a minute account of the visceral anatomy of the Camel.

The Bactrian Camel (*Camelus bactrianus*) (two-humped), a part of which I have lately dissected, was an old male that had been long in a travelling menagerie, and was killed in consequence of old age, disease, and emaciation.

I had not an opportunity of examining the brain; but judging from the cast of one in the Hunterian Museum, from which the drawing before the Society was taken, the weight is about 24 ozs., a proportion of about  $\frac{1}{700}$  or  $\frac{1}{800}$  to the body—a small brain for an animal possessing so great an amount of docility and intelligence. The brain of an Indian Elephant that I weighed was about 12 lbs. in weight.

The eye weighs 1 oz. 148 grs.; the lens 58 grs. There is a peculiarity connected with the eye of the Camel and Dromedary that I have not seen noticed by any writer on these animals, although it can scarcely have escaped observation. If the eyes of the three animals I have spoken of in the Society's collection are inspected, it will be seen that pigmentary masses are suspended from the pupil and pass into the anterior chamber, so as to form a kind of curtain to regulate the admission of light—a beautiful provision in an animal so exposed to the sun's rays. In one of the Camels a loop of pigmentary membrane is seen in the anterior chamber of both eyes. Unfortunately I omitted to examine this part after death in the Camel I dissected.

The tongue is long, narrower in the centre, and more expanded at the base and extremity; the buccal villi long and numerous. The larynx presents no remarkable peculiarity, except that the anterior part of the thyroid cartilage is less prominent than in most of the ruminants.

The trachea is of nearly uniform calibre; it consists of seventy-five rings, and is 3 feet 11 inches in length.

The thyroid glands are of an oblong shape, and entirely separate. They weigh about one ounce and a half.

The heart weighs 6 lbs. 4 ozs.; it measures 11 inches from the

base to the apex. The parietes of the left ventricle are  $1\frac{1}{2}$  inch in thickness, and the septum measures the same. The parietes of the right ventricle are 8 lines in thickness. The tricuspid valve is formed by the expansion of ten tendinous slips, which proceed from two elevations (*corneæ columnæ*) of the right ventricle. There is no heart-bone, as in many of the ruminants; and the apex of the heart is less pointed than in the Antelopes and *Cervidæ*.

The lungs present the most remarkable specimen of disease that I have met with in these organs. They both have a whitish nodulated appearance, and contain scarcely a square inch of healthy structure, the general mass being made up of hard tubercles containing a large proportion of earthy matter. The lungs are about of equal size, and the right (the only one I put into the scale) weighed  $20\frac{1}{2}$  lbs., a great proportion of this being made up of carbonate of lime. The bronchial glands are much enlarged, and are composed of a larger proportion of earthy matter than the lungs. This disposition to the formation of earthy matter in the lungs is very common in the ruminants. I have met with it to a great extent in the *Leucoryx* and in other Antelopes; and in the common sheep the *Echinococcus*-cysts are often converted into chalky and ossific material. As this Society is both zoological and physiological, let me digress for a moment to point out the beautiful law of compensation that exists in all animal bodies, so that when one organ is impaired, or, as in this instance, almost destroyed, one or more parts take on a compensatory action. In this case the blood was aerated by the lining membrane of the trachea and by that of the larger bronchial tubes, the process of depuration being performed chiefly by the liver (which was normal in structure) and by the intestinal glands. I have seen numerous examples of this in the *Quadrumana* and in other orders. The normal structure of the lungs may be almost entirely destroyed by disease, and the animal may linger on for a long period; but when both lungs and liver are seriously affected, life is soon terminated. There is one practical and useful fact that I have alluded to in a former paper, in connexion with tubercle in the lower animals, viz. that it is much more prevalent in the *vegetable* feeders.

Mr. Gilchrist, in his essay on the 'Diseases of the Camel' (India, 1846), does not mention the presence of tubercle in the lungs or in other parts, this lesion being probably the result, as in other animals, of close confinement, and often, in travelling menageries, of a vitiated atmosphere.

The liver weighs  $23\frac{1}{2}$  lbs. It consists mainly of one lobe, with two slight divisions. The under surface is curiously formed into several thin flaps, which pass in a horizontal direction. No gall-bladder is present, and, with the exception of three tubercles, the viscus is in a normal state.

The spleen weighs 25 ozs., and is of the usual fan-like shape that it assumes in most of the ruminants. The splenic vein contains five pairs of valves; these are also present in the gastric and abdominal veins.

The pancreas is of the usual branched form that is found in the ruminants; it weighs only about 10 ozs.—a very small organ for an animal with such a large and complicated stomach.

The kidney weighs 2 lbs. 1 oz., and is of the usual form of this organ in the ruminants; the renal bodies, as is the case in all the ruminants that I have dissected, are not in contact with the kidneys. The mamillary processes are unusually long (3 inches). The pelves of the kidneys are filled with solid, hard, white fat, and from this finger-like masses proceed between the cones. I have on a former occasion mentioned a remarkable local accumulation of hard fat around the heart of an old and emaciated Eland (*Oreas canna*) of a similar character. Both renal bodies were much diseased—a very unusual occurrence in the lower animals. The left renal vein contains five pairs of valves, the right vein only two pairs.

I had not an opportunity of examining the generative organs.

I now come to the most interesting part of the inquiry, viz. the form, capacity, and anatomical relations of the alimentary canal. I scarcely need say that a minute description of the stomach alone would occupy many pages, and the time would not be ill spent; but there are few who would care to hear the details. I have inverted the stomach; and the drawing, of the natural size, before the Society represents it in this position. The rumen, instead of being covered with villi, as in all ruminants (except in the other *Camelidæ*), has a smooth surface lined with pavement-epithelium. In this cavity are two sets of water-cells, the one consisting of about ninety-four, and entirely distinct, the other composed of about seventy-eight cells, and connected with the second stomach—that which would correspond to the reticulum (honeycomb) in ordinary ruminants. From the œsophagus proceeds to the second stomach (reticulum or true water-bag of some authors), an elevated ridge of the mucous and muscular coats, which conducts the food to the last-named cavity, but does not enclose it, as is supposed to be the case with the double ridge in other ruminants. The second stomach, or water-bag, is composed almost entirely of cells, but of less capacity than those before named, although the subdivisions are more numerous; these amount in all to about 380. The large cells in the rumen will contain about two or three ounces of water; but, if all were filled, the capacity of each would be much diminished. I found no traces of food in any of these cells, but a large quantity of small pieces of coal, an old nail, and bits of glass, the weight of all amounting to about 24 ozs. This animal, like many in a diseased state, had probably a depraved appetite, and hence the presence of these extraneous bodies. Ellis, the keeper of the gardens, tells me, however, that these animals, at certain times, are very “nasty feeders,” and will eat almost anything. The next stomach, which has been called the third, corresponds to the maniples; but, as will be seen when the dimensions are given, it is comparatively much larger, and the large mucous folds present in other ruminants are scarcely perceptible. The fourth cavity (or digestive stomach of other ruminants) is small, but extremely vascular and elevated into ridges, like the digestive

stomach of the Dolphin or Porpoise. These ridges evidently increase and decrease in size, according to the activity of the digestive process; and this explains the highly tortuous condition of the arteries. This cavity is shut off from the next, which I call the fifth stomach, by a strong muscular valve. The last-named stomach is thin and dilated, and terminates in the duodenum, although the great contraction at this part can scarcely be called valvular. Daubenton, who gives five stomachs to the Camel, has not included the last cavity; but I think it is entitled to be called a fifth stomach; indeed, if we reckon the two sets of water-bags in the rumen, the Camel may be said to have seven stomachs.

No one can form a proper notion of the immense size of the Camel's stomach unless it is seen distended: when in this state, the following are the measurements and the capacity of the various parts:—The length of the œsophagus 6 feet; of the rumen 43 inches, its circumference 5 feet 6 inches, and it holds twenty gallons of water. The length of the second stomach is 21 inches, and its capacity about six quarts. The third stomach is 34 inches in length, and holds about three gallons of water. The fourth stomach is 8 inches in length, and contains three quarts of water. The fifth cavity is 9 inches long, and holds about two quarts of water. The capacity of all is about twenty-five gallons three quarts; and the length of all, when distended, is 9 feet 6 inches. As regards the quantity of water that these cavities hold I, of course, cannot speak with perfect accuracy.

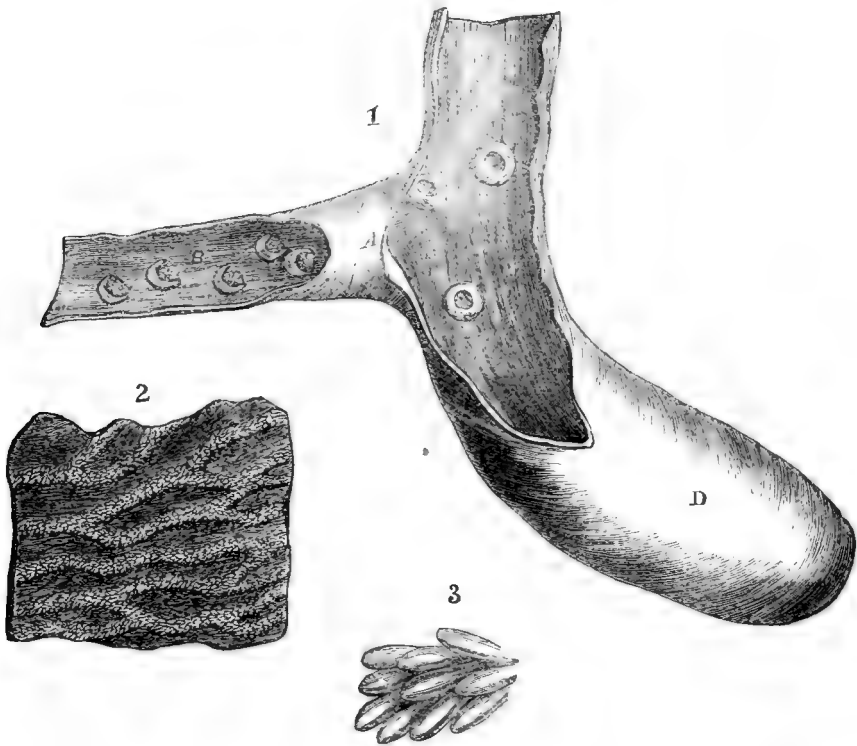
The muscular bands and the mode of closure of the water-bags have been so often described that I need not allude to them; but there is one piece of mechanism in connexion with this apparatus that I think has been overlooked, viz. the arrangement of the external muscular fibres of the rumen. Many of these wide muscular strips terminate in finger-like divisions, which are so spread out as to exercise, I believe, a material influence on the closure of the water-cavities.

I supposed until recently that only the *Camelidæ* had water-cavities in the stomachs; but on dissecting an Antelope from Siberia, the Saiga (*Antilope saiga*), I was surprised to find two large water-bags in the rumen; and I hope to bring the visceral anatomy of this rare animal before the Society at a future time.

The small intestines of the Camel measured 114 feet by 2 feet 6 inches, the colon and rectum 27 feet 6 inches, making in all a length of 159 feet 6 inches. In the Alpaca (*Auchenia pacos*) I found the length of the alimentary tube 70 feet, whilst that of the Huanaco (*Auchenia huanaco*) was 95 feet.

In my paper on some parts of the anatomy of the Giraffe and Nylgau (P. Z. S. 1864, p. 63), I stated that the investigation of the intestinal glands of the lower animals had been much neglected, and that a wide field was left for future inquirers. The dissection of this animal reveals another curious structure in connexion with the intestinal mucous membrane. Near to the cæcal valve I found eight large glandular folds of the mucous membrane; three of these

were circular, the largest measuring  $1\frac{1}{2}$  inch in diameter, the folds forming a circular receptacle that would contain about 2 drachms of fluid; one of these was seated at the commencement of the cæcum, and two on the colon, near to the ileo-cæcal valve. In the ileum, within a space of 6 inches from this valve, were five folds of the mucous membrane, of a crescentic shape, the largest about 1 inch in width, their crescentic edges being all towards the ileo-cæcal valve; the largest of these would hold about a drachm of fluid. In other parts of the ileum, a short distance from the last named, were slight folds of the lining membrane, but assuming a crescentic shape. To the naked eye these, both circular and crescentic, appeared to be mucous follicles surrounded by the folds above described; but on putting them under the microscope, they were seen to be composed of club-shaped villi, about  $\frac{1}{20}$ th of an inch in length, and having much the appearance of those on the surrounding mucous membrane, but of larger size.



1. The cæcum and portions of the ileum and colon: B. ileum; C. colon; D. cæcum; showing the circular and semilunar folds. 2. The elevations on the lining membrane of the small intestine. 3. The same, magnified.

The ileum, over a considerable extent of its surface, presented a whitish-streaked, mottled appearance, arising from transverse rows of elevated villi, as seen in fig. 2; the magnified representation of these villi is shown in fig. 3. The rectum in several parts was folded into

longitudinal ridges, as in the Giraffe; but these were of small size and not so well defined.

*Skeleton.*—The skeleton of the Bactrian Camel, so-called, is described by Professor Owen in the Museum Catalogue of the College of Surgeons; and I need not occupy much time in noticing this part of the structure of the animal, although there are some points, I think, of great interest connected with it. I have carefully examined two skeletons of the Camel—one a Bactrian, at the British Museum, and the skeleton above alluded to, at the College of Surgeons; and, although they are said to be of the same species, I find a great difference in the length of many of the bones, but there is no important difference in the form: the skeletons are both those of old animals. In the British Museum specimen I find the united length of the spinous processes of the dorsal vertebræ to be 110 inches, while those of the College specimen are only 92 inches; and so with the bones of the extremities. These differences in the length of the bones may arise from a difference of sex only, as I believe the skeleton at the College of Surgeons is that of a female. I took drawings and measurements of the bones of both the skeletons I have named, believing, at the time, that one was a Bactrian Camel and the other a Dromedary (the one-humped); but it is probable that these are both the skeletons of the former animal. Professor De Blainville, in his ‘Ostéographie,’ p. 76, says, after examining the skeletons of the two species, “Quant aux autres parties du squelette, il m’a été impossible d’y trouver la moindre particularité différentielle autre que celles qui peuvent être considérées comme individuelles, et que l’iconographie la plus rigoureuse pourrait à peine signaler” (p. 86).

Mr. Flower tells me that he has seen the two skeletons together at Leyden, and that he observed a marked difference in the spinal column. It will be interesting hereafter to have this matter more definitely settled. De Blainville’s comparison was made between one skeleton of the Dromedary and five of the Camel.

The deviations in the skeletons of the *Camelidæ* from the ruminant type, such as the three canine-like teeth in each jaw, the want of perforation of the transverse processes of the cervical vertebræ for the vertebral artery, the form of the spine of the scapula, the peculiarities in some of the tarsal and carpal bones, and the more flattened form of the feet, have been pointed out in the Hunterian Catalogue, and by various writers on the subject; but there are some peculiarities in the skeleton of this animal that have not, I think, received sufficient notice. In my examination of the bones of the male Bactrian Camel at the British Museum, I was struck especially with their great weight and solidity; and I believe, judging from the examination of the bones of nearly all our well-known large quadrupeds, that there is no animal with bones so weighty in proportion to their bulk as those of the Camel. I find that the skull of the Ox is much larger than that of the Camel, but the skull of the Camel is the heavier of the two; and the same remark applies to the Horse’s skull, where, taking proportion into account, the weight of the Camel’s skull greatly preponderates. In two Camels’ skulls that I weighed,



one from a male animal and the other from a female, the one weighed 10 lbs., the other 12 lbs.,—the small lower jaw of one weighing  $4\frac{1}{2}$  lbs. Of the skulls of two Horses weighed, one was  $10\frac{1}{2}$  lbs., and the other 11 lbs.

But there is another remarkable peculiarity in the skull of the Camel, that has not been, I think, sufficiently noticed, viz. the Gorilla-like form of the upper and back part; indeed I can find no animal that has so great a resemblance to the Gorilla in this particular as the Camel. The large size, too, of what are called the true canine teeth, which in some male Camels exceed the length of 2 inches (out of the gum), is another curious affinity; and the early obliteration of the cranial sutures may be mentioned as a third, although I believe, from the examination of a great many skulls of the Gorilla, that they are earlier effaced in this animal; but the rough and unequal condition of the cranial surface for the firmer attachment of muscle is far greater in the Gorilla.

In the Camel the occipital, the sharp parietal, and the triangular frontal ridges are all present, as in the Gorilla; but the occipital ridge is often deeper than that in the anthropoid Ape.

Another deviation in the *Camelidæ* is worthy of notice: they have only twelve ribs, whilst the great majority of ruminants have thirteen; the Giraffe, as is well known, has fourteen. The number of lumbar vertebræ in the Camels is seven, as in the Oxen. Under the microscope there is a marked difference in the hair of the Bactrian Camel and that of one-humped Camel: the former is of a more woolly character. As is well known, the blood-corpuscles of the *Camelidæ* are of an elliptical form; but in the animal I have lately dissected, from the great amount of pulmonary disorganization, the white corpuscles of the blood were very abundant, and these were all round—a fact, I think, of some physiological importance.

## 2. ON THE FEATHERS OF DINORNIS ROBUSTUS, OWEN. BY W. S. DALLAS, F.L.S., KEEPER OF YORK MUSEUM.

The acquisition by the Yorkshire Philosophical Society of a specimen of *Dinornis robustus*, Owen, in so perfect a state of preservation that it retains even portions of the muscular and integumentary systems, enables me to describe at least a part of the structure of the feathery covering of this remarkable bird, and thus to throw some further light upon its affinities among birds with which we are acquainted in the living state. The general condition of the skeleton was described by Mr. Allis in a paper read before the Linnean Society in June last; and Professor Owen has since made use of one or two portions of it for the completion of his description of the species, in a paper communicated to this Society; but the fact of the occurrence of the feathers, however imperfect, of a bird which, as far as our information goes, has long been extinct, seems to call for some special notice.

At first sight, indeed, it would seem that the fresh condition of many parts of this skeleton, and the preservation of traces of the soft parts, might warrant us in supposing that many years have not elapsed since the bird to which it belonged wandered over the hills of Otago; but all possibility of drawing from these circumstances any conclusions as to the period of its death is set aside by the fact that other parts of the skeleton are in a state of decay which would apparently require a free exposure to the weather for many years for its production.

The portion of skin which bears the remains of feathers covered the greater part of the flat, rhombic region of the pelvis immediately above the commencement of the tail, and extended, on the left side, beyond the ridge bounding this part of the pelvis, and for some distance down the slope of its side, where it has beneath it the aponeurotic portion of some of the great muscles of the thigh. The feather-bearing portion forms a sort of broad, irregular, transverse band across this region of the pelvis, encroached upon anteriorly by a wide semicircular notch, and posteriorly, a little to the right of the centre, by an irregular worn space exhibiting numerous perforations, indicating the former positions of feathers which have disappeared. The skin itself is rather thick and coarse. The remains of feathers occur only on that part of the skin which covered the flat back of the pelvis, in which their insertions give rise to strongly marked papillæ. The skin on the sloping left side of the pelvis bears no feathers, and presents no traces of their insertion. It appears, however, to have lost some of its outer layers, and certainly does not furnish evidence sufficient to prove the existence of a featherless space at this part, which would be opposed to Nitzsch's description of the pterylography of the *Struthionidæ*.

The feathers are all very imperfect, consisting only of the basal portions of the shaft and accessory shaft, with here and there some traces of the barbs. The latter occur most abundantly towards the left side, and especially in the feathers situated upon the left ridge, from which the specimen here figured (fig. 1) was taken. The shafts are always evidently imperfect; the longest fragment existing in the skin is only about 2 inches in length. The stem tapers gradually, the quill being the widest part and about  $\frac{1}{24}$ th of an inch in diameter. The quill is inserted about  $\frac{3}{16}$ ths of an inch into the skin, and the webs appear generally to have commenced about  $\frac{1}{2}$ th of an inch from the junction of the quill with the shaft. From these data it is of course impossible to form any opinion as to the original length of the feathers.

The accessory shafts are considerably smaller than the main shafts, but still of sufficient size to constitute an important portion of the plumage. The longest accessory shaft that I have been able to find measures  $1\frac{1}{2}$  inch in length, and is imperfect; there is little doubt that the accessory shafts were both shorter and more slender than the true feathers.

The shaft is somewhat convex above, and marked with a fine longitudinal furrow beneath. It is of a brown colour beneath, but pale

horn-colour above, probably from exposure to external influences. The accessory shaft is of a pale horn-colour, and appears to be nearly cylindrical.

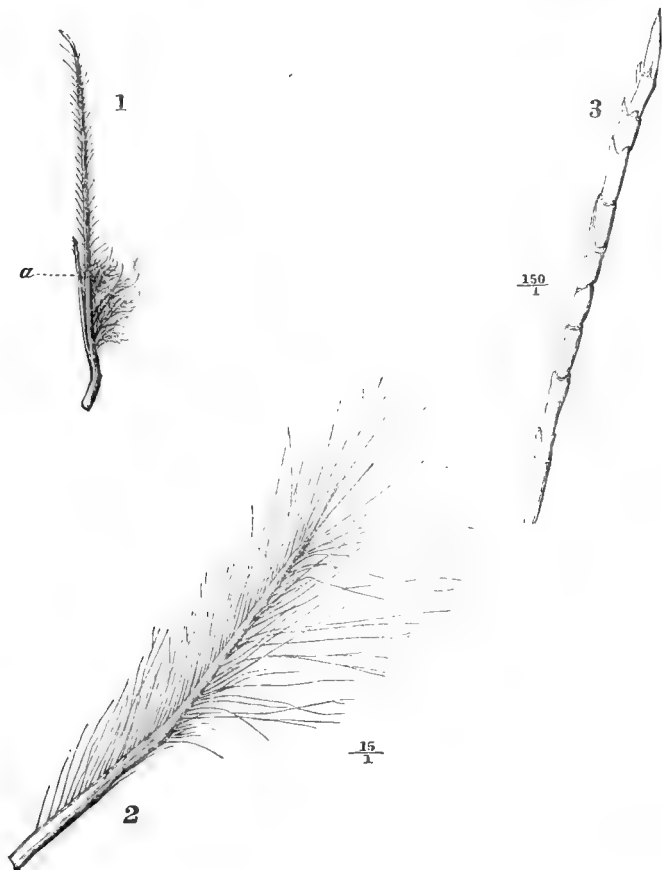


Fig. 1. The basal portion of a feather detached from the skin, of the natural size :  
*a.* The accessory shaft.  
 2. Part of a barb with the barbules ; magnified 15 diameters.  
 3. Apical portion of a barbule ; magnified 150 diameters.

The structure of the web is somewhat different from that which occurs in the Emu and the Cassowary. Towards the base of the shaft the barbs spring in groups of four or five together from nearly the same spot, and thus this part of the web assumes a tufted aspect. As we advance towards the apex this arrangement speedily ceases ; the number of barbs springing from the shaft gradually diminishes, until each side bears only a single series of these appendages. The barbs consist of slender, flattened fibres, bearing long, silky, and very delicate barbules, without any trace of barbicels, but presenting a distinctly beaded appearance when examined by a simple lens. Under

the microscope, with a moderate power, this beaded aspect is lost, and the barbule appears merely divided by faint transverse partitions into a series of cells, some of which, towards the apex, exhibit small tooth-like projections representing the rudiments of barbicels (fig. 3). All the barbs remaining on the feathers appear to be imperfect.

The barbs of the accessory plume are of the same general structure as those on the main shaft, but they appear to form a single series on each side from the base.

The barbs nearest the base of the feather, both in the main web and the accessory plume, are destitute of barbules for some distance from their base; but this distance gradually decreases until the barb is furnished with barbules throughout its whole length.

It is evidently impossible to determine from these mere fragments of feathers what was the precise structure of those organs when perfect; we cannot even decide whether the basal barbs possessed the hair-like tips characteristic of those of the Emu and Cassowary, and still less whether the apical portion of the feather supported simple barbs such as occupy that position in those birds. The only fact of importance, indeed, that I can hope to make known by this paper is that the *Dinornithes* undoubtedly possessed a large accessory plume, thus adding another proof of their relationship to the green-egged Emus and Cassowaries existing in the Australian region, and of their difference from the white-egged group of Struthionines represented in Africa and South America.

### 3. DIAGNOSES OF NEW SPECIES AND A NEW GENUS OF MOLLUSKS FROM THE REIGEN MAZATLAN COLLECTION: WITH AN ACCOUNT OF ADDITIONAL SPECIMENS PRESENTED TO THE BRITISH MUSEUM. BY PHILIP P. CARPENTER, B.A., PH.D.

After the publication of the British Museum Mazatlan Catalogue, the backs of several fresh *Spondylus*-valves were examined by Mr. R. D. Darbishire and myself. Among the specimens were several which were deemed worthy of being added to the national collection; they were deposited there, with a MS. appendix to the Catalogue, in 1858. As it is not judged necessary to print this separately, I have (with the permission of Dr. Gray) transcribed what should be placed on record, in hopes that it may not be judged out of place in the 'Proceedings.' Those who use the Mazatlan Catalogue are requested to observe not only the corrections in the Appendix, pp. 547-552, but also those made in the Review of Professor C. B. Adams's Panama Catalogue, P. Z. S. 1863, p. 339; and in the British Association Reports, 1863, pp. 543 *et seq.* The numbers, both of species and of tablets, are continued from the Mazatlan Catalogue, and correspond with those in the Report. The student of the Gulf fauna should also consult the account of Mr. Xantus's

Cape St. Lucas shells in the 'Annals Nat. Hist.' 1864, and in the Report, pp. 616-626\*.

704. *CELLEPORA AREOLATA*, Busk†.

Tablet 2540 contains a specimen on *Omphalius ligulatus*.

705. *MEMBRANIPORA ?FLEMINGII*, Busk†.

Tablet 2541 contains a group on *O. ligulatus*.

\* The following additional specimens from the Reigen Collection have been presented to the British Museum:—

Tablet.

- 12\*. A group on *Omphalius ligulatus*.
- 13\*. *Lepralia adpressa* and *Membranipora*, sp. ind., on ditto.
- 42. Young opposite valve of *Solecurtus*; perhaps conspecific.
- 201\*. Four young valves (smallest .05 by .034) probably of this species.
- 266\*. Minute transparent valve, .028 across, teeth unformed; perhaps of this species.
- 358\*. Two specimens; margin irregular.
- 594\*. Several specimens in *Uvanilla unguis*; one, not having room within, has made a case for itself outside the *Uvanilla*.
- 642\*. A pair, .3 by .15; probably an older state of the same species, *Barbatia alternata*.
- 60\*. A minute, transparent valve, .045 by .024, without teeth; resembling "*Savicava fragilis*, Nyst," Jeffr., in 'Ann. Nat. Hist.,' Aug. 1858.
- 486\*. A young shell, .06 across, laid open; crowded inside, especially near the umbones, with a pinkish mass of young ones, about .0018 in length.
- 500. A younger pair, much more transverse, transparent, without concentric ridges, the lateral teeth in one valve being simply the raising of the dorsal margins.
- 833\*. Two young specimens, nestling among Nullipore on *Fissurella alba*.
- 869\*. Two specimens, with egg-cases arranged in pattern like *Orbitolites*.
- 876\*. One specimen, curiously mended after fracture.
- 877\*. One specimen, with columella curiously contorted.
- 1023\*. One specimen, with ribs rounded and aspect of *Siphonaria lecanium*; probably a distinct species.
- 1058\*. One young specimen, probably conspecific, though only .07 by .047; there is no trace of spire.
- 1059\*. Three specimens; broad form.
- 1468\*. Fragment of *Spondylus calcifer*, with basal supports of *Hipponyx ?ser-ratus*, in burrow of *Lithophagus plumula*.
- 1795\*. Two specimens with five intercalary teeth.
- 1834\*. One specimen with the canal bent back, as in *Cassidaria*.
- 2221\*. One specimen, mended after severe fracture.
- 2223\*. One specimen; columellar fold bifid.
- 2224\*. Two specimens; columella bent and straight.
- 2225\*. One specimen; labrum thin.
- 2226\*. One specimen; ribs close.
- 2376\*. One specimen, dwarf form; nodulous, as in *N. nodulifera*, Phil.
- 2516. An opposite larger valve, since found, in which there is only one distinct posterior tooth, and the anterior hooked tooth is separating into two.
- [2534. One specimen of *Vitrinella ?tricarinata*, jun., of which the ribs are nodulous in the young state. If rightly determined, this adds no. 710 to the list of species.]
- 2536. A nuclear shell, .046 across, of Naticoid shape, very finely striated in each direction. It is probably a young *Hipponyx*.

† Both of these species were kindly identified by Mr. G. Busk.

## Genus CYCLADELLA.

*Testa bivalvis, tenuis, æquilateralis, æquivalvis, haud hians, umbonibus planatis. Ligamentum tenuissimum, externum. Cardo linea curvata, dent. lat. distantibus, card. transversis, haud radiantibus.*

## 56. CYCLADELLA PAPYRACEA, n. sp.

*C. t. tenuissima, subdiaphana, epidermide tenui induta, planata, suborbiculari; concentrice fortiter lirata, liris rotundatis, intus excavatis; tota superficie lineis granulosis radiantibus creberrimis minutissime cælata; dent. card. i.-ii. transversis, margini dorsali subparallelis; dent. lat. validis.*

= "*Tellina ? eburnea, Hanl.*" (fragments only), Maz. Cat. no. 56.

Mr. Hanley kindly sent for my inspection a perfect pair (as "*Lepton*"), which he had found nestling in a burrow in *Spondylus*. The hinge more resembles *Cyclas* (Lam.) than any other known genus. Its great peculiarity is, that the cardinal teeth, instead of radiating from the umbo, fall in the curve of the hinge-line, as though uniting the lateral teeth. The shell is too thin (being deeply indented within by the concentric waves) to make out the pallial line; but no trace of sinus is visible. It may therefore rank, provisionally, under *Kelliadæ*, although in other respects its affinities appear to be with *Edalia* and *Cooperella*. The ligament appears little more than a prolongation of the epidermis. Beside the transverse cardinal teeth, there is in each valve a curved line, slightly raised, like the end of a finger-nail, which bounds what would be the lunule in other shells.

Long. .1, lat. .123, alt. .045.

*Hab.* Mazatlan; one perfect specimen from Havre Collection (*Mus. Hanl.*); fragments, Liverpool Collection.

## 706. ? MONTACUTA OBTUSA, n. sp.

? *M. t. planata, valde inæquilaterali, subrhomboidea; subdiaphana seu chalcedonica, haud punctata, lævi; marginibus plerumque regulariter excurvatis, dorsali recto, umbonibus haud prominentibus; cardine, utraque in valva, dente uno cardinali et fossa ligamentali; dent. lat. altera valva elongatis, rectis, altera vix conspicuis.*

Differs from ? *M. dionæa* in the elongation of the lateral teeth, and in the possession of a distinct cardinal tooth in each valve.

Long. .047, lat. .06, alt. .01.

*Hab.* Mazatlan; two fresh specimens, Liverpool Collection.

Tablet 2530 contains the larger specimen; the other is transparent.

## 696. PECTUNCULUS, sp. ind.

Tablet 2531 contains a minute valve, .033 across; outside with close, prominent concentric ridges, foliated by about twenty-four

rounded ribs, which are evanescent near the umbo. Inside with a very few strong teeth, developed in a curved line.

698. *SCISSURELLA RIMULOIDES*, n. sp.

*S. t. rapide augente, albida, tenuissima; apice celato; anfr. iii., radiatim liratis, liris subdistantibus, acutis, obliquis; umbilico magno; labro declivi, haud fisso, sed apertura postica, ut in "Rimula" formata, subquadrata, elongata; liris transversis gradus testæ incrementis definientibus; peritremate continuo, obliquo.*

Only one specimen was found of this beautiful little species, the first known from America. It looks like a *Velutina* crossed by sharp ribs in the direction of the slanting mouth. In the first whorl the ribs are very close. It then assumes its normal sculpture, but there is nearly a whorl before there is any trace of incision. This appears to have begun as a slit, which was afterwards closed up. A band, marked off by ten transverse ribs showing stages of growth, encircles the shell as far as the hole, which is long and somewhat rectangular; but there is no band between the hole and the outer lip. The shell furnishes a complete transition to *Rimula*. It is preserved on tablet 2532.

Long. .023, long. spir. .003, lat. .03; div. 140°.

*Hab.* Mazatlan; off *Spondylus calcifer*; Liverpool Collection.

699. *VITRINELLA ORNATA*, n. sp.

*V. t. subdiscoidea, diaphana, tenuissima; anfr. iv., quorum iii. primi nucleosi, insculpti; ultimo carina maxima circa peripheriam; postice subangulata, rugis radiantibus et striolis spiralibus ornata; antice carinata, carina nodosa; basi carina altera et rugis radiantibus ornata; umbilico angulato, satis magno; labro a carina indentato.*

Long. .015, lat. .028-.035; div. (circ.) 175°.

*Hab.* Mazatlan; one specimen off *Spondylus*, on tablet 2533; Liverpool Collection.

700. *VITRINELLA TENUISculpTA*, n. sp.

*V. t. planata, diaphana, tenuissima; anfr. iii. et dimidio, quorum iii. nucleosi; striis elevatis, spiralibus, quarum una magna, quasi carina prope suturam sculpta; periphæria haud angulata; basi bis angulata, interdum rugis radiantibus distantibus ornata; umbilico satis magno, carinato; apertura undata, subquadrata.*

The sculpture is not uniform over the last whorl. The principal diagnostic features are the biangulated base, the infrasutural keel, and the rounded periphery.

Long. .016, long. spir. 0, lat. .023-.03; div. 180°.

*Hab.* Mazatlan; one specimen off *Spondylus*, on tablet 2534; Liverpool Collection.

## 701. ? VITRINELLA, sp. ind.

Tablet 2535 contains a fragment, .085 across, of what was probably a gigantic species of this genus or of *Cyclotrema*, strongly keeled.

## 492. DIALA PAUPERCULA, C. B. Ad.

= *Cingula paupercula*, C. B. Ad. Pan. Shells, no. : *diagnosi mutata*.

= ? *Odostomia mamillata*, Maz. Cat. no. 492 : *diagnosi aucta*.

D. *t. nitida, solida*; vert. nucl. anfr. iv., *lirulis spiralibus et radiantibus tenuiter decussato*; *t. adulta decollata, vertice mamillato*; anfr. norm. iv.; *peritremate continuo*; *basi obtuse angulata, lacuna umbilicali a labio separato formata*.

Long. .085, long. spiræ .055, lat. .05; div. 34°.

The fortunate discovery of a perfect young specimen and some adult shells in the shell-washings of Professor Adams's collection enables us to explain the anomalies described in the Mazatlan Catalogue, where the solitary dead shell was referred, with doubt, to *Odostomia*, in consequence of its truncated apex. It was not possible to recognize in it Professor Adams's "*Cingula*," since that was described as having the apex "subacute," and the angular base and continuous peritreme were not mentioned. The nuclear whorls are sculptured as in *Alaba supralirata*; but the vertex, instead of being persistent as in that genus, appears to be always decollated in the adult. The shell has the peculiar glossy texture of *Diala*.

## 702. MANGELIA SULCATA, n. sp.

M. *t. subturrita, albida, apice obtuso*; anfr. vii., *tumidioribus*; *liris vii., obtusis, rectis, vix angulatis*; *sulcis spiralibus creberrimis, circa basin continuis*; *labro? . . . [fracto]*.

Long. .2, long. sp. .12, lat. .07; div. 35°.

Hab. Mazatlan; one specimen off *Spondylus*, on tablet 2538; Liverpool Collection.

## 703. ? TORINIA, sp. in.

Tablet 2539 contains a small shell, .035 across, consisting of 3½ smooth, flattened, sinistral whorls; with a distinct suture, but not umbilicated. In a larger specimen (unfortunately lost), under the microscope this sinistral vertex appeared turned completely upside down, with more than half a whorl of an orbicular shell, white, sculptured like *Vitrinella*, with a very strong peripheral keel, and other smaller keels, decussated by radiating rugæ. This mode of growth is exactly as in the young *Torinia*; but the adult must have been very distinct from any known species, and perhaps did not belong to any described genus.

## 550. MUCRONALIA INVOLUTA, n. sp.

M. *t. parva, tenui, albida, irregulari, marginibus spiræ valde excurvatis*; *vertice declivi*; anfr. norm. vi. + . . . *satis excur-*



*vatis, suturis valde impressis; basi prolongata, obtusa; apertura ovali, postice angusta; labro acuto; labio tenuissimo.*

Long. ·105, long. spir. ·068, lat. ·033; div. 20°.

= *Leiostraca ?recta*, Maz. Cat. *in loco*: non C. B. Ad.

551. *LEIOSTRACA PRODUCTA*, n. sp.

*L. t. parva, albida, subfusiformi, marginibus spiræ rectis; vertice acutiore, recto; anfr. norm. ix., planatis, suturis vix conspicuis; peripheria satis rotundata; basi rapide angustata, postea producta; apertura subrhomboidea, axi antice acuta, angulata; labro acuto; labio tenui.*

Long. ·123, long. spir. ·08, lat. ·046; div. 23°.

= *Leiostraca ?solitaria*, Maz. Cat., *in loco*: non C. B. Ad.

This species is easily recognized by its very peculiar sharply-pointed beak; in shape like a young *Rostellaria*, without the canal.

652. *ANACHIS TÆNIATA*, Phil.

*Columbella tæniata*, Phil. in Zeit. f. Mal. 1846, no. 26 (non Ad. & Rve. in Voy. Samarang).

= *Anachis Gaskoini*, Cpr. in Maz. Cat. p. 510, no. 652.

Variat *lineis spiralibus fuscis* viii., *quarum* iii. *in spira monstrantur; maculis alternatis inter secundam et tertiam sitis.*

Variat quoque *maculis evanescentibus.*

*Hab.* Callao (teste Gaskoin); Mazatlan (*E. B. Philippi, Reigen*); Cape St. Lucas (*Xantus*).

It appears that Mr. Gaskoin was not acquainted with Philippi's species, which had not then reached the Cumingian Collection; as he pronounced M. Reigen's specimen to be new, and suggested the specific name in the Mazatlan Catalogue. It would have avoided a double synonymy, could the name *tæniata* have been retained for the Samarang shell, and Mr. Gaskoin's for this. The Cape St. Lucas shells vary as above indicated.

650. ?*ANACHIS SERRATA*, Cpr.

Maz. Cat. no. 650, p. 509. Perfect specimens of this singular species having been found at Cape St. Lucas by Mr. Xantus, the diagnosis may be thus completed:—

*Epidermide fimbriata, lirulas spirales eleganter decussante; labri denticulis variantibus, interdum subobsoletis.*

Long. ·28, long. spir. ·15, lat. ·13; div. 40°.

With the sculpture and general aspect of a small *Cantharus*, it has the mouth of an *Anachis*. The operculum, and therefore the generic relations, are not yet known\*.

\* The following additions and corrections may be useful to the students of the British Museum Catalogue:—

Species 181. *Arca multicosata* further differs from *A. grandis* in the epidermis being soft and very finely hairy.

4. DESCRIPTIONS OF NEW SPECIES AND VARIETIES OF CHITONIDÆ AND ACMEIDÆ, FROM THE PANAMA COLLECTION OF THE LATE PROF. C. B. ADAMS. BY PHILIP P. CARPENTER, B.A., PH.D.

LEPIDOPLEURUS ADAMSII.

*L. t.* "L. dispari" simili; pallide rufo-fusca, colore intensiore irregulariter strigata seu maculata; sæpius maculis albidis regione diagonali ornata; jugo vix acuto; areis centralibus et valvis terminalibus conspicue granulosis; areis lateralibus irregulariter verrucosis, verrucis plerumque lobatis; mucrone antico, vix conspicuo: intus, valvis centralibus uni-, terminalibus viii.-x.-fissis; subgrundis parvis, dentibus acutis; suturis medianis postice rectis, antice laminae haud attingentibus, sinu planato, latissimo: limbo pallii imbricatim squamoso.

Long. .6, lat. .3 poll.; div. 110°.

Variat verrucis minus expressis, simplicioribus.

= *Chiton dispar*, C. B. Ad. no. 373, par.

= *Lophyrus adamsii*, P. Z. S., 1863, p. 24.

Unfortunately for those who do not like to remove the non-testaceous portion from their Chitons, as they do from their other shells, the mantle-margin by no means affords a safe clue to the structure of the valves. Among the species of the genus *Ischnochiton*, Gray,

223. The length should be 1.1.

319. For "labio nullo" read "tenuissimo."

330. The nuclear shell has two whorls, *Ampullaria*-shaped.

367. Add to diagnosis, "operculo concavo, linea elevata suturam definiente."

368. Add to diagnosis, "operculo vix concavo, suturis minus definitis."

373. Add to diagnosis, "operculo concavo, suturis distinctis, peripheriam versus linea elevata instructis." The species was found living among the small *Olivellæ*.

376. Add to diagnosis, "operculo concavo, suturis vix definitis." Living, among *Olivellæ*.

501. Instead of the specimen from which the description in the text was written, tablet 1966 contains a much finer shell, since found, which allows of the following additions to the diagnosis:—"vert. nucl. parvo, satis extante, decliviter sito; anfr. norm. v.; interstitiis carinarum transversim rugulosis; labro solidiore. Long. .087, long. spir. .057, lat. .038."

510. A very beautiful shell, found in the refuse of Professor Adams's Panama collection, is probably of this species, though the sutural cancellations are close. It has one more whorl: vertex Chemnitzoid, of three Helicoid whorls, scarcely projecting; apex hidden.

650. From perfect Cape St. Lucas specimens, add the following to diagnosis:—"epidermide fimbriata, lirulas spirales eleganter decussante."

Page 312. Add to the diagnoses of opercula of *Vermetidæ*:—

"(h.) Operculum corneum, intus convexum, nitidum, umbone magno extante; extus concavum, paucispirale, lamina extante suturas definiente. Diam. .045." Tablet 2537 contains the only specimen found, resembling *Siphonium*, from the *Spondylus*-washings.

Tablet 447 is *Liocardium apicinum*, which should stand as species 709.

Page 314, note \* (et seq.), for "*Inflatulum*" read "*Mioceras*."

Page 359, line 18, for "regular" read "irregular."

(=*Lepidopleurus*, Add.,) known by the sharp incisor-teeth lying within a projecting lip, there are three types of mantle-margin, which may be conveniently separated as subgenera, to aid in the difficult task of describing and identifying species. The typical forms, for which the name *Ischnochiton* should be retained, have the scales somewhat chaffy, and very finely striated. *I. magdalenensis* and *I. sanguineus* well represent the group. But another series have the mantle-scales imbricate and strong, as in *Chiton*, Gray, (= *Lophyrus*, Add.,) from which they cannot be distinguished without dissection. For this Messrs. Adams's name *Lepidopleurus* may be retained in a restricted sense. It is uncertain what Risso's original genus was meant to include: his diagnosis applies to all *Chitons* with distinct side-areas and scaly margins.

A third group, separated by Dr. Gray in his 'Guide,' p. 182, as having the "mantle-scales minute, granular," has been named *Trachydermon*: it abounds in the Californian region.

The specimens of *L. adamsii* were found among the duplicates named *Chiton dispar* by the Professor; one was attached to *Discina cumingii*.

#### LEPIDOPLEURUS TENUISCULPTUS.

*L. t.* "*L. adamsii*" *simili*; *olivacea, colore pallido seu intensiore minute variegata; tota superficie minute granulosa; areis lateralibus vix definitis; suturis plerumque albido maculatis; mucrone antico, satis conspicuo, parte postica concava: intus, ut in "L. adamsii" formata.*

Variat: *t. pallidore, ad jugum rufo-tincta.*

= *Chiton dispar*, C. B. Ad. no. 373, pars.

The outside of this shell so much resembles the young of *Chiton* (*Lophyrus*) *stokesii*, that specimens may have been distributed under that name. Very few individuals were found.

#### ISCHNOCHITON ELENENSIS (diagn. auct.).

*Extus areis centralibus clathris parallelis circ. xx. decussatis; ar. lat. costis ii., validioribus, tumidis, tuberculosis: intus marginibus suturalibus posticis reflexis, tuberculatis, sinu ad jugum parvo; laminis insertionis unifissis, ad laminas suturales anticas junctis, sinu latissimo. Valva antica extus costis xii., haud validis; intus fissuris x., dentibus acutis, subgrunda parva. Valva postica mucrone subpostico, depresso; parte postica expansa, concava, costis circ. xi. subobsoletis; intus lamina insertionis circ. ix.-fissa, dentibus curtis, subgrunda parva, intus callosa.*

The central valves in this species are normal; but the posterior valve offers a transition towards *Callochiton*, the outside being concave posteriorly, the insertion-teeth short and the eaves callous.

#### ISCHNOCHITON (? var.) EXPRESSUS.

*I. t.* "*I. elenensi*" *simili, sed carnea; areis centr. clathris x.,*

*distantibus, crebre decussatis, jugo acuto; ar. lat. costis ii., validissimis, angustis, tuberculis angustis: intus marginibus suturalibus posticis planatis, haud tuberculosus, haud sinuatis; lam. insert. ut antea, sinu angusto, ad jugum angulato. Valva antica costis x., validis, angustis: intus ut antea, sed fissuris viii. Valva postica mucrone postico, planato; parte postica expansa, haud concava, costis circ. vii. validissimis: intus lumina circ. vii.-fissa, subgrunda planata.*

With a strong general resemblance to *I. elenensis*, the differences in detail in the only two specimens examined, as above stated, appear of specific importance. If only varietal, it is equally important to notice how much change is tolerated by the habits of the animal. It may be the shell called *Chiton clathratus* by Prof. Adams, of which there were no duplicates to compare. It offers a still more marked transition to *Callochiton*, the margin of the posterior valve being somewhat pectinated by the great projection of the ribs.

“CALLOCHITON” PULCHELLUS: diagn. auct.

*Extus areis centr. lineis interdum parallelis, interdum radiatibus, rugose scrobiculatis; ar. lat. costis ii., validissimis, imbricato-nodosis: valva antica costis similibus circ. ix.: v. post. area centrali lata; mucrone subpostico, planato; parte postica costis vii. similibus, medianis curtissimis, excurvatis: pallio squamulis minutis imbricatis. Intus v. ant. subgrunda (ut in Ischnochitone) munita, sed a costis pectinata; dentibus acutis, intus linea undulata secundum costas instructa, extus concavis, parte convexa costarum incisus: v. medianis similiter pectinatis, laminis secundum costas diag. uniscissis: laminis suturalibus medio continuis, late sinuatis; suturis posticis a sculptura externa granulatis: v. post. vii. lobata, marginibus planatis, laminis dense compressis incrassatis; dentibus obtusissimis, appressis, haud extantibus, subobsoletis, extrorsum planatis, ut in v. ant. fissis; interdum fissuris quoque in partibus concavis.*

As I have seen no published diagnosis of the very peculiar type of insertion-plates observed in this species, which has hitherto been too rare to allow working naturalists an opportunity of dissection, I have given a minute description. The plates of insertion, as well as the exterior eaves, are scalloped by the strong ribs, and alternate with them. In the posterior valve the eaves are flattened outwards, in closely appressed layers, the blunt, ill-developed insertion-teeth lying flat upon them. The valves easily separate from the mantle, when immersed in water. Outside, the species is easily recognized by the two strong ribs of the diagonal areas, the central pitted in somewhat branching rows, and the ribs on the curiously flattened posterior valve resembling a clenched fist.

ACMÆA (? FLOCCATA, var.) FILOSA.

*A. t.* “*A. mesoleucæ*” forma et indole simili; sed sculptura multo

*tenuiore*; *t. jun. lævi*; *dein lirulis delicatulis, acutis, haud granulosis, valde distantibus, interdum obsoletis, filosa*; *interstitiis latis, lævibus*; *tenui, planata, ovali, subdiaphana*; *nigro-fusco, corneo radiatim strigata, seu varie maculata: intus livida seu albida, coloribus externis transeuntibus*; *limbo lato, acuto.*

Long. .7, lat. .56, alt. .12.

= *Lottia* ? *patina*, C. B. Ad. Pan. Shells, no. 367.

*Hab.* Panama (C. B. Adams).

There is no described west-tropical species to which these shells can be affiliated, unless they prove to be a very delicate variety of *A. floccata*, Rve. Unfortunately the Panama limpets have never been collected in sufficient numbers to make out their specific limits satisfactorily. The names here given may stand as species or varieties, according to future elucidation. In shape and texture, but not in colour or sculpture, these shells resemble *A. fascicularis*; in the latter respects, *A. strigatella*. They were named "*tenera*, Ad." by Dr. Dohrn, but are sufficiently distinct from that West-Indian species.

ACMÆA (? FLOCCATA, VAR.) SUBROTUNDATA.

*A. t.* "*A. var. filosæ*" *simili, sed subrotundata, magis elevata, vertice subcentrali; colore intensiore, lineis corneis crebrioribus, angustis*; *t. jun. sæpe pallidior, radiis duobus postice triangulata: intus callo livido, tenuiore.*

Long. .53, lat. .45, alt. .15.

= *Lottia*, sp. ind. *a*, C. B. Ad. Pan. Shells, no. 368.

*Hab.* Panama (C. B. Adams).

ACMÆA (? var.) VERNICOSA.

*A. t. parva, subrotundata, depresso-conica, apice ad duas quintas partes sito; albido-viridi, strigis paucis rufo-fuscis hic et illic ornata, sæpius radiis duobus candidis, postice triangulata; extus lineis acutis radiantibus, valde distantibus, sæpe obsoletis vix sculpta: intus livida, callosa, sæpius spathula candida ornata; basi subplanata, limbo angusto.*

Long. .3, lat. .24, alt. .1.

*Hab.* Panama (Jewett, C. B. Adams).

= *Lottia*, sp. ind. *b*, C. B. Ad. Pan. Shells, no. 369.

Had this form been brought from the China Seas, it might have been taken for the young of *A. biradiata*, Rve. From its solidity, however, its rough exterior, and its callous interior, it appears to be adult. It is barely possible that it may develop into *A. vesperina*. It differs from the young of *A. subrotundata* in being much thicker and less spotted with the green tint.

5. DIAGNOSES OF NEW SPECIES OF MOLLUSKS, FROM THE WEST TROPICAL REGION OF NORTH AMERICA, PRINCIPALLY COLLECTED BY THE REV. J. ROWELL, OF SAN FRANCISCO. BY PHILIP P. CARPENTER, B.A., PH.D.

Of the new species quoted in the "Supplementary Report on the Present State of our Knowledge of the Mollusca of the West Coast of North America," published in the Transactions of the British Association, 1863, pp. 517-686, the principal portion (namely, those dredged by Dr. J. G. Cooper, Zoologist to the Californian State Geological Survey) are described in the 'Proceedings of the California Acad. Nat. Sciences,' for 1864-65; those dredged in Puget Sound, during the U. S. North Pacific Boundary Survey, by the late Dr. Kennerley, are described in the 'Journal of the Philadelphia Acad. Nat. Sc.' for the present year. The species obtained by the naturalists of the British Survey are described in three papers by Dr. Baird and myself, P. Z. S. 1863-65. The new species sent by Mr. J. Xantus from Cape St. Lucas, and by Mr. J. G. Swan from Neeah Bay, appear in the 'Ann. and Mag. Nat. Hist.,' 1864-65. In the same Journal are described the new species which I found in Col. Jewett's collection. Those sent to Dr. Gould from the same collection had been previously analyzed in the 'Proc. Zool. Soc.' 1856. The above are the principal sources of fresh knowledge; but a number of species from the Californian province, which do not range under any of these heads, will be found in the 'Journal de Conchyliologie' for the current year.

In separate papers communicated to the Zoological Society are the diagnoses of additional species from Prof. Adams's Panama and from M. Reigen's Mazatlan collections. The remaining species, from the tropical province, are embodied in the present paper. The types (unless otherwise stated) are in the Museum of the Smithsonian Institution.

(TELLINA) ANGULUS DECUMBENS.

*A. t. tenui, subplanata, alba seu rosacea; lævi, striolis incrementi insculpta; epidermide pallide straminea induta; antice et ventraliter valde producta; postice truncata, angulata; umbonibus acutioribus, vix prominentibus; marginibus dorsalibus postico recto, antico ad angulum parum excurvato, antico et ventrali valde et regulariter excurvatis; parte postica v. dextr. subito angulata, v. sinistr. parum sinuata; nymphis angustis, elongatis, cartilagine omnino externo: dent. card. minimis; dent. lat. v. dextr. antico satis conspicuo, postico obsoleto; v. sinistr. nullis; cicatr. adduct. posticis subrhomboideis, anticis valde elongatis, angustis; sinu pallii maximo, subtriangulari, usque ad cicatricem alteram utraque valva porrecta.*

Long. 1·7, lat. 1·2, alt. ·68 poll.

*Hab.* Panama (teste Rowell, Pease).

This shell was affiliated by Mr. Hanley to the W. African *T.*

*nymphalis*, but differs in the internal scars. Externally it resembles *T. dombeyi*, Lam. (= *Scrobicularia producta*, Cpr. P. Z. S. 1855, p. 230), but is easily recognized by the strictly Tellinoid ligament and anterior lateral tooth, by the posterior portion being pinched instead of waved, and by the junction of the pallial sinus with the opposite scar. By the same characters it is distinguished from *T. tersa*, Gld., which closely resembles *S. dombeyi*, var., in Mus. Cum. Like many other Tellens, it has a white and a pink variety. The name was printed by an oversight in Brit. Assoc. Rep. 1863, p. 669, as *A. amplexans*; but as it was unaccompanied by a diagnosis, and does not describe the shell, no confusion will arise from reverting to the name first given.

#### LUCINA UNDATA.

*L. t. convexa, tenuiore, albida; tota superficie lirulis concentricis creberrimis, compressis, haud acutis ornata, interstitiis minimis; parte ventrali costis radiantibus iii., obtusis, latis, validissimis, interstitiis parvis; lunula maxima, a sulco bene definita, sub umbonibus incurvatis fossa alta minuta indentata; parte postica alata; margine a costis valde undato, minute crenulato; ligamento quasi interno: intus dent. card. parvis, a fossa lunulari intortis; lat. curtis, obtusis; cicatr. adduct. antica irregulari, postica subovali; linea palliari prope marginem sita, undata.*

Long. .45, lat. .44, alt. .3.

*Hab.* Gulf of California (teste Rowell).

The outline somewhat resembles *Cryptodon*; but the aspect is more that of *Verticordia*, while the minute subumbonal pit is suggestive of *Opis*. The shell is sexpartite; the portion between the anterior rib and the lunule resembles a fourth rib, while the projecting lunule and the posterior wing are quite distinct from the body of the shell. The specimen sent by Mr. Rowell to the Smithsonian Institution was completely smashed. The diagnosis is written from a perfect shell sent by Dr. Newcomb to Mr. Cuming.

#### CALLIOSTOMA (? LIMA, var.) ÆQUISCULPTA.

*C. t.* "C. limæ" simili; sed anfr. planatis, suturis haud distinctis; sculptura regulari; jun. monilibus spiralibus inter se æqualibus; t. adulta majore et minore alternantibus; colore rufescente, granulis interdum rufo-fusco maculatis.

*Hab.* Acapulco (Newberry).

Dr. Newberry's specimens agree in most essential respects with "*Trochus lima*, Phil.," in C. B. Ad. Pan. Shells, no. 276, which appears identical with the shells marked "*Ziziphinus antonii*, Koch, N. Zealand," in Mus. Cuming. The Acapulcan shells are quite flat, while those from Panama are for the most part shouldered as in *C. eximium*, Rve. (= *C. versicolor*, Mke. Maz. Cat. no. 289). However, there is no little variation among the Professor's specimens of *C. lima*, and some are so slightly shouldered that the Acapulcan form may be a local variety.

## NARICA INSCULPTA.

*N. t.* " *N. apertæ*" simili, sed magis compacta; paulum angustiore, umbilico tamen majore; lineis spiralibus circ. xxvi. distantibus insculptis cincta, quarum x. in anfr. penult. monstrantur; postice lineis incrementi vix conspicuis.

Long. .3, long. spir. .08, lat. .28; div. 100°.

*Hab.* Acapulco, on *Ostrea iridescens*, Rowell.

The Cape St. Lucas species (*vide* Ann. Nat. Hist. 1864, xiii. p. 476) has the sculpture in irregularly raised lirulæ, while this has minute grooves chiselled out of a smooth surface. It appears that the San Franciscans import the huge tropical oysters in large quantities, their own species having the coppery flavour which Americans dislike in the British species. From the outside of the valves, Mr. Rowell obtained this and many other interesting species.

## DRILLIA EBURNEA.

*D. t. turrita, carneo-albida, tenuiore, lævi, maxime nitente; marginibus spiræ rectis; anfr. nucl.? . . . [decollatis]; norm. circ. ix., postice planatis, supra suturas appressis, medio satis excurvatis; hic et illic rugis radiantibus, obsoletis, irregularibus exsculpta; basi prolongata, canali conspicuo, aperto; sinu postico minore, in sulco lato, haud definito, spiram ascendente sito; labro acuto; labio indistincto; columella planata.*

Long. 1.3, long. spir. .8, lat. .45; div. 30°.

*Hab.* Near Gulf of California (teste Rowell).

Easily recognized by its smooth glossy aspect and French-white colour; the notch lying along a broad spiral channel, which throws the junction of the whorl as it were up the suture.

## MANGELIA ALBOLAQUEATA.

*M. t. solida, turrita, alba, rudi, marginibus spiræ rectis; anfr. nucl.? . . . [decollatis]; norm. circ. ix. subrotundatis, costis circ. xi.-xv., declivibus, satis angustis, postice obsoletis, lineis subregularibus spiram ascendentibus; lirulis spiralibus anticis crebris, postice obsoletis; basi elongata; labro? . . . ; labio calloso; sinu postico majore, suturam attingente.*

Long. .88, long. spir. .55, lat. .34; div. 30°.

*Hab.* Panama (teste Rowell).

Described from an imperfect and worn specimen, but easily recognized by its ivory-white colour, and ribs in slanting rows, as though the creature were roofed with white tiles. It was erroneously quoted in the Brit. Assoc. Rep. 1863, p. 669, as a *Drillia*.

## EULIMA FALCATA.

*E. t. valde tereti, valde curvata, alba, politissima, solidiore, marginibus spiræ meniscoideis; anfr. nucl.? . . . [detritis]; norm. circ. x., planatis, lente augmentibus; axi hamata; suturis indistinctis; basi elongata, haud tereti; apertura pyriformi, antice latiore; labro acuto; labio tenui, appresso.*



Long. .31, long. spir. .21, lat. .09; div. 12°.

*Hab.* Acapulco, on *Ostrea iridescens*, Rowell.

The spire-outlines are scythe-shaped. It is much larger and more solid than *L. distorta* and (?var.) *yod*.

#### CERITHIOPSIS INTERCALARIS.

*C. t. valde elongata, rufo-fusca, marginibus spiræ rectis, suturis impressis; anfr. nucl. iii. + ? . . . (decollatis), radiatim distanter liratis; norm. x., planatis; costis radiantibus primum xii., dein circ. xxii., angustis, haud extantibus, ad peripheriam continuis, interstitiis quadratis; carinis spiralibus primum ii. nodulosis, dein alteris ii. minoribus inter eas intercalantibus; carina postica suturali haud nodulosa, secunda valde nodulosa, tertia intercalante æquante sed haud nodulosa, quarta antica valde nodosa, quinta circa peripheriam, primæ et tertiæ simili, haud nodosa, alteraque contigua, minima, inter quas sutura gyrat; basi concava, lævi; columella valde contorta; canali brevi, aperto; labro? . . . \**

*Hab.* Guacomayo.

This beautiful species comes nearest to *C. bimarginata*, C. B. Ad., of which, indeed, the type does not agree with the diagnosis so well as does this specimen. It differs in having other spiral ribs intercalating between the two principal ones, and in the radiating sculpture being continued to the periphery. One specimen only was found in the shell-washings, not perfect at the mouth.

#### COLUMBELLA HUMEROSA.

*C. t. parva, turrita, alba, linea seu maculorum serie fusca interdum spiram ascendente; marginibus spiræ parum excurvatis; anfr. nucl.? . . . [detritis]; norm. vi., convexis, postice tumetibus, suturis valde impressis; costis radiantibus vii.—viii., distantibus, validissimis, rotundatis; interstitiis late undatis; lirulis validis spiralibus extantibus, interstitiis eas æquantibus, costas et harum interstitia transeuntibus; basi angusta; labro vix varicoso, postice emarginato, intus solidiore, dentibus circ. iv. munitis; apertura late undata, compacta.*

Long. .26, long. spir. .15, lat. .13; div. 38°.

*Hab.* Acapulco, on *Ostrea iridescens*, Rowell.

The sculpture resembles that of *Rhizocheilus*, and the tall spire that of *Anachis*; yet it appears to belong to the restricted typical genus.

#### MURICIDEA DUBIA, VAR. SQUAMULATA.

Variat *t. omnino albida; sculptura tenuiore; spira elevata; tota superficie minute squamulata, squamulis imbricatis.*

*Hab.* Cape St. Lucas (*Xantus*).

The opercula in the beautiful specimens sent by Mr. Pease are

\* I forgot to measure the specimen before returning it to the Smithsonian Inst.; but it is about the size of *C. assimilata*.

typically Muricoid. The essential features are those of *M. dubia*; the pale colour and delicate sculpture and imbrication may arise from a deep-water station, as is seen in similar European shells. Mr. Cuming, however, regards it as distinct.

6. ON A NEW SPECIES OF THE GENUS *BASILEUTERUS* OF CABANIS, WITH A SYNOPSIS OF THE KNOWN SPECIES OF THE GENUS. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plates IX., X.)

Dr. J. Hartlaub, of Bremen, has most kindly placed at my disposal a skin of a species of the genus *Basileuterus*, belonging to the family Mniotiltidæ, which he has lately received from a collector in Demerara. Whilst drawing up the characters of this bird, which appears to me to be new to science, I have taken the opportunity of giving a list of the known species of this genus, together with such short diagnoses as may serve to distinguish the species.

The genus *Basileuterus* was first established by Cabanis in 1848 (Schomburgk's *Reise nach Guiana*, iii. p. 666), although it had been mentioned by name, without any characters being assigned to it, in his well-known "Ornithologische Notizen," published in Wiegmann's 'Archiv'\* for the previous year. The type given is the *Sylvia vermivora* of Vieillot, founded on Azara's "Contra-maestre coronado," no. 154. The next place where we find the genus mentioned is in Bonaparte's 'Conspectus,' where ten species are assigned to it. This part of Bonaparte's work was, if we are not much mistaken, composed at Berlin; and the arrangement followed was probably, therefore, taken from the shelves of the Berlin Museum, where the specimens had at that time been arranged by Dr. Cabanis according to his own views. I believe, therefore, that we shall not be wrong in assuming that the list of species given in the 'Conspectus' consists nearly of such as its founder would have attributed to the genus. In the 'Museum Heineanum' Dr. Cabanis gives only two species besides the type, namely, *B. culicivorus* sive *brasieri* and *B. ruber* (*Setophaga rubra*, Sw.), which latter is more correctly located in a separate section, *Cardellina*.

Professor Baird has given a very good arrangement of the Mniotiltine forms in his 'Birds of North America' (p. 234). This arrangement I have followed very nearly in my 'Catalogue of American Birds;' and I see no reason for departing from it. Professor Baird places *Basileuterus* in the Setophagine division of the Mniotiltidæ, between *Cardellina* and *Setophaga*. The only alteration I am disposed to suggest here is to remove *Cardellina*, which is decidedly an aberrant form leading off towards the Tanagers, to the extremity of the group; and to locate *Basileuterus* between *Myiodioctes* and *Setophaga*, to both of which it is certainly nearly allied.

\* 1847, pt. 1, p. 316.



J Jennens. del. et lith.

M. & N. Hanhart. imp.

1 BASILEUTERUS MESOLEUCUS.  
2. BASILEUTERUS CINEREICOLLIS.

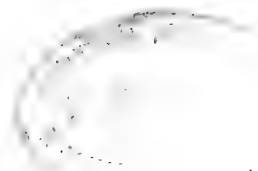




J. Jennens . del. et lith.

M. & N. Hanhart . imp.

1. BASILEUTERUS SEMICERVINUS.  
2. BASILEUTERUS UROPYCIALIS



The species of the genus represented in my own collection may be divided as follows:—

- A. Pedes digitique debiliores : rostrum minus forte.
- a. Pilei striga media, utrinque nigro marginata : subtus omnino flavæ : *B. vermivorus*, *B. brasieri*, et *B. belli*.
- b. Pileo toto rufo : superciliis albis : gutture et pectore flavis : *B. mesochrysus*, *B. delatirii*, et *B. rufifrons*.
- B. Pedes digitique robustiores : rostrum fortius, magis crassum.
- a. Ventre medio flavo aut olivaceo : *B. chrysogaster*, *B. coronatus*, *B. cinereicollis*, et *B. bivittatus*.
- b. Ventre medio albo.
- a'. Uropygio olivaceo, dorso concolore : *B. leucoblepharus*, *B. stragulatatus*, et *B. mesoleucus*.
- b'. Uropygio pallide fulvo : *B. semicervinus* et *B. uropygialis*.

These species may be diagnosed as follows:—

### 1. BASILEUTERUS VERMIVORUS.

*Sylvia vermivora*, Vieill. Nouv. Dict. ii. p. 278.

*Muscicapa vermivora*, D'Orb. Voy. Ois. p. 324.

*Basileuterus vermivorus*, Cab. in Schomb. Guian. iii. p. 667 ; Bp. Consp. p. 313 ; Sclater, P. Z. S. 1855, p. 144 ; Cat. A. B. p. 34 ; Burm. Syst. Ueb. iii. p. 113.

*Olivaceus, subtus flavus, lateraliter obscurior : pileo nigro, plaga mediali flammea : superciliis albidis : rostro corneo, pedibus pallide corylinis.*

Long. tota 4·5, alæ 2·3, caudæ 2·0 poll. Angl.

*Hab.* Brasil., Guian., Paraguay, Nova-Granada, et ins. Trinit.

### 2. BASILEUTERUS BRASIERI.

*Muscicapa brasieri*, Giraud, B. Texas, pl. 12 ; Sclater, P. Z. S. 1855, p. 66.

*Basileuterus culicivorus*, Bp. Consp. p. 313 ; Cab. Mus. Hein. p. 292.

*B. brasieri*, Sclater, P. Z. S. 1856, p. 292, et 1859, p. 374 ; Cat. A. B. p. 34 ; Sclater & Salvin, Ibis, 1860, p. 274.

*Cinereus : subtus flavus : pileo medio flavo, striga utrinque nigra : capitis lateribus flavicante mixtis : rostro corneo, pedibus pallidissime corylinis.*

Long. tota 4·6, alæ 2·2, caudæ 2·0.

*Hab.* Texas et Mexico.

### 3. BASILEUTERUS BELLII.

*Muscicapa belli*, Giraud, B. Texas, pl. 7. f. 1.

*Basileuterus bellii*, Sclater, P. Z. S. 1855, p. 65, et 1859, p. 374 ; Cat. A. B. p. 35 ; Sclater & Salvin, Ibis, 1860, p. 31.

*B. chrysophrys*, Sclater, P. Z. S. 1857, p. 202 ; Bp. Consp. p. 314.

*Olivaceus, subtus flavus : capitis lateribus et pilei striga mediali*

*castaneis, hac utrinque nigro marginata : superciliis latis, aureo-flavis : rostro obscure corneo, pedibus corylinis.*

Long. tota 4·6, alæ 2·3, caudæ 2·0.

*Hab.* Texas et Mexico.

#### 4. BASILEUTERUS MESOCHRYsus.

*Basileuterus mesochrysus*, Sclater, P. Z. S. 1860, p. 251; Cat. A.

B. p. 35.

*B. delatirii*, Sclater, P. Z. S. 1855, p. 144 (nec Bp.).

*Olivaceus : subtus omnino flavus, lateraliter olivascens : pileo et lateribus capitis castaneis : superciliis longis et striga rictali albis : rostro nigro, pedibus pallidis.*

Long. tota 4·5, alæ 2·3, caudæ 2·2.

*Hab.* Nova Granada.

#### 5. BASILEUTERUS DELATIRII.

*Basileuterus delatirii*, Bp. Compt. Rend. xxxviii. p. 383, & Notes Orn. p. 63; Sclater, P. Z. S. 1860, p. 250; Cat. A. B. p. 35; Sclater & Salvin, Ibis, 1860, p. 274.

*Olivaceus : subtus flavus, ventre albicante : pileo et lateribus capitis castaneis : superciliis longis et striga a rictu albis : rostro nigro, pedibus corylinis.*

Long. tota 5·0, alæ 2·0, caudæ 2·2.

*Hab.* Mexico merid. et Guatemala.

#### 6. BASILEUTERUS RUFIFRONS.

*Setophaga rufifrons*, Sw. An. in Menag. p. 294; Bp. Consp. p. 314.

*Basileuterus rufifrons*, Bp. Consp. p. 314; Baird, B. N. Am. p. 296; Sclater, P. Z. S. 1856, p. 291, & 1858, p. 299; Cat. A. B. p. 35.

*Fuscus : alis et cauda extus olivaceo limbatis, pileo et lateribus capitis castaneis, superciliis longis et striga rictali albis : subtus gula et pectore pallide flavis, ventre medio albicante, laterali cum crisso pallide fusco : rostro nigro, pedibus corylinis.*

Long. tota 5·5, alæ 2·2, caudæ 2·5.

*Hab.* Mexico bor. et med.

#### 7. BASILEUTERUS CHRYSOGASTER.

*Setophaga chrysogaster*, Tsch. Faun. Per. p. 192; Bp. Consp. p. 313.

*Basileuterus chrysogaster*, Sclater, P. Z. S. 1859, p. 137, & 1860, p. 273; Cat. A. B. p. 35.

*Schistaceus : interscapulio olivacescente, subtus omnino flavus : pileo nigro, plaga mediali flava aut aurantiaca : rostro nigro, pedibus pallidis.*

Long. tota 5·0, alæ 2·5, caudæ 2·1.

*Hab.* Respubl. Æquatorialis et Peruviae reg. occident.

#### 8. BASILEUTERUS CORONATUS.

*Myiodiocytes coronatus*, Tsch. Faun. Per. p. 193.



*Basileuterus coronatus*, Sclater, P. Z. S. 1855, p. 144, & 1859, p. 137; Cat. A. B. p. 34; Bp. Consp. p. 314.

*Olivaceus*: pileo medio castaneo, utrinque nigro marginato, lateribus capitis schistaceis: gutture albo, abdomine flavo: rostro corneo, pedibus corylinis.

Long. tota 5·0, alæ 2·6, caudæ 2·3.

*Hab.* Nova Granada et resp. Æquatorialis.

#### 9. BASILEUTERUS CINEREICOLLIS. (Pl. IX. fig. 2.)

*Basileuterus cinereicollis*, Sclater, P. Z. S. 1864, p. 166.

*Olivaceus*: pileo nigricante, plaga mediali flava: capitis lateribus et gula cinereis, hac albescentiore: abdomine flavo, lateraliter olivaceo: rostro obscure corneo, pedibus pallidis.

Long. tota 5·0, alæ 2·5, caudæ 2·2.

*Hab.* Nova Granada.

*Obs.* Since I described this species I have received a second specimen, exactly similar.

#### 10. BASILEUTERUS BIVITTATUS.

*Muscicapa bivittata*, Lafr. et D'Orb. Syn. Av. i. p. 52; D'Orb. Voy. Ois. p. 324.

*Myiodioctes tristriatus*, Tsch. Faun. Per. p. 193.

*Basileuterus bivittatus*, Sclater, P. Z. S. 1859, p. 137, & 1860, p. 85; Cat. A. B. p. 34.

*Olivaceus*: subtus dilutior, medialiter fulvescens; pileo nigro, striga verticali lata et altera utrinque superciliari elongata pallide fulvis: rostro pallide corneo, pedibus corylinis.

Long. tota 4·8, alæ 2·5, caudæ 2·0.

*Hab.* Respubl. Æquatorialis, Peruvia et Bolivia.

#### 11. BASILEUTERUS LEUCOBLEPHARUS.

*Sylvia leucoblephara*, Vieill. Nouv. Dict. xi. p. 206, et Enc. Méth. p. 559; D'Orb. Voy. Ois. p. 216, pl. 12. f. 2.

*Trichas superciliosus*, Sw. An. in Menag. p. 295.

*Geothlypis leucoblephara*, Cab. Mus. Hein. p. 17.

*Trichas leucoblephara*, Lafr. Rev. Zool. 1840, p. 231; Bp. Consp. p. 310; Burm. Syst. Ueb. iii. p. 114.

*Basileuterus leucoblepharus*, Sclat. Cat. A. B. p. 36.

*Olivaceus*: pileo medio ardesiaco, utrinque nigro marginato, superciliis albis: subtus albus, lateraliter cinerascens, tibiis et crisso flavicante tinctis: rostro corneo, pedibus pallide corylinis.

Long. tota 5·5, alæ 2·3, caudæ 2·4.

*Hab.* Brasil., Paraguaya et Bolivia int.

#### 12. BASILEUTERUS STRAGULATUS.

*Muscicapa stragulata*, Licht. Doubl. p. 55.

*Muscicapa rivularis*, Max. Beitr. iii. p. 789.

*Geothlypis stragulata*, Cab. Mus. Hein. p. 17.

*Trichas stragulata*, Burm. Syst. Ueb. iii. p. 115.

*Basileuterus stragulatus*, Sclat. Cat. A. B. p. 35.

*Olivaceus* : pileo medio cinereo, utrinque nigro marginato, superciliis albis : subtus albus, lateribus et crisso ochraceo perfusus : rostro corneo, pedibus pallide corylinis.

Long. tota 5·7, alæ 2·7, caudæ 2·5.

Hab. Brasilia orient.

13. *BASILEUTERUS MESOLEUCUS*, sp. nov. (Pl. IX. fig. 1.)

*Olivaceus* : pileo cinereo, superciliis et lateribus capitis pallide rufis : subtus medialiter albus, lateribus et crisso pallide fulvis : rostro obscure corneo, pedibus pallide corylinis.

Long. tota 5·2, alæ 2·3, caudæ 2·0.

Hab. Demerara.

Obs. Proximus *B. stragulato*, sed pileo unicolore, superciliis rufis, et ventre late et clare albo, necnon alis et cauda brevioribus distinguendus.

14. *BASILEUTERUS SEMICERVINUS*. (Pl. X. fig. 1.)

*Basileuterus semicervinus*, Sclater, P. Z. S. 1860, pp. 84, 291 ; Cat. A. B. p. 35.

*Obscure fuscus, dorso olivaceo perfuso : superciliis, corpore subtus et uropygio cum caudæ parte basali cervino-rufis : caudæ apice nigricanti-fusco : rostro nigro, pedibus pallide corylinis.*

Long. tota 5·0, alæ 2·3, caudæ 1·4.

Hab. Resp. Æquator.

15. *BASILEUTERUS UROPYGIALIS*. (Pl. X. fig. 2.)

*Basileuterus uropygialis*, Sclater, P. Z. S. 1861, p. 128 ; Sclater & Salvin, P. Z. S. 1864, p. 347 ; Cat. A. B. p. 35.

*Olivaceus : capite cinerascente, superciliis et corpore subtus dilute cervinis, ventre albescente : uropygio et caudæ dimidio basali pallide fulvis : hujus apice cinerascenti-olivaceo : rostro nigro, pedibus pallide corylinis.*

Long. tota 4·5, alæ 2·7, caudæ 1·8.

Hab. Isthmus Panama.

I have not included *Myiothlypis nigricristata* and *Euthlypis lacrymosa* in the present list, although I doubt whether either of these forms ought really to be separated generically from *Basileuterus*.

7. ON THE FISHES OF COCHIN, ON THE MALABAR COAST OF INDIA. BY SURGEON F. DAY, F.Z.S., F.L.S., ETC., MADRAS ARMY.

Part II. ANACANTHINI.

The ANACANTHINE fishes are by no means abundant in Cochin, either in the number of genera represented or the individuals forming the several species. As a rule they are good eating ; but their scarcity precludes their being frequently brought to the tables of Europeans. They are generally known by the designation of "*Suppatu*" (Mal.), a word meaning "a shoe."

**BREGMACEROS MACCLELLANDII** (Thompson).

B. vii. D. 16 + x. + 15. P. 25. V. 6. A. 22 + x. + 15.  
C. 17. L. 1. 64. L. tr. 6/8.

Length of specimen  $2\frac{7}{10}$  inches.

This specimen was captured in March 1861. The species appears to be rare.

**PSEUDORHOMBUS RUSSELLII** (Gray).

B. vii. D. 71. P. 12. V. 6. A. 59. C. 17. L. 1. 75.

Length of specimen 11 inches.

Not common; good eating.

**SYNAPTURA FOLIACEA** (Richardson).

B. vi. D. 62. P. 7. V. 6. A. 46. C. 15. L. 1. 75.

Length of specimens from 3 to  $6\frac{5}{10}$  inches.

Not rare; good eating.

**PLAGUSIA BILINEATA** (Bloch).

B. vi. D. 96. V. 4. A. 73. C. 8. L. 1. 85.

Length of specimen 7 inches.

The SILUROID fishes are represented in several genera, whilst the individuals composing the species are most abundant. Many are exceedingly useful; but others are dangerous, and consequently offer especial reasons for examination. Being with but few exceptions scaleless, they are prohibited as articles of food to both Mahomedans and Jews, and are left to the native Christian and Pariah population, as, excepting the *Wallago* genus, none of the true scaleless Siluroids are eaten by Europeans. All of them are considered more or less indigestible, heating, and liable to give rise to irritation of the intestinal canal. There are several which might be made serviceable in the manufacture of isinglass, and the *Arius militaris* is said to have been thus employed at Tellicherry; but in Cochin, at least, none of them appear ever to have been put to such a use. "Fish-sounds" are obtained from this order of fish, as well as from some others.

The estuary species are mostly captured by a rod and line, especially in the monsoon-time; but some of the smaller ones are taken in the Chinese nets at the side of the river.

The *Siluridæ heteroptera* and *S. proteroptera*, more especially in their groups of *Silurinæ*, *Ariinæ*, and *Bagarinæ* (with the exception of the *Wallago* and, I believe, *Plotosus* genera), comprised under the Malayim term "Coree," are exceedingly dreaded, from the injuries they inflict with their serrated pectoral spines, the wounds from which are reputed to be venomous. On being captured, both the dorsal and pectoral spines are immediately broken off; for no purchaser will handle them until this has been done.

That most dangerous inflammations are frequently occasioned from wounds caused by the pectoral spines of these fish I can confirm by personal experience, having often treated such cases in the hospitals

of Cochin, which have arisen amongst those who have incautiously handled them; but whether due to their irregular and jagged nature, or their poisonous character, has always been a disputed point.

*PLOTOSUS ANGUILLARIS* (Bloch).

*Moorghee* (Mal.).

B. xii. D.  $\frac{1}{4}$  93. P.  $\frac{1}{11}$ . V.  $\frac{1}{13}$ . A. 66. C. 13.

Length of specimens from 7 to  $7\frac{6}{10}$  inches.

Not uncommon in the backwaters and estuaries; eaten by the lower classes of natives. Wounds occasioned by their pectoral spines do not appear to be dreaded in Malabar.

*SACCOBRANCHUS SINGIO* (Buch. Ham.).

*Kahree meen* (Mal.).

B. vi. D. 7. P.  $\frac{1}{6}$ . V. 6. A. 72. C. 15.

Length of specimens from 3 to  $14\frac{5}{10}$  inches.

These fish, known as the "Bichu ka Mutchee" (Hind.) or Scorpion-fish, are greatly dreaded by the natives of Malabar. As soon as they are perceived in the nets, their pectoral spines are broken off by a blow with a stick; consequently it is difficult to procure un mutilated specimens, as the fishermen will rather cut the meshes of their nets and let them escape than endeavour to capture them.

Inhabits all sluggish pieces of water; and the young are found in all inundated paddy-fields. Eaten by the natives.

*WALLAGO ATTU* (Schn.).

*Wahlah* (Mal.).

B. xix.-xxi. D.  $\frac{1}{4}$ . P.  $\frac{1}{13-14}$ . V. 8. A. 87-90. C. 17.

Length of specimen 13 inches.

Common in the rivers: rather rich eating, salt well, and adapted for curries; but are reputed to be irritating to the intestinal canal. Captured up to  $3\frac{1}{2}$  feet in length, and even occasionally larger. Very voracious; take a bait freely.

*WALLAGO MALABARICI* (C. & V.).

*Mungee wahlah* (Mal.).

B. xv. D. 4. P.  $\frac{1}{13}$ . V. 9. A. 68. C. 17.

Length of specimens from  $5\frac{4}{10}$  to  $12\frac{5}{10}$  inches.

Length of head  $\frac{1}{7}$  of total, of pectoral fin  $\frac{1}{9}$ , of caudal  $\frac{1}{9}$ , of base of anal  $\frac{2}{9}$ . Height of head  $\frac{1}{14}$ , of body  $\frac{1}{7}$ , of dorsal fin  $\frac{1}{16}$ , of anal  $\frac{1}{16}$  of total length. Diameter of eye  $\frac{1}{5}$  of length of head, eyes  $1\frac{1}{2}$  diameter apart, nearly one diameter from end of snout.

Gape of mouth very wide, being three times its antero-posterior length. Muzzle rounded in front; lower jaw the longest, curving upwards in its centre, so that when closed its upper margin is completely in advance of the upper jaw, and even ascending to a higher level. Cleft of mouth only extends half the distance to the eye, the

centre of which is situated opposite the angle. Superior maxillary barbel reaches as far as the end of the pectoral fin; that on the lower jaw is short, and only equals one-third of the length of the head.

Teeth sharp, carded, and recurved, in six or eight rows; in both intermaxillaries and lower jaw, and in two oblique spots on the vomer, separated by an interspace.

*Fins.* Dorsal weak, expanded in the centre, arising opposite the commencement of the ventral; pectoral reaching to just beyond the origin of the anal, its spine serrated on its inferior aspect. Anal divided from the caudal by a notch, and covered for about two-thirds of its distance from the abdomen by a fleshy sort of sheath. Caudal lobed; the superior lobe the longest.

Lateral line straight from the upper margin of operculum to centre of caudal.

*Colours.* Greenish along the back; white along the sides, abdomen, and chest, with a purplish tinge. The whole of the body minutely studded with fine black points: a large, round, darkish finger-mark on the shoulder, opposite the centre of the operculum.

Inhabits the same localities as the *W. attu*, and equally good for eating and salting. Said never to exceed 2 feet in length.

**PSEUDEUTROPIUS SYKESII (Jerdon).**

*Schilbe sykesii*, Jerdon, Madras Journal of Literature & Science, no. 35, 1849, p. 335.

*Pseudeutropius mitchelli*, Günther, Catal. v. 1864, p. 59.

B. viii.-ix. D.  $\frac{1}{7}$ . P.  $\frac{1}{8}$ . V. 6. A. 35.

Length of specimen  $5\frac{5}{10}$  inches.

By no means rare in the rivers of Malabar. In two specimens the adipose fin was absent, perhaps lost by some accident; probably from some such deformed specimen Dr. Jerdon described the *Schilbe sykesii*.

**MACRONES TENGARA (Buch. Ham.).**

B. x. D.  $\frac{1}{7}$ . P.  $\frac{1}{8}$ . V. 6. A. 12.

Length of specimens from  $6\frac{5}{10}$  to  $6\frac{8}{10}$  inches.

Common; grows to a considerable size; eaten by the lower classes.

**MACRONES ARMATUS, Day, sp. nov.**

B. x. D.  $\frac{1}{7}$ . P.  $\frac{1}{6}$ . V. 6. A. 11. C. 15.

Length of specimens from  $3\frac{5}{10}$  to  $4\frac{3}{10}$  inches.

Length of head  $\frac{1}{6}$  of the total length. Height of head  $\frac{1}{11}$ , of body  $\frac{1}{6}$  of the total length.

Eyes a little more than one-third the length of the head; nearly one diameter apart, and one from end of snout. Summit of head rugose; occipital process (see figure, p. 290) three times as long as wide, with an intermediate bone between its upper extremity and the basal bone of the dorsal fin. Fonticulus not quite extending to the

base of the occipital process. Maxillary barbels extend to the caudal; of the inferior labial barbels, the external reaches as far as the



middle of the pectoral, whilst the internal are not quite so long as the head. Vomerine teeth form a crescentic band.



Dorsal spine serrated posteriorly in its upper third, but weaker and shorter than that of the pectoral, which is serrated interiorly, and as long as from the angle of the mouth to the posterior extremity of the head. Caudal very deeply forked, upper lobe the longest. Base of the adipose dorsal equals that of anal.

Wounds inflicted by its pectoral spine are much dreaded: it ends superiorly in one point directed forwards, between which and the first tooth on its inferior margin is a membranous prolongation in the form of a trefoil leaf.



Outer extremity of pectoral spine, magnified.

Not uncommon in the rivers and tanks of fresh water, and occasionally found in the backwaters. Takes a bait freely, and is eaten by the poorest of the population.

**MACRONES CAVASIUS** (Buch. Ham.).

B. x. D.  $\frac{1}{7}$ . P.  $\frac{1}{7}$ . V. 6. A. 11. C. 15.

Length of specimens from  $3\frac{7}{10}$  to  $3\frac{8}{10}$  inches.

Very common in every river, and even inundated paddy-fields; never grows to a large size; eaten as the last.

**PSEUDOBAGRUS CHRYSSEUS**, Day, sp. nov.

B. x. D.  $\frac{1}{7}$ . P.  $\frac{1}{6}$ . V. 6. A. 27. C. 17.

Length of specimen  $6\frac{2}{10}$  inches.

Length of head about  $\frac{2}{9}$ , of base of first dorsal  $\frac{1}{13}$ , of base of adipose dorsal  $\frac{1}{13}$ , of caudal  $\frac{2}{9}$ , of base of anal  $\frac{2}{9}$  of total length. Height of head  $\frac{1}{9}$ , of body  $\frac{2}{9}$ , of dorsal fin  $\frac{1}{6}$ , of anal  $\frac{1}{10}$  of total length. Diameter of eye  $\frac{9}{20}$  of length of head, eyes  $1\frac{1}{2}$  diameter apart, upwards of 1 diameter from end of snout.

Jaws equal in length ; gape of mouth wide, its transverse width being equal to half the length of the head. Summit of head depressed ; both it, the opercula, and the shoulder-bone furrowed ; occipital process narrow, twice as long as wide ; basal bone considerably produced to meet occipital process, and extended in front on either side of dorsal spine. A flat lance-shaped fonticulus in the central line of the head, between the orbits, pointing downwards and forwards, reaching in front nearly to intermaxillaries, and superiorly only extended to a short distance behind the orbits. Nasal cirri equal half the length of the head, superior maxillary ones slightly longer ; the external of the inferior labial ones reach as far as the base of the pectoral, whilst the internal ones are one-quarter shorter.

Teeth very fine, "*en velours*" in both maxillaries and lower jaw ; whilst on the vomer and palate they are considerably longer, stronger, and arranged in a crescentic band.

*Fins.* The first dorsal arises opposite about the middle of the pectoral ; and the ventral just beyond the termination of the pectoral, whilst it just reaches as far as the commencement of anal. Adipose dorsal commences about the middle of the anal.

Dorsal spine strongly serrated ; about ten teeth posteriorly in its upper two-thirds, and three serrations in the front of its summit anteriorly, whilst its extremity ends in a soft filament. The rays are longer than the spine. Pectoral situated in lower quarter of the body ; its spine stronger than that of the dorsal, slightly roughened, serrated anteriorly, and strongly serrated (sixteen to eighteen teeth) posteriorly. When laid flat, this spine is protected by an overhanging bony arch, formed by the process of the shoulder-bone. Second dorsal soft and rounded. Anal rather rounded posteriorly. Caudal deeply lunated ; outer rays the longest.

Lateral line passes from summit of operculum direct to the centre of caudal.

*Colours.* Back greenish ; sides golden yellow ; a large round black finger-mark situated just behind the operculum, and surrounded by a light-yellow margin. The first and adipose dorsals are yellowish, tinged with dusky. Caudal has a deep black base and a blackish margin ; its ground-colour reddish orange, slightly stained with black at its extremity. Anal of a deep orange-red, slightly margined with black. Eyes orange.

Exceedingly common in the Kurriavanoor River, where they appear to prefer the deepest pools ; four or five are frequently taken out at one haul of a cast-net. They are also occasionally captured during the monsoons, especially in the backwater at Kurriapudnam and the river at Cochin. Said by the fishermen to rarely exceed 16 inches in length. Esteemed for eating ; but the wounds inflicted by their pectoral spines are dreaded.

ARIUS GAGORA (Buch. Ham.).

B. v. D.  $\frac{1}{7}$ . P.  $\frac{1}{10}$ . V. 6. A. 18. C. 15.

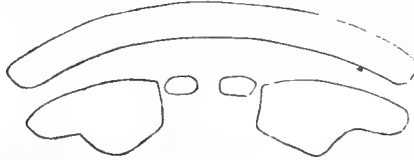
Length of specimen  $7\frac{8}{10}$  inches.

Not uncommon ; eaten by the lower classes.

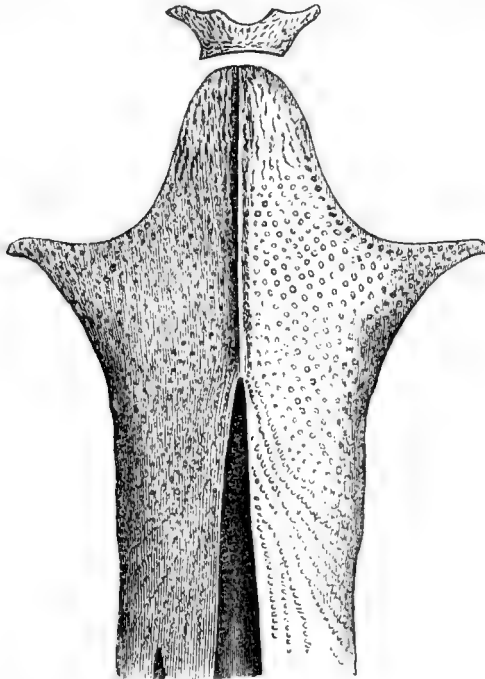
**ARIUS CÆLATUS (Cuv. & Val.).**B. v. D.  $\frac{1}{7}$ . P.  $\frac{1}{9}$ . V. 6. A. 19. C. 15.Length of specimen  $5\frac{9}{10}$  inches.**ARIUS NETUMA (Cuv. & Val.).**B. vi. D.  $\frac{1}{7}$ . P.  $\frac{1}{12}$ . V. 6. A. 19. C. 17.

Length of specimen 12 inches.

This fish appears to me to be fairly described in Cuv. and Val., except as to its teething, which is not mentioned. Dr. Günther, in his 'Catalogue,' places the *A. netuma*, Cuv. & Val., as a synonym of the *Bagrus bilineatus*, Cuv. & Val. Snout very obtuse. Teeth villiform on intermaxillaries, and much larger than those on the vomer and palate; palatine teeth in a large patch, irregularly quadrangular, and extended externally; vomerine teeth on a small oval spot, and not at all, or very slightly, joined to those of the palate. Maxillary cirri extend to the end of operculum or base of



pectoral. Summit of head granulated. Occipital process broader than long, slightly elevated along its centre; basal bone of dorsal



spine strong and granulated. Dorsal spine very strong, granulated



in front, serrated behind for its upper half, and of equal length with the pectoral spine, which is also granulated in front, serrated for its upper third, and strongly serrated posteriorly; its length equals that of the head, as far as the posterior margin of the orbit. Soft dorsal two-thirds the height of body.

Grows to a very large size; is eaten by the natives.

*ARIUS SUBROSTRATUS* (Cuv. & Val.).

B. vi. D.  $\frac{1}{7}$ . P.  $\frac{1}{11}$ . V. 6. A. 20. C. 17.

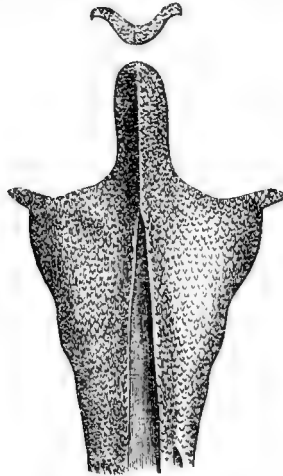
Length of specimens from 9 to  $9\frac{8}{10}$  inches.

Length of head  $\frac{3}{10}$  of total length. Height of body  $\frac{1}{5}$ , of head  $\frac{1}{6}$  of total length. Diameter of eye about  $\frac{1}{5}$  length of head, eyes  $1\frac{1}{2}$  diameter apart,  $2\frac{1}{2}$  from end of snout.

Teeth villiform on intermaxillaries, space covered more than one-fourth as wide as long; none on vomer; on palatine in two oval patches, placed wide apart, and diverging behind.



Upper surface of head granulated; occipital process longer than broad, rather keeled along its centre. Fonticulus long, narrow, and



sharp at both ends, extending from just behind the intermaxillaries to nearly as far as the base of occipital process. Operculum sulcated: shoulder-bone depressed in holes, like the marks from a thimble.

Dorsal spine ending in a soft point, strongly granulated anteriorly, serrated in its upper part, also serrated posteriorly in its upper two-thirds. Pectoral spine about equal strength with dorsal, rugose externally, serrated posteriorly.

*Colours.* A brilliant dark bluish silver as far as the lateral line, silvery-white below. Fins yellowish.

Common; mostly captured during the south-west monsoon; eaten by the natives.

**OSTEOGENIOSUS MILITARIS** (Linn.).

B. v. D.  $\frac{1}{7}$ . P.  $\frac{1}{11}$ . V. 6. A. 20. C. 15.

Length of specimen 8 inches.

Rare; and not observed above 8 inches in length.

**BATRACHOCEPHALUS MINOR** (Buch. Ham.).

B. v. D.  $\frac{1}{7}$ . P.  $\frac{1}{9}$ . V. 6. A. 20. C. 17.

Length of specimens from  $6\frac{7}{10}$  to  $6\frac{8}{10}$  inches.

By no means rare, more especially in the cold months; do not appear to grow large; are not esteemed good eating, but used as food by the lower classes.

**SAURIDA TUMBIL** (Bloch).

*Arranna* (Mal.).

B. xiii. D. 12. P. 16. V. 10. A. 10. C. 19. L. 1. 53.  
L. tr. 5/6.

Length of specimen  $7\frac{2}{10}$  inches.

Never common; but rarely absent in the cold months of the year. Eaten by the natives, but not esteemed.

In the following description of the Loaches and Carps, I have followed the arrangement adopted by Dr. Bleeker in his excellent 'Ichthyological Atlas.'

The Loaches are eaten by the poorer classes, or rather the slave castes, of Malabar, who obtain them from the inundated paddy-fields and small watercourses, where they abound, along with the *Saccobranchus singio*, *Etroplus maculatus*, *Polyacanthus cupanus*, and several species of *Puntius*, &c. Not only do they inhabit the plains, but the hills have also their varieties, one of which differs so remarkably from recorded genera that I have instituted a new one for its reception.

My specimens of the common species in spirits have unfortunately been destroyed, and skins alone are insufficient for the purpose of deciding the genus to which it belongs: it is the *Cobitis rubripinnis* (Jerdon), *Coyeewalla* (Mal.). D. 2/6. A. 2/7. No free spine (?) under the eye. Cirri 6. Length of head  $\frac{1}{6}$ , of base of dorsal  $\frac{1}{3}$ , of base of anal  $\frac{1}{3}$ , of caudal  $\frac{1}{6}$ , of pectoral  $\frac{1}{3}$  of total length. Height of head  $\frac{1}{3}$ , of body  $\frac{1}{6}$ , of dorsal fin  $\frac{1}{8}$  of total length. Diameter of eye  $\frac{1}{6}$  of length of head, eyes 2 diameters from end of snout, 2 diameters apart.

Summit of head scaleless; cheeks scaled. Dorsal central, slightly in front of commencement of ventral. Anal in posterior quarter of body. Caudal entire, square.

*Colours.* Body olive-green, becoming of light brown on the sides, with nine brown bars descending halfway to lateral line, and a number of smaller and irregular bands beneath. A black bar at base of caudal. Dorsal with two brown bars. Caudal with four brown bands; operculum with upper margin black.

## NEMACHEILUS TRIANGULARIS, Day, sp. nov.

B. iii. D. 9. P. 11. V. 9. A. 6. C. 19. Cirri 6.

Length of specimen  $2\frac{1}{10}$  inches.

Length of head about  $\frac{1}{5}$ , of base of dorsal  $\frac{1}{10}$ , of base of anal  $\frac{1}{21}$ , of pectoral  $\frac{1}{8}$ , of caudal  $\frac{1}{5}$  of the total length. Height of head  $\frac{1}{10}$ , of body  $\frac{1}{4}$ , of dorsal fin  $\frac{1}{4}$ , of anal  $\frac{1}{10}$  of the total length. Diameter of eye  $\frac{1}{4}$  of length of head, eyes 1 diameter apart, 2 diameters from end of snout; no suborbital spine.

Body elongated, fusiform, cylindrical in front, compressed along the sides. From snout to frontal convex, thence to caudal straight; interorbital space convex.

Lower jaw shortest; opening of mouth below, and extending as far posteriorly as half the distance to the orbit; the end of the snout fleshy and overhanging the mouth; intermaxillaries produced downwards and forming a knob, which is in advance of the lower jaw when the mouth is closed. Lips rather fleshy. Cirri four, on snout, with base not united; two on superior maxillaries, half the length of the head. Eyes not covered by any adipose membrane. Nostrils nearer to the eye than the snout; anterior tubular; posterior broad, open. Operculum rounded posteriorly.

*Fins.* Dorsal arises slightly in front of the origin of the ventral, and most of it is situated in the anterior half of the body. Anal is entirely in the posterior third of the body. Dorsal square; anal slightly rounded; caudal deeply lobed.

Scales very distinct over the whole body; none on the head. The lateral line passes straight from the head towards the centre of the caudal fin, but ceases abruptly opposite the termination of the anal.

*Colours.* Yellowish-banded, each band being edged with black; seven along the body, which pass backwards towards the lateral line, and consequently are disposed in a V shape; one band passes over the operculum, a second through the eye, and a third from the orbit to the angle of the mouth. Dorsal with three irregular rows of black spots. Pectoral, ventral, and anal unspotted, but darkest at their margins. Three oblique black bands on the caudal, which has also a black base.

I am indebted to the Rev. Henry Baker, jun., for this pretty little Loach, which he discovered on the hills at Mundikyum.

The next Loach which I have to describe I obtained at Trichoor, near Cochin, from a paddy-field, amongst some specimens of *Polyacanthus* and *Saccobranchus singio*. It is the most remarkable species I have observed, and cannot be included in any genus as at present constituted; I therefore propose to define one for its reception, premising that such should be placed immediately subsequent to Bleeker's genus *Lepidocephalichthys*, as it possesses a veiled eye, a dorsal fin with few rays placed opposite a ventral, and no swimming-bladder. One of its most appreciable features is that the innermost ray of its pectoral fin is expanded into a strong flattened spine.

## Genus PLATACANTHUS.

Body elongate, moderately compressed; back low; a fleshy keel on the back, midway between the termination of the dorsal and commencement of caudal, on to which it is continued; opercular and suborbital regions scaled. Eyes veiled. Snout obtuse. Cirri eight, on snout two; on superior maxillaries four; on inferior maxillaries two. Suborbital spine free, bifurcated, close to orbit; no tubercle on end of lower jaw. Nostrils simple. Dorsal fin arises opposite ventral, in centre of the body. The internal ray of pectoral forming a large flattened spine, half the length of the soft rays. Caudal emarginate. No swimming-bladder apparent.

PLATACANTHUS AGRENSIS, Day, sp. nov.

B. iii. D. 7. P. 6—1. V. 7. A. 6. C. 16. Cirri 8.

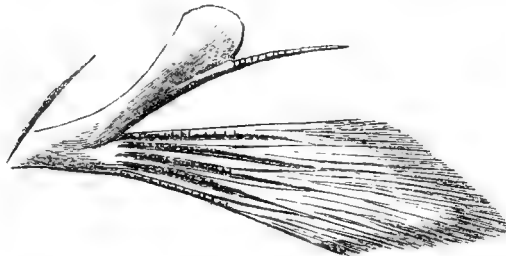
Length of specimen  $3\frac{2}{10}$  inches.

Length of head  $\frac{1}{11}$ , of pectoral  $\frac{1}{4}$ , of base of dorsal  $\frac{1}{6}$ , of base of anal  $\frac{1}{32}$ , of caudal  $\frac{1}{8}$  of the total length. Height of head  $\frac{1}{16}$ , of body  $\frac{1}{8}$ , of dorsal  $\frac{1}{12}$ , of anal  $\frac{1}{12}$  of the total length. Diameter of eye  $\frac{1}{3}$  of the length of the head, eyes 1 diameter from end of snout,  $\frac{1}{2}$  a diameter apart. A strong bifurcated suborbital spine arises below the orbit, close to its anterior margin, and then passes backwards with a slight inward curve.

Body elongated, compressed; profile curving considerably from snout to opposite orbits, from back of head to caudal nearly straight. A raised adipose keel along the posterior sixth of the back, and extending on to the upper surface of the base of the caudal fin. Sides compressed, but with a slight bulging just before the commencement of the caudal.

Opening of the mouth below, transversely oval, and extending a very short distance posteriorly. End of snout fleshy, and overhanging the mouth. Lips thick, continuous; no enlargement of intermaxillaries, nor tubercle on lower jaw. Cirri two, fleshy on snout, their bases not united; four on superior maxillaries, and two on lower jaw; the longest cirrus reaches as far as the eye. Nostrils midway between orbit and end of snout; neither tubular. Upper margin of orbit close to profile. Eyes covered with veil. Opercles rounded posteriorly. Interorbital space smooth, scaleless.

*Fins.* Dorsal arises midway between snout and base of caudal. Ventral arises under the commencement of the dorsal. Pectoral



Pectoral fin, magnified.

large, the internal ray forming a broad spine, having a flattened extremity internally, and terminating externally in a soft filamentous prolongation. The flat portion of the spine, which is only about half the length of the soft rays, lies against the side when the fin is at rest. Anal situated entirely in the posterior third of the total length; its first ray undivided, its last divided to the root. Caudal slightly lobed.

Scales very distinct over the whole of the body and cheeks; none on the top of the head. Lateral line straight.

*Colours.* Light brown, with irregular spots and bands. Dorsal spotted with brown. Caudal with four oblique bars of dark brown, and a brown bar at its base.

The CARP order is most extensively distributed in the fresh waters around Cochin, as well as in inland situations, even to nearly the summits of the highest hills of the Western Ghauts. Some of these fish are kept in the large tanks inside the Hindu pagodas; and even on the banks of the broad Shahlacoodee river stands a Hindu temple where they are regularly fed, and have become so tame as to come when called, and even take food from human hands. In the paddy-fields the smaller species are most abundant, and afford luxurious feasts not only to the multitudes of wading-birds that frequent Malabar, but also to the lower classes of natives.

GARRA MALABARICA, Day, sp. nov.

*Wuttooree* (Mal.).

B. iii. D. 3/9. P. 15. V. 10. A. 2/5. C. 19. L. 1. 31.  
L. tr. 4/3. Cirri 2.

Length of specimen 4 inches.

Length of head  $\frac{1}{6}$ , of pectoral  $\frac{1}{7}$ , of base of dorsal  $\frac{1}{8}$ , of base of anal  $\frac{1}{6}$  of total length. Height of head  $\frac{1}{10}$ , of body  $\frac{1}{6}$ , of dorsal  $\frac{1}{7}$ , of anal  $\frac{1}{8}$  of the total length. Diameter of eye nearly  $\frac{1}{3}$  the length of head, eyes a little above 1 diameter from end of snout, nearly 2 diameters apart.

Profile rises as far as the occiput; thence to the caudal it is nearly straight. Under surface of body equally convex with that of the upper. Sides compressed. Back rather broad and flat, and nearly as wide as the body is deep.

Mouth below; upper jaw the longest; the two lips united, thick, and covered with mucous pores, as is also the snout. Below the under jaw is an oval disk, the transverse diameter of which is a little wider than that of the eye. One pair of fleshy cirri on superior maxilla, and which are not above two-thirds of the length of the orbit. Snout broad, depressed. Eye nearer to the posterior than it is to the anterior extremity of the head; its superior surface is on the upper profile, and it looks upwards and outwards. Inter-orbital space nearly flat from side to side. Nostrils nearer to orbit than they are to the end of the snout.

*Fins.* Dorsal situated rather nearer snout than it is to the base of

the caudal, and a little in advance of the ventrals; it is higher in front than behind; its base is without scales. Pectorals inserted subhorizontally. Anal short, situated entirely in posterior fourth of the body, its commencement being midway between posterior extremity of the pectoral and the termination of the lower lobe of the caudal. Ventrals short. Caudal large, emarginate, but not deeply; base scaly.

Lateral line nearly straight from upper margin of operculum to centre of caudal, and nearer the back than it is to the abdominal surface.

*Colours.* Back deep olive, fading to dirty white on the abdomen; a wide leaden-blue stripe runs along either side of the lateral line, becoming of a shot green along the four central rays of the caudal. Fins yellowish.

Not rare in the Kurriavanoor River.

*LABEO MELANAMPYX*, Day, sp. nov.

B. iii. D. 3/9. P. 16. V. 9. A. 3/6. C. 18. L. 1. 20.  
L. tr. 4/3. Cirri 4.

Length of specimens from 1 to  $2\frac{3}{10}$  inches.

Length of head  $\frac{2}{3}$ , of pectoral fin  $\frac{1}{6}$ , of base of dorsal  $\frac{2}{13}$ , of base of anal  $\frac{1}{11}$ , of caudal  $\frac{2}{5}$  of total length. Height of head  $\frac{1}{6}$ , of body  $\frac{1}{3}$ , of dorsal  $\frac{1}{6}$ , of anal  $\frac{1}{7}$  of total length. Diameter of eye nearly  $\frac{1}{3}$  the length of head, eyes upwards of 1 diameter from end of snout,  $1\frac{1}{2}$  apart.

Profile rises to anterior margin of dorsal; thence to caudal it slightly descends. Abdomen flat below, and its profile not so convex as that of the back; sides compressed.

Mouth directed forwards and slightly downwards; upper jaw overhanging lower. Upper half of mouth forming a half circle; when it is wide open, the whole orifice is nearly oval. Tip of lower jaw uncovered by the lip. Lips continuous from upper to lower jaw; postlabial sulcus deep, simple; lower lip with numerous fine pores, thickened below symphysis. Præorbital bone rather triangular, base in front. Snout bulging, and continued laterally into a slight lobe; both it and præorbital covered by crenulations. Cirri four, two on snout, two on superior maxillaries, which are as long as orbit. Nostrials nearer to orbit than to end of snout; anterior tubular, and separated by a membranous valve from the posterior, which is broad, oval, and patent. Some widely scattered pores exist over the whole of the upper surface of the head.

*Fins.* Dorsal arises midway between snout and base of caudal, and is slightly in advance of the commencement of the ventral, which last is nearly horizontal. Anal arises midway between posterior extremity of operculum and termination of the caudal, and is completely behind the whole of the dorsal. Caudal deeply lobed. Dorsal and anal fins with a row of scales at their bases. Pectoral reaches almost to the ventrals, the tip of which last nearly touches the anal.

Scales large; lateral line slightly descends. Pharyngeal teeth sharp, pointed, and slightly curved at their extremities, placed in three closely approximating rows.

*Colours.* Reddish brown, with four vertical black bands: one behind the eye; a second from before the base of dorsal fin, arising wide, becomes narrow close to the origin of the ventral; a third from the termination of the dorsal, crosses the lateral line, but does not reach so low down as the base of the anal; the fourth crosses the base of the caudal. Muzzle black. Fins dusky. Eyes reddish.

I am indebted to the Rev. H. Baker, jun., for several specimens of this fish, which he captured at Mundikyum.

*LABEO DENISONII*, Day, sp. nov.

B. iii. D. 2/8. P. 15. V. 9. A. 2/5. C. 19. L. 1. 28. L. tr. 5/3. Cirri 2.

Length of specimens from 4 to  $5\frac{1}{10}$  inches.

Length of head  $\frac{1}{6}$ , of pectoral  $\frac{1}{7}$ , of base of dorsal  $\frac{1}{8}$ , of base of anal  $\frac{1}{12}$ , of caudal  $\frac{1}{5}$  of total length. Height of head  $\frac{1}{10}$ , of body  $\frac{1}{5}$ , of dorsal  $\frac{1}{6}$ , of anal  $\frac{1}{10}$  of total length. Diameter of eye about  $\frac{1}{3}$  of length of head, eyes rather more than 1 diameter apart,  $1\frac{1}{5}$  diameter from end of snout.

Body elongated, compressed; profile from snout to dorsal gently elevated, thence to caudal gradually sloping.

Mouth small, directed forwards and slightly downwards, the upper jaw being the longest. Lower jaw curves slightly upwards at its extremity, with a slight tubercle at the upper surface of symphysis. Tip of lower jaw uncovered by lip. Upper and lower lips continuous; edges entire, a little thickened so as to form a small lobe below symphysis of lower jaw. Sulcus simple, not very deep. Snout slightly projecting over upper jaw, with a triangular expansion on either side anteriorly; some small pores at its apex; no cirri. Præ-orbital irregularly triangular, longer than high, rounded in front. Maxillary cirri two, fleshy, one-third longer than the orbit. Nostrils nearer orbit than end of snout, the posterior closed by a membranous valve; margin of anterior slightly elevated around its edge, so as to appear semitubular.

*Fins.* The dorsal commences the width of two scales nearer the snout than it does to the base of the caudal; it is in advance of the ventral. Anal situated in the posterior quarter of the body, and entirely behind termination of the dorsal. Dorsal highest in front; a row of small scales at its base. Large free scale at base of ventral, which fin is rounded. Anal highest anteriorly. Caudal deeply lobed.

Scales large. Lateral line slightly curved at first, then passing direct to centre of caudal. Air-bladder contracted, dividing one-third from the remainder. Pharyngeal teeth sharp, pointed, slightly curved towards their extremity, situated in three closely approximating rows.

*Colours.* Silvery, with a line of black running from snout through lower part of eye to centre of base of caudal fin; above that a wide line of bright scarlet, extending the same distance. Back glossy metallic blue, and the abdomen silvery white. Caudal with an oblique black band crossing the posterior third of each lobe. Other fins colourless.

I received several specimens of this species from the Rev. H. Baker, jun., who discovered it at Mundikyum. I have named it after H. E. Sir W. Denison, K.C.B., the Governor of Madras.

ROHITA DUSSUMIERI (Cuv. & Val.).

*Toolee* (Mal.).

B. iii. D.  $\frac{3}{12}$ . P. 17. V. 9. A.  $\frac{3}{5}$ . C. 19. L. 1. 35. L. tr.  $\frac{9}{7}$ .

Length of specimen  $8\frac{4}{10}$  inches.

Common in the Kurriavanoor River. They take surprising leaps when attempts are made to capture them with nets, sometimes springing completely over the heads of the boatmen, who are standing up at the time. Immediately on being captured, their necks are broken with a stick.

Fair eating; much esteemed by the natives.

CYCLOCHEILICHTHYS PINNAURATUS, Day, sp. nov.

B. iii. D.  $\frac{3}{8}$ . P. 17. V. 9. A.  $\frac{2}{6}$ . C. 21. L. 1. 29. L. tr.  $\frac{6}{5}$ . Cirri 4.

Length of specimen  $3\frac{4}{10}$  inches.

Length of head above  $\frac{1}{4}$  of total; of base of dorsal  $\frac{1}{5}$ , of base of anal  $\frac{1}{11}$ , of caudal  $\frac{1}{4}$  of total length. Height of body  $\frac{1}{3}$ , of head  $\frac{1}{5}$  of total length. Diameter of eye  $\frac{1}{4}$  of length of head, eyes 1 diameter from end of snout, upwards of 1 diameter apart.

Profile rises considerably to commencement of dorsal, thence sinks more gradually to the caudal. Abdomen not so convex as back. Body strongly compressed.

Eyes situated in anterior half of the head; their upper surface does not reach the profile. Mouth directed forwards; lower jaw covered by the upper when the two are closed. Nostrils situated nearer to eye than to end of snout; posterior patent, divided by a membranous flap from the anterior, which is slightly tubular. Præ-orbital triangular; apex directed forwards and inwards. Two cirri on snout, two-thirds the length of the maxillary pair, which are nearly as long as the orbit.

Dorsal nearly triangular, with a row of scales at its base; it commences midway between snout and base of caudal, and is slightly in advance of ventrals. Anal, which has also a row of scales at its base, is situated in the posterior fourth of the body. Dorsal spine finely serrated posteriorly for its upper three-fourths. Inferior margin of anal concave. Caudal deeply lobed. Pectoral just reaches ventral. Ventral does not extend quite to anal.

Scales with eight or ten lines arising from their anterior margin and rather diverging posteriorly. Lateral line in a single distinct tube, extending along half the exposed posterior extremity of each scale; it first descends slightly for six scales; opposite the centre of operculum it passes direct to the caudal.

*Colours.* Silvery, with a large diffused black spot on lateral line, extending from the twenty-fourth to the twenty-eighth scale. A



red spot on operculum. Dorsal and pectoral tinged with red, and minutely spotted with black, as is also the base of each scale and the various pieces of the operculum. External half of ventral bright orange-scarlet; anal tinged with red; both minutely dotted with black. Caudal stained with black.

Captured in Cochin, in a small pond.

**PUNTIUS CHRYSOPOMA** (Cuv. & Val.).

*Munduttee* (Mal.).

B. iii. D. 4/8. P. 15. V. 9. A. 3/5. C. 19. L. 1. 28.  
L. tr. 6/4. Cirri 4.

Length of specimens from 4 to  $7\frac{1}{2}$  inches.

Very common in rivers; grows to upwards of 2 feet in length; is good eating.

**PUNTIUS HAMILTONII** (Jerdon).

*Oolee perlee* (Mal.).

B. iii. D. 3/8. P. 17. V. 9. A. 2/5. C. 19. L. 1. 24. L.  
tr. 5/3. Cirri 2.

Length of specimens from  $3\frac{2}{10}$  to  $4\frac{1}{10}$  inches.

Dorsal fins commence exactly over the ventrals; spine smooth. It is very similar to the next; but the scales in this species are not in parallel rows. Opposite the fifth scale of the lateral line a fresh row commences. Height of body half its length, without the caudal fin, which is deeply lobed.

General colour of the back green; abdomen silvery, and a slight golden tinge on upper part of operculum; a dark diffused spot on the lateral line from twenty-first to twenty-third scale. Dorsal slightly stained with dark at its summit. Pectoral, ventral, and anal yellowish. Caudal dirty white.

When young, the summit of the head is golden green, and a yellow streak runs from opposite the centre of the eye to the centre of the tail. When about 2 inches long, the black spot at the side of the tail begins to show itself, whilst the dorsal becomes of a brownish red, and by degrees the golden streak on the side disappears.

In the monsoon-time a beautiful rosy streak extends from the eye to the centre of the caudal, and the back is more of an olive-green, and the fins redder.

Very common in the rivers and paddy-fields; but is more frequently found in tanks than some of the other species.

**PUNTIUS PARRAH**, Day.

? *Puntius amphibius* (Jerdon). Not Cuv. & Val.

*Parrah perlee* (Mal.).

B. iii. D. 3/8. P. 15. V. 8. A. 2/5. C. 19. L. 1. 25.  
L. tr. 5/4. Cirri 2.

Length of specimens from  $2\frac{8}{10}$  to 5 inches.

Length of head  $\frac{1}{5}$ , of base of dorsal  $\frac{1}{5}$ , of base of anal  $\frac{1}{2}$ , of pec-

toral  $\frac{1}{7}$ , of caudal  $\frac{1}{5}$  of the total length. Height of head  $\frac{1}{6}$ , of body  $\frac{1}{4}$ , of dorsal  $\frac{1}{6}$ , of anal  $\frac{1}{7}$  of the total length. Diameter of eye nearly  $\frac{1}{3}$  of the length of the head, eyes nearly  $1\frac{1}{4}$  diameter apart, 1 diameter from end of snout.

Profile curved gradually to dorsal, descends along its base, and thence straight to the caudal.

Cirri, one pair at the superior maxillæ, which are two-thirds of the length of the orbit. Nostrils nearer to the orbit than to end of snout; posterior patent, divided from anterior, which is slightly tubular, by a membranous valve.

*Fins.* Dorsal commences midway between snout and base of caudal, situated just over the ventral. Spine strong, smooth, and with a soft point; last two rays elongated. Anal arises behind the posterior margin of dorsal, at equal distance between the orbit and the end of the caudal. Upper surface of dorsal concave; under surface of anal the same. Caudal deeply lobed. Pectoral does not quite reach the ventral, nor the ventral the anal.

*Scales.* Rows above the lateral line regular, parallel, unbroken.

*Colours.* Upper surface of back dark silvery green, divided from a silvery abdomen by a dark bluish line. Cheeks golden red. Pectoral, ventral, and anal tinged with yellow. Dorsal and caudal dusky. A diffused black spot on the lateral line extending from twentieth to twenty-second scale. Eyes golden.

Very common in the rivers, and also in the inundated paddy-fields.

*PUNTIUS PUNCTATUS*, Day, sp. nov.

*Putter perlee* (Mal.).

B. iii. D. 3/8. P. 15. V. 8. A. 2/5. C. 18. L. 1. 27. L. tr. 6/4. No cirri.

Length of specimens from  $2\frac{5}{10}$  to  $3\frac{4}{10}$  inches.

Third dorsal spine strongly serrated posteriorly.

Length of head  $\frac{1}{6}$ , of pectoral  $\frac{1}{6}$ , of base of dorsal  $\frac{1}{7}$ , of base of anal  $\frac{1}{10}$ , of caudal  $\frac{1}{6}$  of total length. Height of head  $\frac{1}{6}$ , of body  $\frac{1}{3}$ , of dorsal  $\frac{1}{5}$  of total length. Eye large, close to profile, nearly  $\frac{1}{2}$  the length of head,  $\frac{1}{3}$  of a diameter from end of snout, eyes nearly 1 diameter apart.

Lateral line first curves gently downwards, and from opposite base of ventral passes direct to centre of caudal.

*Colours.* Olive-green above, gradually fading into silvery on the abdomen. A black diffused spot on the twentieth and twenty-first scales of the lateral line. The anterior half of the fourth scale from the operculum, of the row next below the lateral line, deep black, and also a portion of the scale above and beneath it. Fins yellowish. Dorsal and anal tipped with orange. Dorsal spotted with black, in two longitudinal rows, with a third in the front part between the other two. The dark markings are much more visible in the months when the freshes are coming down.

Common; eaten by the natives.

**PUNTIUS VITTATUS**, Day, sp. nov.

B. iii. D. 2/8. P. 12. V. 9. A. 2/5. C. 20. L. 1. 22.  
L. tr. 4/3. No cirri.

Length of specimen  $1\frac{6}{10}$  inch. Dorsal spine entire.

Length of head  $\frac{2}{9}$ , of pectoral  $\frac{1}{6}$ , of base of dorsal  $\frac{1}{5}$ , of base of anal  $\frac{1}{11}$ , of caudal  $\frac{2}{7}$  of total length. Height of head  $\frac{1}{4}$ , of body  $\frac{1}{3}$  of total length. Diameter of eye nearly  $\frac{1}{2}$  the length of head, eyes  $\frac{2}{3}$  of a diameter from end of snout, 2 diameters apart.

Rarely grows above  $1\frac{1}{2}$  inch in length, and is the most common species in the paddy-fields. When about  $\frac{8}{10}$ ths of an inch long, a vertical black stripe begins to show itself in the posterior third of the dorsal fin, the tip of which also becomes edged with black; and there is some irregular orange coloration about the fin. A black spot shows itself at the base of the caudal and anal fins; and in young specimens the line of demarcation between the green of the back and the silvery abdomen is very apparent, and seems as if a white line ran from the eye to the centre of the caudal. In adult specimens there are four black spots, one just before the dorsal, one under its posterior margin, one at the base of the caudal, and one at the base of the anal. The dorsal has one black streak down it, and a black tip, with orange markings. Upper surface of body dusky green. Abdomen silvery. Cheeks sometimes golden.

Is eaten by the slave castes.

**PUNTIUS FILAMENTOSUS** (Cuv. & Val.).

*Curroah* (Mal.).

B. iii. D. 3/8. P. 17. V. 9. A. 2/5. C. 16. L. 1. 21.  
L. tr. 5/4. No cirri.

Length of specimens from  $3\frac{5}{10}$  to  $6\frac{4}{10}$  inches.

The young have no filaments to the dorsal rays; in the adult they are present on all.

Common in some tanks, especially the fort-ditch in Cochin. Is considered good eating.

**RASBORA ANJANA?** (Buch. Ham.).

? *Leuciscus malabaricus* (Jerdon).

*Kokanutchee* (Mal.).

B. iii. D. 2/7. P. 15. V. 9. A. 3/5. C. 19. L. 1. 34.  
L. tr. 5/3.

Length of specimens from  $3\frac{1}{10}$  to  $3\frac{2}{10}$  inches.

Length of head  $\frac{1}{5}$ , of base of dorsal  $\frac{1}{13}$ , of base of anal  $\frac{1}{16}$ , of caudal  $\frac{1}{6}$  of the total length. Height of head  $\frac{1}{8}$ , of body  $\frac{1}{5}$ , of dorsal  $\frac{1}{6}$  of the total length. Diameter of eye above  $\frac{1}{3}$  of length of head, eyes 1 diameter from end of snout, upwards of 1 diameter apart.

Profile rises gradually to a little before the first dorsal, then still more gently slopes to the root of caudal. Abdominal surface about equally convex with that of back. Sides compressed; head still more so.

Mouth oblique, directed slightly upwards, with a short protuberance at the apex of the lower maxilla, which is received into a corresponding fissure in the intermaxillaries. Snout appears rather elevated. Præorbital irregularly quadrangular.

Dorsal fin high and square, arises the breadth of two scales nearer to the snout than it does to the root of the caudal; it is opposite the ventral. Caudal deeply forked. Anal square, arising midway between the base of the pectoral and the lower extremity of the caudal. Base of fins destitute of scales.

Lateral line commences opposite the upper margin of the operculum, and curves downwards until it reaches the fifth scale; thence it follows the curve of the abdomen to the lower half of the caudal.

*Colours.* Back greenish; a narrow yellow streak extends from the eye to about the centre of the caudal fin; below it is a broad leaden line. The whole of the fish has a purplish reflexion. Fins reddish orange; caudal slightly tipped with black.

Very common in the rivers, small streams, and tanks; takes a fly or bait readily.

The next fish, of which I have six specimens, differs from any of the genera of *Barbini* described by Bleeker. It evidently belongs to his subfamily *Catla*, and is allied to a certain extent to his *Rasborichthys*; but there are well-marked differences which warrant the formation of a new genus for its reception. Dr. Jerdon has described two other species of this genus under the term *Rhodeus*, because their lateral line suddenly ceases; but the *Rhodeus*, according to Bleeker, belongs to the true *Leuciscini*, its scales are large, it has only two series of pharyngeal teeth, the apex of the præorbital is directed upwards, and the posterior half of the dorsal is opposite an elongated anal.

#### Genus BRACHYGRAMMA, Day.

Body subelongate; sides compressed. Snout broad, depressed; præorbital bone triangular, apex directed downwards. No cirri. Eyes not covered by any adipose membrane. Opening of mouth of moderate size, oblique. Superior symphysis emarginate; inferior hooked above. Scales small, deciduous. Lateral line curved downwards, ceasing abruptly opposite the ventral fin. Base of dorsal scaleless; it arises behind the commencement of the ventrals, but does not extend as far as opposite commencement of anal. Anal few-rayed; no scales at its base. Caudal deeply lobed. Pharyngeal teeth large, oval, with their free surface concave or spoon-shaped, 1, 2, 3/3, 2, 1.

BRACHYGRAMMA JERDONII, Day, sp. nov.

*Wumboo* (Mal.).

B. iii. D. 2/7. P. 15. V. 9. A. 3/5. C. 19. L. 1. 63.  
L. tr. 10/6.

Length of specimens from  $2\frac{9}{10}$  to  $3\frac{8}{10}$  inches.

Length of head  $\frac{1}{5}$ , of pectoral  $\frac{1}{7}$ , of base of dorsal  $\frac{1}{10}$ , of base of anal  $\frac{1}{10}$ , of caudal  $\frac{1}{5}$  of the total length. Height of head  $\frac{1}{6}$ , of body  $\frac{1}{4}$ , of dorsal  $\frac{1}{7}$ , of anal  $\frac{1}{9}$  of the total length. Diameter of eye nearly  $\frac{1}{5}$  of the length of the head, eyes a little above  $\frac{1}{2}$  a diameter from the end of snout,  $1\frac{1}{4}$  diameter apart; its under surface is as close to lower profile as its upper surface is to the margin of the head.

Profile rises gradually from snout to posterior extremity of the head; thence there is a gradual decline to the caudal. Abdominal surface rather more curved than the dorsal. Sides compressed. Head compressed from side to side. Snout broad, depressed.

Mouth of moderate size, oblique. Lower jaw the longest, with a hook at its extremity, which is received into a corresponding emargination in the intermaxillaries. When the mouth is closed, the upper surface of the lower lip forms a portion of the superior profile of the head. Lips thin, covering both jaws. Præorbital triangular; apex below. Nostrils close to the anterior superior angle of the orbit; the posterior broad and patent, divided by a valve from the anterior, the margins of which are raised. Operculum nearly triangular, smooth. Intermaxillaries slightly protrusible, elevated into a point behind, expanded in front, and in central line emarginate to receive the hook of lower jaw.

*Fins.* Dorsal arises rather nearer the caudal than it does to the snout, is slightly behind the commencement of the ventral, but does not extend so far backwards as to above the anal. Anal situated in posterior third of the body, arises at an equal distance between orbit and end of inferior lobe of caudal. Dorsal and anal square. Caudal deeply lobed.

Scales on chest very small as far as ventral fins. Lateral line formed of long single tubes, only extending along fifteen scales, and curved downwards.

Pharyngeal teeth short, wide, transversely oval; extremities concave both from side to side and from before backwards, in fact resembling the concave surface of a spoon, 3, 2, 1 / 1, 2, 3.

*Colours.* Greenish above, silvery below. A bright greenish-yellow line separates the green of the back from the silvery sides and abdomen. Summit of head bright green. Inside of mouth and lips closely spotted with black. Fins colourless. Eyes white.

Is not uncommon in rivers and ponds. I have named the species after Dr. Jerdon, who appears to be the first who discovered the genus in India.

**BARILIUS BAKERI**, Day, sp. nov.

B. iii. D. 3/10. P. 15. V. 10. A.  $\frac{3}{14}$ . C. 17. L. I. 38. L. tr. 9/2.

Length of specimens from  $4\frac{6}{10}$  to  $5\frac{1}{10}$  inches.

Length of head  $\frac{1}{4}$ , of base of dorsal  $\frac{1}{7}$ , of base of anal  $\frac{1}{6}$ , of pectoral  $\frac{1}{6}$ , of caudal  $\frac{2}{9}$  of the total length. Height of head  $\frac{1}{7}$ , of body  $\frac{2}{7}$ , of dorsal  $\frac{1}{6}$ , of anal  $\frac{1}{7}$  of total length. Diameter of eye about  $\frac{1}{4}$  of

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the length of the head, eyes  $1\frac{1}{4}$  diameter apart, 1 diameter from end of snout.

Profile more convex on ventral than on dorsal aspect.

Gape of mouth large, triangular, directed forwards, compressed from side to side. Lower jaw slightly the longest, terminating in a knob, which is received into the apex of a triangle formed by the meeting of the intermaxillaries. Lips not fleshy; jaws entirely covered; some pores along the margin of the lower lip, on the snout, and on the anterior margin of the præorbital. Sulcus single, not deep. Snout rather enlarged at extremity, and divided by a small fissure from the margin of the præorbital bone, which last is pentagonal, with the inferior border the longest. Nostrils rather closer to orbit than to end of snout, divided from one another by a membranous valve; posterior broad, open; anterior with raised margins. Upper surface of head rather convex from side to side.

*Fins.* Dorsal commences nearly midway between snout and base of caudal, and opposite the middle of the ventrals; it extends backwards as far as opposite to the fourth ray of the anal. Caudal deeply forked, lower lobe the longest. Anterior margins of dorsal and anal the highest; the former with a slightly convex, the latter with a concave margin. Base of dorsal scaleless, of anal scaled; two long free scales at base of ventral; some scales at base of caudal.

Scales large; lateral line descending nearly to the abdomen.

Pharyngeal teeth in three rows, curved, slightly hooked at their extremities and pointed, arranged in the following order:—5, 4, 2/2, 4, 5.

*Colours.* Back bluish grey, fading to whitish along the sides. Abdomen silvery. Some bright blue spots along the sides. Dorsal, anal, and pectoral fins margined with white; their bases dark grey. Caudal grey in the centre, whitish externally.

I have named this fish after the Rev. H. Baker, jun., who obtained several specimens of it from Mundikyum.

The next fish is a *Perilampus* (McClelland); but Bleeker's description of the genus does not coincide with this one at least of the species in South India. He observes, "scales large," whereas they are mostly of middle size or small; he also places the genus amongst the *Acheilognathini*, a group which he has given as having pharyngeal teeth in one row; but the species of which I have brought some specimens from Cochin have them in three series.

**PERILAMPUS AUROLINEATUS, Day, sp. nov.**

B. iii. D. 2/12. P. 14. V. 7. A. 3/15. C. 19. L. l. 34–40. L. tr. 7/2.

Length of specimens from  $2\frac{7}{10}$  to  $2\frac{8}{10}$  inches.

Length of head nearly  $\frac{1}{5}$ , of pectoral  $\frac{1}{6}$ , of base of dorsal  $\frac{1}{6}$ , of base of anal  $\frac{1}{5}$ , of caudal  $\frac{1}{5}$  of the total length. Height of head  $\frac{1}{5}$ , of body  $\frac{1}{3}$ , of dorsal  $\frac{1}{7}$ , of anal  $\frac{1}{7}$  of total length. Diameter of eye  $\frac{1}{3}$  of length of head, eyes  $\frac{3}{4}$  of a diameter from end of snout, 1 diameter apart.

Profile slightly raised to base of dorsal, and thence gently sinks to the caudal; inferior surface of body much more convex than that of the back. The upper margin of lower jaw when closed is flush with the upper surface of the head.

Mouth oblique. Lower jaw the longest; extremity covered with a knob, which is received into an emarginate space formed by the intermaxillaries. Lips thin, covering the jaws. Præorbital small, irregularly quadrilateral; the lower extremity the smallest, forming a sort of apex. Upper margin of orbit close to profile. Upper surface of head nearly flat. Opercula smooth.

*Fins.* Dorsal arises rather nearer to snout than it does to the posterior extremity of the caudal, but is entirely situated in the posterior half of the body (excluding the caudal fin). Anal arises opposite the dorsal. Caudal lobed. Pectorals just reach the ventrals. Ventrals do not extend to the anal. Anterior extremity of dorsal and anal the highest. Margin of dorsal convex, of anal slightly concave.

Scales with well-marked lines radiating from their posterior margin: their rows run obliquely towards the back. Lateral line strongly concave, and situated in lower fifth of the body.

Pharyngeal teeth curved, pointed; the external row being much the largest—5, 4, 1/1, 4, 5.

*Colours.* Four yellow horizontal lines passing from the head to the tail, the highest and lowest of which are much less brilliant than the others. Between these lines, colour bright blue. Lower part of abdomen silvery. A bright blue spot on the operculum. Fins finely dotted with black. A dark line runs along the centre of the caudal.

Common in rivers, and also found in stagnant tanks. Is eaten by the natives.

#### PANCHAX LINEATUM (Cuv. & Val.).

B. v. D. 8. P. 15. V. 6. A. 17. C. 19. L. l. 34. L. tr. 9.

Length of specimens from  $2\frac{1}{10}$  to  $3\frac{2}{10}$  inches.

The length of the ventral and caudal fins vary very much in different seasons of the year.

It is exceedingly common in all rivers, tanks, paddy-fields, and even in pieces of water within the influence of the tides. It is eaten by the natives.

The EELS are amongst the most difficult of fish to obtain at Cochin, in consequence of the dread in which the natives hold them. Unfortunately the Sea-snakes abound along the Malabar coast; and snake-like fishes are therefore held in awe. Even if captured, neither Mahomedans nor Jews will touch them; whilst there seems to be some antipathy against their use amongst the servants of Europeans, so that they rarely appear at the table. The bite of the *Muranesox telabon* (Cuv.) and also of several other species of Eels is severe, and dangerous wounds are frequently caused by them.

**MURÆNA MACULATA** (Buch. Ham.).

B. xi. D. 256. A. 221. C. 12.

Length of specimens from  $10\frac{1}{10}$  to 18 inches.

Common in fresh water; excellent eating.

**MURÆNESOX TELABON** (Cuvier).

B. xv. D. 250-265. P. 17. A. 135-146. C. 11.

Length of specimens from 21 to 27 inches.

Common. Its bite is very severe. Is good eating.

**SYMBRANCHUS BENGALIENSIS** (McClelland).Length of specimen  $25\frac{1}{10}$  inches.

Captured in the fort-ditch, Cochin.

**PISOODONOPHIS BORO** (Kp.).

B. xxix. D. 345. P. 12. A. 250.

Length of specimen  $11\frac{1}{2}$  inches.

Common.

**LEPTOCEPHALUS MALABARICUS**, Day, sp. nov.Length of specimen  $3\frac{5}{10}$  inches. Number of neural spines about 212.

Length of head  $\frac{1}{4}$  of total length. Height of head  $\frac{1}{35}$ , of body  $\frac{1}{12}$ , of dorsal fin nearly  $\frac{1}{35}$ , of anal nearly  $\frac{1}{35}$  of the total length. Diameter of eye  $\frac{1}{5}$  of the length of head, eyes 1 diameter from end of snout.

Profile from snout nearly straight to the upper margin of the back, then slightly raised. Body very compressed.

Mouth-cleft beyond the posterior margin of the orbit. Snout produced, overlapping lower lip. Eyes central.

Whether due to accident or natural causes, a circular hole, exceeding the diameter of the eye, exists at the posterior extremity of the anterior two-fifths of the body, midway below vertebral column and ventral surface; also a notch near the caudal, at its under surface.

Dorsal fin commences a short distance behind the head, and is continuous with the caudal and anal. Anal occupies the posterior half of the body. Caudal very short.

*Colours.* Body whitish. Eye golden; lower surface orange. One line of yellow, spotted with green, proceeds backwards from the eye; a second from the mouth; this last also traverses the lower lip.

This little fish was brought alive, and remained about two hours swimming about in a globe of water. The aperture referred to and the notch were very distinct whilst it was alive.

In describing the succeeding genera, I shall follow M. Valenciennes's arrangement in the 'Histoire Naturelle des Poissons,' because Bleeker's excellent 'Atlas Ichthyologique' has not extended so far.

Natives esteem the *Hemiramphus* genus when fresh; and even the



Europeans consider their roes, when curried, a great delicacy. But the "*Cuttay charlay*" (Mal.), *Spratella fimbriata*, C. & V., is the fish most generally approved of by the natives, whether fresh or salt. In fact, the Christian population appear to consider no curry fit to eat unless it contains fish. The *Dussumieria acuta*, C. & V., and *Engraulis brownii*, Gm., are both relished by Europeans, the latter being known as "Whitebait;" whilst the "*Charlay*" (Mal.), *Sardinella neohowii*, C. & V., or Sardine, is exceedingly valuable on account of the fish-oil which is prepared from it, and extensively exported from Malabar to Europe.

**BELONE CANCELATA** (Buch. Ham.).

*Coahlan* (Mal.).

B. x. D. 16. P. 11. V. 6. A. 16. C. 15<sup>+</sup>.

Length of specimen  $8\frac{1}{10}$  inches.

Found in the Kurriavanoor River, and said to be very destructive to small fish; it does not appear to grow to a large size.

**BELONE CAUDIMACULATA** (C. & V.).

*Coplah* (Mal.).

B. x. D. 14. P. 11. V. 6. A. 17. C. 15.

Length of specimen  $12\frac{2}{10}$  inches.

Is captured only in the sea, and at the mouth of the river within the influence of the tides. Considered good eating by the natives; but not much esteemed by Europeans, owing to its large number of bones.

**BELONE ANNULATA** (C. & V.).

B. xiii. D. 22. P. 12. V. 6. A. 23. C. 15.

Length of specimen  $19\frac{4}{10}$  inches.

Inhabits the same places, and held in the same esteem, as *B. caudimaculata*, C. & V.

**HEMIRAMPHUS REYNALDI** (C. & V.).

*Morrul* (Mal.).

B. xii. D. 16. P. 12. V. 6. A. 15. C. 15. L. l. 58. L. tr. 8.

Length of specimen  $7\frac{6}{10}$  inches.

Exceedingly common after the commencement of the south-west monsoon, and through the cold weather. Very much esteemed by the natives, and its roe highly prized by Europeans for curries.

**HEMIRAMPHUS XANTHOPTERUS** (C. & V.).

*Coollah* (Mal.).

B. xii. D. 15. P. 13. V. 6. A. 16. C. 15. L. l. 56. L. tr. 9.

Length of specimen  $7\frac{8}{10}$  inches.

The length of the head, from the termination of the intermaxillaries, is  $\frac{1}{6}$  of the total to the end of the lower lobe of caudal fin, of beak

from opening  $\frac{1}{6}$ , of pectoral  $\frac{1}{11}$ , of caudal  $\frac{2}{13}$ , of base of dorsal  $\frac{1}{9}$ , of base of anal  $\frac{1}{10}$  of total length. The height of head  $\frac{1}{3}$ , of body  $\frac{1}{9}$  of the total length. Diameter of eye  $\frac{1}{3}$  of the length of the head, eyes not quite 1 transverse diameter apart, upwards of 1 diameter from end of intermaxillaries.

Intermaxillaries forming a very pointed angle at their junction. Teeth in wide bands in both jaws, the innermost being the largest, in the lower maxillary at the central line only touching at their base. Interorbital space nearly flat.

Dorsal fin commences a little behind posterior third of body. Anal arises opposite dorsal, and their shape is the same, highest in front. Caudal not deeply cleft; lower lobe the longest.

This *Hemiramphus*, with its scarlet-tipped beak, is occasionally seen in vast numbers at the mouth of the river, and is also frequently captured in fresh water.

**CHIROCENTRUS DORAB (Forsk.).**

B. viii. D. 16. P. 14. V. 6. A. 33. C. 19.

Length of specimen  $16\frac{5}{10}$  inches.

Not uncommon at Cochin; but much more abundant at Tellicherry, and where there are rocks. Is highly esteemed by the natives, and extensively salted.

**CHANOS PALA (Cuv.).**

B. iv. D. 14. P. 17. V. 11. A. 9. C. 19.

Length of specimen 7 inches.

Usually captured in the backwater, during the monsoon; is good eating.

**ELOPS SAURUS (Linn.).**

B. l. xxxi., r. xxix. D. 23. P. 17. V. 15. A. 17. C. 31.  
L. l. 109. L. tr.  $\frac{12}{12}$ .

Length of specimen  $22\frac{5}{10}$  inches.

**MEGALOPS CUNDINGA (Buch. Ham.).**

*Cunnay* (Mal.).

B. xxiii. D. 20. P. 15. V. 11. A. 24. C. 19. L. l. 39.  
L. tr.  $\frac{6}{6}$ .

Length of specimens from  $9\frac{5}{10}$  to  $15\frac{1}{10}$  inches.

It is sometimes captured at the mouth of the river; but is most commonly found in tanks, especially in the fort-ditch. Amongst the Cochin specimens there is not any difference in the number of scales in the adult and the young, as observed by Cantor in the Straits settlements. Likewise the filament from the last dorsal ray is as long in adults as in the younger specimens; but the comparative size of the eye is larger in the older ones. Considered good eating, but bony.

**SARDINELLA NEOHOWII (C. & V.).***Charlay* (Mal.).

B. v. D. 17. P. 17. V. 9. A. 16. C. 17. L. l. 45. L. tr. 13.

Length of specimen  $6\frac{5}{10}$  inches.

Comes to Cochin in some years in enormous numbers; and from it fish-oil is prepared. When Dussumier was in Malabar, about 1827, he observed that those not consumed as food were used for manuring the cocoa-nut trees and the rice-fields.

It is very good eating, but too fat to salt well.

**SPRATTELLA FIMBRIATA (C. & V.).***Cuttay charlay* (Mal.).

B. v. D. 19. P. 17. V. 8. A. 20. C. 19. L. l. 46. L. tr. 11.

Length of specimens from  $5\frac{6}{10}$  to  $5\frac{9}{10}$  inches.

Very much esteemed by the natives, and extensively salted. Owing to its not containing much oil, it is not a good species for those manufacturers; but that very reason favours its being cured. It is very abundant.

**PRISTIGASTER TARTOOR (C. & V.).**B. vi. D. 13. P. 13. A.  $\frac{1}{60}$ . C. 21. L. l. 50.Length of specimen  $4\frac{1}{2}$  inches.

Twenty-eight spines before commencement of anal.

Rare in Cochin.

**ALAUSA MELANURA (C. & V.).**

B. vi. D. 16. P. 14. V. 8. A. 17. C. 21. L. l. 38. L. tr. 9.

Length of specimen  $3\frac{6}{10}$  inches.**ENGRAULIS MALABARICUS (C. & V.).***Monangoo* (Mal.).B. xii. D. 13. P. 14. V. 7. A. 40. C. 19. L. l. 42.  
L. tr. 11.

Length of specimen 8 inches.

Very common, eaten by natives; but is very bony, and not esteemed by Europeans.

**ENGRAULIS BROWNII (Gmelin).**

B. xi. D. 15. P. 15. V. 7. A. 21. C. 19. L. l. 36. L. tr. 7.

Length of specimen  $5\frac{2}{10}$  inches.

This species is exceedingly numerous in some seasons, and is one of those commonly known as *Whitebait* by the Europeans, by whom it is much esteemed.

**ENGRAULIS DUSSUMIERI (C. & V.).**B. x. D.  $1/12$ . P. 13. V. 6. A. 34. C. 19. L. l. 35.  
L. tr. 9.

Length of specimens from  $4\frac{4}{10}$  to  $4\frac{5}{10}$  inches.  
Not uncommon in the cold season.

*ENGRAULIS AURATUS*, Day, sp. nov.

B. x. D.  $\frac{1}{14}$ . P. 12. V. 7. A. 34. C. 19. L. l. 40. L. tr. 9.

Length of specimen  $4\frac{6}{10}$  inches.

Length of head nearly  $\frac{1}{7}$ , of pectoral  $\frac{1}{7}$ , of base of dorsal  $\frac{1}{9}$ , of base of anal  $\frac{1}{4}$ , of caudal  $\frac{1}{7}$  of the total length. Height of head  $\frac{1}{6}$ , of body  $\frac{1}{4}$ , of dorsal fin  $\frac{1}{7}$ , of anal  $\frac{1}{9}$  of the total length. Diameter of eye, longest transverse,  $\frac{1}{3}$  of the length of head, eyes  $\frac{1}{2}$  a diameter from end of snout, 1 diameter apart. Its anterior and posterior third covered by an adipose lid.

Profile scarcely ascends from snout to dorsal fin, or descends much thence to the caudal, the abdominal surface being very much more convex; sides flat.

*Head.* Snout short; gape of mouth extending to below the posterior margin of the orbit; superior maxillaries very elongated, reaching as far as last quarter of pectoral, and equal to nearly one-third of the total length of the fish. A raised crest exists from snout along the whole central line of the head. Operculum narrow, octagonal; posterior margin having its central two-fifths straight, directed a little obliquely backwards, and forming an obtuse angle at its upper and lower fifths; superior and inferior margin straight, but very short. Præoperculum, posterior margin nearly vertical. Branchiostegous opening very wide, extending almost to the lower margin of the symphysis.

*Teeth.* A series of fine villiform teeth in the lower jaw, also along the whole extent of the elongated superior maxilla; only a few in the external half of each intermaxillary. A few in the vomer. A long double line of fine teeth in the palatine bones, with a large oval toothed space posteriorly.

*Fins.* Dorsal commences midway between snout and base of caudal fin; anal midway between anterior surface of chest and commencement of caudal. Pectoral arises below the posterior margin of operculum, and reaches to the ventral. Dorsal triangular, with a small spine a short distance before its first ray. Pectoral falciform. Anal, anterior portion highest. Caudal lobed, lobes of equal length. About thirteen sharp compressed scales on the keel of the lower margin of the body, anterior to the commencement of the ventral fins, and seven between their termination and the origin of the anal.

*Colours.* The upper surface of the back closely dotted with black, and of a brilliant shining coppery tinge, passing downwards and becoming pure white on the sides. A large black spot on the shoulder. Dorsal with minute black dots, more especially at its upper margin; otherwise colourless, as are also the pectoral, ventral, and anal fins. Caudal light straw-coloured, with a darkish tip. Eyes tinged with brown superiorly, below yellowish.

Common, and considered good eating; arrives during the southwest monsoon.

*DUSSUMIERIA ACUTA* (C. & V.).

B. xv. D. 21. P. 14. V. 9. A. 14. C. 21.

Length of specimens from  $4\frac{1}{10}$  to  $6\frac{3}{10}$  inches.

Very common, and excellent eating.

*COILIA REYNALDI* (C. & V.).B. x. D.  $1\frac{1}{14}$ . P. 15. V. 15. A. 104. C. 15.Length of specimens from  $3\frac{7}{10}$  to  $3\frac{8}{10}$  inches.

Not rare.

*CHATOESSUS ALTUS* (Gray).*Noonah* (Mal.).B. vi. D. 18-19. P. 15. V. 9. A. 23-25. C. 19. L. 1. 48.  
L. tr. 18.Length of specimens from  $5\frac{8}{10}$  to  $6\frac{1}{10}$  inches.

Common and good eating.

*CHATOESSUS CHACUNDA* (Buch. Ham.).

B. vi. D. 20. P. 17. V. 8. A. 20. C. 19. L. 1. 45. L. tr. 11.

Length of specimens from 3 to 6 inches.

Eaten by the natives, by whom it is esteemed.

The *Plectognathi* are not approved of as food, but are eaten by the poorer classes.

*ALUTARIUS LEVIS* (Bloch).*Mullah purroah* (Mal.).B. vi. D.  $2\frac{1}{46}$ . P. 15. A. 49. C. 12.Length of specimen  $5\frac{8}{10}$  inches.

Rare.

*TRIACANTHUS BIACULEATUS* (Bloch).*Mootarree* (Mal.).

B. vi. D. 5-24. P. 14. V. 1. A. 19. C. 14.

Length of specimens from 3 to  $7\frac{2}{10}$  inches.

Very common; does not grow to a large size.

The *Ostracioides* are comparatively rare, only two species having been observed at Cochin, and of these only three specimens.

*OSTRACIUM TESSERULA* (Cantor).B. vi. D. 9. P. 13. A. 9. C.  $8\frac{1}{1}$ . Plates  $12 \times 5$ .Length of specimen  $\frac{8}{10}$ ths of an inch.*OSTRACIUM NASUS* (Bloch).B. vi. D. 9. P. 11. A. 9. C.  $8\frac{1}{1}$ .Length of specimen  $5\frac{1}{10}$  inches.

Amongst the *Gymnodontidæ* the most common are the Tetrodons or Sea-Porcupines, as known to Europeans, or "*Kuddul mahcut-chee*" (Mal.), Sea Frogs, as they are termed by the natives on account of the noise they make when captured. They are taken in the Chinese nets on the river's bank; they are thrown up by the sea on the shore, and also captured in brackish and saltwater marshes. The natives occasionally eat them; but as they frequently cause indigestion—some allege, symptoms of poisoning—they are generally avoided. The native doctors prescribe them in cases of phthisis, having a belief in their curative powers for diseases of the lungs.

**TETRODON LUNARIS (Cuvier).**

B. v. D. 14. P. 18. A. 12. C. 10  $\frac{2}{2}$ . Sides spineless.

Length of specimen 3  $\frac{3}{10}$  inches.

Rare.

**CRAYRACION TESTUDINEUS (Linn.).**

*Paattha* (Mal.).

B. v. D. 10. P. 17. A. 10. C. 10.

Length of specimens from 1  $\frac{9}{10}$  to 7  $\frac{5}{10}$  inches.

In the small specimen the spines exist all over the body, as in the older one; but the horizontal lines along the abdomen are absent, the back and sides alone showing the coloration of the more mature one.

**CRAYRACION FLUVIATILIS (Ham. Buch.).**

B. v. D. 14. P. 21. A. 12. C. 12.

Length of specimens from 3 to 4  $\frac{8}{10}$  inches.

The commonest species; abundant all through the year.

**CRAYRACION COCHINENSIS, Day, sp. nov.**

B. v. D. 9. P. 18. A. 10. C. 11. Spined to front of anal fin.

Length of specimen 5  $\frac{5}{10}$  inches.

Length of head nearly  $\frac{1}{4}$ , of pectoral  $\frac{1}{11}$ , of base of dorsal  $\frac{1}{8}$ , of base of anal  $\frac{1}{5}$ , of caudal  $\frac{1}{5}$  of total length. Diameter of eye  $\frac{1}{5}$  of length of head, eyes 2  $\frac{1}{3}$  diameters apart posteriorly, 1  $\frac{3}{4}$  anteriorly, 2 from end of snout.

Spines single, sharp, closely set, commencing from interorbital space, and behind upper and lower jaws, and continued on the back as far as the anus. Anteriorly from the interorbital space they are continued in rather a fine band, surrounding the nostrils, posteriorly in a crescentic form; there are none on the space around the pectoral fin anteriorly. Nostrils tubular, placed above and slightly behind the anterior margin of the orbit.

*Fins.* Dorsal arises at the commencement of the posterior third of the back, and at a distance equal to its base in front of the anterior

margin of the anal. All the fins are rounded. The first ray of anal and three first of dorsal undivided.

*Colours.* Olive-green on the back, becoming lighter on the sides and dirty white on the abdomen. A large pure-white spot, longer than the diameter of the eye, over each orbit. Dorsal, caudal, and anal fins of a yellowish green, stained with a darker shade at their extremities. Pectoral brownish olive.

Rare. A single specimen captured in June 1863.

*LEIODON VIRIDIPUNCTATUS*, Day, sp. nov.

B. v. D. 12. P. 18. A. 11. C.  $10\frac{2}{2}$ . Sides spineless.

Length of specimen 6 inches.

Length of head  $\frac{1}{3}$ , of pectoral  $\frac{1}{8}$ , of base of dorsal  $\frac{1}{12}$ , of base of anal  $\frac{1}{20}$ , of caudal  $\frac{1}{5}$  of the total length. Diameter of eye  $\frac{1}{5}$  of the length of the head, eyes 2 diameters apart anteriorly, but further posteriorly, rather nearer to gill-opening than to end of snout.

Spines short, some distance asunder, commence from occiput, and pass along the back two-thirds of the way to the commencement of the dorsal fin. Inferiorly they begin below the orbit, surround the lower and posterior margin of the pectoral fin, and are continued backwards as far as the anus. Those most in front are directed backwards; but from the posterior margin of the pectoral they are turned downwards. Nostrils broad, open, placed above and slightly behind the anterior margin of the orbit.

*Fins.* Dorsal arises at commencement of posterior quarter of the body, and its posterior margin is above the first ray of the anal. All the fins are rounded. First three dorsal and two anal rays are undivided.

Lateral line curves upwards from above the pectoral fin, and is continued to centre of the caudal. It is very indistinct.

*Colours.* Back light green. Abdomen silvery white. Back and sides covered with emerald-green spots; a bar of the same colour passes across the vertex, from one eye to the other, and also goes backwards in the median line, towards a second irregular band of the same colour, which passes across the back further posteriorly. Eye brown, with a golden rim surrounding the iris. Caudal and anal tipped with black. Dorsal yellowish. Four black spots under the throat.

The *LOPHOBRANCHIATE* fishes are not numerous at Cochin—but are more common a little to the south, commencing at Quilon. They are neither eaten nor made use of by the natives, except for the purpose of drying and selling as curiosities to the European sailors and others.

*HIPPOCAMPUS COMES* (Cantor).

*Coodra meen* (Mal.).

D. 16. P. 17. A. 4. Rings of body 11, of tail 33.

Length of specimens from  $8\frac{1}{10}$  to  $9\frac{2}{10}$  inches.

## SYNGNATHUS SCHLEGELI (Kaup).

D. 35. C. 9.

Length of specimens from 5 to  $7\frac{2}{10}$  inches.

Eighteen rings before the dorsal fin (which stands on 9), and 14 rings posterior to it.

## SYNGNATHUS ARGYROSTICTUS (Kuhl &amp; V. Hass.).

D. 27. P. 16. A. 2. C. 10.

Length of specimen  $5\frac{2}{10}$  inches.

By no means rare, and ascends the rivers far above the influence of the tides, one specimen having been captured at Alwaye, some miles beyond that portion of the river where the salt water ceases.

The great order of SELACHIA is abundantly represented, in the Sharks (*Shraawoo*, Mal.) and Rays which abound in the seas and backwaters surrounding Cochin. It is not a little remarkable that very few accidents occur from Sharks carrying off human beings; in fact, during five years' residence there was only one such instance came to my knowledge. The Hammer-headed species is the one most feared; but the Saw-fish is much more dreaded than any of the Shark tribe, accidents from its wounds being by no means infrequent.

Shark-liver oil is employed as a good substitute for the true cod-liver oil, and, could its odour be mitigated without deleteriously affecting its medicinal properties, it would be exceedingly valuable. Sharks' fins are dried and exported to places whence they are said to find their way to China. Shark's flesh is considered so nourishing that it is rather extensively salted; and owing to its properties it has received the name of "*pāl soora*" (Mal.), or milk-producer, and is given to women shortly after their confinements. Sharks' skins are employed for sword-belts, and in various useful trades.

The Rays, of course, are not eaten by Mahomedans or Jews, and appear not to be held in much esteem, except for salting or oil; they are mostly captured in the backwater during the south-west monsoon and the succeeding cold months. They grow to an enormous size, more especially the *Trygon uarnak*. The spines on the tails of these fish are much dreaded, as they often inflict most dangerous wounds with them; they are at once broken off on their being captured. But, feared alive, these tails are believed to possess some secret but powerful agency when dead, which protects the fortunate possessor, so long as he wears one about his person, not only against the power of spells, but also enables him to face the "evil eye" with impunity.

## CHILOSCYLLIUM PLAGIOSUM (Müll. &amp; Henle).

*Ettee* (Mal.).Length of specimens from  $4\frac{5}{10}$  to 21 inches.



The young, as pointed out by Cantor, are always barred ; the mature has neither bars, streaks, nor spots. It is dull ashy grey above, and dirty white or reddish white beneath.

Common ; flesh esteemed very nourishing.

*SQUALUS ACUTUS* (Rüpp.).

Length of specimen  $16\frac{2}{10}$  inches.

Common.

*SQUALUS MELANOPTERUS* (Quoy & Gaim.).

Length of specimen  $10\frac{2}{10}$  inches.

Common ; grows to a very large size.

*SPHYRNA ZYGÆNA* (Linn.).

The Hammer-headed Shark is much dreaded, and grows to a large size. Its flesh is considered very wholesome. Oil extracted from its liver is the favourite native remedy for night blindness.

*PRISTIS ANTIQUORUM* (Linn.).

Length of specimen 12 inches.

Much feared, as it inflicts most dangerous wounds. Flesh esteemed.

*RHYNCHOBATUS DJEDDENSIS* (Forsk.).

Length of specimen  $17\frac{2}{10}$  inches.

*ASTRAPE DIPTERYGIA* (Bl., Schn.).

Length of specimen  $6\frac{8}{10}$  inches.

*TRYGON UARNAK* (Müll. & Henle).

Length of specimen 12 inches.

Very common. Large specimens, spotted like a Cheetah, are as common as the smaller and immature light brown ones. They grow to a very large size, and wounds from their spines are considered very dangerous. Good eating.

*DASYATIS MICRURA* (Bl., Schn.).

Length of specimen 9 inches.

Not common.

*HYPLOPHUS SEPHEN* (Forsk.).

Length of specimen  $21\frac{3}{10}$  inches.

The skin of this species forms some of the true shagreen of commerce. Its tail-spine is considered dangerous. Grows to a large size, is fair eating. Is most common during south-west monsoon and succeeding cold months.

*ÆTOBATUS NARINARI* (Bl., Schn.).

*Therrundee* (Mal.).

Length of specimen 15 inches.

Out of 211 species of fish which I have brought in safety to this country from Cochin, nearly one in eight appear to have been hitherto undescribed. As zealous Dutch and French travellers have more efficiently collected ichthyological specimens in Malabar than elsewhere on the shores of India, it shows the vast field still left to be explored. The freshwater fishes of the inland hills appear almost unknown; for out of eight species kindly furnished me by the Rev. H. Baker, jun., five were entirely new.

The difficulty in India of obtaining fresh specimens, of preserving them when obtained, the damage they receive on being conveyed from place to place, and the almost impossibility of procuring at out-stations good ichthyological works of reference make the study of the finny tribes more difficult, perhaps, than that of any other branch of zoology. At the same time these very difficulties render it more productive than most others in new forms and hitherto unknown species.

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March 28th, 1865.

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

The Secretary called the attention of the Meeting to the valuable addition recently made to the Society's collection in the shape of a pair of the rare Fruit-Pigeon of the Seychelles Islands, *Erythrœnas pulcherrima* (Scop.), remarkable for the curious naked wattles at the base of the bill, and for other peculiarities. This pair of birds, believed to be the only individuals of the species ever received alive in this country, had been presented to the Society by Lady Barkly, the wife of H. E. Sir Henry Barkly, K.G., Governor of Mauritius.

The Secretary also announced the arrival on the preceding day of a fine specimen of the King Penguin (*Apterodytes pennantii*) of the Falkland Islands. This bird, which was believed to be the only Penguin ever brought alive to Europe, had been obtained at the Falklands, and skilfully conveyed to this country by Commander Fenwick, of H.M.S. 'Harrier,' by whom it had been liberally presented to the Society.

The following papers were read:—

1. NOTICE OF A NEW SPECIES OF PORPOISE (*PHOCÆNA TUBERCULIFERA*) INHABITING THE MOUTH OF THE THAMES. BY DR. JOHN EDWARD GRAY, F.R.S., F.L.S., ETC.

The fact of a new species of Porpoise being found on our own shores, at the mouth of the Thames, must be considered as a proof of how little we at present know of the species of Cetacea.

The Zoological Society, who are so anxious to obtain specimens of these animals that their habits may be studied, procured with considerable trouble a fine male Porpoise, which had been caught at Margate. It was carried to the Gardens, and placed in the pond formed for these animals; but, though showing no external injury, it was in so weak a state when it arrived that it sank to the bottom, and was obliged to be taken out and suspended by bands on the surface of the water so that it might not be choked. After a time it recovered so as to be able to swim about by its own exertion, but it only survived the transport a few days.

Messrs. Bartlett and Gerrard, when it was alive, said that it differed so much in general appearance from the Common Porpoise that they were induced to believe that it might be a species of *Lagenorhynchus* or *Grampus*.

The general form of the head, and examination of the teeth after death, proved at once that it was a species of *Phocæna*, very nearly allied to, if not identical with, *Phocæna communis*.

Dr. Burmeister's description of a *Phocæna* from the River La Plata (contained in the Museum at Buenos Ayres), which is peculiar for having some spines on the upper edge of the dorsal fin, naturally made me careful in examining the edge of the fin of this specimen; and to my astonishment I discovered that this species also was provided with a series of compressed tubercles, giving the fin a sharp, hard, serrated appearance.

The tubercles or spines on the dorsal fin having been observed in two specimens from very different localities, I was induced to inquire if it was a character common to the genus, which had been overlooked; but, on examining the stuffed specimen of the Common English Porpoise in the Museum, it is clear that they are not found in the common state of the species. It then occurred to me that it might be a peculiarity of the male sex; but Mr. Flower informs me that the male specimen which lived for some weeks in the Gardens of the Society, and which he lately dissected, certainly had no spines on the edge of the dorsal fin; so that cannot be the case.

Under these circumstances I think I am justified in considering that the existence of these spinous tubercles is a peculiarity of the species, and probably a specific character. The examination of the skull shows that there are differences in its form which confirm this opinion.

The species of *Phocæna* may be thus defined:—

a. *Back in front of the dorsal fin, and upper edge of the dorsal fin, smooth, without tubercles or spines. Dorsal fin on the middle of the back.*

1. PHOCÆNA COMMUNIS.

*Hab.* North Sea and mouths of rivers.

b. *Back in front of the dorsal fin smooth; the upper edge of the dorsal fin with a single series of oblong compressed tubercles,*

*which are more crowded near the upper end of the fin. Dorsal fin in the middle of the back.*

2. *PHOCÆNA TUBERCULIFERA*, sp. nov.

*Hab.* Mouth of the Thames, Margate.

- c. *Back in front of the dorsal fin with a single series, and upper surface of the dorsal fin with three series, of square-based compressed tubercles or spines. Dorsal fin behind the middle of the back.*

3. *PHOCÆNA SPINIPINNIS*, Burmeister, P. Z. S. 1865, p. 228.

*Hab.* Rio de la Plata.

The new species may be described as follows:—

The specimen was 52 inches, measured along the side from the end of the nose to the notch in the middle of the tail. The front edge of the dorsal fin is 23 inches from the tip of the nose, measured over the arch of the back; the hinder edge of the dorsal fin, measured in the same manner, is 22 inches from the notch in the tail. The front edge of the base of the pectoral fin is 9 inches from the end of the nose; and the fin itself is 9 inches long, measured along its front margin. The tail is 13 inches wide, measured across the hinder edges; the lobes are rounded, and rather overlap each other at the central notch.

The hinder part of the back, the whole of the dorsal fin, and the upper and lower surfaces of the pectoral and caudal fins are black; the head, the lower lip, the front part of the back, and the sides to the base of the pectoral fins are greyish black; the upper parts of the sides of the body behind the pectoral fins are grey, more or less mottled with a darker shade; the chin, throat, chest, belly, and under parts of the body white. The upper and lower jaws are of the same length. The upper lip covers the edge of the lower one, the covered part being pale-coloured, flattened, and gradually shelving in towards the upper margin. There are two minute pits (which may have been the places from which whiskers arose) in the upper part of the upper lip, situated about where the depression is placed that separates the beak from the head in those genera which have the beak marked.

The dorsal fin is scarcely falcate, with a rather broad, rounded upper margin, which is armed with a single series of distinct compressed tubercles; the tubercles have an oblong base, with a slightly raised conical centre, and the surface is covered with irregular radiating wrinkles. Those on the front part of the edge are largest, and separate from one another; they diminish in size and become crowded near the hinder upper part of the fin, forming a ridge, which is hard and serrated to the touch.

The skull is much like that of *Phocæna communis* in size, general form, and in the number, disposition, form, and size of the teeth; but





M & N Hanhart, imp.

J. Wolf del. et lith.

PLATE XL. BEAVER.

it differs from the skull of that species in the beak of the skull being rather narrower, more tapering in front. The foramen maximum is narrow, much higher than wide, and the condyles larger; while in *P. communis* the foramen maximum is nearly circular, and the condyles smaller and more oblique. The symphysis of the lower jaw is longer, and the sloping lower edge is more oblique and considerably longer than in *P. communis*.

A skeleton is being formed of the bones of this animal; and the skin has been preserved in spirits, which is certainly one of the best ways of preserving the specimens of Cetacea, as it allows the outer surface to be examined at any future time in a state most nearly resembling that of living specimens.

## 2. NOTICE OF AN APPARENTLY UNDESCRIBED SPECIES OF AMERICAN PORCUPINE. BY DR. J. E. GRAY, F.R.S., F.L.S., ETC.

(Plate XI.)

There has been in the British Museum since 1853 a small specimen of a short-tailed American Porcupine, which was sent from Columbia. I suspected that the animal might be young; and I have been waiting, expecting that we might receive another specimen from the same source, which would enable me to give a more complete account of the animal; but as no additional materials have come to hand, I shall now proceed to give a short notice of it, in the hope that the description and figure may have the effect of drawing the attention of collectors to the animal.

### ERETHIZON (ECHINOPROCTA) RUFESCENS. (Pl. XI.)

Pale brown, varied with black; head white, speckled with black and pale brown; tail and feet black; chin, throat, and beneath pale brown. A short white streak on the centre of the nose, and a few white spines, forming a slight crest, on the nape; a whitish mark on the side of the cheek. The bristly spines of the head thin, white, with a small black subterminal band and yellow tip; the spines of the back elongate, white, with a black subterminal ring and elongated rufous tips; those of the front part of the back and sides very slender, bristle-like, gradually becoming thickened, stronger, and shorter, until on the hinder part of the back, above the tail, they are well developed, short, thick. Spines with black ends and very small brown tips. The end of the nose, chin, and underside of the body covered with uniform pale brown slender bristles. The tail and feet covered with short black bristles. Whiskers black, slender, flexible.

*Hab.* Columbia.

There are a few spines on the top of the head, with one white to the tip, making a kind of occipital crest; but I am not sure that this may not be an individual peculiarity.

The soles of the hind feet are bald to the heel. Cutting-teeth

yellow, slender, rounder in front. Unfortunately I have not been able to see the skull.

If this is a true *Erethizon*, the genus may be divided into two sections:—

1. *Erethizon*. The back covered with elongated bristles and short spines. *E. dorsatus* and *E. epixanthus*.

2. *Echinoprocta*. The back covered with one kind of elongated slender spines, which become shorter, thicker, and more rigid over the rump. *E. rufescens*.

### 3. NOTICE OF A SPECIES OF TUPAIA FROM BORNEO, IN THE COLLECTION OF THE BRITISH MUSEUM. BY DR. JOHN EDWARD GRAY, F.R.S., F.L.S., ETC.

(Plate XII.)

There has been in the British Museum for some years a specimen of a *Tupaia* in spirits, which was received from Borneo, and also a stuffed specimen without a habitat, evidently of the same species.

These specimens have the general coloration of *Tupaia tana*, and have evidently been regarded as varieties of that species; but they are most distinct. The head and skull are short and broad, of about the same form and proportion as those of *Tupaia ferruginea*; the fur and tail is of the same bright shining bay as *T. tana*, but it is entirely destitute of the three black streaks between the shoulders, which is so well marked in that species.

The skull shows that the stuffed specimen is that of an adult animal not so large as *T. tana*, and more nearly resembling in size *T. ferruginea*. It may be known at once from the latter species by the dark red-brown colour of the tail, with its very red underside. I propose to call it

#### TUPAIA SPLENDIDULA. (Pl. XII.)

Fur dark red-brown, blackish-washed. Tail dark red-brown; pale red beneath; the shoulder-streak yellow. The head conical, about twice as long as wide behind.

*Hab.* Borneo.

The head is large compared with the size of the body; the ears rounded, with several ridges on the conch, and a well-developed convex tragus, not unlike the human ear. The palm and soles are bald to the wrist and heel.

I thought at first that this species might be the *Tupaia speciosa* of Wagner; but that animal is stated to have a head as long and as tapering as *T. tana*, and, indeed, seems to be only a slight variety of that species.

The figures of the animal hitherto published, having been taken chiefly from stuffed specimens, do not show these peculiarities, which are to be observed in the specimen from Borneo preserved in spirits.





Wolfe. et. lith.

M & N Harhart, imp.

TUPAIA SPLENDIDULA.



4. NOTICE OF A NEW GENUS AND SPECIES OF THE FAMILY TRIONYCHIDÆ FROM WESTERN AFRICA. BY DR. J. E. GRAY, F.R.S., F.L.S., ETC.

The British Museum has just received two specimens of a *Trionyx* with covered legs from Western Africa (collected by the late Dr. B. Baikie, probably on the Niger), which is evidently different in structure from any we have before received from that country, and which I am inclined to believe is an entirely new form.

It differs from the other African *Trionyches* with covered feet in only having two pairs of callosities on the sternum; while *Heptathyra* has seven, and *Cyclanosteus* has nine such hardnesses on the sternal bones. These callosities differ in disposition and mode of development, as well as in manner, in the three genera. The form of the skull is like that of the genus *Cyclanosteus*; that is to say, the face is moderate, with eyes about halfway between the front of the zygomatic arch and cavity of the temporal muscle and the end of the nose; but it differs from the skull of the latter genus in the forehead and crown being wider and flatter.

The genus (which I should refer to the tribe *Cyclanosteina*) may be defined thus:—

TETRATHYRA.

The face of the skull short, convex, arched in front; orbits lateral, shelving, about midway between the end of the nose and the front of the zygomatic arch; forehead flat, rhombic, broad. The dorsal shield with flexible margins, without any marginal bones; front of dorsal shield warty above and without any odd nuchal bone. Sternum flat, with broad rounded lobes covering the feet, and two pairs of sternal callosities; the front pair small, rounded, on the front ends of each of the front pairs of sternal bones; the lateral pairs are large, oblong, broadly notched out behind, and very rugose.

This genus differs from *Cyclanosteus* in the want of any odd bone in front of the dorsal shield, as well as in the number and disposition of the sternal callosities.

The upper surface of the front of the disk is closely covered with roundish warts. The sternal callosities are not developed in the young specimen, the larger lateral pair being first indicated as the animal increases in size. The dorsal disk of the young specimen is marked with close grains, or warty, in rather arched longitudinal ridges.

There are some young specimens in spirits from West Africa in the Museum, which belong to this species; they differ from the young of *C. senegalensis* in being marbled, while that species is marked with distinct small subcircular black spots.

This second genus of *Cyclanosteina* may explain the reason why we have two skulls from West Africa the one with the front and the other with the whole upper edge of the lower jaw dilated, as figured in the 'Proceedings of the Zoological Society' for 1864, fig. 18, p. 95, and fig. 21, p. 96.

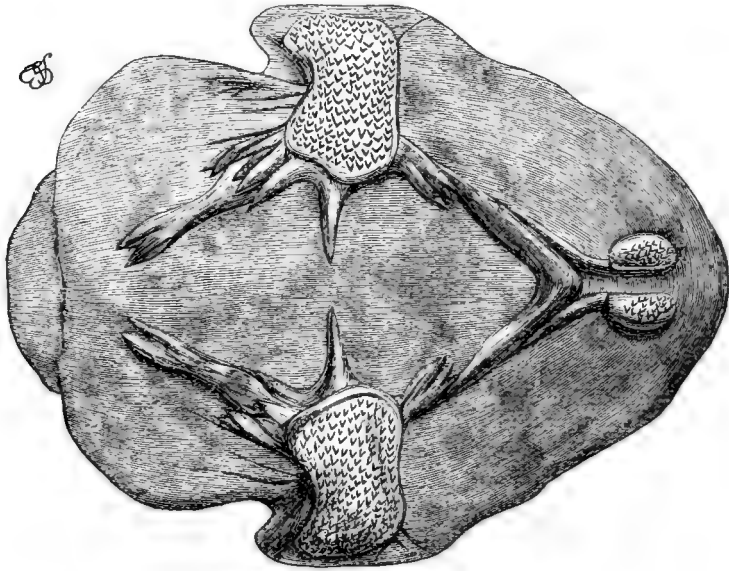
**TETRATHYRA BAIKII**, sp. nov.

Head olive, white-spotted. Back olive, marbled with black above; the lower surface pale, irregularly black-marbled or spotted. The front pair of callosities small, oblong.

Younger specimen, the head and dorsal shield pale brown, marbled with large black (often inosculating) streaks; lower part of head and sternum black, with large, irregular-sized, pale spots, some of which are symmetrical.

*Hab.* West Africa, River Niger?

The largest specimen, which is not full-grown, is 11 inches long; the dorsal shield 7 inches long and 5 inches wide.



Lower surface of *Tetrathyra baikii*.

5. DESCRIPTION OF A NEW SPECIES OF ROCK-KANGAROO FROM NEW SOUTH WALES. BY GERARD KREFFT, CURATOR AND SECRETARY, AUSTRALIAN MUSEUM, SYDNEY, N. S. WALES.

**PETROGALE LONGICAUDA**, sp. nov.

Hair remarkably soft and long (3 inches in length upon the back and sides), dark grey at the base, tipped with pale yellow and black, giving the fur a mottled appearance. Head and neck grey, a lighter patch extending from the base of the ears to the nostrils. Ears grey at the base, black at the tip; sides slightly fringed with yellow. Shoulders and fore legs dark grey, grizzled with white, which colour extends to about the middle of the body. The hair of the back and haunches is of much longer growth, silky to the touch, of a mottled brownish-grey colour, and changing into rusty

yellow near the base of the tail. The tail at its root is sandy-coloured, but soon changes into dark brown, the hair being very coarse and long, forming into a broad brush at the end.

	Inches.
Length from tip of nose to root of tail . . . . .	29 $\frac{1}{4}$
Tail . . . . .	27
Face to base of ear . . . . .	4 $\frac{1}{4}$
Arms and hands . . . . .	6
Tarsi and toes . . . . .	7
Ear . . . . .	2 $\frac{1}{4}$

This *Petrogale* is easily distinguished from all other species by its remarkably long and bushy tail, which is about a foot longer than that of any other Rock-Wallaby. A single specimen of this interesting animal has been procured by Mr. George Masters, Assistant Curator of the Australian Museum, at Dabee Rylstone, 250 miles N.W. of Sydney. Mr. Masters informs me that this Wallaby is very quick and difficult to approach, and that, after watching for two nights, only one specimen could be secured. The skull was completely broken, so that no description could be given of it,

#### 6. NOTE ON SOME ENTOZOA COLLECTED BY MR. CHARLES W. DEVIS. BY DR. COBBOLD, F.R.S.

I am indebted to Mr. Devis for a few parasites obtained, during the present month, from animals dissected at the Queen's Park, Manchester. All the forms appear to have been described by previous writers; but there are some points which deserve a passing remark, especially since Mr. Devis is likely to offer further contributions, which may be expected to yield important results respecting the distribution of some of these species. The specimens are as follows:—

1. Several examples of the so-called *Filaria capsularis*, from the liver of the Lump-fish (*Cyclopterus lumpus*).

2. One dozen individuals of *Distoma incisum*, from the Wolf-fish (*Anarrhichas lupus*). These minute flukes are usually found in the intestine; but, in the present case, Mr. Devis states that they were attached to the mucous membrane of the bladder. Unfortunately their structural characters are mostly lost from accidental desiccation previous to transmission. The gills of this fish likewise supported a considerable number of Lerneans belonging to the genus *Anchorella*.

3. Several specimens of *Ascaris ensicaudata*, from the duodenum of the Missel-Thrush (*Turdus viscivorus*).

4. Also several specimens of the same *Ascaris* from the duodenum of the Summer Duck (*Anas sponsa*). These individuals, from their comparatively large size, at first suggested the likelihood of a new species of Nematode; but a microscopic examination of the extremities of the body yielded nothing distinctive.

5. Several examples of *Dispharagus crassicauda* from the proventriculus of the Great Northern Diver (*Colymbus glacialis*), and also a solitary specimen of the *Echinorhynchus polymorphus*. For the above-named Nematode I have here employed the nomenclature of Dr. Molin, Professor of Zoology at Padua, although it is often extremely difficult to determine whether a particular species is referable to the genus *Dispharagus* or to *Spiroptera*.

7. DESCRIPTION OF A NEW SPECIES OF PASSERINE BIRD FROM MADAGASCAR. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XIII.)

In a series of bird-skins lately received by Mr. S. Stevens from Mr. Plant, who is now collecting specimens of natural history in Madagascar, is a single specimen of a small bird which I have not previously met with, and which I consider to be new to science.

It belongs either to the *Muscicapidæ* or to the *Laniidæ* (if these two families are really distinct, which I much doubt), and must probably be placed somewhere in the neighbourhood of *Pachycephala* and the smaller species of *Tephrodornis*, to which the name *Hyloterpe*\* has been applied. But I am not able to find any other species strictly congeneric with the present bird; and so, although always unwilling to increase the much too great number of generic names already existing, I consider it is perhaps better to invent a new term for the present species than to refer it to a genus with which it may probably have very little connexion. I therefore propose to call it *Hylophorba ruticilla* with the following characters:—

**HYLOPHORBA**, genus novum, affine generi *Hyloterpæ*.

*Rostrum dimidio brevius quam caput, compressum, culmine arcuato, gonyde ascendente, dente apicali distincto. Narium aperturæ ovales, patulæ, basales. Setæ rictales paucæ, breves. Alæ breves, remiges prim. x. ; primus spurius, secundi dimidium ab insertione æquans: iv<sup>tus</sup> v<sup>tus</sup> vi<sup>tus</sup> fere æquales et vii<sup>imum</sup> superantes, vii<sup>imus</sup> longior quam iii<sup>us</sup>. Cauda modica, apice quadrato. Pedes debiles, tarsi antice squamatis, postice lævibus; digitis brevibus.*

**HYLOPHORBA RUTICILLA**, sp. nov. (Plate XIII.)

*Murino-fusca, capite et cervice supra cinereis: alis nigricanti-brunneis, dorsi colore limbatis: cauda rubro-castanea: subtus pallide fulva, ventre medio dilutiore, gula alba; tectricibus subalaribus ventre concoloribus; rostro nigro, ad rictum imum*

\* Blyth (Ibis, 1865, p. 43) states that his Indian *Tephrodornis grisola* (Jerdon's B. of India, i. p. 411) is identical with *Hyloterpe philomela*, Cab. (See my remarks on this species, P. Z. S. 1863, p. 217).





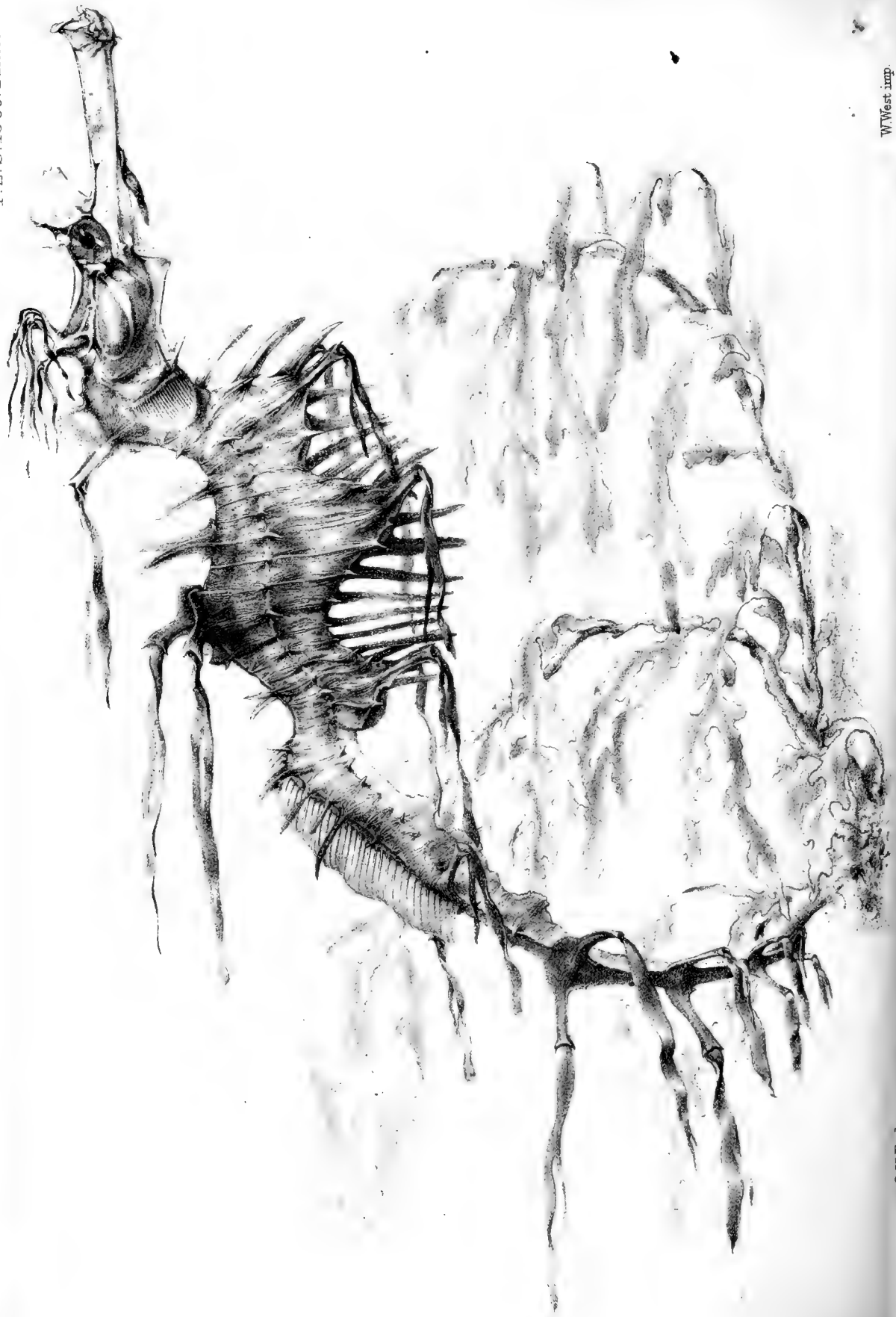






*Phyllopteryx foliatus.*





*et ad basin mand. inferioris albicante: pedibus obscure cinereis.*

Long. tota 4·8, alæ 2·6, caudæ 1·9, rostri a rictu 0·55, tarsi 0·7 poll. Angl.

*Hab.* Madagascar.

One example of this bird was obtained by Mr. F. Plant in the forests near Anooivarika.

8. ON THE PIPE-FISHES BELONGING TO THE GENUS PHYLLOPTERYX. BY ALBERT GÜNTHER, M.A., PH.D., M.D., F.Z.S.

(Plates XIV., XV.)

Many Pipe-fishes are provided with short or thin cutaneous appendages, symmetrically disposed on the different dermal scutes. These appendages are most developed in the species which may be referred to the genus *Phyllopteryx* (Swains.), Kaup. The first of these extraordinary forms was described and indifferently figured by Shaw (Zool. v. pl. 180). He named it *Syngnathus foliatus*, which name must be preferred to that given in the same year by Lacépède (*Syngnathus tæniopterus*, Ann. Mus. iv. pl. 58. f. 3), since the author of a work may be presumed to have named the species at a much earlier period than the writer of a memoir.

The British Museum possesses, among others, a fine example, 13½ inches long, of this *Phyllopteryx foliata* from Tasmania; and there is a beautiful coloured figure in the collection of drawings made by Ferdinand Bauer, Dr. Brown's companion during Capt. Flinders's voyage. The figure of this species (Pl. XIV.) is two-thirds of the natural size, the coloration being taken from Bauer's drawing.

A second species was described by Dr. Gray as *Haliichthys tæniophorus* in 'Proc. Zool. Soc.' 1859, p. 38, and figured pl. VII.; it is from Freycinet's Harbour.

A third species has been lately presented to the British Museum by Mr. George French Angas, who received it from Port Lincoln, South Australia. I name it *Phyllopteryx eques* (Pl. XV.). Its form is still more extraordinary than that of the preceding species, the spines, crest, and cutaneous appendages being much more developed, and the trunk being dilated into an upper and three lower prominences. The snout is as long as the distance of the front margin of the orbit from the hind part of the nape; it bears a pair of small spines behind the middle of its upper edge, a pair of minute barbels at the chin, and a pair of long appendages in the middle of its lower part. The forehead bears an erect, broad, subquadrangular crest, with a shorter single spine behind; a horizontal spine above each orbit; a cluster of spines with narrow appendages on the occiput. Nape of the neck with a long spine, dilated at the base into a crest, and carrying a long bifid appendage.

The trunk is compressed, somewhat dilated, strongly arched on the back, and with two deep indentations in its lower profile. There

are seventeen bony rings between the pectoral fin and the root of the tail. The spines are of three kinds: 1. The band-bearing spines are the strongest, strongly compressed, not flexible, each terminating in a pair of short points. There are one pair of these spines in the middle of the back, and one on each of the three prominences of the abdominal outline; the flaps are long and bifid. 2. Very long, compressed, and somewhat flexible spines, without appendages; these occupy in pairs the uppermost part of the back, and in a single series the median line of the belly. 3. Small, short, conical spines run in single series along the median line of the sides, and along the lateral edges of the belly; a pair of similar spines in front of the lower part of the base of the pectoral fin.

Tail quadrangular, with sharp edges, and with five pairs of band-bearing spines along its upper side; its end is slightly prehensile.

P. 20. D. 37. The dorsal is situated entirely on the tail.

The specimen, being dry, has lost its original colours, which were probably red during life. The iris is crossed by radiating streaks; and several other streaks (of a whitish colour) radiate from the eye over the opercles and the upper part of the head.

There is no doubt that these fish attach themselves with the prehensile end of their tail to stems of seaweed or other objects; and when they are in the vicinity of seaweed of a similar colour, their resemblance to it must be so great that they would easily escape being observed by their enemies. The figure of *P. eques* (Plate XV.) is of the natural size.

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April 11, 1865.

Professor T. H. Huxley, F.R.S., V.P., in the Chair.

Dr. Crisp exhibited a drawing of the placenta of the Giraffe lately obtained from the Society's Gardens. It weighed  $13\frac{1}{2}$  lbs., and contained 156 cotyledons. Dr. Crisp said that the cotyledons of the Ox and Sheep were said to number from 70 to 100. In the placenta of a Dorcas Gazelle (*G. dorcas*) he had counted only 30; so that probably the Giraffe had a larger number than any other of the ruminants.

Dr. Crisp also exhibited a drawing of the Aard-Vark (*Orycteropus capensis*). He had obtained the animal in the flesh; and the drawing was placed before the Society to show the enormous muscular power of this quadruped, especially in the tail and in the extremities. The weight of the body was about 90 lbs. Dr. Crisp purposed bringing the anatomy of the Aard-Vark before the Society on a future occasion.

The following papers were read:—

## 1. ON THE MYOLOGY OF HYRAX CAPENSIS. BY JAMES MURIE, M.D., AND ST. GEORGE J. MIVART, F.Z.S.

Since the time of Cuvier, naturalists seem generally to have agreed to follow him in associating the *Hyrax* with the perissodactyle Pachyderms.

Professor Huxley, however, in an elaborate and interesting paper on the structure of the placenta in this species, read before the Zoological Society in June 1863, stated important facts, which had led him greatly to doubt the accuracy of his illustrious predecessor's determination.

It therefore becomes a matter of great zoological and anatomical interest to ascertain *precisely* the details of the anatomy of this somewhat anomalous genus, so that valid data may be obtained for the formation of a true judgment as to its real affinities, and from which its definite place in the system of nature may be correctly ascertained.

It would be a superfluous task to enumerate here all the earlier and well-known dissertations on, and descriptions of, this animal; but we may refer to two papers published in the 'Proceedings' of this Society,—one by Professor Owen, read in December 1832, containing a most interesting description of its internal structure, and comparing many of its varied characters with those of the Rodents, Pachyderms, and Edentates; the other by the late Mr. W. Martin, read in February 1835, corroborating Pallas's and Professor Owen's observations. We may also allude to H. Kaula's earlier Monograph, published in 1830\*.

Since this present paper was undertaken, our attention has been called to a notice by Prof. J. F. Brandt, in the 'Bulletin de l'Académie Impériale des Sciences de St. Pétersbourg,' tome v. no. 7, p. 508, in which that author appears inclined to restore the *Hyrax* to the place assigned to it by Pallas, namely, among the Rodents, although at the same time he mentions his discovery in it of a sac-like enlargement of the Eustachian tube similar to that existing in the Horse.

The author further announces his intention of soon laying before the Imperial Academy a complete account of the anatomy of the *Hyrax*; but we are not aware that this has yet been done; so that we may, in fairness, be permitted to state the results of our examination of the myology of this animal—the more so since, as far as we know, scarcely anything has hitherto been published on this subject beyond Meckel's observations, and because several of the facts we have noticed seem to us of considerable interest, and perhaps may even be found, if taken along with the peculiarities of the skeleton, to contribute some little towards the elucidation of its natural affinities.

Before proceeding to the description of the muscles, we must express our regret that the mutilated condition of the lower part of the neck and the abdomen in our specimen, prevented the accurate determination of several points of considerable interest.

\* Monographia Hyracis. Diss. inaug. quam præside Rapp. publ. examini submittit H. Kaula. Tubing. 1830.

*Muscles of the Head and Neck.*

*Masseter*.—From the very great size of the ascending ramus of the mandible, this muscle presents a very broad surface, and it answers the description given by Cuvier \* and Meckel †.

The *external pterygoid* arises from the pterygoid fossa at its outer and anterior margin, and is inserted into the neck of the mandible (fig. 1, *E. p.*).

The *internal pterygoid* has origin by a strong tendon from the hook-like process at the lower extremity of the outer margin of the pterygoid fossa, and from the posterior and inner margin of that fossa. It spreads out in a fan-shaped manner, and is inserted into the concavity of the mandible behind the mylo-hyoid foramen, between the *digastric* and the bone (figs. 1 & 2, *I. p.*). The external and internal pterygoid we found to be completely and distinctly separate, and by no means confounded together as Cuvier states ‡. We particularly mention the distinctness of these two muscles, in order to demonstrate more clearly the true nature of the *digastric*.

Fig. 1.

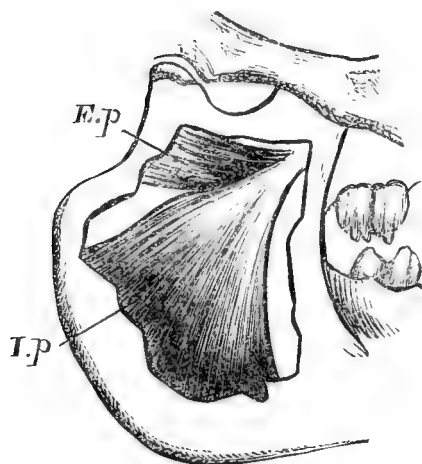


Fig. 2.

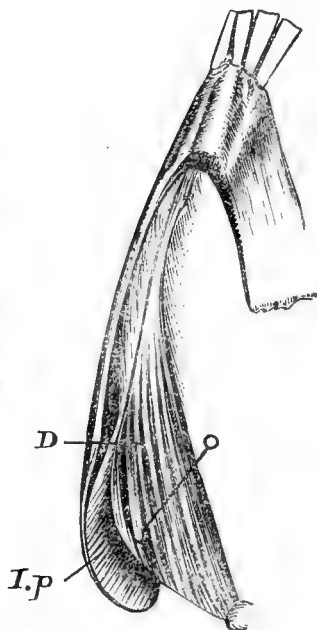


Fig. 1. Ramus of the lower jaw. A portion of the bone is removed, to show the pterygoid muscles. *E. p.* External pterygoid. *I. p.* Internal pterygoid.

Fig. 2. Right half of inferior maxilla, seen from below. *D.* Digastric. *I. p.* Fibres of insertion of the internal pterygoid into the angle of the mandible.

The *stylo-hyoid* arises from the paramastoid process, behind the

\* Anat. Comp. tome iv. part 1, p. 69.

† Anat. Comp. tome viii. p. 476.

‡ Anat. Comp. vol. iv. part 1, p. 91.



digastric, and is inserted as usual; it is strong and relatively thick, as Meckel says\*.

The *stylo-glossus* is very well defined, arising from the anterior margin of the paramastoid, and having the usual insertion into the tongue.

On the left side we observed a long narrow muscular slip, arising from the paramastoid by a delicate tendon, and descending the neck; but its insertion we could not ascertain. This we took to be the *stylo-pharyngeus*.

*Digastric*.—This is very large and much flattened, and lies closely appressed to the concavity inside the mandible, behind and beneath the mylo-hyoidean ridge. It arises from the paramastoid, along with the three last-mentioned muscles and the third head of the *sterno-cleido-mastoid*; but the digastric occupies the greater portion of that process. It is inserted inside and along the whole of the inferior margin of the mandible, as far as a little behind the symphysis, delicate fibres running on almost to the symphysis itself (see fig. 2, *D*). Though this muscle is not exactly double-bellied, yet there is more or less of glistening tendon on both sides posterior to its middle. Cuvier's description is correct as far as it goes †, also that of Meckel ‡, who particularly mentions its great width.

The *sterno-hyoid* and *thyroid* muscles had their usual insertions into the hyoid bone and thyroid cartilage; but their *origin* was destroyed. All the other muscles connected with the larynx were well developed, except the *omo-hyoid*, which we did not find. Meckel § says that it (*le scapulo-hyoidien*) is wanting.

The fibres of the *platysma myoides* are strongly developed, and posteriorly the muscle is in intimate union with the *cleido-mastoid* (or *cephalo-humeral*), which it overrides (fig. 3, *P. m.*).

*Sterno-cleido-mastoid*.—First part, *cephalo-humeral* or *cleido-mastoid*, strong and long, arises from the occiput, and is inserted into the ulna in common with the biceps (figs. 3 & 4, *C. h.*). At the upper part, as already mentioned, its union with the *platysma myoides* is so close that the line of demarcation is hardly to be defined.

On comparing the muscles of a Guinea-pig (*Cavia*) with those of our *Hyrax*, we found the *sterno-cleido-mastoid* had nearly the same origin and insertion at the upper part of the humerus; however, it differed from the *Hyrax* in having a distinct attachment to a rudimentary clavicle.

The second part, or true *sterno-mastoid*, is very thick and bulky, and with an unusual origin, which may perhaps have led to its being confounded with the digastric ||. It arises by a strong tendon from the summit of the posterior margin of the ascending ramus of the mandible, and also by fasciæ from the posterior border of the same, and from the surface of the *masseter*. It is inserted into the manubrium, and joins its fellow of the opposite side in the lower half of the neck (fig. 4, *S. cl. m. 2*).

\* Anat. Comp. tome viii. p. 507.

† *Op. cit.* tome viii. p. 478.

|| Owen, Proc. Zool. Soc. 1832, p. 207.

† *Op. cit.* tome iv. part i. p. 94.

§ *Loc. cit.* p. 507.

The connexion of this second part of the sterno-cleido-mastoid with the mandible offers an interesting resemblance to the attachment of the same muscle in the Horse.

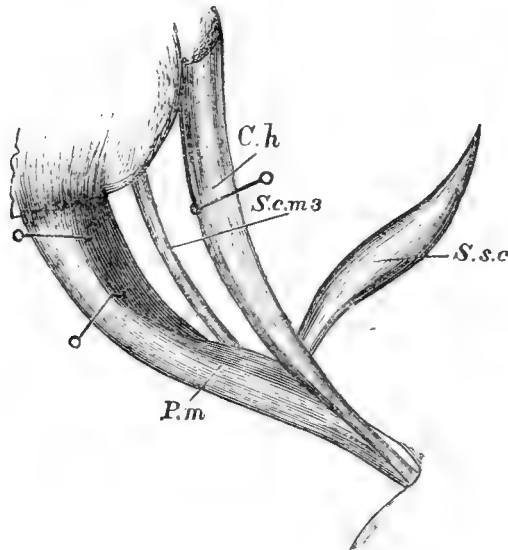
Meckel describes this muscle, in the *Hyrax*, as connected with the mastoid process by a strong and long tendon\*.

In the Guinea-pig this portion of the muscle did not arise from the jaw, but from the skull, as usual.

The third part of the *sterno-cleido-mastoid* is very slender, and not unlike an *omo-hyoid* in appearance (see fig. 3, *S. c. m. 3*). It arises from the paramastoid, and joins deeply the conjoined portions of the two foregoing parts of this muscle.

This may be what Meckel alludes to in the passage just referred to, and appears also to be the "*troisième ventre*" spoken of by him, at page 162, as being often found in Man.

Fig. 3.



Diagrammatic view of superficial muscles of the neck.

*P. m.* Platysma myoides, its attachments to the lower jaw and forearm; above, it is cut open and drawn back by hooks to expose *S. c. m. 3*, the third small portion of the sterno-cleido-mastoid. *C. h.* Cephalo-humeral. *S. s. c.* Sterno-scapular.

The *longus colli* has attachment upon the ventral surface of the cervical vertebræ, the 2nd to 7th inclusive, and is inserted in the thorax, on the bodies of the first six dorsal vertebræ.

The *rectus capitis anticus major* arises from the cervical vertebræ, from the 6th to the 3rd, and is inserted into the basioccipital.

We found no trace of the *rectus capitis anticus minor*, at least as a separate muscle.

The *rectus lateralis* is well developed, arising from the transverse process of the atlas, chiefly its anterior surface, and being inserted into the paramastoid.

\* Anat. Comp. tome vi. p. 163.

The *scalenus anticus* is strong, though small, extending from the transverse processes of the 5th, 6th, and 7th cervical vertebræ to the first rib.

A slip of this muscle descends in front of the thorax as far almost as the cartilage of the third rib. This is not noticed by Meckel\*.

The *scalenus posticus* is very long and flattened, proceeding from the 3rd, 4th, and 5th ribs, and being inserted into the transverse processes of the 4th, 5th, and 6th cervical vertebræ. Meckel† gives but one insertion, namely, into the 5th cervical vertebra.

There is no third scalenus.

The *splenius capitis* and *splenius colli* arise in common from the spinous processes of about the 4th, 5th, and 6th dorsal vertebræ, and proceed upwards and outwards, the first being inserted into the occiput, the second into the transverse process of the atlas, as mentioned by Meckel‡.

The *complexus major* is large, and separable at its origin into several slips. It has origin from the transverse processes of the vertebræ, from the axis to sixth dorsal, and is inserted into the occiput internal to the splenius. It is in close apposition, vertically, to its fellow of the opposite side (like the leaves of a book), no strongly developed *ligamentum nuchæ* intervening.

The *complexus minor* is smaller, and is found to arise from lowest cervical and first two dorsal vertebræ, and to be inserted into the occiput between the *splenius capitis* and *complexus major*, immediately below the former. Like the *complexus major*, it is separable below into several slips; but these are united by fasciæ.

The *complexus tertius* arises from the zygapophyses of the two first dorsal vertebræ, and continues upwards to the transverse process of the atlas, being attached also to the zygapophyses of the intervening cervical vertebræ.

This muscle is very distinct, lying between the last and the *transversalis cervicis*; yet it has not, as far as we know, received a separate name. Meckel§ describes it as the *transversalis cervicis*; but this it cannot be, as the *transversalis cervicis* is always the continuation into the neck of the *longissimus dorsi*, whereas our muscle lies distinctly internal to such continuation. Both Quain and Ellis || are

\* *Loc. cit.* p. 260.

† *Loc. cit.* p. 156.

‡ *Loc. cit.* p. 140.

§ *Loc. cit.* p. 147. He describes the true *transversalis cervicis* as the *cervicalis ascendens*.

|| 'Demonstrations of Anatomy,' 5th edition, page 427. The author, in a footnote, says, "The anatomy of the prolongation from the longissimus might be simplified by describing it as the transversalis muscle with a double insertion, like the splenius, into the head and neck—" *transversalis capitis*," " *transversalis colli*." These muscles, we think, may, however, be better tabulated as follows :—

Sacro-lumbalis .....	Cervicalis ascendens.
Longissimus dorsi .....	Transversalis cervicis.
	Complexus tertius.
	Complexus minor.
	Complexus major.

The *transversalis cervicis* is the *transversalis colli* of Ellis.

The *complexus minor* is his *transversalis capitis*, also the *trachelo-mastoid* of many authors.

clear as to this essential nature of the *transversalis cervicis* in Man ; and Burdach corrects Meckel on this point as regards the Apes. Of course it cannot be considered as the *biventer cervicis*, as this is always on the *inside* of the *complexus*.

The *transversalis cervicis* is but the continuation of the *longissimus dorsi*, and is very wide and conspicuous. It is inserted into the five lowest cervical vertebræ by muscle, which has superimposed conspicuous tendons, one to each transverse process. This is the *cervicalis ascendens* of Meckel\*.

The *cervicalis ascendens* is wanting, as there is no evident continuation of the *sacro-lumbalis* into the neck, except perhaps a few fibres to the seventh cervical vertebra.

The *rectus capitis posticus major* is a large and powerful muscle, arising from the spine of the axis, its whole outer surface, and with an insertion into the occiput.

The *rectus capitis anticus minor*, as usual, extends from the neural laminae of the atlas to the occiput, beneath the last.

The origin of the *obliquus capitis superior* is the transverse process of the atlas. Its insertion is into the occiput, between the superior and inferior curved lines.

The *obliquus capitis inferior* is very large. Its origin is from the neural lamina and base of the spinous process of the axis, and it is inserted into the transverse process of the atlas.

These last four muscles are exceedingly well developed, and they together form a prominent inverted fleshy pyramid.

The *levator claviculae* is strong ; it arises from the transverse process of the atlas, and is inserted into the fascia covering the *teres minor*, passing over the neck of the scapula. Meckel does not notice this muscle in the *Hyrax*.

#### *Muscles of the Back and Abdomen.*

*Trapezius*.—This muscle is very extensive, arising along the median line of the back, from the occiput as far as the middle of the dorsal region, overlapping the *latissimus dorsi*. It is inserted into the scapula—the anterior part of the muscle upon the spine towards its acromial end, the posterior part of the muscle below (behind) the spine. Some fibres of the anterior portion of the muscle are involved with the *platysma myoides*, somewhat in the manner described by Meckel †.

The *rhomboideus major* has origin from the spines of the 6th, 7th, 8th, 9th, and 10th dorsal vertebræ, with an insertion into the posterior angle of the scapula.

The *rhomboideus minor* is represented by a small delicate muscle, arising from the spine of the sixth dorsal vertebra, and being inserted, superficially to the last, into the cartilaginous portion of the scapula.

These muscles are probably subject to some variation, as Meckel ‡ describes three muscles in the place of these two, and *in addition* our next muscle also.

\* *Loc. cit.* p. 149.

† *Loc. cit.* p. 225.

‡ *Loc. cit.* p. 241.

*Rhomboideus capitis* or *occipito-scapular*.—From the occiput, ligamentum nuchæ, and spines of the vertebræ\*. It narrows as it proceeds outwards and backwards, and is inserted into the scapula opposite to the base of the spine. At its insertion, this muscle is folded, the concavity of the fold being directed backwards (fig. 5, *R. c.*). It is the “*rhomboïde antérieur*” of Meckel †.

The *latissimus dorsi* is closely connected with the *panniculus carnosus*. It arises as usual (that is, taking into consideration the great number of dorsal vertebræ), and at its insertion bifurcates, one slip joining a part of the similarly bifurcating *panniculus carnosus*, and being with it attached to the aponeurosis covering the *biceps*; the other part, which is tendinous, unites with the *teres major* and another portion of the *panniculus carnosus*, and with them is inserted into the inner margin of the bicipital groove of the humerus. As Meckel remarks ‡, the vessels and nerves of the arm pass out between its two insertions.

The *serratus magnus* is a most extensive and powerful muscle, which contains inseparably united with it the *levator anguli scapulæ*, as Meckel is also inclined to think §. It arises from the transverse processes of the cervical vertebræ, from the third to the seventh, besides from the first five ribs, and by ten digitations from the ribs posterior to these. It is inserted along the whole length of the border of the scapula (fig. 5, *S. m.*). Meckel || remarks its great size: it is indeed an excellent example of the way in which the body of quadrupeds is, as it were, slung to the scapula by this muscle, as was remarked by Cuvier ¶.

The *serratus posticus* is most remarkably developed: Meckel says\*\* that the *Hyrax* is apparently the mammal in which it is the most so. It arises by tendon from the ligamentum nuchæ, quite at the hinder end of the neck, and from the fascia of the back. It is inserted by well-marked digitations (so as truly to merit its name *serratus*) into all the ribs, except the first three. It covers and is closely applied to the *sacro-lumbalis*.

The *sacro-lumbalis* is very small and narrow, though long. It has the usual origin and insertion, its all but completely aborted cervical continuation being the *cervicalis ascendens*.

The *longissimus dorsi* is rather largely developed; it arises and is inserted as usual. Its large and marked cervical prolongation is the *transversalis cervicis* above described.

The *panniculus carnosus* appears as an extensive sheet of muscular fibres, covering the whole back, the sides, and abdomen. It is thinnest towards the median line of the back, but is of considerable

\* The attachments of this muscle differed slightly on the two sides, on the left extending as far backwards as the sixth dorsal, but on the right its attachment was not so extensive; and in general appearance it more resembled a levator anguli scapulæ.

† *Loc. cit.* p. 241.

§ *Loc. cit.* p. 234.

¶ *Leçons d'Anat. Comp.* vol. i. p. 369.

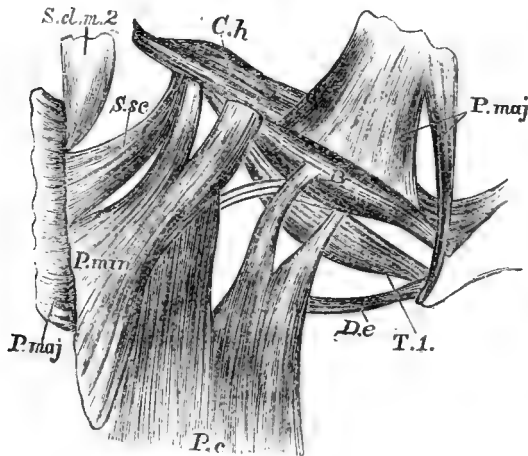
\*\* *Loc. cit.* p. 188.

‡ *Loc. cit.* p. 263.

|| *Loc. cit.* p. 246.

thickness in the pectoral region. Its attachments are the median line of the back, the median line of the abdomen, anteriorly and above to the fascia covering the scapula. Anteriorly below (where the muscle is thicker) it divides into two separate layers, the deep and much narrower one being inserted into the lesser tuberosity of the humerus, and so intimately connected with the insertion of the pectoralis minor as to be readily confounded with it. The more superficial portion, with its antero-posteriorly directed fibres, covering the front of the thorax, fixes itself so as to be in a manner fused with the obliquely directed fibres of the pectoralis minor at the posterior border of that muscle. The outer portion of this superficial layer, however, terminates in a slip, which bifurcates, one part being attached to the fascia covering the biceps in common with a portion of the latissimus dorsi, as above described, the other part being inserted into the inner margin of the bicipital groove of the humerus, in common with the teres major and other portion of the latissimus dorsi (see fig. 4, *P. c.*). The fibres of the posterior part of this muscle (the panniculus carnosus) converge from the back opposite the ilium, and from the lower portion of the abdomen, to form a pyramidal fasciculus, which passes to the lower limb, and is inserted into the superficial aponeurosis of the leg over the knee.

Fig. 4.



#### Muscles of the thoracic region.

*P. maj.* Pectoralis major (cut through and turned back). *P. min.* Pectoralis minor. *S. cl. m. 2.* Sternocleidomastoid, its second part. *S. sc.* Sternoscapular. *C. h.* Cephalo-humeral. *B.* Biceps. *T. 1.* First portion of triceps. *D. e.* Dorso-epitrochlear. *P. c.* Panniculus carnosus.

The *external oblique* is very long, considering the proportions of the animal. It arises from the whole of the ribs, except the three most anterior ones; Meckel\* states, from all except the first five. Its other attachments are from the crest of the ilium and linea alba,

\* *Loc. cit.* p. 194.

its anterior two-thirds. It does not go to form a Poupart's ligament, nor an outer inguinal ring; but the fibres converge opposite the crest of the ilium, and proceed by a pointed fasciculus, which is inserted upon the adductors of the femur to the outer side of the pyramidalis muscle. At its insertion, the fibres are very weak and reduced to a mere fascia. Meckel\* says that those animals in which the testicles do not descend externally offer no trace of an inguinal ring; and this is a characteristic example.

The *internal oblique* and *transversalis* were closely united together. They offered no remarkable peculiarities, except their attachment to many ribs.

From the mutilated condition of the specimen, we could not make out with certainty the boundaries and attachments of the *rectus abdominis*; but, according to Meckel†, it is wide, attached anteriorly to the sternum, high up, and all the ribs to the first.

We found the *pyramidalis* unmistakably present in our specimen, although this would seem to be opposed to what Meckel says with reference to the non-existence of this muscle generally, and to his unsuccessful search for it in the *Hyrax* ‡. It is inserted into the symphysis pubis, as usual.

#### *Muscles of the Fore Limb.*

The *pectoralis major* arises from the anterior three-fourths of the sternum, the median raphe between it and its fellow of the opposite side being very slight. At its upper border, between the anterior end of the sternum and the head of the humerus, it is closely connected with the cephalo-humeral or first part of the sterno-cleido-mastoid, which covers its insertion into the humerus. The *p. major* bifurcates opposite the axilla, the posterior part being inserted into the fascia of the forearm just beneath the olecranon, the anterior part into the humerus external to the biceps (fig. 4, *P. maj.*). The pectoral muscles are very adherent to each other, but still their limits are easily traced. We did not find two *layers* in the *pectoralis major*, as Meckel§ mentions. We fancy, from his description, that he has included a portion at least of the *p. minor*, and possibly part of the *panniculus carnosus*, in his description of this muscle. At its insertion into the humerus, this muscle has a pouch-like fold, the concavity being turned forwards and inwards.

The *pectoralis minor* has an origin from the lower half of the sternum, and it is inserted into the greater tuberosity of the humerus (fig. 4, *P. min.*). At a short distance from its insertion a strong muscular slip is given off, which diverges slightly and joins the sterno-scapular muscle. At its outer border, the fibres of the *p. minor* are joined almost at right angles by those of the large *panniculus carnosus*, as previously described. As Meckel does not mention this muscle in the *Hyrax*, we suppose he has included it in his description of the *p. major*, as we have indicated above.

\* *Loc. cit.* p. 194.

† *Loc. cit.* p. 203.

‡ *Loc. cit.* p. 208.

§ *Loc. cit.* p. 270.

The *subclavius* is absent ; in this respect the Hyrax differs from the Guinea-pig. The muscle which we call the *sterno-scapular* evidently comes under the denomination *subclavius* in Meckel's\* work.

*Sterno-scapular*.—This rather uncommon muscle arises from the sternum, immediately in front of the origin of the *pectoralis minor*, and, passing over the scapulo-humeral articulation, continues along the upper (anterior) border of the scapula, to be inserted into its anterior superior angle (figs. 3 & 4, *S. sc.*).

This muscle is very interesting, because it occurs in the Pig and other Ungulata†, not, however, that it is exclusively confined to that group, as we found it existing most unmistakeably in the Guinea-pig, which we examined on purpose.

There is a muscle described by Meckel‡ as existing in the Hare, Porcupine, and Agouti, extending from the spine of the scapula to the sternum, which evidently is our *sterno-scapular*, but which he considers rather belongs to the *subclavius* than forms part of the *trapezius*, as Cuvier§ thought.

The *deltoid* is very slightly developed, as occurs also in the Ungulata. It seems to consist of two portions, the first arising by tendinous fasciæ from the inferior border of the *infra-spinatus*, and inserted by a broad tendinous fascia into the outer border of the humerus, below its head (fig. 5, *D.*).

The second part, much smaller than the first, arises from the great tuberosity of the humerus, and not from the scapula, and is inserted into the deltoid prominence immediately internal to the insertion of the first head.

Our description seems to agree with Meckel's|| observation as to the deltoid being divided into two muscles.

The *supra-spinatus* muscle is very strong, and with the usual origin, but, on account of its bulk, occupying more space than the mere fossa (fig. 5, *S. sp.*). It ends in a forked manner, and is inserted into the whole inner side of the greater tuberosity, and outer margin of bicipital groove of the humerus. Meckel observes that the consequence of this double insertion in the Horse, Camel, and *Hyrax* is only to raise the arm, without carrying it outwards, in this way being an auxiliary to the deltoid¶.

The *infra-spinatus* arises from the infra-spinous fossa, the fibres being delicate towards the cartilaginous portion of the scapula. It contains, near the neck of the bone, a strong tendon within its substance, and the muscle is inserted into the great tuberosity of the humerus (fig. 5, *I. sp.*).

The *subscapularis* does not cover the subscapular fossa. It arises by four or five digitations, which do not reach the whole length of the scapula. The insertion is into the lesser tuberosity of the humerus.

The *teres major* is long and strong ; as usual, it arises along mar-

\* *Loc. cit.* p. 260.

† Huxley, in his recent Hunterian Lectures for 1865.

‡ *Loc. cit.*, pp. 259, 260.

§ *Leçons d'Anat. Comp.* vol. i. p. 373.

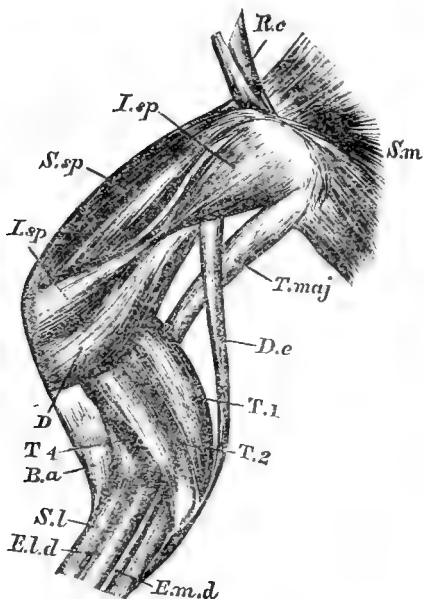
|| *Loc. cit.* p. 226.

¶ *Loc. cit.* p. 259.



gin of scapula, but not from the cartilage. In common with part of the latissimus dorsi and part of the panniculus carnosus, it is inserted into margin of bicipital groove, while it is also overlapped by the coraco-brachialis (fig. 5, *T. maj.*).

Fig. 5.



View of the outside of the fore limb.

*S. m.* Serratus magnus. *R. c.* Rhomboideus capitis. *S. sp.* Supra-spinatus. *I. sp.* Infra-spinatus. *D.* Deltoid. *T. maj.* Teres major. *D. e.* Dorso-epitrochlear. *T. 1.* First head of triceps. *T. 2.* Second head of triceps. *T. 4.* Fourth head of the triceps. *B. a.* Brachialis anticus. *S. l.* Supinator longus. *E. l. d.* Extensor longus digitorum. *E. m. d.* Extensor minimi digiti.

The *teres minor* is very small. It arises from the lower or posterior border of scapula, the whole length of its neck, but very little more. The insertion is into the great tuberosity of the humerus, beneath and behind the infra-spinatus. It is in intimate union with the scapular head of the triceps.

The *biceps* is single-headed, arising only from the scapula. It is inserted into the neck of the ulna in common with the cephalo-humeral, after passing round the inner side of the neck of the radius, where it has a strong tendon (fig. 4, *B.*). We thus agree with Meckel\* as to its single head and insertion into the ulna. In the Guinea-pig we found it also to have but one head.

The *brachialis anticus* arises by a single and very strong head from the back of the neck of the humerus, and turns round to the front of the bone, descending into the forearm to be inserted into the ulna (fig. 5, *B. a.*). In its very high origin this muscle resembles

\* *Loc. cit.* p. 286.

its homologue in the Pig and Horse; but the Guinea-pig presents us also with the same structure.

The *coraco-brachialis* comes from the rudimentary coracoid process, and is inserted into the humerus from the lesser tuberosity down to quite the middle of the shaft, in a line along the inner margin of the bicipital groove. It lies in front of the *teres major*.

We found the *triceps* to be divided into four distinct portions, without counting the small muscle which we have called the dorso-epitrochlear. The first of these, or scapular head, is very strong, and arises from the neck of the scapula, adherent to the *teres minor* and *infra-spinatus*. It has an insertion into the olecranon (fig. 5, T. 1).

The second, which corresponds to the outer head, is nearly equal in size to the former. It arises from the neck of the humerus, below the *teres minor*, just behind the greater tuberosity. It is also inserted into the olecranon and outer condyle of the humerus (fig. 5, T. 2).

The third or inner head is much smaller than either the first or the second. It arises from the inner side of the neck of the humerus, below the *brachialis anticus*, and below the insertion of the *teres major*, intervening between these two muscles at its origin. The insertion of this third portion is into the inner side of olecranon.

The fourth part of the *triceps* is much smaller and also shorter than the three preceding; it arises in common with the last, but is clearly separated from it below. It covers the posterior surface of the shaft of the humerus, and is inserted into the inner condyle and olecranon process (fig. 5, T. 4).

Meckel does not appear to have observed our fourth belly of the *triceps* proper. What he calls "the fourth" is our dorso-epitrochlear.

The *dorso-epitrochlear* is a long and very narrow muscle. The origin is very different from that of the muscle usually described under this name. We found it to arise from the lower border of the *infra-spinatus*, and to be inserted into the olecranon by a strong tendinous fascia (figs. 4 & 5, D. e.).

The *supinator longus* is exceedingly diminutive, and arises from the outer side of the shaft of the humerus, just above the common origin of the next two muscles, and is inserted into the radius near its neck (fig. 5, S. l.).

The presence of the *supinator longus* is interesting, inasmuch as it is wanting in the Pig and Horse, as also, according to Meckel, in the Hare, Porcupine, Agouti, Beaver, Rat, &c.\*

The *extensor carpi longior* and *brevior* were not quite separated as described by Meckel†, but the two had a common origin from the external condyle of the humerus, a little above the carpus giving rise to two distinct tendons. They have an insertion, the one into the metacarpal bones of the index, and the other into metacarpal bones of the middle digits.

The *extensor communis digitorum* arises between the last-mentioned muscle, and divides into two fleshy bundles which give origin to four flat tendons, one being inserted into each of the four digits.

\* *Loc. cit.* p. 304.

† *Loc. cit.* p. 208.

The *extensor minimi digiti* arises as usual (Fig. 5, *E. m. d.*), but soon divides into two separate delicate muscles, each of which ends in a tendon, one being inserted into the proximal phalanx of the fifth digit; the other, passing beneath the outermost tendon of the extensor communis digitorum, goes to the distal end of the fourth metacarpal bone. Meckel found only a single tendon, which went to the fifth digit\*.

The *extensor ossis metacarpi pollicis* is a well-developed muscle, with rather an extensive origin, and with much tendon in its substance. It is inserted into the trapezium and rudiments of the pollex.

The *extensor primi*, the *secundi internodii*, and the *extensor indicis* are all wanting.

The *extensor carpi ulnaris* has origin from the outer side of the coronoid process of the ulna and the outer condyle of humerus, but chiefly from the latter. Its insertion is into the proximal end of the fifth metacarpal and the pisiform bone.

The *pronator teres* arises from the internal condyle, as usual. The insertion is by a flattened and pretty strong tendon into the middle of the shaft of the humerus, at its inner side.

The *flexor carpi radialis* arises from the inner condyle, below the last. This muscle, which is tendinous at its lower half, is inserted into the trapezium.

The *palmaris longus* is rather largely developed, and arises from the inner condyle and intermuscular fascia. Passing down to the palm of the fore limb, it forms the palmar fascia, which contains a flat fibro-cartilaginous disk, the palmar fascia ending in four slips for the four digits. At the carpus, a bursa is interposed between the tendon of this muscle and that of the flexor carpi ulnaris. Meckel† says that this muscle is only represented by a long, wide tendon; but in our specimen it had a good fleshy belly.

The *flexor carpi ulnaris* is a very strong muscle, with the usual origin, and inserted into the pisiform bone by a very broad tendon, the muscular fibres on the outer side reaching down to that bone (fig. 6, *F. c. u.*).

The *flexor sublimis digitorum* arises in intimate union with the deep flexor as far nearly as the carpus, but is divisible into three slips, each of which gives off a tendon, these three tendons going to the second, the third, and the fourth digits; that into the second is inserted in the inner side of the tendon of the deep flexor; that to the third forms its perforated tendon; that to the fourth unites with a tendon of the next muscle to form the perforated tendon of that digit. Meckel's description does not at all agree with our description (fig. 6, *F. s. d.*).

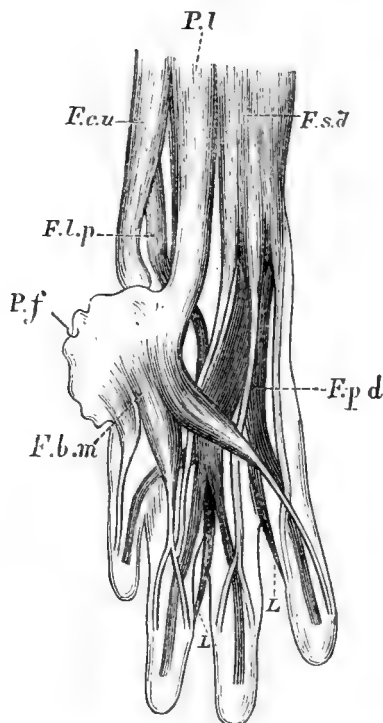
*Flexor brevis manus.*—This very peculiar and, as far as we know, hitherto undescribed muscle arises from the fibro-cartilaginous disk above mentioned, and from both the superficial and the deep palmar fasciæ. It divides into three distinct and rather long digitations, each ending in a tendon. These three tendons go to the second, fourth, and fifth digits; that going to the fourth digit unites

\* *Loc. cit.* p. 321.

† *Loc. cit.* p. 317.

with the corresponding tendon of the flexor sublimis to constitute the perforated tendons of that digit; that going to the fifth digit is inserted by itself outside the deep flexor; that going to the second digit is inserted singly on the inner side of the deep flexor tendon. The perforated tendon of the third digit is formed by the flexor sublimis only (fig. 6, *F. b. m.*). The fleshy belly, which Meckel\* describes as investing the tendons of the sublimis at their origin, is doubtless our flexor accessorius manus.

Fig. 6.



Flexor muscles and tendons of the fore foot.

*P. l.* Palmaris longus. *F. c. u.* Flexor carpi ulnaris. *F. s. d.* Flexor sublimis digitorum. *F. p. d.* Flexor profundus digitorum. *F. l. p.* Flexor longus pollicis. *P. f.* Palmar fascia. *F. b. m.* Flexor brevis manus. *L.* Lumbricales.

The *flexor profundus* and *longus pollicis* are distinct above, but united at the wrist, where they give origin to a very broad and strong tendon, which, dividing into four, forms the flat and strong perforating tendons of the four digits. The tendon to the index does not pass through a truly perforated tendon, but the tendons from the flexor brevis and flexor sublimis so cross each other as to produce the appearance and action of a normal perforated tendon (fig. 6, *F. p. d.* and *F. l. p.*). Meckel† appears to have confounded this muscle with the flexor sublimis. They are indeed very closely connected, but still able to be separated.

\* *Loc. cit.* p. 333.

† *Loc. cit.* p. 333.

The *lumbricales*, instead of being absent, as Meckel\* says, are very distinct, though only two in number (as are also those in the foot). One of these arises from the palmar surface of the broad tendon of the flexor profundus, between the origin of the tendons of the two inner digits, and is inserted into the proximal phalanx of the second digit at its outer side; the other arises between the deep tendons of the third and fourth digits, and is inserted into the inner side of the proximal phalanx of the fourth digit (fig. 6, *L. L.*). In the left foot, however, we found these two muscles to be inserted into the outer sides of the second and third digits.

The pollex is not destitute of muscles, as Meckel† asserts, as it possesses at least two separate, though very small, muscular bundles; but what they represent we cannot pretend to say (fig. 7, *P.*).

The fifth digit possesses a large and strong *abductor minimi digiti*. This *arises* by a strong tendinous fascia from the outer side of the pisiform bone, and is inserted into the outer side of the proximal phalanx of the fifth digit (fig. 7, *Ab. m. d.*).

Fig. 7.

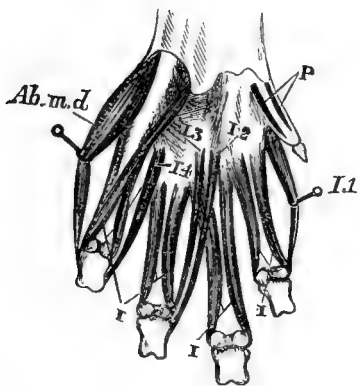


Fig. 8.

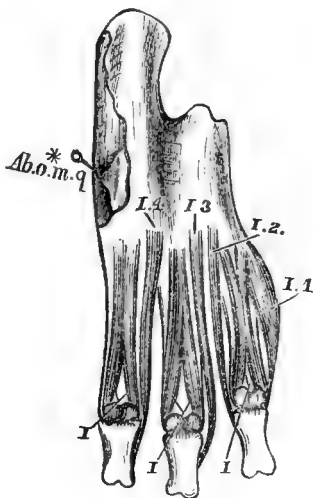


Fig. 7. Palmar interossei of the fore foot, and small muscles to first and fifth digits. *P.* Muscular fibres upon pollex. *Ab. m. d.* Abductor minimi digiti. *I. I. I.* The indicators point to the four pairs of interossei. *I. 1.* The first single interosseous muscle. *I. 2.* The second single interosseus. *I. 3.* The third single interosseus. *I. 4.* The fourth single interosseous muscle.

Fig. 8. Same muscles, sole of hind foot. *I. I. I.* The three double pairs of interossei. *I. 1.* First single interosseous muscle. *I. 2.* Second single interosseus. *I. 3.* Third single interosseous muscle. *I. 4.* Fourth single interosseous muscle. *Ab. o. m. q.* Abductor ossis metacarpi quinti.

There are four pairs of *interossei* covering the plantar surfaces of the metacarpal bones. They *arise* from the strong tendinous fascia which covers the proximal ends of the metacarpal bones beneath,

\* *Loc. cit.* p. 333.† *Loc. cit.* p. 347.

and are *inserted* into sesamoid bones, one on each side of the distal ends of the metacarpals, the sesamoids acting on the proximal phalanges by means of the connecting fasciæ (fig. 7, *I. I. I.*).

Besides these four pairs, there are also four single interosseous muscles.

The *first* covers the inner side of the index metacarpal, and is visible on the dorsum, as before mentioned. It arises from the whole length of that bone, and is inserted within the innermost sesamoid (fig. 7, *I. 1.*).

The *second* is a thin muscular slip, lying between the third and fourth metacarpals, rather on their plantar surfaces. It *arises*, in common with the other interossei, from the fascia before mentioned, and is inserted by a delicate tendon into the inner side of the proximal phalanx of the fourth digit (fig. 7, *I. 2.*).

The *third* (close adjoining the last, and similar in form) lies on the outer side of the second. It has a similar *origin*, but is *inserted* into the inner sesamoid bone of the fourth digit (fig. 7, *I. 3.*).

The *fourth* *arises* from the fascia on the inner side of the pisiform bone, and is inserted into the inside of the middle phalanx of the fifth digit (fig. 7, *I. 4.*).

On the dorsum of the hand only the inner interosseous of the index is visible.

#### *Muscles of the Lower Extremity.*

The *gluteus maximus* has an attachment by aponeurosis along the crest of the ilium, being continuous with the lumbar fascia, also with an origin from the middle of the sacrum and the caudal vertebræ. It forms a thin sheet of muscular fibre, covering the outer side of the thigh. Posteriorly it is firmly adherent to the biceps, and is inserted along with the upper part of that muscle into the aponeurosis covering the outer surface of the limb, and which aponeurosis is attached to the patella (fig. 11, *G. max.*). This muscle has been described as in perfect continuity with the biceps; but we could distinctly trace the line of separation—although it was not so very clear above, by reason of the overlapping of this muscle by the biceps; but, on dissecting from below, the line of demarcation was readily traceable.

At pages 354 and 406, Meckel describes part of this muscle as corresponding to the tensor vaginæ femoris, and seems to confound with it more or less of the biceps.

The *gluteus medius* is very large and entirely fleshy, thin in the middle and thick at its borders, thus differing from muscles in general. It arises from the whole outer surface of the ilium, from the sacrum and caudal vertebræ, as far back as the origin of the semitendinosus. It is inserted into the third trochanter, except a small portion of its anterior part, which joins the aponeurosis of the *gluteus maximus* going to the patella (fig. 11, *G. med.*). We cannot agree with Meckel\* in saying that it is smaller than the *gluteus maximus*.

The *gluteus minimus* is an extraordinarily thick and powerful muscle,

\* *Loc. cit.* p. 359.

arising from the whole outer surface and upper margin of the ilium as far down as the acetabulum, as also from the sacrum and several caudal vertebræ. It is inserted into the great trochanter.

The *tensor vaginæ femoris* is thick though small. It arises from the anterior inferior spinous process of the ilium, and is inserted into the fascia as usual. This muscle does not lie here so superficial as ordinarily, but is somewhat wedged in between the glutei and iliacus (fig. 11, *T. v. f.*). It has been described by Meckel\* as the sartorius.

The *psoas magnus* is a stout muscle, arising from the fronts of the bodies of the last dorsal and all the lumbar vertebræ, and from the bases of the transverse processes of the lumbar vertebræ. Insert into the small trochanter (fig. 10, *P. m.*).

The *psoas parvus* has attachments upon the fronts of all the lumbar vertebræ, and is inserted by a long tendon into the ilio-pectineal ridge. Its proportion to the *psoas magnus* seemed to us larger than as described by Meckel†.

The *quadratus lumborum* is very long and narrow, arising from the sides of the bodies of the last twelve dorsal vertebræ and from the heads of the ribs, also from the transverse processes of all the lumbar vertebræ, and from the anterior part of the sacrum. It is inserted into the sacro-iliac synchondrosis.

The *iliacus* is a moderate-sized, laterally compressed muscle, arising from the anterior superior spine of the ilium, and the margin between it and the anterior inferior spine; it is inserted into the lesser trochanter (figs. 10 & 11, *I.*).

The *coccygeus* arises from the spine of the ilium, and, spreading out in a fan-shaped manner, is inserted into the caudal vertebræ (fig. 9, *C.*).

Although the tail is so extremely rudimentary, yet the *pubo-coccygeus* is distinctly developed as a delicate band of muscular fibre arising from the pubes behind the symphyses, and inserted into the caudal vertebræ. This muscle is not noticed by Meckel. (Fig. 9, *P. c.*)

The *pyriformis* is very closely connected with the gluteus minimus, appearing as it were to wrap round it at its lower part; so that the line of demarcation is not easily ascertained. It arises from the ventral surface and outer border of the sacrum, immediately behind the sacro-iliac synchondrosis, and is inserted into the great trochanter in union with the gluteus minimus, as Meckel‡ describes.

The *quadratus femoris*, as justly observed by Meckel§, is very voluminous (fig. 10, *Q. f.*). It arises from the front part of the tuberosity of the ischium, and is inserted into the line between the greater and lesser trochanters.

The *gemellus superior* extends from the spine of the ischium to the trochanteric fossa.

The *gemellus inferior* has the following attachments, viz. from the surface of the ischium, near the tuberosity, to the trochanteric fossa (fig. 9, *G. i.*).

The *obturator internus* is rather a small muscle, arising from the

\* *Loc. cit.* p. 399.

† *Loc. cit.* p. 368.

‡ *Loc. cit.* p. 361.

§ *Loc. cit.* p. 365.

inner side of the ascending ramus of the pubes, close to the ilium, and from the inner surface of the ilium as high as the ilio-pectineal line. It is inserted into the trochanteric fossa by a delicate tendon, with which the gemelli are closely connected (fig. 9, *O. i.*).

Fig. 9.

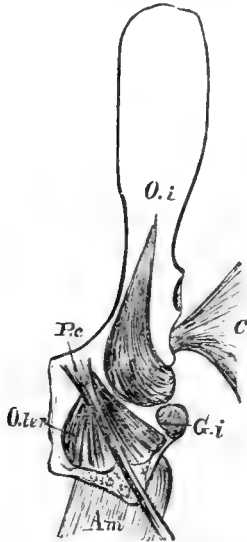


Fig. 10.

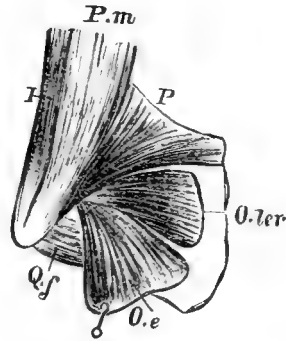


Fig. 9. Inner view of left half of the pelvis. *O. i.* Obturator internus. *O. ter.* Obturator tertius. *P. c.* Pubo-coccygeus. *C.* Coccygeus. *G. i.* Gemellus inferior. *A. m.* Abductor magnus.

Fig. 10. Right side of pelvis, seen in front. *I.* Iliacus. *P. m.* Psoas magnus. *P.* Pectineus. *O. ter.* Obturator tertius. *O. e.* Obturator externus.

The *obturator externus* is thick and fleshy, having its usual origin and insertion (fig. 10, *O. e.*).

*Obturator tertius.*—This very peculiar and anomalous muscle, of which we have not met with any record, arises from the inner surface of the ischium, close to its junction with the pubes, passing through the obturator foramen. It is inserted into the trochanteric fossa, in common with the obturator externus (figs. 9 & 10, *O. ter.*).

The *biceps* is of extraordinarily large dimensions, and, arising by a strong tendon from the tuberosity of the ischium, and spreading out into a wide sheet of muscle, separates into two main divisions. The anterior of these overlaps the gluteus maximus, with which it is closely connected, and is inserted by strong tendinous fascia into the patella and outer head of the fibula. The posterior division of the biceps, which is more separated from the anterior division than is this last from the gluteus maximus, is inserted into the fascia of the leg along the outer border of the fibula (fig. 11, *B.*). Meckel\*, in his description of this muscle, takes no notice of the anterior division, which he appears to have interpreted as part of the gluteus maximus.

The *semitendinosus* has a double origin, as in the Horse†, one

\* *Loc. cit.* p. 390.

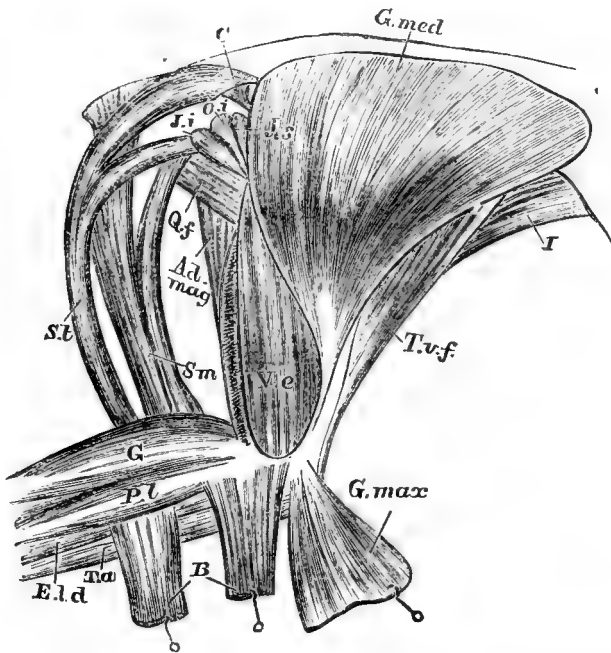
† *Loc. cit.* p. 383.



head arising from the tuberosity of the ischium, behind the last-described muscle; the other, larger and broader, has an origin from the caudal vertebræ fully an inch broad. These two flat heads unite to form a single roundish muscle, which is inserted by a thin tendon into the upper third of the front of the tibia, below the insertions of the gracilis and semimembranosus (fig. 11, *S. t.*).

The *semimembranosus*, as Meckel\* remarks, has an extraordinary breadth and thickness. It has, like the last, a double origin, one head arising from the ischium behind the semitendinosus, the other head arising from all the caudal vertebræ posterior to the origin of the last named, and closely connected with the levator ani. These two flat muscular heads unite, like those of the semitendinosus, to form a large and powerful muscle, which is inserted into the inner condyle of femur and upper part of tibia (fig. 11, *S. m.*).

Fig. 11.



Buttocks and lower limb, to below the knee.

*I.* Iliacus. *G. max.* Insertion of gluteus maximus. *G. med.* Gluteus medius. *T. v. f.* Tensor vaginæ femoris. *C.* Coccygeus. *O. i.* Obturator internus. *G. s.* Gemellus superior. *G. i.* Gemellus inferior. *Q. f.* Quadratus femoris. *Ad. mag.* Adductor magnus. *V. e.* Vastus externus. *B.* The insertions of the biceps, turned back. *S. t.* Semitendinosus. *S. m.* Semimembranosus. *G.* Gastrocnemius. *P. l.* Peroneus longus. *E. l. d.* Extensor longus digitorum. *T. a.* Tibialis anticus.

The *sartorius* was not represented, even in the most rudimentary manner; and, as above said, the muscle described by Meckel† under this name is really the tensor vaginæ femoris.

\* *Loc. cit.* p. 386.

† *Loc. cit.* p. 399.

The *gracilis* is a broad muscle, arising from the symphysis pubis, being inserted into the inner side of the tibia between the insertions of the semitendinosus and the semimembranosus.

The *rectus femoris* is a very strong muscle, arising from the anterior inferior spinous process of the ilium just above the acetabulum, and inserted as usual.

The *vastus externus* (fig. 11, *V. e.*) and the *vastus internus* were not unusual, except that they were well separated from the next, and were almost entirely muscular to their insertion into the patella.

The *crureus* is wonderfully distinct and strong, remarkably so if contrasted with its condition in Man. Fibres extend all along the front shaft of the femur, and are inserted into the patella and capsule of the joint. There is a strong glistening tendon in the middle of its front surface; but the sides are muscular down to its insertion. Meckel\* notes the distinctness in this animal of the four component parts of the quadriceps extensor femoris.

The *adductor magnus* arises from the symphysis pubis, its posterior half, and is inserted into the lower half of the linea aspera and the internal condyle of the femur (fig. 9, *A. m.* and fig. 11, *Ad. mag.*).

The origin of the *adductor brevis* is from the anterior half of symphysis pubis, and its insertion is into linea aspera of the femur, above the last.

The *adductor longus* arises by a distinct tendon from the anterior end of the symphysis pubis, and is inserted into the middle of the shaft of the femur anteriorly, and internally to the two last. It is this muscle which Meckel† appears to have described as the pectineus, adding that there are only two adductors. He appears not to have noticed the next.

The *pectineus* arises from the brim of the pelvis, from the junction of the ilium with the pubes to the middle line of the body. It is inserted into the line leading from the lesser trochanter to the linea aspera (fig. 10, *P.*).

The *tibialis anticus* has origin from the inner side of tibia to about a quarter of its length from its summit. It is inserted into the inner side of the metatarsal of the second digit (figs. 11 & 12, *T. a.*). Huxley‡ says, this muscle is wanting in the Pig.

The *extensor longus pollicis* is wanting.

The *extensor longus digitorum* is smaller in size than the tibialis anticus, and it is situated on its outer side. It arises between the heads of the tibia and fibula, a few fibres of origin coming from both, but chiefly by a tendon from the outer condyle of the femur. It ends in three tendons, which are inserted into the three digits. Meckel§ says, this muscle does not arise from the femur either in the *Hyrax* or Pig; but we found it to do so distinctly in our specimen, and Prof. Huxley, in his recent Hunterian Course, described it as so doing in the Pig. (Figs. 11 & 12, *E. l. d.*)

The *peroneus longus*, which is comparatively a large muscle, arises from the head of the fibula, the external lateral ligament passing

\* *Loc. cit.* p. 403.

† *Loc. cit.* p. 377.

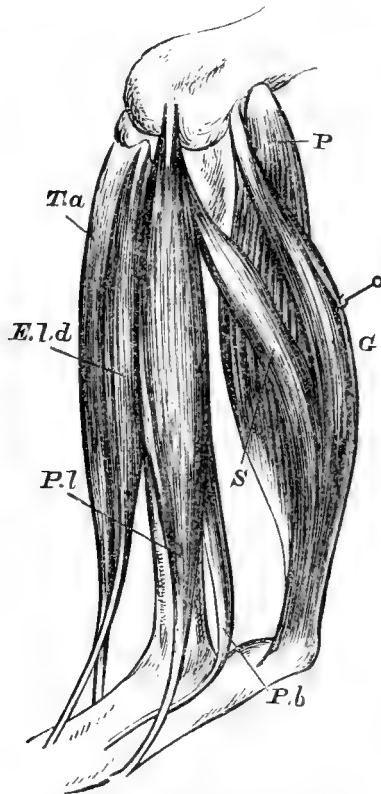
‡ Hunterian Course for 1865.

§ *Anat. Comp.* t. viii. p. 426.

between the two slips of its origin. The tendon does not pass under the external malleolus, but on its outer side; it then passes through to the sole of the foot, between the naviculare and the head of the outermost metatarsal, the tendon dividing, one part being inserted into the navicular bone, the other running on between that bone and the head of the innermost metatarsal, to its inner side, where it seems to be inserted.

The *peroneus brevis* extends from the outer margin of the fibula, and, passing as usual, has its tendon inserted into the distal end of the proximal phalanx of the outermost digit (fig. 12, *P. b.*).

Fig. 12.



Inferior part of lower limb.

*T. a.* Tibialis anticus. *E. l. d.* Extensor longus digitorum. *P. l.* Peroneus longus. *P. b.* Peroneus brevis. *S.* Soleus. *G.* Gastrocnemius. *P.* Plantaris.

The *extensor brevis digitorum* occupies the outer half of the dorsum of the foot. It arises from the external lateral ligament, the astragalus, and os calcis, and ends in three digitations, each terminating in a minute tendon. These tendons are inserted into the outer sides of the proximal ends of the three proximal phalanges, and not alone into those of the two internal ones, as Meckel\* records.

\* *Loc. cit.* p. 429.

The *gastrocnemius*, which is a well-developed muscle, arises by two heads from the outer and inner condyles of the femur; these unite, as usual, to give origin to the tendo Achillis, which is broad (figs. 11 & 12, *G.*).

The *soleus* arises from the head of the fibula, beneath the popliteus, and is united to the tendo Achillis (fig. 12, *S.*).

The *plantaris* is likewise a very strong muscle, arising from the external condyle. Its tendon passes to the inner side of the tendo Achillis, and then over the tuberosity of the calcaneum, being there separated from the last-named tendon, as are the homologous muscles of the hand. The tendon then passes into the sole of the foot to form the plantar fascia, which last divides into three slips to be inserted into the three toes (fig. 12, *P.*).

The *flexor longus digitorum* is rather diminutive, and arises from the heads of the tibia and fibula, continuing its origin as far down as the popliteus—that is, to near the middle of the tibia.

Its somewhat small tendon passes within the internal malleolus, and joins with that of the flexor longus hallucis about the middle of the foot, and although smaller than that muscle, appears to contribute the greater share to the formation of the perforating tendons of the two inner digits, these two muscles blending together as in the Pig (fig. 13, *F. l. d.*).

The *flexor longus hallucis* is a much stronger muscle than the preceding, rather beneath and external to which it takes origin, *i. e.* from the neck of the fibula and interosseous membrane. Its broad and strong tendon, which, as in the Pig, is much larger than that of the flexor longus digitorum, passes in the groove between the os calcis and the inner malleolus, and thence into the middle of the foot, and joins the tendon of the last-named muscle, uniting with it to form the perforating tendons of the two inner digits, but sending a separate tendon to the outermost or fourth digit. (Fig. 13, *F. l. h.*)

The *tibialis posticus* is entirely wanting.

The *popliteus* arises by a strong tendon from the groove on the outer side of the outer condyle, and is inserted into the tibia from its neck to almost the middle of the bone.

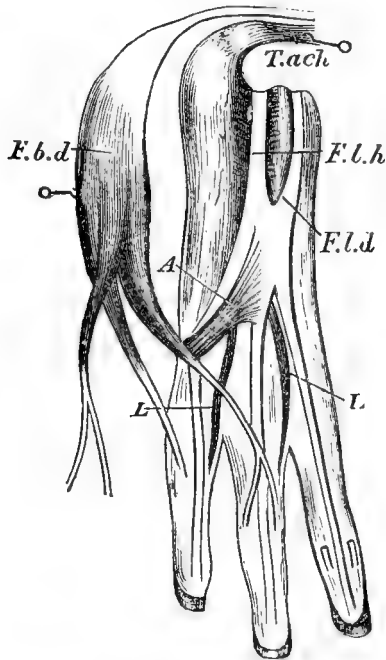
The *flexor brevis digitorum* is of fair size, corresponding to the dimensions of the foot. Origin, superficial plantar fascia, calcaneum, and external malleolus; while it is also attached to the deep plantar fascia. Anteriorly it divides into three thin and flattened tendons, which are very closely applied to the deep flexor tendons, and bifurcate, as usual, to give passage to the latter. We could not but remark the very close correspondence between this muscle and the flexor brevis manus, both in appearance and attachment. (Fig. 13, *F. b. d.*)

There is a small bundle of muscular fibre which arises from the plantar surface of the deep flexor tendon, and is inserted into the middle tendon of the flexor brevis. This is, apparently, all that represents the *accessorius* (fig. 13, *A.*).

The *lumbricales* are two in number, as in the hand: one arises from the deep middle tendon close to the accessorius (of which it almost appears a continuation), and is inserted by a delicate tendon

into the inner side of the proximal phalanx of the middle digit; the other one arises from the outermost deep tendon, on the inner border of its plantar surface, and is inserted into the inner side of the proximal phalanx of the outermost (fourth) digit (fig. 13, *L, L.*).

Fig. 13.



Sole of the hind foot.

*T.ach.* Tendo Achillis. *F.l.h.* Tendon flexor longus hallucis. *F.l.d.* Tendon flexor longus digitorum. *F.b.d.* Flexor brevis digitorum, with one of its perforated tendons cut through, and the whole muscle drawn to the one side to expose the deep flexor tendons. *A.* Accessorius. *L.* Lumbricales.

As in the hand, so in the foot, the only muscle visible on the dorsal surface is that situated on the inner side of the innermost digit.

The muscles on the plantar surface are seven in number, three being more or less double, and apparently corresponding to the four pairs of interossei above described as existing in the hand, the other four being single. The three more or less double muscles arise (as in the hand) from the fasciæ covering the proximal ends of the lower surfaces of the metatarsal bones, and are inserted into sesamoid bones, one on each side of the distal end of each metatarsal, the sesamoids acting on the proximal phalanges by the connecting tendinous fasciæ (fig. 8, *I, I, I*).

The single interosseous muscles are also four in number, as in the fore foot.

The first single interosseous is very large and strong. It arises from the inner half of the plantar surface of the metatarsal of the index, filling the concavity on the inner and dorsal surface of that

bone, and is *inserted*, by a small tendon, into the fascia adjoining the innermost sesamoid (fig. 8, I. 1).

The second single interosseous *arises* from the plantar surface of the *os naviculare* and one of the cuneiform bones, and is *inserted* into the outer surface of the proximal end of the proximal phalanx of the index digit by a small tendon (fig. 8, I. 2).

The third single interosseous muscle *arises* from the fascia on the under surface of the proximal end of the middle metatarsal bone, and is *inserted* into fascia on the inner side of the inner sesamoid bone of the middle digit (fig. 8, I. 3).

The fourth single interosseous muscle *arises* from the strong tendinous fascia covering the plantar surface of the cuboid, and is *inserted* into the inner side of the proximal end of the proximal phalanx of the outermost digit (fig. 8, I. 4).

The existence of the interossei of the foot is mentioned by Meckel (*loc. cit.* p. 461), but nothing is said in the way of description.

A very strong and thick ligamentous fascia covers the under and outer side of the calcaneum; muscular fibre contained in and arising from this is inserted into the head of the outermost metatarsal bone (fig. 8, *Ab. o. m. q.*). Query,—Does this represent Prof. Huxley's *abductor ossis metacarpi quinti*, only here attached to the fourth instead of to the fifth metatarsal?

After having thus passed in review almost all the muscles of the *Hyrax*, it might perhaps be expected that we should express some decided opinion as to the value of these in reference to the zoological affinities of the animal. But this we are not prepared to do.

It is true that such characters as the attachment of the sternomastoid to the mandible, the development of the sterno-scapular, the very small size of the deltoid, but enormous proportions of the triceps, and great extent of the brachialis anticus, together with the arrangement of the glutei, the vast size of the semimembranosus, the attachment of the extensor longus digitorum to the femur, &c., tend rather to confirm than otherwise those ungulate affinities which have been attributed to the *Hyrax*.

But, on the other hand, we find so many resemblances to the Rodentia, as exemplified in the Guinea-pig (specially selected by us for comparison as the most Pachyderm-like of accessible Rodents), that we are indisposed, from the consideration of the muscular structure alone, definitely to assign the *Hyrax* to one or other of the *existing* orders constituting the class Mammalia.

## 2. DESCRIPTION OF A NEW SPECIES OF INDIAN PORCUPINE. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

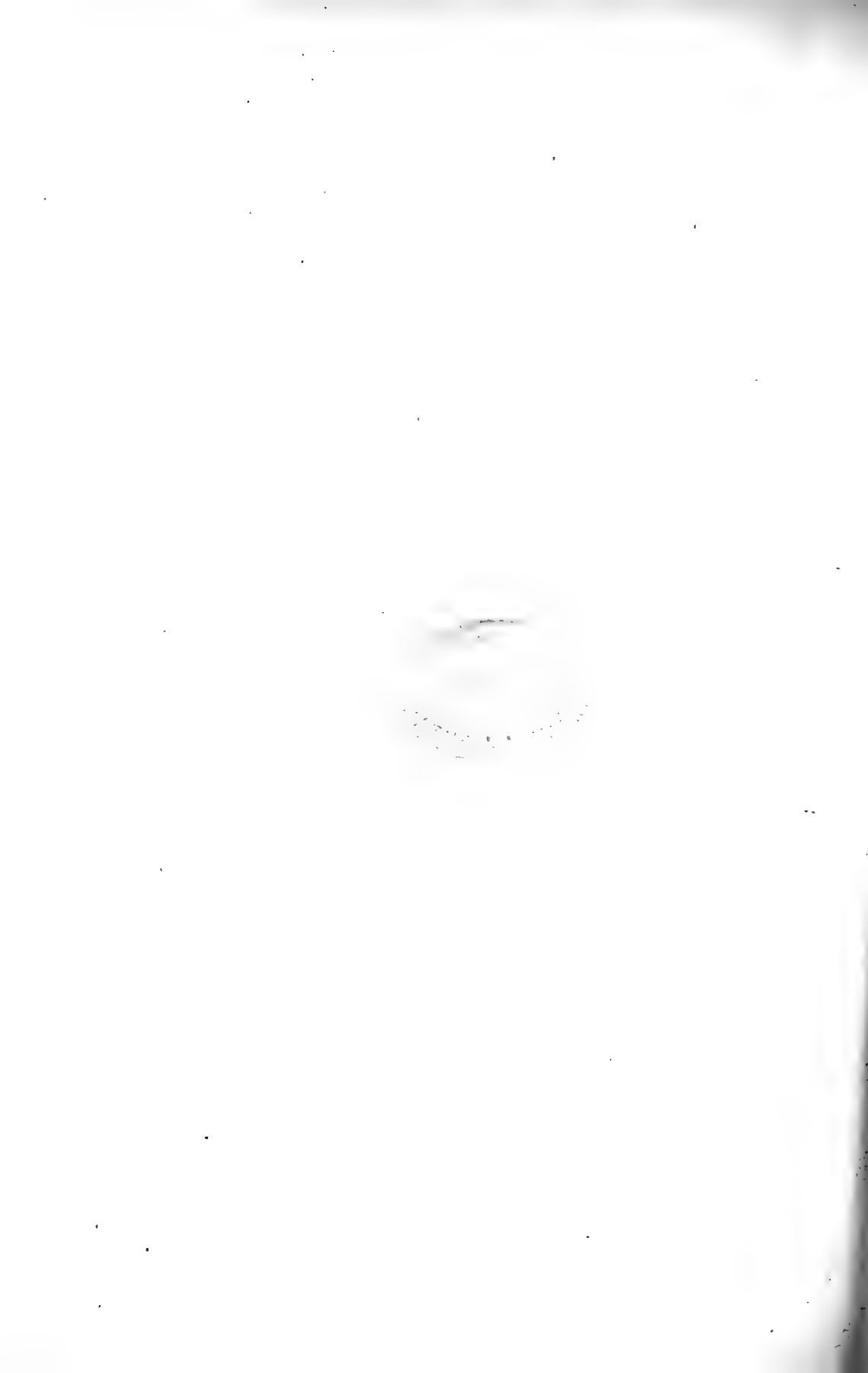
(Plate XVI.)

About three years ago I received a communication from our excellent Corresponding Member, Colonel Sir William Thomas Denison,



J. Wolf del., et lith.

HYSTRYX MALABARICA





K.C.B., Governor of Madras, inquiring of me whether anything was known in Europe of a second Indian Porcupine, distinguished from the common species by having some of its quills of a deep orange-colour. Upon my replying that this Porcupine appeared to be unrepresented in our collections of animals either living or dead in this country, and would moreover probably prove new to science, Sir William promised to do his best to obtain living specimens of it for the Society's Menagerie. The first examples of this animal obtained by Sir William for transmission to this country died, I believe, before they were shipped. But in the latter part of last year Sir William was successful in obtaining four other living specimens, which reached this country in safety on the 22nd of December last. Three of these Porcupines are still living in the Society's Menagerie. The fourth died a few days after its arrival, and was found one morning already partially devoured by its carnivorous companions. Enough, however, remained of it to make a tolerably good skin, which, together with the skull, I now exhibit. Upon these materials I propose to attempt to give characters to this hitherto undescribed species.

Before doing so, however, I should mention that this species, although it has never yet been described, and, as far as I can ascertain, has never reached Europe before, alive or dead, has been already provided with a name, which I do not propose to alter. Mr. Francis Day, Fellow of this Society, late of H. M. Madras Medical Service, in his work on the native Indian state of Cochin, called 'The Land of the Permauls,' published at Madras in 1863, has spoken of this animal as "The Orange Porcupine, *Hystrix malabaricus*," and given some details respecting it\*. Mr. Day has also kindly supplied me with some further notes respecting it, which I shall give presently.

I commence, however, by characterizing the species, which belongs to the typical *Hystriees*, and is very closely allied to *H. leucura*, as

**HYSTRIX MALABARICA, sp. nov. (Pl. XVI.)**

*H. cristæ setis purpurascenti-nigris, unicoloribus; rostro pilis minutis obsito: colore corporis antici purpurascenti-rubro, spinis ad basin aurantiacis, inde ad apicem purpurascenti-nigris: spinis dorsi elongatis, aliis aurantiaco-rubro et nigro, aliis, sicut in specie vulgari, albo et nigro annulatis: dorsi postici linea mediali distincta, e spinis aliis albis, aliis aurantiacis composita: cauda longa, spinis aliis albis, aliis aurantiaco-rubris.*

Long. tota a rostro ad basin caudæ 28·0 poll., caudæ 8·0.

*Hab.* India Meridionalis, prov. Cochin.

*Obs.* Affinis *H. leucuræ*, sed spinarum colore, rostro minus setoso, et cauda longiore distinguenda.

Although the general external appearance of this Porcupine is remarkably different from that of *H. leucura*, so that the living animal strikes one at the first glance as being undoubtedly distinct, I have been somewhat disappointed, on comparing the two skins together, to

\* Land of the Permauls, pp. 446, 447.

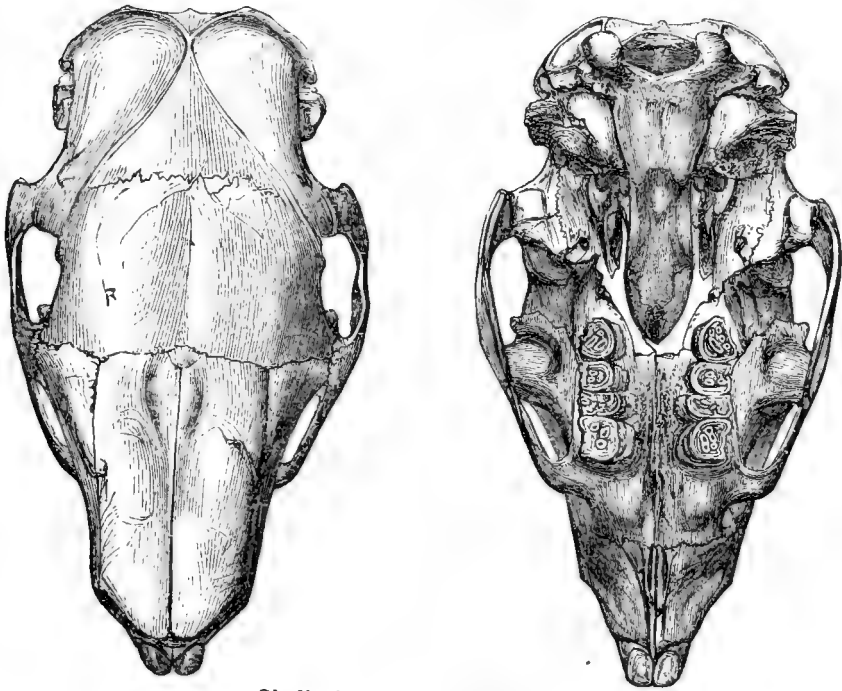
find how difficult it is to detect any very decided differences in their structure. The muzzle in the present specimen of *H. malabarica* (which is the only individual I have been able to examine) seems to be decidedly less clothed with hair than in *H. leucura*. This is one of the few points in which *H. leucura* differs externally from *H. cristata*, and in this respect the present specimen seems more like *H. cristata*. The whole of the short spines and hairs of the anterior portion of the body in *H. malabarica* are dark reddish orange at their bases, growing into purplish brown at their tips; and the same is the case with those of the flanks and legs. The elongated spines of the middle of the back are some of them black, annulated with white, just as in *H. leucura*; others, more especially towards the sides, where these latter rather predominate, have the white replaced by a bright orange-red. The medial line of the rump is well defined, as in *H. leucura*; but the white spines are mixed with others wholly orange. This is likewise the case with the spines round the base of the strong spines which terminate the tail: some of these are wholly white, and some wholly orange. The strong spines which surround the tail, and extend beyond its extremity, are mostly wholly white, with some wholly orange intermixed. In the centre of these are about twelve of the singular hollow truncated quills mounted on pedicels, just as in *H. leucura* and *H. cristata*\*. About one-fourth part of these abnormal quills are orange; the others are white.

As the cranial characters of the species of *Hystrix* are generally very well marked, and indeed the only test by which the species can be certainly distinguished, I was in hopes of finding in the cranium of *Hystrix malabarica* some more certain evidence of its real distinctness from *H. leucura*. I have therefore carefully compared the skull of the new species with a fine series of six skulls of *H. leucura* in the British Museum †, in doing which I have received the valuable assistance of my friend Dr. Peters, who happened to be present at the occasion. The skull of *Hystrix malabarica*, which is that of a very old animal with the molar teeth worn very low and the cranial sutures nearly obliterated, agrees in the shape of the nasal and intermaxillary bones with *H. leucura*. As in the latter species, so in *H. malabarica* the nasal bones have their sides nearly parallel with the hinder margin, terminating nearly in a line with the anterior edge of the orbit, and the nasal processes of the intermaxillaries are broad and truncated. At first I was inclined to think there was some difference in the patterns of the molar teeth of the two species, those of *H. malabarica* being surrounded by a complete cingulum of enamel, and the internal areas being completely isolated, which is not the case in *H. leucura*. But this, I suspect, is only due to the age of the specimen. It would therefore be desirable to have further specimens of the skull of *H.*

\* I am not aware whether any explanation has ever been given of the use of these curious quills. My impression is that they serve to act as a rattle, which is thus formed, as in the Rattle-Snakes (*Crotalus*), by a cutaneous development at the end of the tail.

† *H. cristata* and *H. leucurus* of the 'Catalogue of the Bones of Mammalia in the British Museum' (1862), p. 191.

*malabarica* for comparison upon this point; but in other respects there seem to exist differences in the skulls of the two species which are amply sufficient to confirm their specific separation.



Skull of *Hystrix malabarica*.

1. In *H. leucura* the total length of the molar series is greater than the distance between the molars and the tympanic bone; in *H. malabarica* it is rather less.

2. In *H. malabarica* the entopterygoid is more remote from the tympanic bone, and is of a different form.

3. The facial surface of the lachrymal is very small in *H. malabarica*—much smaller than in *H. leucura*.

4. The rostral part of the cranium is more elongated and more compressed in *H. malabarica*, and the foramina incisiva are longer and narrower.

These and other minor peculiarities will, I think, sufficiently serve to separate *H. malabarica* from its nearest ally, although it is of course desirable that further specimens should be obtained for comparison.

With regard to the habits of *H. malabarica*, Mr. Day has kindly furnished me with the following particulars:—

“During my residence at Cochin I was informed by the natives that a species of orange-coloured Porcupine was found in the neighbouring hills, the flesh of which was more highly esteemed for food than that of the common variety. It was said to be a smaller species, and that the two never lived in the same locality. Small families of

them, I subsequently ascertained, are found in various places along the ghawts of Cochin and Travancore.

“At Trichoee, about forty miles north-east of Cochin, there was a colony of these animals. They had formed their burrows in the laterite rock, in a spot from which it was impossible to reach them by digging. As I was anxious to obtain one of them, the burrows were stopped and a pitfall dug before two, which were the most frequented; brushwood was then heaped before the other apertures and set on fire, but the prisoners did not venture out until they had been smoked three days and nights.

“The native sportsmen declare that the aroma from these burrows is quite sufficient to distinguish the different species.

“In 1862 I placed a pair, about a third grown, in a cage, and kept them there nearly two months: although they permitted the dogs and cats to steal their food, they never became tame or even friendly with those who fed them.

“They were omnivorous; and, though quiet all day, as soon as it became dusk they commenced to gnaw their cage, and continued to do so until daybreak; subsequently, when the bars were encased with tin, they passed the night scratching.

“In captivity they lose much of their orange-colour; and its vividness greatly decreases when they are ill.

“The natives consider wounds caused by their quills to be venomous, and the effects frequently fatal.”

It may be useful to add to this paper a list of the known species of *Hystrix*, and their localities, arranged according to Mr. Waterhouse's excellent system\*.

#### a. Species nucha cristata.

1. *H. CRISTATA*, Linn. et auct. (*Acanthion cuvieri*, Gray); Waterhouse, *l. c.* p. 448: ex Europa merid. et Africa bor. et occ.

2. *H. AFRICÆ AUSTRALIS*, Peters, *Reise n. Moss.* i. p. 170: ex Africa austr. orient.

3. *H. LEUCURA*, Sykes (*H. hirsutirostris*, Brandt; Waterhouse, *l. c.* p. 454; *H. cristata* et *H. leucurus*, Gray): ex Asia occidentali usque ad Indiam extremam.

4. *H. MALABARICA*: ex India merid.

#### b. Species nucha non cristata.

5. *H. HODGSONI*, Gray; Waterhouse, *l. c.* p. 461: ex India superiore.

6. *H. JAVANICA* (F. Cuv.); Waterhouse, *l. c.* p. 465: ex Java.

The Society's collection contains at the present time fine living specimens of four of these, namely, *H. africæ australis*, *H. leucura*, *H. malabarica*, and *H. javanica*.

\* Nat. Hist. Mamm. vol. ii. p. 446 et seq.

3. NOTES ON THE WHALES OF THE CAPE; BY E. L. LAYARD, ESQ., OF CAPE-TOWN, CORR. MEMB. WITH DESCRIPTIONS OF TWO NEW SPECIES; BY DR. J. E. GRAY.

Mr. E. Layard, the Keeper of the South African Museum at Cape-Town, has most kindly sent me descriptions and drawings, made by Mr. Trimen, of the skulls of the Cetacea contained in that museum. Amongst these is the drawing of a Porpoise or Grampus taken in Kalk Bay (Simon's Bay). Unfortunately the skull of this animal was placed in the skin during Mr. Layard's absence from the Cape; so that it cannot be got at for description; but, from what he saw of the dentition, he believes it is like a Grampus—very like the figure of the skull of *G. cuvierii* in the 'Catalogue of Cetacea in the Collection of the British Museum,' t. 5. f. 1. He says that there is a separate skull, greatly resembling that figure, in the South African Museum.

The Grampus (?) prepared with the skull in the skin, mentioned above, is represented as having a rounded head, without any appearance of a beak. "It is entirely deep brown black; the skin smooth, with a few wrinkles behind the chin and on the front edge of the pectoral fin.

"The entire length, from the nose to the end of the tail, 8 feet; from the nose to the front base of the dorsal fin, along the curve, 3 feet 9 inches; of the dorsal, 10 inches; of the back, from the hinder edge of the dorsal fin to the end of the tail, 3 feet 10 inches; width of the tail, 1 foot 11 inches.

"Length from the front of the mouth to the base of the pectoral, 1 foot  $5\frac{1}{2}$  inches; of the upper edge of the pectoral, 1 foot 5 inches."

In the South African Museum are two smaller skulls from the coast of the Cape,—one apparently of a *Steno*, with  $\frac{37}{38}$  teeth; and the other of a *Delphinus*, probably the common one of Table Bay, which has  $\frac{24}{25}$  teeth.

These are probably new species, to be described.

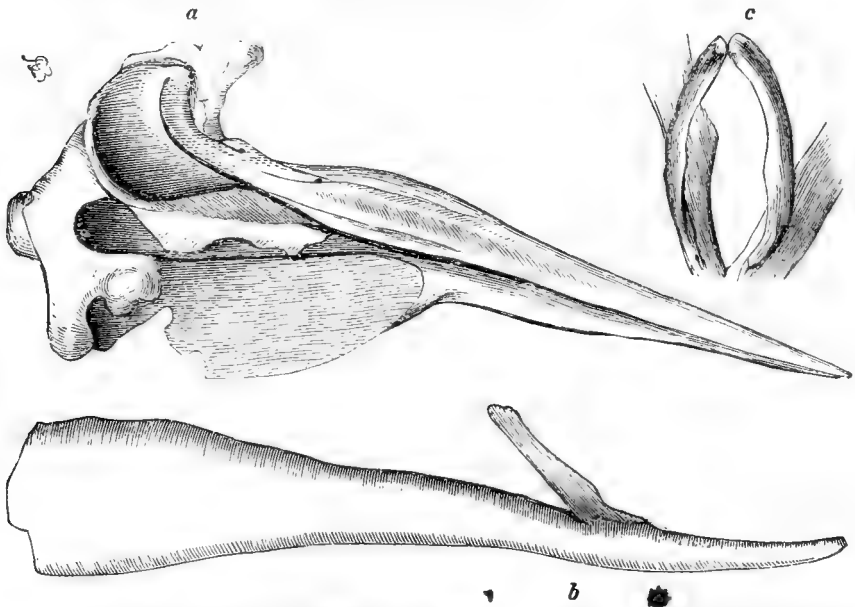
Mr. Layard observes, "These Cetaceans are constantly in the Bay; but I cannot get the fishermen, who catch plenty of the *Delphinus*, to bring them to the museum. I have offered the market value, besides all the flesh and the blubber; but they are so prized as food by the men that they are cut up instantly and sold by auction."

"Two, if not more, species of Whales come into our bays to calve. I have never been fortunate enough to see them entire; but, from the remains, I think them to be the "Right Whale" (*Balæna*) and Humpback (*Megaptera*). By the way, do you know the meaning of *Pæskop*? The Dutch are the dirtiest-minded people I ever met with: they have heaps of such names for their animals and plants."

"I have seen off the coast several species of Whale (one near Agulhas) with an enormous elongated back-fin; which could it be? They are in sight for an hour at least."

"I send you a drawing, by our friend Mr. Trimen, of the skull of a Cetacean which I have taken to be a *Ziphius*, probably a very old *Ziphius sechellensis*; but the figure in your 'Catalogue of the Ce-

tacea in the British Museum,' t. 3. f. 2, does not convey any idea how the curious flattened teeth arch over the upper jaw, as shown in Mr. Trimen's drawing. I stood by him all the time, so can answer for the correctness of the sketch; and I took the measurements myself." The drawing shows that it is the skull of an animal more allied to *Ziphius micropterus* than to *Z. seychellensis*. It differs from *Z. seychellensis* in the lower jaw being elongate, slender, gradually tapering in front, like the lower jaw of *Z. micropterus*. It differs from the latter species in the tooth on the side of the jaw being elongated, strap-shaped, with a small process\* in the front side of the truncated apex, and especially in these teeth being arched inwards, forming a high arch "over the upper jaw," the crown of the lateral teeth being short and triangular in *Z. micropterus*. It is evidently quite distinct in the form of the rostrum of the skull and the shape of the teeth from the *Ziphius micropterus* of the coast of Europe. I therefore propose to call it *Ziphius layardii*.



*a, b.* Skull and lower jaw of *Ziphius layardii*. *c.* Teeth of lower jaw, from front.

The entire length of the skull, from condyle to top of the rostrum, 3 feet 7 inches; of the rostrum, from tip to the notch, 2 feet 6 inches; the width at the widest part of the brain-case 1 foot 6 inches; the length in a straight line, from the tip of the rostrum to the crest over the blower, 2 feet 11 inches; the height of the skull, from the hinder part of the palate to the crest over the blower, 1 foot 2 inches.

The entire length of the lower jaw 3 feet; the length of the condyle, to the hinder edge of the base of the tooth, 1 foot 11½ inches; the length of the exposed part of the tooth along the anterior edge, 9½ inches; the width below the teeth of the side of the lower jaw, measured from the inner part of their base, 3 inches.

\* The process is not so distinctly shown as it ought to be in the woodcut.





J. Wolf del. et lith.

M. & J. Harcourt imp.

PHOLIDOTUS AFRICANUS



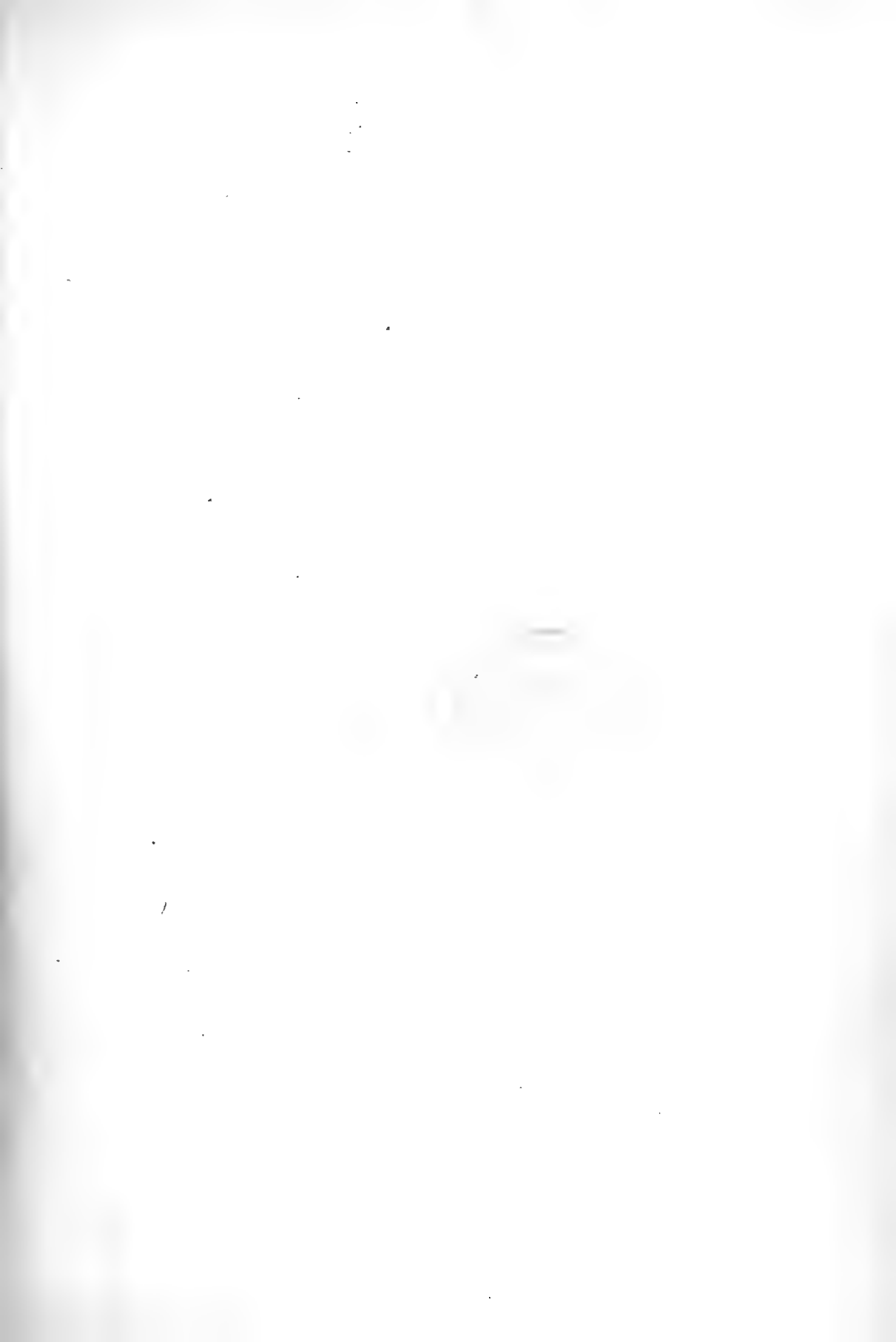




M & N Hanhart imp

DASYPUS VELICOSUS

J. Wolf del et lith





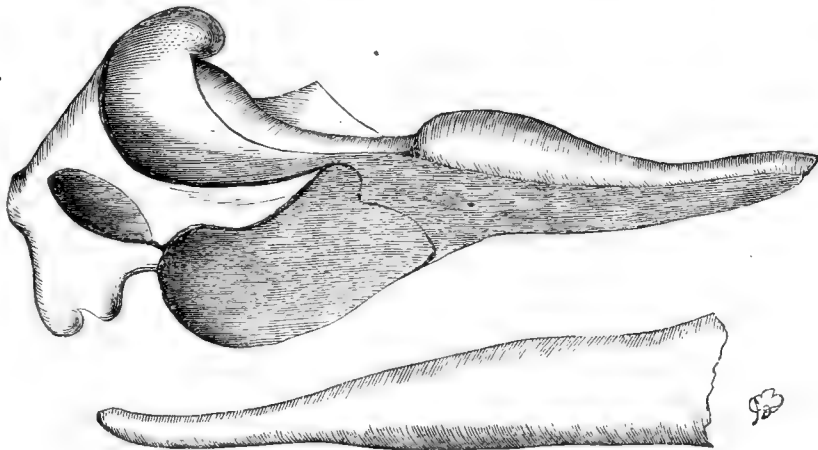
1/2

There is a partial hollow, as if it were the cavity of an old tooth that had fallen out, on the margin of the inner jaw, behind the base of the elongated arched tooth.

"In your letter you sent me a sketch of the skull of *Ziphius indicus* with two teeth in the front of the lower jaw, and a short stumpy head, totally unlike the skull of *Ziphius* figured in the 'Catalogue of Cetacea.'"

"There is a skull in the South African Museum which I have got down as a *Globiocephalus*. It is the skull of a very old animal without teeth; but I think I can trace that it has had two front teeth in the lower jaw, if not also along (the edge of) the upper and lower jaw. The animal was taken on our coast."

The figures of the skull which accompany this note appear to me to represent the skull of a species of *Hyperoodon*, which differs from *Hyperoodon* of Europe in having only a low crest on each side of the maxillary bones. I would propose to designate the species *Hyperoodon capensis*.



Skull and lower jaw of *Hyperoodon capensis*.

The length of the skull, from the end of the rostrum to the occipital condyle, is 3 feet; the height of the skull, from the crest of the blower to the condyle, 2 feet; the greatest width of the braincase 1 foot 7 inches.

4. REVISION OF THE GENERA AND SPECIES OF ENTOMOPHAGOUS EDENTATA, FOUNDED ON THE EXAMINATION OF THE SPECIMENS IN THE BRITISH MUSEUM. BY DR. JOHN E. GRAY, F.R.S.

(Plates XVII., XVIII., XIX.)

The species of this family of animals have been so well described by Cuvier, Sundevall, Lund, Burmeister, and others, that I have only

one or two new species to describe. I have attempted to arrange the genera, especially of the *Dasypodinae*, in more natural groups.

The osteological characters have been well studied by Cuvier, De Blainville, Owen, Rapp, Turner, and others.

I have figured the skulls of a few species which have not before been published.

### Section EDENTATA ENTOMOPHAGA.

Grinders rootless. Canines sometimes entirely wanting; if present, like the grinders. Face elongate; mouth mostly small. Body armed with scales, spines, or rigid hairs. Limbs short and strong, hinder ones longest. Stomach simple; malar bone simple or wanting.

*Dasypidæ*, Gray, Ann. Phil. 1825; Cat. Mamm. B. M. 188.

*Effodientia*, Baird, N. A. Mamm. 621.

*Insektenfressende Edentaten*, Rapp, Edent.

### Division 1. CATAPHRACTA.

Body covered with scales, or with an external armour divided into rings or bands, generally revolute.

#### Fam. 1. MANIDIDÆ.

Body covered with scales. Tail expanded. Claws of feet bent on the sides in walking.

1. **MANIS.** Upper part of fore feet hairy, without any scales. Tail very long, slender. Scales elongate, narrow, keeled; central series of caudal scales continued to the end.
2. **PHOLIDOTUS.** Upper part of fore and hind feet covered with scales to the toes. Scales broad, short. Tail moderate, tapering; central series of caudal scales continued to the end.
3. **SMUTSIA.** Upper part of fore and hind feet covered with scales to the toes. Scales broad, short. Tail moderate, very broad to the end; central series of caudal scales not continued to the end.

#### Fam. 2. DASYPODIDÆ.

The body covered with a bony convolute armour, formed of tesserae.

**Tribe 1. DASYPODINA.** The dorsal disk closely attached to the back of the animal, divided in the middle into three parts by free rings separating the scapular and pelvic shields; pelvis free from the pelvic shield; scapular or pelvic shield moderate; central rings many; feet strong; hind toes free; claws large. Skull not soldered to the frontal shield. Tail elongate. **PELTOCHLAMYDES.**

A. Digitigrade. *Backs of feet round, covered with plates; toes of the front and hind feet separate; claws conical. Head elongate; ears close together. Chærochlamydes.*

4. TATUSIA. Toes  $5/4$ . Tail with rings of plates.

B. Plantigrade. *Soles of feet flat, callous, with a prominent heel; toes of fore feet united to the claws, compressed; claws compressed, sharp-edged below. Toes of hind feet separate; claws elongate. Head broad; ears far apart. Platychlamydes.*

\* *Head conical. Teeth many, small.*

5. PRIONODOS. Toes  $5/5$ ; middle front very large; outer front toes very small. Intermaxillary toothless. Four front bands of tesseræ of the scapular shield partially free.

\*\* *Head flat, conical. Teeth few, nine or ten, large; intermaxillary with one tooth on each side.*

6. DASYPUS. Tail round at the base, tesseræ convex. Marginal plates of the dorsal disk small; nuchal band linear, broad to the end; first band of plates of the scapular shield fixed like the rest.

\*\*\* *Head broad, conical. Teeth few, nine or ten, large; intermaxillary toothless.*

7. EUPHRACTUS. Tail ringed at the base; tesseræ convex. Marginal plates of the dorsal disk falcate; nuchal band narrow at the sides; first band of the scapular disk more or less free.

8. XENURUS. Tail nakedish, with sunken shields.

Tribe 2. TOLYPEUTINA. Scapular and pelvic shields large, convex; central rings three, only attached to the middle of the back, which is covered with hair on the sides under the shield. Feet weak; front with elongated unequal claws, on the tip of which the animal walks; hinder feet clavate, with flat ovate nails; hind part of feet rounded, shielded. Skull attached to the frontal shield. Tail short. SPHÆROCHLAMYDES.

9. TOLYPEUTES.

Tribe 3. CLAMYDOPHORINA. The dorsal disk divided behind into a dorsal and a pelvic shield. The pelvic shield agglutinated to the pelvis. Feet strong; toes united; claws large.

10. CHLAMYDOPHORUS. The dorsal shield only attached by the middle of the back, which is covered with hair on the sides.

11. BURMEISTERIA. The dorsal shield attached to the skin to its edge.

## Division 2.

Body covered with hairs or spines, not with scales or armour.

## Fam. 3. ORYCTEROPODIDÆ.

Body covered with bristles. Head conical; mouth small.

## 12. ORYCTEROPUS.

## Fam. 4. MYRMECOPHAGIDÆ.

Body covered with hair. Head conical; mouth small.

\* *Terrestrial. Tail bristly. Teeth 5.*

## 13. MYRMECOPHAGA. Tail covered with long hair.

\*\* *Arboreal. Tail conical, prehensile.*

14. TAMANDUA. Teeth  $5/4$ , covered with short hair.15. CYCLOTHURUS. Teeth  $2/5$ , covered with silky hair.

## Fam. 5. ORNITHORHYNCHIDÆ.

Body covered with hair or spines. Mouth in the form of a flat or cylindrical beak. Hind feet of males spurred.

## 16. PLATYPUS. Head depressed. Body covered with fur. Feet expanded, webbed.

## 17. ECHIDNA. Head slender, conical, tapering. Body covered with spines. Feet with long claws.

## Division 1. CATAPHRACTA.

Body covered with scales, or with an external armour divided into ring bands, revolute.

## Fam. 1. MANIDIDÆ.

Body covered with scales. Tail flat, expanded. Toes bent up. Walking on the outer side of the feet. Fossorial; slow; forming a globe when contracted. (*Osteology*.—See Cuv. *Oss. Foss.* v. 99; Sundevall, *Kong. Vet. Akad. Hand.* 1842, p. 274; Turner, *P. Z. S.* 1851, p. 219.)

*Manina*, Gray, *Cat. Mamm. B. M.* 188.

*Manidæ*, Turner, *l. c.* 1851, p. 219.

*Vermilinguia*, Giebel, *Säugeth.* p. 394.

Cuvier only knew of two species, the long- and the short-tailed (see *Oss. Foss.* v. 98).

Dr. Sundevall, in the 'Kongl. Vetensk. Akad. Handlingar' for 1842, p. 245, has published an excellent essay on the species, the anatomy and the history of the genus. This essay is nearly reproduced by M. Ad. Focillon, 'Rev. Zool.' 1850, pp. 465 & 513.



Rafinesque has described a species under the name of *M. cæonyx*, because he believed it had a bifid claw; but he seems to have mistaken the bone that bears the claw, which in all the species is bifid, for the claw.

### 1. MANIS.

The upper surface of the fore feet hairy, without any scales. Scales of the body slender, oblong, with nearly parallel striæ. Tail much longer than the body, narrow. The central series of caudal scales continued to the end. Claws compressed; the first or outer claw of each foot very small, retracted behind. Africa.

*Manis*, § 1, Sundevall, *l. c.* 251.

The nose bald; the side of the face, chin, underside of the body, the upper surface of the hands and wrist without scales, and covered with short hair; the conch of the ear not developed.

\* *Scales of the body dark brown, in eleven series.* Manis.

#### 1. MANIS LONGICAUDA. Pangolin. B.M.

Dark brown; hair of face and underside of body black. Scales of the body in eleven series; end rounded, with a central prominence. Tail very long. Body and head 11, tail 24 inches.

*Manis tetradactyla*, Linn. S. N. i. 53; Fischer, Syn. 394; Gray, Cat. Mamm. B. M. 188; Turner, P. Z. S. 1851, p. 220.

*M. macroura*, Erxl. Syst. 101.

Var. ? *M. africana*, Desm. Mamm. 376.

*M. longicauda*, Geoff., Sundevall, *l. c.* 251.

*Pholidotus longicaudatus*, Briss. R. A. 31.

*M. longicauda* β, Sundevall.

*M. longicaudata*, Rapp, Edent. 15; Shaw, Zool. i. 180, t. 55.

*Pangolin d'Afrique*, Cuv. Oss. Foss. v. 98.

*Hab.* Africa: Guinea, Gaboon.

\*\* *Scales of body horn-coloured, in twenty-one series.* Phatagin.

#### 2. MANIS TRICUSPIS. Phatagin. B.M.

Pale brown; hair of face and underside of body grey; scales of the body in twenty-one series, truncated, with a central prominence, often appearing three-pointed. Body 12, tail 18 inches.

*Phatagin*, Buffon.

*Manis tricuspis*, Rafinesque, Ann. Gén. Sci. Phys. de Bruxelles, vii. 214; Sundevall, *l. c.* 1841, p. 252; Rapp, Edent. 15.

*M. multiscutata*, Gray, P. Z. S. 1843; Cat. Mamm. B. M. 188; Fraser, P. Z. S. 1843; Zool. Typ. 15; Turner, P. Z. S. 1851, p. 220.

*M. 4-dactylus*, Thompson, P. Z. S. 1834, p. 28.

*M. tridentata*, Focillon, Rev. de Zool. 1850, t. 1; Rapp, Edent. 16, t. 2 a. (B.M.)

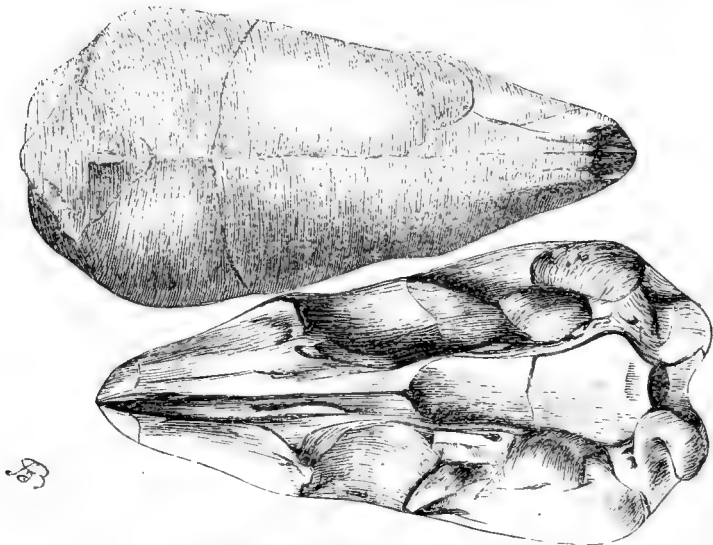
*Hab.* West Africa; Fernando Po (*Fraser*); Guinea; Sierra Leone (*Thompson*). Skeleton and skull (B.M.).

The face of the skull, from the front of the orbit, is rather more than half the length of the brain-case.

A specimen of this species in spirits in the British Museum has the nose produced, conical, bald, smooth, with three series of plates on the front of the forehead, commencing about halfway between the tip of the nose and the eyes. The nostrils are lateral, covered with a well-developed flap. The cheeks and orbits with scattered, short, black hairs, like the hairs on the back of the hand and wrist. Ears without any external conch. The underside of the body with scattered, very short, rigid hairs. The skin of the back between the scales bald. The scales elongate, with straight sides for two-thirds of their length, then contracted, with rather concave sides, with two deep broad notches on each side of the tip, forming three more or less distinct projections, the middle one being the most produced. Soles of fore and hind feet bald and callous, covered with a hard skin, which peels off in spirits. Toes 5/5; the front inner small; the fifth, second, and then the fourth larger; the middle or third largest: hinder inner small, the outer larger; the second and fourth larger, and the third rather larger still, but not so much larger as in the front foot. The upper part of the fore feet and wrist unarmed, and covered with short, scattered hairs. The hind feet covered with scales nearly to the claws, and hairy on the sides and at the base of the claws.

Professor Rapp separates the specimens from Fernando Po as a species, because in the latter the tail is shorter and all the scales are tricuspid; but the specimens from West Africa vary in the length of the tail, and in perfect specimens all the scales are tricuspid.

Fig. 1.



Skull of *Manis tricuspis* (separate).

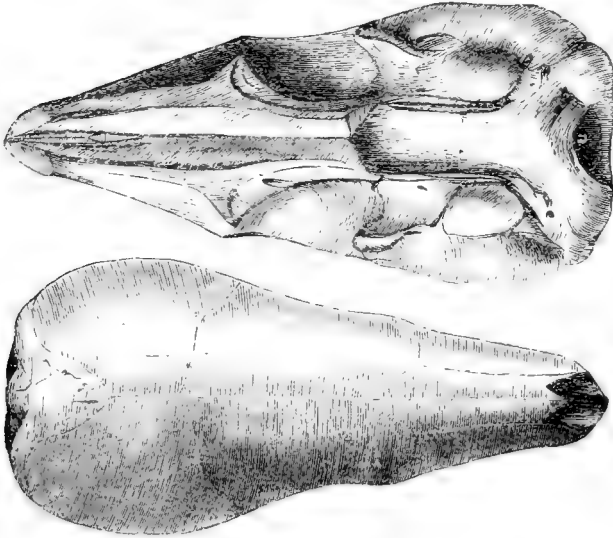
In the British Museum there are a skull and a complete skeleton

which were extracted from the skins of two animals from West Africa, which are so very much alike in form, and in the number and form of the scales and the length of tail, that I should have referred them without doubt to the same species. The skulls, however, are so exceedingly unlike that I believe they might be considered to belong to two species, unless the differences arise from a difference of sex, which the state of the specimens does not allow me to determine.

The separate skull (fig. 1) is very ventricose, thin, light, and showing the sutures.

The skull belonging to the complete skeleton (fig. 2) is smaller, narrower, more conical, solid, and with the suture much less distinctly visible.

Fig. 2.



Skull of *Manis tricuspis* (from the skeleton).

A fœtus of this species, 10 inches long, was noticed by Mr. Thompson under the name of *M. tetradactylus* (Proc. Zool. Soc. 1834, p. 28).

## 2. PHOLIDOTUS.

The fore and hind feet entirely covered with keeled scales; the internal claw of the fore foot nearly equal to the outer one, and not retracted behind. Scales of the body broad, short. Tail moderate, tapering at the end; the central series of caudal scales continued to the tip.

*Hab.* India and Asiatic Islands.

*Manis*,  $\beta$ . *Pholidotus*, Sundevall, *l.c.* 253; Rapp, *Edent.* t. 6. f. 1, 2.

\* Scales dark brown, in seventeen longitudinal series; the three or four series on each side shorter, keeled. Tail as long as body and head. Face of skull elongate, nearly as long as brain-case.

## 1. PHOLIDOTUS JAVANUS.

B.M.

Dark brown; tail as long as body and head; scales of the sides and of the hind feet acutely keeled, the front and hinder claws nearly equal-sized. Head and body 15, tail 15 inches.

*Manis pentadactyla*, Raffles, Linn. Trans. xiii. 249.

*M. javanica* (partly), Fischer, Syn. 400 (not of Sundevall).

*M. aspera*, Sundevall, *l. c.* 253; Rapp, Edent. t. 2a (good), t. 6. f. 1, 2 (skull); Desm. Mamm. 377; Gerrard, Cat. Bones B. M. 285.

*Hab.* Sumatra (*Raffles*). Male and female (B. M.).

Teats two, pectoral; penis pendant.

*Manis aspera* is described from a single specimen in the Paris Museum, sent from Sumatra. It is evidently the same as that which Raffles described and figured under the name *M. javanica*, and which has been so named in the English Museums.

The *M. javanica* of Dr. Sundevall, which he described as having fulvescent scales, is the same as his *M. dalmanni* and the *M. aurita* of Hodgson, which is common in India, and has been generally confounded with the larger-scaled *M. pentadactyla* or *M. laticauda*.

Desmarest describes, under the name of *M. javanica*, the Java animal with keeled scales on the legs, and refers to Raffles.

*Manis guy*, Focillon, Rev. Zool. 1850, t. 10; Rapp. Edent. 17.

"Tail shorter than the body and head; twenty-one longitudinal rows of scales; end of the tail naked on its lower surface; scales broad, ending in an obtuse point, striated to the tip; with bristles between the scales."

Described and figured from a young specimen preserved in spirit, said to have been received from Africa. Appears to me to be only a young specimen of *Pholidotus javanicus*.

The front feet are covered with scales to the claws, and it has the conch of ear moderately developed, not so much so as in *P. dalmanni*.

What is *Manis leucura*, Blyth, Journ. Asiat. Soc. Beng. xxx. 91; Rapp, Edent. 18, thus described, "Tail as long as the body and head; scales of the tail adpressed, so that the margin is entire, not dentated."? The habitat is unknown.

\*\* *Scales horn-coloured; of the back, in seventeen longitudinal series. Tail as long as the body. Conch of ear produced.*

## 2. PHOLIDOTUS DALMANNII.

Pale brown; tail short, as long as the body without the head; scales of the young striated, of the middle of back truncated, of the sides of hind feet keeled; of the older specimen worn smooth; ears large; hair of head and underside of body short, grey. Body and head 22, tail 15 inches.

*Manis*, Dalmann, Act. Stockh. 1749, p. 265, t. 6.

*Manis*, Förster, Act. Berol. 1789 (printed 1793), p. 90, t. 5, 6; Sundevall, *l. c.* 262, 269.

*Manis dalmannii*, Sundevall, *l. c.* 256, t. 4 a. f. 10 (toe-bones), 1842; Rapp, Edent. 17.

*M. aurita*, Hodgson.

*M. pentadactyla* (partly), Gerrard, Cat. Bones B. M. 285.

*M. javanica*, Sundevall, *l. c.* 254, t. 4a. f. 11; Turner, P. Z. S. 1851, p. 219?

*Pangolin*, Buffon, x. t. 34.

*Hab.* India, Himalaya (*Hodgson*); China (*Dalmann*); ?Java (*Sundevall*).

A small specimen of the species, preserved in spirits in the British Museum, may be thus described:—The head ovate, convex above and on the sides. The end of the nose, the side of the face, including the orbit, to the back of the ears, the throat, underside of the body, and the inside of the legs bald, with a few very slender, elongated hairs on the front of the chin. The forehead with one scale, and five series of scales behind it. The ears large, with a well-developed, oblong, nearly flat conch behind; an oblong prominence for a tragus in front of the small auditory aperture. The fore and hind legs covered with series of scales down to the base of the toes; the toes united to the claws. The palms of the fore feet and the soles of the hind feet hard, callous, well developed. The fore feet with five elongated conical claws, which are strongly inflexed on both palms; the inner and outer small, then the second and fourth, and the centre or third the largest. The hind feet with five short, conical, compressed claws; the inner and outer small, the three middle larger, the middle one being rather the largest. The skin of the back, between the bases of the scales, bald; the lower part of the scales and the middle of the scales striated. The tongue elongate, exsertile, flat, linear, tapering to the tip, which is rounded. The eyelids soft, distinct, not ciliated, but the outer surface entirely covered with very short bristles.

Professor Sundevall, in his Monograph, places considerable reliance on the form of the claws, and on the comparative size and form of the claws of the fore and hind feet, as a specific distinction. The specimens which I have examined from the same locality seem to differ very much in this respect.

*Manis dalmannii* was described from specimens from China, which looked like the young of *M. laticauda*. It is probably the same as the many-scaled species from India, or at least must be very nearly allied to it, more especially as the large size of the ears, which caused Hodgson to call it *M. aurita*, is mentioned.

Dr. Sundevall states that his *M. javanica* is from Java, and he believes that it is common there; but he describes all the scales as fulvescent. I have never seen any Javan or Sumatran specimen of that colour. They are always dark brown, while the Indian species is always pale-coloured; and I am inclined to believe that it must have been the Indian species that was described.

There are two skulls of this species in the British Museum, received from Mr. Hodgson as belonging to his *M. aurita*; they are very solid, considerably stouter in proportion to their length than the skull of *M. indica* figured by Cuvier, and they have very broad nasal bones, which are rounded at the hinder end.

Professor Sundevall seems inclined to believe that the skeleton of *Pangolin à courte queue*, or, as he quotes it, "*Pangolin des Indes*," figured and described by Cuvier in the 'Ossemens Fossiles,' is the skeleton of his *M. javanica*. I think this a mistake. Compare the skull with the skull of *M. javanica* figured by Rapp, which I am assured was taken out of the skin which he figures (which is the true *M. javanica* of this essay). I believe that the *M. javanica* of Sundevall is an Indian and not a Javan species; and it differs from the Indian species figured by Cuvier in the skull being shorter and broader, as mentioned above.

\*\*\* *Scales horn-coloured, pale; of the back, in eleven or thirteen longitudinal series. Tail as long as the body. Ears with only a slightly raised edge, without any distinct conch. Phatages.*

### 3. PHOLIDOTUS INDICUS.

Pale brown; scales striated at the base; tail more slender than the body, tapering to the end, as long as the body without the head; ears not prominent.

"Varies in the width of the tail and the curvature of the claw."—*Sundevall.*

*Manis pentadactyla*, Linn. S. N. i. 51; Gerrard, Cat. Bones B. M. 285 (partly); Gray, Cat. B. M. 188; Turner, P. Z. S. 1851, p. 219.

*M. laticauda*, Illiger; Sundevall, l. c. 259.

*M. macroura*, Desm. Mamm. 376.

*M. brevicaudata*, Tiedem. Zool. i. 497.

*M. brachyura*, Erxl. Syst. 98.

*M. crassicaudata*, Gray in Griff. A. K.; Rapp, Edent. 16.

*Broad-tailed Manis*, Penn.

*Pangolin à courte queue*, Cuv. Oss. Foss. v. t. 8 (skeleton).

*Hab.* Asia—India: Bengal, Madras, Pondicherry, Assam.

The skull in Cuvier's figure (Oss. Foss. v. t. 8. f. 2-4) is much more slender and less ventricose behind than the skulls of *M. dalmannii* in the British Museum. The face is represented as being about two-fifths the entire length of the head; and the nasal bones are narrower and longer.

In a fœtus in spirits in the British Museum, the eyelids are soft, the ears are only fringed with a slightly raised edge, and there are a few bristles projecting between the scales of the back.

Mr. MacClelland describes the *Manis brachyura* of Assam as having fifteen longitudinal series of scales, with bristles in pairs passing out between the scales. The lower part of the head and body and inside of the legs covered with coarse white hairs (Proc. Zool. Soc. 1839, p. 153). Is this *M. dalmannii*?

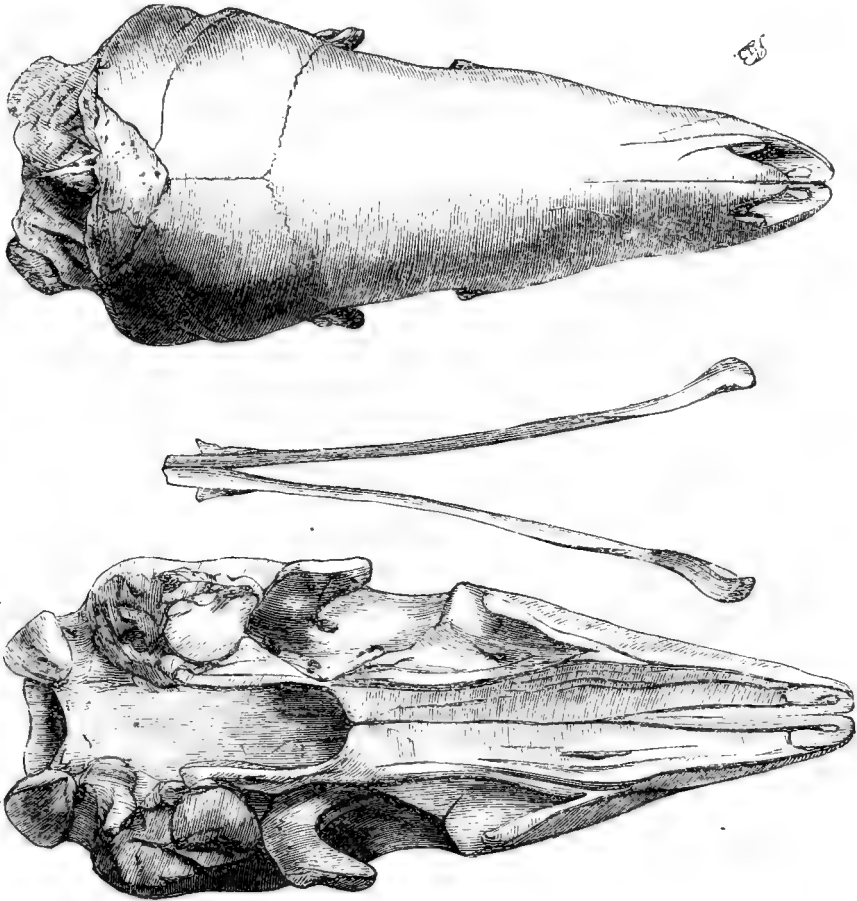
### 4. PHOLIDOTUS AFRICANUS. (Pl. XVII.)

B.M.

Pale brown; scales striated at the base; tail as long as the body, tapering to the end. Body and head 30, tail 25 inches.

*Hab.* West Africa, River Niger (*Dr. B. Baikie*).

Very like *P. indicus*; but the scales are larger, and the tail is longer.



Skull of *Pholidotus africanus*.

What is *Manis leptura*, Blyth, Journ. Asiat. Soc. of Bengal, xvi.; Arch. f. Naturg. 1849; Rapp, Edent. 18?

### 3. SMUTSIA.

Upper part of the fore and hind feet covered with scales. Scales broad, short, and pale-coloured. Tail very broad, rounded at the end; central series of scales interrupted before reaching the end of the tail.

#### SMUTSIA TEMMINCKII.

Scales striated, elongate; of the middle series only on the base of the tail.

*Manis temminckii*, Smuts, Mamm. Cap. 54; Smith, Ill. S. Afr.

Zool. t. 7 (scales bad); Bennett, P. Z. S. 1834, p. 81; Turner, P. Z. S. 1851, p. 219; Gerrard, Cat. Bones B. M. 285; Sundevall, *l. c.* 260, t. 4. f. 2 (young skull and toe-bones); Peters, Reise n. Mossamb. i. 174, t. 32. f. 8 (os hyoides); Rapp, Edent. 17; Rüpp. Mus. Senck. iii. 179.

*Hab.* Eastern Africa, Sennaar, Caffraria, Kordofan (*Hedenborg*), Latakoo (*Steedman*).

Sundevall figures the skull of a very young specimen of this species. It is short, ventricose; the face broad, short, not half the length of the brain-case; the nasal bones are short, broad, wide behind; the lower jaw simple, without any process in the front of the upper edge (see Vet. Akad. Hand. 1842, t. 4. f. 34).

## Fam. 2. DASYPODIDÆ.

Body covered with a bony convolute armour, formed of imbedded tesserae.

*Dasypus*, Linn., Cuvier.

*Dasipina*, Gray, Mamm. B. M. 189.

*Dasypodidæ*, Turner, P. Z. S. 1851, p. 211.

*Fodientia*, Illiger, Burmeister, Thiere Bras. 208; Giebel, Säugeth. 417.

*Loricata*, Vicq d'Az.

Osteology (see Cuv. Oss. Foss.; Turner, P. Z. S. 1851, p. 211).

Cuvier (Oss. Foss. v. 117. 1) divides the Armadillos into three groups according to the number of the toes:—

- I. Hind feet with four toes, the two central equal: *Dasypus novemcinctus*, Linn. = *Tatusia*, *D. tricinctus*, Linn. = *Tolypeutes*.
- II. The hind feet with five claws, one of the middle ones larger: *D. sexcinctus* = *Dasypus*, *Tatou pichey* and *Tatou velu* = *Euphractus*.
- III. The hind feet with five claws, the three outer ones very large: *D. unincinctus* = *Xenurus*; *Tatou géant* = *Prionodos*.

Cuvier observes, "The Armadillos with four toes have a short penis with a large three-lobed gland, and those with five toes a very long penis." The Apar (*D. tricinctus*), which is arranged with those having four claws, has five claws, and has a penis like those of that division.

These animals walk in three different manners, each having a particular conformation of the foot for the purpose.

The *Tatusiæ* are digitigrade.

The *Dasypodes* are plantigrade.

The *Tolypeutæ* walk on the tips of the front claws, and may be called unguigrade.

The differences in the form of the bones of the feet are described and figured in Cuvier's 'Oss. Foss.,' but he does not appear to have been aware of the differences in the habit and mode of walking.



Dr. Burmeister, in 'System. Uebers. der Thiere Brasiliens,' p. 276, 1854, divides the genus *Dasypus* of Linné into two subgenera—*Dasypus* and *Praopus*—the latter for *D. 9-cinctus* of Linnæus, and synonymous with the genus *Dasypus* as restricted by Wagler.

Tribe 1. **DASYPODINA.** The dorsal disk closely attached to the back of the animal, divided in the middle by free rings into scapular and pelvic shields; pelvic shield free from the pelvis.

1. Scapular and pelvic shields moderate; central rings several. Feet strong; hind toes free; claws large. Skull smooth above, and separate from the frontal shield. Tail elongate. *Peltochlamydes*.

A. Digitigrade. *The toes of the front and hind feet separate; claws conical, similar; palms and soles covered with shields, without any marked heel. Head elongate, ovate; forehead rounded; nose slender; ears close together, on the top of the head. Body subcylindrical. Chærochlamydes.*

These animals walk on their toes, and are very porcine in their character, as well as in the general form of the feet; the hinder part of the wrist and feet is covered with plates like the rest of the legs.

#### 4. TATUSIA.

Central rings 5 to 8. Toes 4/5, subequal, the two front and three hinder middle largest; inner and outer small; claws conical. Tail conical, elongate, annulated; lower rings of two or three series of plates. Cutting-teeth none; grinders 8/8, moderate. *Osteology*, see Cuvier, Oss. Foss. v. t. 10; Turner, P. Z. S. 1851, p. 212.

*Tatus*, Gesner.

*Tatusia*, sp., F. Cuvier.

*Dasypus*, Wagler.

*Dasypus* 2 (*Tatusia*), Rapp, Edent. 8.

*Praopus*, Burmeister, Syst. Ueber. d. Thiere Brasil. i. 295, 1854; Arch. f. Naturg. 1862, 98.

The penis short, ending in a three-lobed gland (Cuvier, v. 118).

\* *Face suddenly contracted; the nose subcylindrical; hinder part of palate rather narrow, flat, rounded on the sides. Tatusia.*

#### 1. TATUSIA PEBA.

Ears one-third of the length of the head; shields smooth; underside with scattered bristles; tail as long as the body.

*Tatusia septemcincta*, Gray, Cat. Mamm. B. M. 189; Gerrard, Cat. Bones B. M. 286; Turner, P. Z. S. 1851, p. 212.

*Dasypus septemcinctus*, Linn. Am. Acad. i. 281.

*D. octocinctus*, Schreb. Säugeth. t. 73.

- D. novemcinctus*, Linn. S. N. i. 54.  
*D. niger*, Illiger.  
*D. peba*, Desm.  
*D. longicaudus*, P. M. Abbild. t. 83?  
*T. affinis*, Lund.  
*D. peba*, Desm. Mamm. 368; Owen, P. Z. S. 1831, p. 141; Krauss, Arch. für Naturg. 1862, p. 20, t. 3. f. (skull).  
*Praopus 7-cinctus*, Burmeister, La Plata, 428.  
*Tatusia peba*, Owen, Odont. t. 82. f. 2.  
*D. tatusia peba*, Lesson; Rapp, Edent. 8.  
*Praopus longicaudatus*, Burm. Thier. Bras. 298, 1854; Abhandl. Nat. Ges. zu Halle, 1861, p. 147.  
*Tatou noir*, Azara; Cuvier, Oss. Foss. v. t. 10 (skeleton).  
*Cachicame*, Buffon, H. N. x. 215, t. 57; Cuv. Oss. Foss. v. 124, t. 10 (shield).

? *Tatouèle*, Buffon, H. N. x. 212.

*Hab.* Central and South America: Texas (*Baird*); Guiana (*Krauss*); Brazil (*Pr. Max.*); Paraguay (*Azara*).

"Texan Armadillo. The people of Matamoros esteem its flesh, and the women attribute imaginary properties to its shell. Living on the kitchen refuse. Nocturnal; burying flesh and vegetable substances for food."—*Baird*.

The head of the animal and the skulls in the Museum collection seem to increase in width, compared to the length, as the animal increases in age. The width of the head and skull does not depend on the sex; for we have broad-headed and narrow-headed males in the collection. The sides of the stuffed specimens are pale whitish, with black backs. The specimens vary in the size of the scapular disk. In one male in the Museum it appears much smaller than in most of the other specimens; but they all vary more or less in this character. The tail varies considerably in length, compared with the length of the body; but the shortest is as long as the body.

See also *Tatou verdadeiro*, Cuv. Oss. Foss. v. 118; Turner, P. Z. S. 1851, p. 213.

*Dasyopus uroceras*, Lund, Dansk. Vedensk. Natur. Afh. viii. 65, 225; Rapp, Edent. 8.

*Hab.* Brazil (*M. de St.-Hilaire*).

Tail terminated by a horny sheath of one piece, the bands broader; plates of pelvic shield larger.

There is no specimen agreeing with the above description. May not the peculiarity of the tail be an accidental malformation?

Dr. Burmeister gives *Tatu verdadeiro* as one of the common Brazilian names of the species; and he gives *D. uroceras* as a synonym\* of his *D. (Praopus) longicaudatus*.

\* Dr. Peters, in the 'Monatsbericht' for 1864, p. 179, very shortly indicates, but gives no diagnostic characters nor descriptions of, *Dasyopus pentadactylus*, *D. fenestratus*, and *D. novemcinctus*, var. *mexicanus*. The latter is probably the animal described by Dr. Spencer Baird. It is to be regretted that every zoologist who wishes to name a species does not append to it a diagnosis: in this respect the Scandinavian zoologists of Sweden and Denmark set a good example.

2. *TATUSIA HIRSUTA*.

Tail elongate, tapering; the head, body, limbs, and dorsal shield covered with elongated hairs; the head elongate; nose slender; ears large.

*Praopus hirsutus*, Burm. Abhandl. Nat. Ges. Halle, 1861, p. 147; Reise durch d. La Plata Staaten, 1861, p. 228; Arch. f. Naturg. 1862, p. 144.

*D. hispidus*, Burm. La Plata, ii. 428.

*Hab.* Guayaquil (Mus. Lima, *Burmeister*).

Length of head  $4\frac{1}{2}$ , body  $11\frac{1}{4}$ , and tail  $10\frac{1}{2}$  inches. The rings and the plates of the shield are very indistinctly marked, indeed only shown at the shoulders and by slight folds on the lower part of the sides.

See also *Dasypus hispidus*, Burm. Thiere Brasiliens, i. 287.

*Hab.* Brazil; said to be distinct from *D. hirsutus*, Burm.

3. *TATUSIA HYBRIDA*.

Ears above one-fourth the length of the head; plates of the pelvic shield convex and elevated; tail about half or one-third the length of the body.

*Dasypus hybridus*, Desm. Mamm. 368; Martin, P. Z. S. 1837, p. 13 (anat.); Darwin, Voy. Beagle, i. 92.

*Tatusia hybrida*, Less. Mamm. 311; Turner, P. Z. S. 1851, p. 213.

*D. (Tatusia) hybridus*, Rapp, Edent. 9.

*D. septemcinctus*, Schreb. Säugeth. ii. 220, t. 72 & 76.

*D. (Praopus) hybridus*, Burm. La Plata, 428.

*Tatou mulet*, Azara.

*Hab.* Paraguay, very common; Rio Negro; North Patagonia.

\*\* *Face attenuated; nose elongate, conical; hinder part of palate broad, concave, with raised edges on the side.* *Praopus*.

4. *TATUSIA KAPPLERI*.

*Dasypus kappleri*, Krauss, Arch. für Naturg. 1862, p. 24, t. 3. f. 1, 2 (skull).

*D. (Praopus) peba*, Burm.

*Hab.* Surinam (*Krauss*).

Carapace very much like *Tatusia peba*; but there are two series of claw-like plates, with free projecting ends, on the anterior side of the lower part of the hind legs; there are five plates in the upper series.

The skull is larger, and nose much more produced; the palate keeled on the sides in a line with the zygomatic arch.

In *D. peba* (*l. c. t. 3. f. 3, 4*) the palate is rounded on the sides, without any keel, and the nose shorter and more slender. Neither of the four skulls in the British Museum is near as large as the one figured by Dr. Krauss; but some of them have the palate keeled on the sides, more as in his figure of *T. kappleri* than as the palate is represented in the one he calls *T. peba*.

See also *Dasypus punctatus*, Lund. ; *Tatusia*, sp., Turner, P. Z. S. 1851, p. 213.

Defined from a denuded skin in Mus. Coll. Surg.

B. Plantigrade. *Palms and soles bald, callous, with a prominent heel. The toes of the fore feet united to the claws, compressed; claws compressed, sharp-edged beneath. Toes of hind feet separate; claws elongate, acute. Head broad; forehead flattened; nose short; ears far apart, on side of the head. Body depressed. Platychlamydes.*

The body is depressed, expanded, more or less covered with hair, which sometimes almost hides the tesseræ of the shield. Legs short, strong; the whole of the feet applied to the ground in walking.

\* *Head ovate; forehead convex; teeth numerous, small; intermaxillaries toothless. The first three or four rings of tesseræ of the scapular rings partially free. Tail not ringed. The soles of the hind feet with tessera on the sides and behind.*

#### 5. PRIONODOS.

The three or four front rings of the scapular shield deeply divided, free when young; central rings numerous. Tail not ringed, with the tesseræ placed alternately. Plantigrade; soles of the feet partially covered with tesseræ. Toes 5/5; two inner front toes small; outer very small, rudimentary; second and third large; the third very large, with a very large claw. Skull broad; nose broad. Teeth  $\frac{24-24}{24-24}$ , small; intermaxillary toothless. *Osteology*, see Turner, P. Z. S. 1851, p. 215; Cuv. Oss. Foss. v. t. 11. f. 1, 3; Rapp, Edent. t. 11.

*Prionodontes*, F. Cuv.; Less. Man. 309; Turner, P. Z. S. 1851.

*Priodonta*, Gray, Cat. Mamm. B. M.

*D. (Priodontes)*, Rapp, Edent. 10.

*Cheloniscus*, Wagler; Krauss.

The skeleton is figured by Rapp, Edent. t. 4 b. f. 1. The two inner toes of the fore feet elongate, slender, with small claws; the three others short; the third very stout, with a very large claw; the fourth similar, but smaller; the fifth or outer very small and short. The pelvis very broad behind; the second cervical vertebra elongate, with a very high superior central crest, and very rudimentary lateral processes.

PRIONODOS GIGAS. Tatou.

B.M.

*Dasypus gigas*, Cuv. Oss. Foss. v. 128, t. 11. f. 1, 5; Pr. Max. Beitr. ii. 516; Burm. Brasil. 277.

*D. giganteus*, Desm. Mamm. 368.

*Priodonta gigas*, Gray, Cat. Mamm. B. M. 120; Owen, Odont. t. 85. f. 1; Gerrard, Cat. Bones B. M. 287.

*Priodontes gigas*, Turner, l. c.; Gervais, Expéd. de F. Le Castelnau, Mamm. t. 18; Rapp, Edent. t. 4 b (skeleton).

*P. giganteus*, Less. Mamm. 309.

*Cheloniscus gigas*, Wagler; Krauss, Arch. f. Naturg. 1862, p. 19.

*Kabalassou*, Buffon, H. N. x. t. 41.

*El Maximo*, Azara.

*Hab.* Paraguay (*Azara*); Surinam (*Krauss*); Brazil (called "Tatu canastra").

\*\* *Head flat, conical. Teeth few, nine or ten, large; intermaxillary bone with a tooth on each side behind. Tail shielded.*

## 6. DASYPUS.

Head broad, covered with large plates; a series of small shields under the eyes; frontal plate large, broad. Central rings six or eight. Two short bands of large equal plates, not so wide as the head, between the back of the head and the front edge of the scapular shields. Toes 5/5. Teeth  $\frac{9-9}{10-10}$ ; the first upper in the intermaxillary.

*Encoubert*, Buffon; Cuv. Oss. Foss. v.; Rapp, t. 3, f. 4, 5.

*Dasypus*, Turner, P. Z. S. 1851, p. 214.

*Dasypus (Euphractus)*, Burmeister, La Plata, ii. 1861.

*Euphractus*, Wagl.

*Dasypus* (1. *Dasypus*), Rapp, Edent. 7 (skull, t.).

\* *Dorsal shield with two short hairs on the hinder margin of each tessera; under part of the body with scattered bristles.*

### 1. DASYPUS SEXCINCTUS.

B.M.

Dorsal shield bald, with two hairs on the hinder side of each of the dorsal tesseræ.

*Dasypus sexcinctus*, Linn. S. N. 154; Cuv. Oss. Foss. v. t. 11. f. 456; Gerrard, Cat. Bones B. M. 286; Burm. Thier. Bras. 290; Owen, Odont. t. 85. f. 3, 4; Gray, Cat. Mamm. B. M. 189; Turner, P. Z. S. 1851, p. 214; Rapp, Edent. 7, t. 3. f. 4, 5 (skull).

*D. encoubert*, Desm. Mamm. 370.

*D. setosus*, P. Max. ii. 520; Abh. Bras. t.

*Encoubert*, Cuv. Oss. Foss. v. t. 11. f. 4-6 (skull).

*Dasypus villosus*, Giebel, Zeitschrift, 1861, 93, t. 345. f. 1 (skull).

*D. gilvipes*, Illiger, Abh. Berl. Akad.

*D. octodecim-cinctus*, Erxl.

*Hab.* Brazil and Paraguay.

One of the young specimens in the British Museum has only four toes on the hind feet; but the outer toes on one foot appear to have been destroyed; and on the other foot there is a scale where the fifth ought to be placed. This may be the normal state of a different species.

The skull which Giebel figures as that of *D. villosus*, Burmeister, evidently belongs to this species.

\*\* *Dorsal shield with numerous elongated bristles from the hinder edge of each tessera ; under part of body very hairy.*

2. *DASYPUS VELLEROSUS*, sp. nov. (Pl. XVIII.) B.M.

The forehead convex, with many polygonal shields; the dorsal shield covered with abundant elongated bristly hairs; the underside of the body covered with close hairs. Toes 5/5, the outer and inner hinder small.

*Hab.* Santa Cruz de la Sierra (*Bridges*).

\* *Head broad, depressed; nose very slender, broad, depressed; intermaxillary toothless.*

7. *EUPHRACTUS*.

Head conical, covered with a shield of very many polygonal plates, with a tuft of hair under the eyes. Nape with a narrow short band of small plates. Dorsal disk very hairy, the first row of plates on the front of the scapular shield forming a free ring; the lower marginal plates of the pelvic shield large, falcate. Tail conical, covered with rings of plates. Toes 5/5; claws acute, triangular, front largest. Skull broad, very depressed. Nose very slender, elongate; intermaxillary bone toothless. Teeth  $\frac{8-8}{9-9}$ , moderate.

*Dasypus* (*Euphractus*), partly, Burmeister.

*Euphractus*, partly, Wagler.

*Dasypus*, sp., Turner, P. Z. S. 1851, p. 214.

*Tatusia*, sp., Burmeister.

\* *Nose short, broad; ears large.*

1. *EUPHRACTUS VILLOSUS*. Peludo. B.M.

Muzzle broad; ears large; forehead broad, covered with rugulose tubercular plates; back covered with abundant long black hairs, more or less deciduous.

*Dasypus villosus*, Desm. Mamm. 370; Gerrard, Cat. Bones Mamm. 286; Turner, P. Z. S. 1851, p. 214.

*Tatusia villosa*, Lesson, Man. 312.

*Dasypus* (*Tatusia*) *villosus*, Rapp, Edent. 10.

*D.* (*Euphractus*) *villosus*, Burmeister, La Plata, ii. 1861.

*El Peludo*, Azara, ii. 140.

*Hab.* Buenos Ayres, Pampas.

The skull which Giebel (*Zeitschrift*, 1861, t. 345. f. 1) figures under the name of *D. villosus* is evidently that of *D. sexcinctus*.

\*\* *Nose slender, elongate; ears small.*

2. *EUPHRACTUS MINUTUS*. Pichy. B.M.

Nose slender, elongate; ears small; forehead convex, covered with

irregular smooth polygonal plates. Back with scattered, elongate, slender, black or grey bristles.

*Dasypus minutus*, Desm. Mamm. 371; Turner, P. Z. S. 1851, p. 214.

*D. patagonicus*, Desm. N. Dict. H. N. xxx. 11. 491.

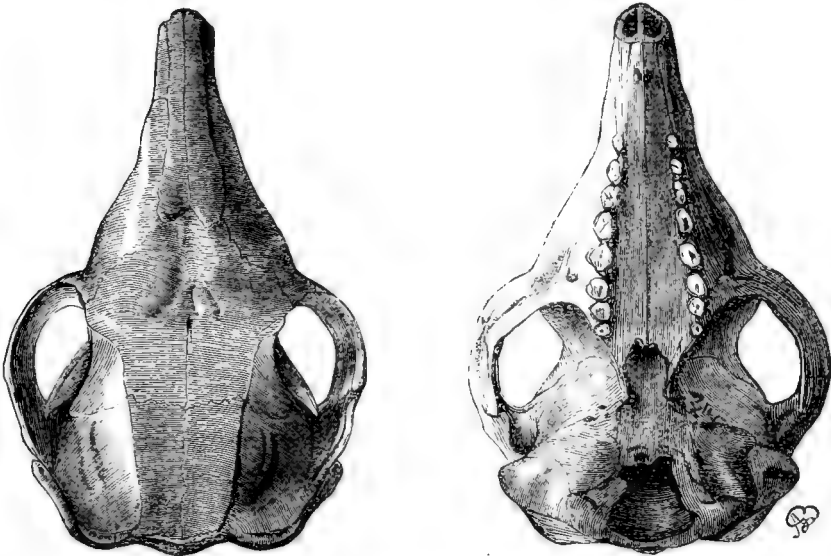
*Tatusia minuta*, Lesson, Man. 847; Gray, List Mamm. B. M. 190; Gerrard, Cat. Bones B. M. 286.

*Dasypus (Euphractus) minutus*, Burmeister, La Plata, ii. 427, 1861.

*D. (Tatusia) minuta*, Rapp, Edent. 10.

*Tatou pichey*, Azara.

*Hab.* Chili; La Plata.



Skull of *Euphractus minutus*.

“The four Chilian species of Armadillo (*Dasypus*) are nearly similar in habits. The Peludo (*D. villosus*) is nocturnal; while the others wander by day over the open plains, feeding on beetles, larvæ, roots, and even small snakes. The Pichy (*D. minutus*) prefers a very dry soil and the sandy dunes near the coast, where for many months it can never taste water. In soft soil the animal burrows so quickly that its hinder quarters would almost disappear before one could alight from one’s horse.”—*Darwin’s Journ.* p. 96.

#### 8. XENURUS.

Head elongate. Scapular and pelvic shields convex; central rings many, ten or eleven. Toes 5/5. Tail nakedish, with a few imbedded tesseræ. Teeth  $\frac{8-8}{9-9}$ ; intermaxillary teeth none. Skull elongate; brain-case constricted over the back of the orbit, swollen in front; forehead convex; nose conical, truncated.

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*Cabassu*, Buffon; Cuv. Oss. Foss. v. t. 11. f. 7, 9.

*Xenurus*, Wagler; Turner, P. Z. S. 1851, p. 215; Krauss.

The plates on the inner side of the two inner toes of the fore and hind feet are ciliated with a series of bristle-like hairs.

\* *Nose of skull elongate, produced.* Tatoua.

1. XENURUS UNICINCTUS. Kabassu. B.M.

Tail nakedish, with some scattered shields; those of the base of the tail immersed; becoming more abundant, closer, and more developed at the end, especially on the underside of the tip.

*Dasypus unicinctus*, Linn. S. N. i. 52.

*D. gymnurus*, Illiger; P. Max. Beitr. ii. 529.

*D. tatouay*, Desm. Mamm. 369; Tschudi, Faun. Peru, 206; Guérin, Icon. Mamm. t. 34. f. 2.

*D. duodecim-cinctus*, Schreb. Säugeth. 225, t. 75, 76.

*Tatusia tatouay*, Lesson, Man. 311.

*D. multincincta*, Thunb. Vet. Acad. Hand. 1818, 68, t. 1.

*Xenurus unicinctus*, Gray, Cat. Mamm. B. M. 120; Turner, P. Z. S. 1851, p. 215; Gerrard, Cat. Bones B. M. 285.

*Dasypus xenurus* et *D. 12-cinctus*, Krauss, Arch. Nat. 1862, p. 19.

*Tatusia gymnura*, Rapp, Edent. 9.

*Cabassou*, Cuv. Oss. Foss. v. 120, t. 11. f. 7-9 (skull).

*Kabassou*, Buff. H. N. x. 218, t. 40.

*Tatou Tatouay*, Azara.

*Hab.* Brazil, S<sup>ta</sup> Catharina; Surinam (*Krauss*); Guiana; Peru; Paraguay.

In a young specimen, not in a good state in the British Museum, the plates of the dorsal shield are eroded, with a prominent ridge on each side.

See also—1. *Dasypus verrucosus*, Wagler, Seba, Thesaur. t. 30. f. 4; Cuvier, Oss. Foss. v. 120; Burm. Thier. Bras. 287.

2. *D. gymnurus*, P. Max. and Wagner. Appear like varieties or synonyma.

What is *Xenurus nudicaudus*, Lund, Turner, P. Z. S. 1851, p. 219, from "Tail shorter and more entirely naked" (Cuvier, Oss. Foss.)?

\*\* *Nose of skull short, compressed.* Xenurus.

2. XENURUS HISPIDUS.

Skull short; nose short, compressed; nasal bones short.

*Dasypus hispidus*, Burmeister, Thiere Bras. i. 287; Giebel, Zeitschrift, 1861, p. 93, t. 2, 34. f. 3, 4 (skulls of old and young).

? *Tatu*, Seba, Thes. i. t. 30. f. 2, according to Burmeister.

*Cabassu*, Cuv. Oss. Foss. v. 120.

*Hab.* Brazil.

In our skulls of *X. unicinctus* the distance from the perforation under the orbit to the end of the intermaxillary is  $1\frac{3}{4}$  inch; in Giebel's figure it is  $1\frac{1}{2}$  inch.

I have not seen this species. The skull figured by Giebel is that



of a *Xenurus*, judging from the constriction of the brain over the orbit; but the face is very much shorter than in the skulls of *X. uncinatus* in the Museum Collection.

C. *The dorsal disk only united to the body by the centre of the back, free from the hairy skin on the sides. The scapular and pelvic shields large, convex, separated by three free central rings. Feet weak; front with elongated unequal claws, on the tips of which the animal walks; hind feet club-shaped, with flat ovate nails; palms and soles covered with plates. Tail short. Skull attached to the frontal shield by two or more bony prominences. Sphærochlamydes.*

The animal has the power of bending the body so as to form a nearly perfect sphere, the shield on the head and the short tubercular tail filling up the aperture occasioned by the notches in the scapular and pelvic shields. They walk on the small end of the elephant-like hind feet, and on the tips of the slender, elongated, middle claws of the fore feet.

#### 9. TOLYPEUTES.

Head with a flat frontal shield, hinder edge prominent; ears granular. Scapular and pelvic shields large, convex; central rings three, free. Tail short, expanded at the base; end conical, covered with close tesserae; upper ones very convex. Toes 4 or 5, before and behind; inner and outer small; front claws unequal; two middle elongate, large. The hind feet small; toes indistinct, united; claws ovate, flat, nearly like the human nail. Skull elongate, slender; nose conical; intermaxillary toothless, with a bony prominence above each orbit for attaching the frontal shield. Teeth large. *Osteology*, Cuv. Oss. Foss. v. 123; Turner, P. Z. S. 1851, p. 215.

*Apar*, Geoff. Compt. Rend. 1847, xxiv. 572.

*Cheloniscus*, Fabr. Column.

*Tolypeutes*, Illiger, Prod. 1811.

The underside of the body covered with long bristly hairs; the outer plate of the moveable rings thin, with a fringe of elongate rigid hairs on the outer edge. The bodies of the males are less ventricose and more elongate than in the female; the hair on the underside of the males is grey, in the females it is blackish; the male organ is very large and, when contracted, cylindrical and pendulous. They are very active, running with rapidity, but looking very insecure, on their slender limbs. They are called "Tatu bola" by the Brazilians.

\* *Toes 5/5. Tail conical; base thick; end broad, flat, truncated; underside flattish. Frontal shield broad and arched above. Cheloniscus.*

1. TOLYPEUTES TRICINCTUS. *Apar*. B.M.  
Frontal shield flat, broad; the hinder margin not produced above

the head; regularly arched. Nape with three bony plates in front of the scapular shield. Front claws five; the inner and outer ones small; the middle one moderately large.

*Dasyppus tricinctus*, Linn. S. N. i. 53; Schreb. Säugeth. 215, t. 71.

*D. apar*, Desm. Mamm. 367, t. 26. f. 3.

*Tatusia apar*, Lesson, Man. 310.

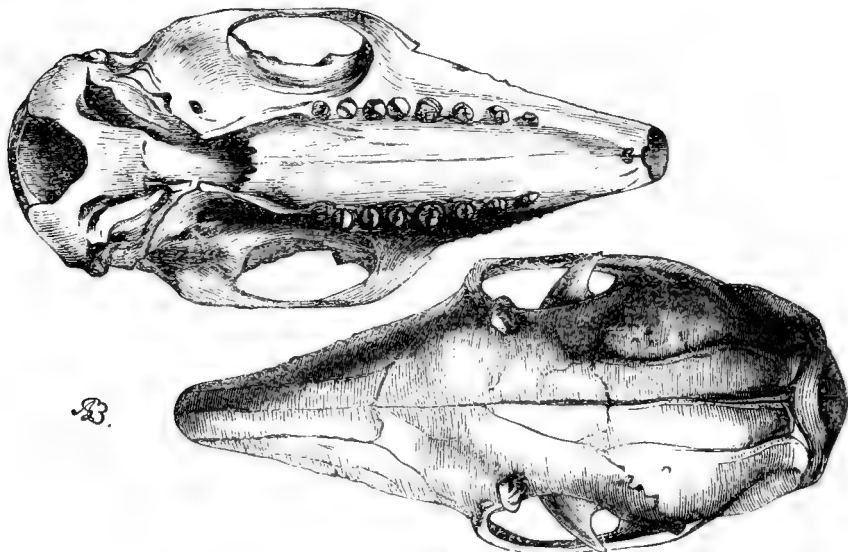
*T. tricincta*, Gray, Cat. Mamm. B. M. 181; Gerrard, Cat. Bones B. M. 286.

*Tolypeutes tricinctus*, Turner, P. Z. S. 1851, p. 215.

*Dasyppus (Tatusia) tricinctus*, Rapp, Edent. 9.

*Apar*, Buffon, H. N. x. 206.

*Hab.* Bolivia; Buenos Ayres.



Skull of *Tolypeutes tricinctus*.

\*\* Toes 4/5. Tail conical; base broadly expanded; end conical, rather compressed; under surface convex. Frontal shield narrow, produced above the head, and truncated behind. Nape without any plates. *Tolypeutes*.

## 2. *TOLYPEUTES CONURUS*. Mataco.

B.M.

Frontal shield flat, narrow, produced behind the head into a kind of hood, and truncated on the hinder edge. Nape without any tesseræ. Front claws four, the outer one small, the middle one very large and strong.

*Dasyppus (Tolypeutes) conurus*, Is. Geoff. Compt. Rend. 1847; Rev. Zool. 1847, p. 135; Burmeister, d. La Plata, ii. 427; Giebel, Zeitschrift, 1861, p. 93, t. (skull).

*Mataco*, Azara, ii. 161.

*Hab.* South America, La Plata (*Burmeister*).

The specimen living in the Gardens of the Zoological Society, I have been informed by Mr. Bartlett and Dr. Peters, has only three front claws; all those in the British Museum have four, which appears to be the normal number. In other respects the animals are similar. The shell of the living animal is blackish brown. The skin between the central rings is brown, bald, and smooth. The animal sleeps rolled up with its head downwards.

The skull that Giebel (*Zeitschrift*, 1861, t. 234. f. 2) figures as that of *Dasypus conurus* may belong to this species; it is unlike the skull of *Tolypeutes tricinctus* in not having any tubercles over the orbits; but it is doubtful, as one of the skulls figured on these plates is wrongly determined, and the descriptions of the skeletons to which they belong, therefore, cannot belong to the species to which they are referred. The one named *D. villosus* is *D. sexcinctus*.

**Tribe 3. CHLAMYDOPHORINA.** The dorsal disk divided into two parts behind, forming an elongated dorsal and short pelvic shield; the latter is attached to the bones of the pelvis.

#### 10. CHLAMYDOPHORUS.

The dorsal disk free beneath, only attached to the middle of the back. Pelvic shield and the tail covered with tesseræ. The sides of the back under the shield, the underside of the body, and limbs covered with silky hair. *Osteology*, Yarrell, *Zool. Journ.*; Turner, *P. Z. S.* 1851, p. 213; Gray, *P. Z. S.* 1857, p. 8 (fig. pelvis); *Ann. N. H.* xix. 1857, p. 492.

*Chlamyphorus*, Harlan; Rapp, *Edent.* 12.

*Dasypus* (*Chlamyphorus*), Fischer, *Syn.* 394.

*Chlamyphorus*, Gray; Burmeister.

**CHLAMYDOPHORUS TRUNCATUS.** Pichiciago. B.M.

*Chlamyphorus truncatus*, Harlan, *Acad. Lyc. Nat. Hist. N. York*, 1825, t. ; Burmeister, *Reise La Plata*, i. 297, ii. 429; Rapp, *Edent.* 22; Yarrell, *Zool. Journ.* iii. 544, 1837.

*Chlamyphorus truncatus*, Gray, *P. Z. S.* xxv. 1857, p. 9 (skeleton); Burmeister, *Ann. & Mag. N. H.* xi. (1863) 308.

*Hab.* Chili; Mendoza.

#### 11. BURMEISTERIA.

The dorsal shield attached to the skin of the back to the edge. The pelvic disk and the tail only partly covered with tesseræ. The sides and under part of the body and limbs covered with woolly hair.

*Clamydophorus*, sp., Burmeister.

**BURMEISTERIA RETUSA.**

The plates of the dorsal shield with one or two bristles on the

hinder edge; those on the sides of the back with many bristles on the lower edge. The upper part of the pelvic disk with pencils of bristles.

*Chlamyphorus retusus*, Burmeister, Abh. Naturf. Ges. zu Halle, vii. 167, t. 1, 1863; Ann. & Mag. N. H. 1863, xi. 308.

*Hab.* Bolivia; Santa Cruz de la Sierra (*Burmeister*).

Larger than *Chlamydophorus truncatus*.

#### Division 2.

Body covered with hair or spines, not with armour.

#### Fam. 3. ORYCTEROPODIDÆ.

Body covered with bristles. Head conical; mouth large. Toes 4/5; inner front wanting; three middle longest. Claws broad. *Osteology*, Cuvier, Oss. Foss. v. 139, t. 12; Turner, P. Z. S. 1851, p. 220; Rapp, Edent. t. 4; Sundevall, Kong. Vet. Akad. Hand. 1841, x. 236. t.

*Myrmecophagina* (partly), Gray, Cat. Mamm. B. M. 190.

*Orycteropodidæ*, Turner, *l. c.* 220.

*Fodientia*, Giebel, Säugeth. 412.

#### 12. ORYCTEROPUS.

Character of family.

##### 1. ORYCTEROPUS CAPENSIS. Aard Vark. B.M.

Facial line nearly straight; the nose elongate, thick, scarcely attenuated.

*Myrmecophagus capensis*, Gmelin, S. N. i. 53.

*M. afra*, Pall. Misc. Zool. 64.

*Orycteropus capensis*, Geoff.; Desm. Mamm. 372; Gray, Cat. Mamm. B. M. 190; Gerrard, Cat. Bones B. M. 287; Smuts, Man. Cap. 52; Sundevall, *l. c.* 1841, p. 228; Owen, Odont. t. 76. f. 8, 9, 11, t. 77, 78; Rapp, Edent. 13, t. 1-4 (skull).

? *O. senegalensis*, Lesson, Man. 277; Duvernoy, Ann. Sci. Nat. xix. 192, t. 9, 1853.

*Cochin de Terre Allemand*, Buffon, H. N. v. t. 2; Camper, Act. Petrop. 1777, p. 222, t. 4. 6 (skull).

*Orycterope*, Cuv. Oss. Foss. v. t. 12 (skeleton).

*Orycterope du Cap*, Cuv. Oss. Foss. v. 117, t. 12 (skull).

*Hab.* South Africa, Cape of Good Hope.

##### 2. ORYCTEROPUS ÆTHIOPICUS.

Forehead, before the eyes, shelving; the nose short, thin; the first front toe longer than the rest.

*Orycteropus æthiopicus*, Sundevall, Kong. V. Akad. Hand. 1841, p. 226, t. 3. f. 1-5; Rapp, Edent. 13.

*Hab.* Sennaar (*Hedenborg*).

## Fam. 4. MYRMECOPHAGIDÆ.

Body covered with hair. Head conical, elongate; mouth small.

*Edentata genuina*, Cuvier, Oss. Foss. v. 97.

*Myrmecophagidæ*, Turner, l. c. 217.

*Myrmecophagina*, Gray, Cat. Mamm. B. M. 190.

*Myrmecophaga*, Linn. S. N. i. 52.

*Lipodonta*, Nitzsch.

*Vermilingua*, Ill. Prodr.

The ribs of the animals of this family are flat and more or less dilated on the outer side; they are most dilated in the *Cyclothuri*, where they are expanded nearly their whole length, and so much so that they overlap each other, and form a complete armour to the thoracic viscera. The figure given by Rapp agrees with the skeletons in the British Museum. The ribs of the skeleton of *Myrmecophaga*, figured by Cuvier (Oss. Foss. v. t. 9) and Rapp (*Edentata*, t. 6), are only dilated on the middle of the outer side, and not there to such an extent as in the above-named genus.

\* Terrestrial. Tail bushy; walking on side of feet, with claws curved up.

## 13. MYRMECOPHAGA.

Toes 4/5. Palatine and pterygoid bones united beneath the nasal canal for its whole length. Fur of body and tail elongate, flaccid. Tail very bushy, lax. Skull very long, very slender; nose very slender, much longer than the brain-case.

Terrestrial, living solitary in marshes. *Osteology*, Cuvier, Oss. Foss. v. 97, t. 9; Rapp, t. 46.

## MYRMECOPHAGA JUBATA.

Fur blackish grey, mixed; hind limbs and a mark running obliquely from the shoulders upwards and backwards black.

*Myrmecophaga jubata*, Linn. S. N. i. 52; Gerrard, Cat. Bones B. M. 288; Rapp, Edent. 14. t. 46 (skull).

*M. tridactyla*, Linn. S. N. ed. 10, p. 35.

*M. sciurea*, Pallas, Misc. 65.

*Tamanoir*, Buffon, H. N. x. 144, t. 29; Supp. iii. t. 55; Cuvier, Oss. Foss. v. 97, t. 9.

*Great Ant-eater*, Penn.

*Hab.* South America, La Plata.

*Anatomy*, see Owen, P. Z. S. 1837, p. 22; Ann. & Mag. N. H. xix. 59; Trans. Zool. Soc. iv. 117; Rapp, Edent. t. 46 (skeleton); Cuvier, Oss. Foss. v. t. 9 (skeleton).

\*\* Arboreal. Tail conical, prehensile; feet clasping the branches.

## 14. TAMANDUA.

Toes 5/4. Palatine and pterygoid bones united beneath the nasal

canal for the whole length. Fur of body and tail short, bristly. Tail tapering, prehensile. Skull long, slender; nose nearly as long as brain-case (Rapp, t. 5).

Living on trees.

Penis (figured by Rapp, Edent. t. 6. f. 4) is elongate, cylindrical, rather tapering, covered with rings of acute tubercles and with a globular gland.

1. TAMANDUA BIVITTATA. Collared Tamandua. B.M.

Head, shoulders, fore limbs, outside of hind limbs, and middle of the tail white; a stripe from each side of the neck over the shoulder and remaining part black. "Tail but little longer than the body; its terminal third scaly."—Turner.

Var. Black less intense.

*Myrmecophaga tridactyla*, Linn. S. N. 51.

*M. tetradactyla*, Linn. S. N. 52; Rapp, Edent. 14, t. 3  $\delta$ , t. 5 (skull).

*M. tamandua*, Cuv.; Desm. Mamm. 374; Blainv. Ostéogr. t. (skeleton).

*Tamandua tetradactyla*, Lesson; Gray, Cat. Mamm. B. M. 191; Gerrard, Cat. Bones B. M. 288; Turner, P. Z. S. 1851, p. 218; Desm. N. Dict. H. N. xii. 107.

*M. bivittata*, Desm. N. Dict. H. N. xii. 107.

*M. nigra*, Geoff.; Desm. N. Dict. H. N. xii. 107.

*M. myosura*, Pallas, Miscell. 64.

*M. ursina*, Griff. A. K. 16.

*M. crispus*, Rüpp. Mus. Senck. iii. 179.

*Tamandua*, Buffon, H. N. x. 144; Cuvier, Oss. Foss. v. 101.

*Middle Ant-eater*, Penn.

*Hab.* Brazil; Paraguay.

*Myrmecophaga annulata* (Desm. Mamm. 374, from Krusenstern, Voyage, t. fig., altered Griffith, A. K. t. 144) and *M. annulata* et *M. striata* (Shaw, from Buff. H. N. Supp. iii. t. 56) are only a *Coati* (*Nasua*) disfigured.

2. TAMANDUA LONGICAUDATA. Yellow Tamandua. B.M.

Uniform light ochraceous, with a paler vertebral line; tail nearly double the length of the body, its terminal half covered with small scales and a few scattered black hairs; ears large, rounded, about one-third the length of the head; no shoulder-streak.

*Myrmecophaga longicaudata*, Wagner; Turner, P. Z. S. 1851, p. 218; Burm. Thier. Bras. 304.

*Hab.* —? (B. M. and Zool. Soc.).

15. CYCLOTHURUS.

Toes 2/5; the outer front one much the largest. Pterygoid bones meeting, presenting two long, parallel, and little prominent crests, and much extended backward, and not forming a canal. Skull short,

broad; nose moderate, slender, shorter than the brain-case. The ribs are very broad, dilated, forming a solid armour to the chest, and overlapping each other (see Rapp, t. 5. f. 3, 4, 5).

*Cyclothurus*, Gray, Cat. Mamm. B. M.; Turner, P. Z. S. 1851, p. 218.

CYCLOTHURUS DIDACTYLUS.

B.M.

Fulvous back, blackish-washed; feet and tail grey, longer hairs with minute black tips.

*Myrmecophaga didactyla*, Linn. S. N. i. 51; Rapp, Edent. 15, t. 5. f. 3-6 (skull); Blainv. Ostéogr. t. (skeleton).

*M. minima*, Brisson, R. A. 28.

*Cyclothurus didactylus*, Lesson; Gray, Cat. Mamm. B. M. 191.

*Little Ant-eater*, Edw. Glean. i. 220, t. 220.

*Fourmoulier à deux doigts*, Cuv. Oss. Foss. v. 103.

*Hab.* South America, Brazils.

CYCLOTHURUS DORSALIS. (Pl. XIX.)

B.M.

Golden yellow, silky, back with a broad, well-defined black stripe; feet and tail yellow.

*Hab.* Costa Rica (*Salvin*).

The back and sometimes the sides are washed with blackish. Always known by the distinct, well-defined, broad dorsal streak, and the yellow colour of the feet and tail.

Fam. 5. ORNITHORHYNCHIDÆ.

Body covered with hair or spines. Mouth in the form of a flat, depressed, or slender beak, subcylindrical. Hind feet of the male spurred.

Skeleton with marsupial bone, and a merrythought (*furcula*) like that of birds.

*Monotrema*, Geoff.

*Replandia*, Illiger.

16. PLATYPUS.

Beak depressed. Body covered with hair. Tail broad, short, depressed. Feet very short. Toes 5/5; front toes united by a web. Hind feet with an acute spur on inner side.

*Platypus*, Shaw, Viv. Nat. 1799.

*Ornithorhynchus*, Blumenbach, Handb. 135, 1800.

*Ornithorhynque*, Cuv. Oss. Foss. t. 14.

*Demipus*, Wiedem. Zool. Arch. i. 175.

PLATYPUS ANATINUS.

*Platypus anatinus*, Shaw, Nat. Misc. t. 385; Gen. Zool. i. 229, t. 66, 67, 1799; Gerrard, Cat. Bones B. M. 288.

*Demipus anatinus*, Wiedm. Zool. Arch. i. 175, t.

*Ornithorhynchus paradoxus*, Blumenb. Handb. ed. 10, p. 135; Abbild. t. 41, 1800; Home, Phil. Trans. 1802, p. 87.

- O. anatinus*, Gould, Mamm. Austr. i. t. 1.  
*O. brevirostris*, Ogilby, P. Z. S. 1831, p. 150.  
*O. rufus*, Leach, Zool. Misc. 136.  
*O. fuscus*, Leach, Zool. Misc. ii. 136, t. 111.  
*O. crispus* et *O. lævis*, Macgillivray, Mem. Wern. Soc. v. 127.  
*Duck-billed Platypus*, Shaw.  
*Ornithorhynche*, Cuv. Oss. Foss. v. 143, t. 14 (skeleton).  
*Hab.* South-eastern Australia and Van Diemen's Land.

## 17. ECHIDNA.

Beak elongate, cylindrical, attenuated. Mouth small, terminal. Tongue very long. Body covered with spines. Tail very short  
*Osteology*, Cuv. Oss. Foss. t. 13 (shield).

- Echidna*, Cuv. Tabl. Elém. 143, 1797.  
*Tachyglossus*, Illiger, Prod. 1811.  
*Ornithorhynchus*, sp., Home.  
*Myrmecophaga*, sp., Shaw.

## ECHIDNA ACULEATA.

- Echidna australiensis*, Less. Man. 318.  
*E. hystrix*, Cuv. R. A. i. 226; Leach, Zool. Misc. ii. t. 90; Gould, Mamm. Austr. i. t. 2; Gerrard, Cat. Bones B. M. 288.  
*E. longiaculeata*, Tiedem. Zool. i. 592.  
*Myrmecophaga aculeata*, Shaw, Nat. Misc. t. 109, 1792.  
*Tachyglossus aculeatus*, Illig.; Schreb. Säugeth. t. 63 B.  
*T. hystrix*, Wagner; Schreb. Säugeth. iv. 242.  
*Ornithorhynchus hystrix*, Home, Phil. Trans. 1802, p. 348.  
*Porcupine Anteater*, Shaw.  
*Echidne*, Cuvier, Oss. Foss. v. 144, 613 (skeleton).  
*Hab.* Australia.

Var. More hairy.

- Echidna setosa*, Cuv. R. A. i. 226; Gould, Mamm. Austr. i. t. 3.  
*E. brevicaudata*, Tiedemann, Zool. i. 392.  
*Tachyglossus setosus*, Illiger; Schreb. Säugeth. t. 63.  
*Hab.* Van Diemen's Land.

5. ON THE STRUCTURE OF THE STOMACH IN DESMODUS RUFUS.  
 BY PROF. T. H. HUXLEY, F.R.S., V.P.Z.S.

According to Cuvier (Leçons, ed. 2, t. iv. pt. ii. p. 31), the Cheiroptera exhibit three principal forms of stomach, which are related to their varied food. There is the transversely elongated tubular stomach possessed by those Cheiroptera which live on fruit; the globular stomach, with closely approximated cardiac and pyloric orifices, exhibited by the specially insectivorous Bats; and the longitudinally elongated, conical stomach, with a pyloric cæcum, found in those Bats which suck the blood of other animals. By way of commen-



tary on the last proposition, Duvernoy adds (*l. c.* p. 32) that the stomach of the blood-suckers is "more or less straight and elongated, approaching in form and structure that of the Carnivora;" while at page 33 he writes:—

"In the Phyllostomes the stomach presents two principal forms. The group with bilobed median incisors has it elongated, without any pyloric cæcum, but with a very long tubular pyloric part, the pylorus and the cardia being situated at the apex and the base of a long recurved cone. This elongated form, which recalls that of the most voracious Carnivora, is also seen in a species with median, simple, anomalous incisors. In the Vampire (*V. spectrum*) the stomach is larger and approaches a rounded form, having the pylorus and the cardia closely approximated, though there is a short tubular pyloric portion. In two species of Phyllostomes, with simple median incisors, the stomach is altogether globular, with the two orifices approximated, and the cæca lost in the common cavity."

I find that *Desmodus rufus* presents a fourth kind of stomach, which is not only different from all these, but is unlike any form of that organ which has hitherto been observed in the mammalian series.

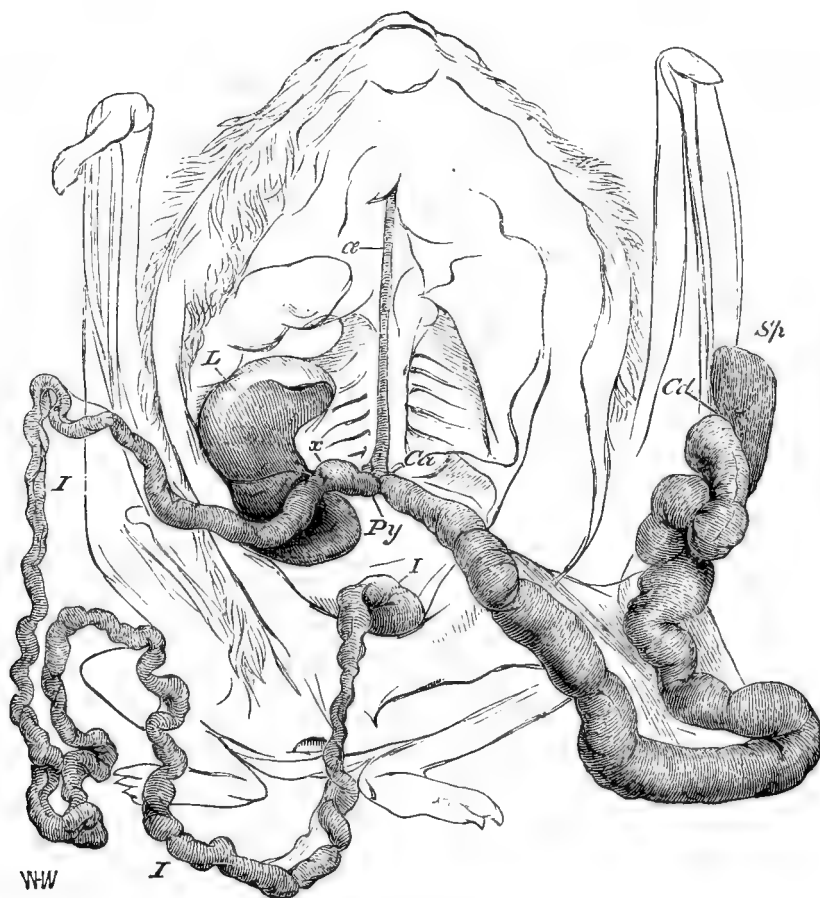
The gullet ( $\alpha$ ) is exceedingly narrow, and opens into a transversely elongated tube (*Py*), which passes on the right side into the intestine (*I, I, I*). The duodenum and the stomach are not outwardly separated by any pyloric constriction; but as the gall-duct ( $x$ ) is inserted at a distance of not more than 0·2 inch from the œsophageal aperture, it is clear that the pyloric division of the stomach is exceedingly abbreviated.

The cardiac division, on the other hand, is enormously elongated, forming a vast cæcum, sharply bent upon itself, and several inches in length (*Ca, Cd*). At first this cæcum is not wider than that part of the stomach into which the œsophagus opens; but before it bends upon itself it has fully twice that diameter, and the recurved portion remains wide throughout, dilating, somewhat suddenly, towards its cæcal end, and then slightly narrowing again to its termination.

In one specimen which I examined, the body of the *Desmodus*, from the snout to the end of the coccyx, measured 3·2 inches in length; and the intestine, from the pylorus to the anus, was 11 inches long; while the gastric cæcum, straightened out, measured 6·5 inches in length, so that this remarkable diverticulum of the stomach was twice as long as the body, and nearly two-thirds as long as the intestine.

In the 'Zoology of the Voyage of the Beagle,' Mr. Waterhouse, in concluding his description of a species of *Desmodus* (*D. d'orbignyi*), remarks—

"It is desirable perhaps to separate the blood-sucking Bats from the insectivorous species, and place them between the latter group and the *Pteropina* (with which they agree in the large size of the thumb and the rudimentary interfemoral membrane) under a sectional name, which I propose to call *Hæmatophilini*."

*Desmodus rufus.*

The thoracic and abdominal cavities are laid open; and the alimentary canal is unravelled and displayed throughout its whole length. From a preparation in the Museum of the Royal College of Surgeons. *æ*. The oesophagus. *Ca*. The commencement of the cardiac sac of the stomach. *Cd*. The blind end of that sac. *Py*. The short pyloric division of the stomach. *Sp*. The spleen. *L*. The liver, with *x*, the point at which the bile-duct opens into the alimentary canal. *I, I, I*. The intestine. The parts are represented of the natural size.

It does not quite clearly appear whether by "blood-sucking Bats" Mr. Waterhouse denotes the *Desmodi* only, or whether he includes the blood-sucking Phyllostomes with them. On the former supposition I am disposed not only to agree with Mr. Waterhouse, but even to go so much further as to regard the Desmodine genera, *Desmodus* and *Diphylla*, as constituting, under the title of HÆMATOPHILINA, one of the three primary divisions of the Chiroptera, the other two being the FRUGIVORA and the INSECTIVORA.

In the FRUGIVORA the nose and ears present no unusual modification. With the exception of *Hypoderma* and *Notopteris*, the index digit is provided with a nail. The upper incisor teeth are of mode-

rate size or very small. Before they are worn, the crowns of the molar teeth are divided into two ridges by a longitudinal furrow. The pyloric region of the stomach is greatly elongated; the uterus is two-horned.

In the INSECTIVORA, or ENTOMOPHAGA, there are foliaceous developments of the integument of the nose, or of the ears, or of both. The upper incisor teeth are of moderate size, or are very small. The molar teeth have V-shaped cusps, and do not exceed  $\frac{6-6}{6-6}$ , or fall below  $\frac{4-4}{4-4}$  in number. The index is not only devoid of a nail, but has frequently no bony phalanx at all, and never possesses more than two ossified phalanges. The stomach is either like that of the Carnivora or is globular, the cardiac and pyloric orifices being closely approximated. The uterus is pyriform.

Lastly, in the HÆMATOPHILINA the integumentary appendages of the nose and ears are small or rudimentary. The index is devoid of a nail, and has only a single phalanx. The median upper incisors are enormous, and are alone retained in the adult. The two pairs of lower incisors are small and pectinated. The molars are  $\frac{2-2}{3-3}$ , with crowns rising to a sharp longitudinal ridge. If the other species of *Desmodus* and *Diphylla* are like *Desmodus rufus*, the œsophagus is very narrow, and the stomach has an immense cardiac cæcum in this group.

The substance of the above remarks was contained in a lecture upon the organization of the Cheiroptera, which formed part of my course at the Royal College of Surgeons during the present year. I was not at that time aware that my friend Prof. Peters, of Berlin, had already noted the anomalous character of the stomach of *Desmodus* in the pages of a work upon the Mammalia which is at present unpublished, but which we may hope will not long remain so; and from a proof-sheet of which I quote the following passage:—

“4. Subfamily *Desmodi* . . . . . The stomach is very small, and has, on the left side (not at the pylorus), an intestiniform appendage 1 to 2 inches in length.”

Further, I gather from this proof, and from conversation with Prof. Peters, that he regards *Desmodus* merely as a somewhat aberrant member of the subfamily of the *Phyllostomata*, and not as the type of a primary division of the Cheiroptera. The peculiarities of the dentition of the *Desmodi* are, he considers, foreshadowed by the *Stenodermata*, containing the genera *Stenoderma*, *Chiroderma*, *Sturnira*, *Brachyphylla*, and *Centurio*, the true molar teeth of which are distinguished by having an external cutting, or notched margin, and usually acute cusps on the middle of the masticating surface; while they never have the V-shaped cusps of their allies, and are said to live exclusively on fruits. In several of these genera the total number of molar and premolar teeth does not exceed four on each side, above and below—a character which is also to be regarded as an approximation towards the extreme reduction observed in *Desmodus*.

Professor Peters's acquaintance with the Bats is so extensive and

profound that I feel bound to call particular attention to these views, which substantially constitute objections to the taxonomic suggestions I have ventured to throw out.

6. ON DEFORMITY OF THE LOWER JAW IN THE CACHALOT  
(*PHYSETER MACROCEPHALUS*, LINN.). BY JAMES MURIE,  
M.D.

The great length, the graceful elegance, and the beautiful symmetry of the lower jaws, as well as the regularity of the teeth, of the common Cachalot, are often striking objects of admiration in our museums. Occasionally, however, these jaws are found deformed in a very curious manner, and in such a way as at first sight cannot readily be accounted for.

With the exception of the short graphic account given by Mr. Beale in his 'Natural History of the Sperm Whale' (1839, p. 36), I am not aware of any original description or observation on this anomalous condition; and as three examples of a well-marked kind have fallen under my notice, I have considered it might not be uninteresting to examine, as far as the specimens have permitted, their exact condition, in order, if possible, to elucidate the cause of this abnormality.

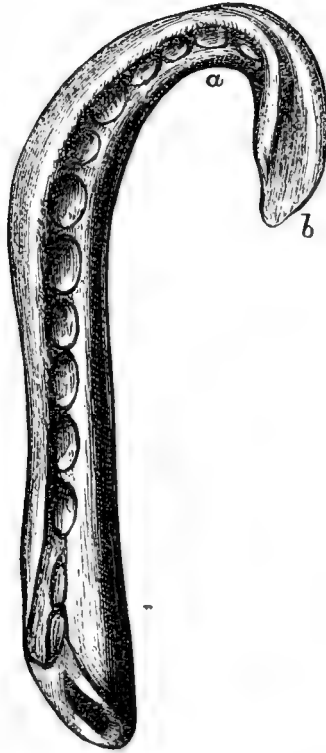
The first specimen I have to mention I saw when I was in New York a few years ago. I then paid a visit to the Museum in connexion with the United States Navy Yard at Brooklyn; and among the various curiosities exhibited I observed the right moiety of the lower jaw of a Cachalot, which arrested my attention from its peculiar shape. I made inquiries concerning the specimen, but failed to obtain any history in connexion with it.

The unusual form of this half of a lower jaw (of a comparatively speaking young animal) consisted in the symphysis and anterior half of the body being twisted at nearly right angles to the ordinary direction of the bone. The ramus was perfectly normal; and the body from thence onwards to about its middle seemed quite natural. From this latter part, however, it took a quick curve outwards almost rectangularly, then with a second larger sweeping curve it bent itself somewhat backwards, and further on towards the anterior end of the symphysis it again recurved itself a short way forwards, not unlike the manner depicted in fig. 2, of a somewhat similar-sized jaw in the British Museum.

The specimen, no. 2452, vol. ii. of the Physiological Series in the Museum of the Royal College of Surgeons\*, presented by Fred. D. Bennett, Esq., F.L.S., is described in the catalogue as "The right ramus of the lower jaw of a *Physeter*, the anterior part of which is curved strongly inwards and backwards, in consequence of some injury received in youth."

\* My acknowledgments are due to the Museum Committee for permission to figure this most interesting object.

Fig. 1.



This second specimen (fig. 1) is another illustration of the same kind of twisting as the one already described, and resembling it in being towards the right side; but in this case the jaw has been sawn across merely to preserve the interesting part of it; though, from the proportional size of the piece, compared with adult specimens in the same museum, one has no hesitation in referring it also to a young animal. The total length of the bone in a straight line is 23 inches, but following the curve it is as much as 33 inches. It contains nineteen sockets for the teeth. The ramus of the jaw seems normal as far forwards as the symphysis; thence inclining at a slight angle outwards for about a distance of 14 inches, it makes again a sudden sharp turn outwards, and then a second as quickly backwards, so as to resemble a hook in figure. The plane of the bone is also very much altered in position; this is best observed by following the course of the alveoli and sockets of the teeth. The extremity towards the ramus (where the jaw is cut across) has the alveolus in the natural position; but the fourth and fifth sockets forwards from this exhibit a slight inclination outwards; and this alteration of the sockets and plane of the bone goes on to the centre of the concavity of the twist, where they are no longer above, but on the middle of the side, and with a direction backwards (fig. 1 *a*). From this they still continue to alter in position to the extremity of the hook, where

the inner surface of the bone, which ought to have been in approximation with the left half, comes to be upon the upper surface (fig. 1 *b*), while the sockets are thrown round, partly looking opposite to those in the hinder part of the jaw, and partly on the under surface. The bone in this instance is increased in density, and several of the sockets for the teeth have spongy bone thrown out upon their surfaces, showing that the parts have suffered at one time or other from chronic inflammation. The bone otherwise is healthy, or such as if it had not suffered from rachitis or other softening causes.

The third example is one which gives a better idea of this anomalous condition (see fig. 2). It is a specimen contained in the Osteological Collection at the British Museum, which I was enabled to examine carefully through the kindness of Dr. Gray and Mr. Gerrard. There is no history attached to it.

The two halves of the jaw are complete, but separated from each other. Their size shows the animal to have been young, although of considerable dimensions. The length of the two, placed in juxtaposition, in a straight median line from opposite the posterior ends of the rami to the anterior surface of the bend, is about 65 inches, while the measurement following the curve of the right half to the tip of the jaw is 92 inches. Their anterior fourth has a curve towards the left side, in shape not unlike a shepherd's crook; and they have besides a twist upon themselves.

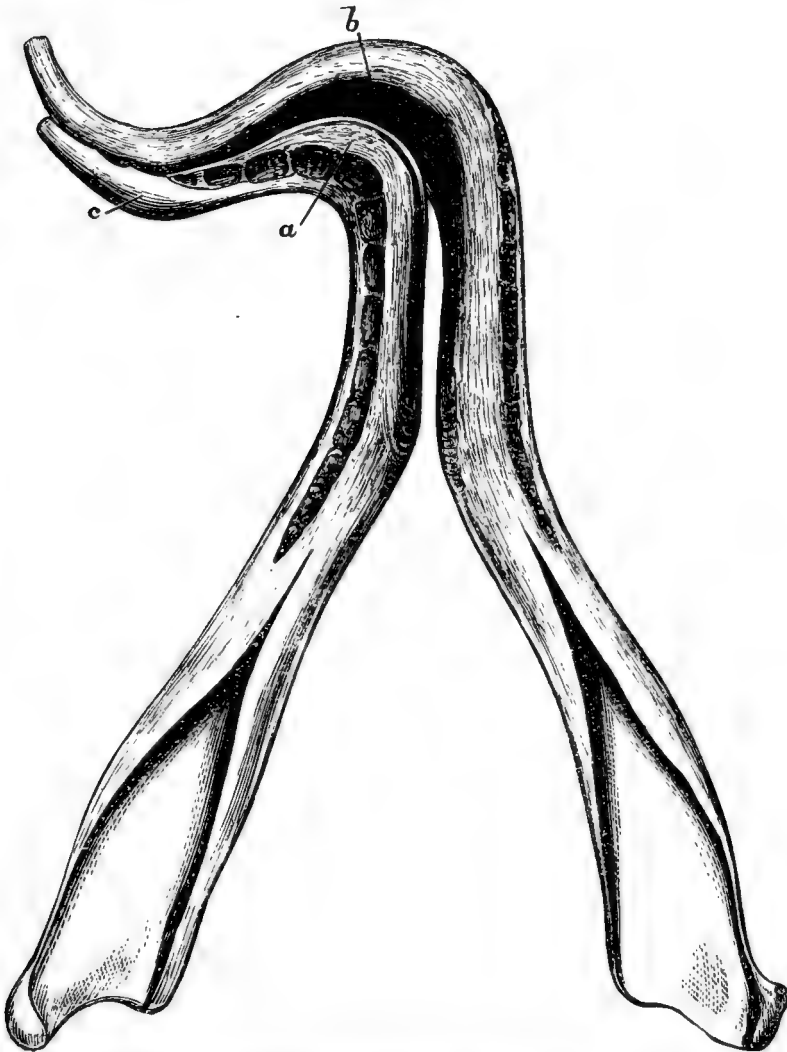
Each lateral half of this inferior maxillary bone presents characters sufficient to make it worthy of a separate description. The left has twenty-two sockets in its alveolar process. Following these as the most simple guide to the nature of the twist, we find the posterior six alveoli to be nearly on the upper surface, or in natural position; the next seven in advance (which occupy the hinder end of the symphysis) by degrees change from the upright position, so that the foremost one at the middle of the crook comes to be on the outer side of the jaw, and points directly backwards to the condyles. The four alveoli anterior to these last return gradually from the outer side to the upper surface, and the remaining five in front continue as it were in their normal position, that is, directed upwards. The bone of the jaw, besides the double angular bend, has in the mean time rolled itself outwards along with the sockets, so that the internal edge of the symphysis at the sharp bulging curve (fig. 2 *a*) is upon the upper surface; then as the bone bends backwards and outwards the symphysis returns or rolls itself inwards (fig. 2 *c*), so that at the anterior end it is first above and then comes to be almost on the inward and under surface. The symphysis has therefore a double bend and a double twist.

The pathological condition of the left half of the jaw is as follows:—The alveoli, as far forwards as the wide bend, are partially filled with spongy exostosed bone; the rest of the anterior alveoli have likewise traces of spongy bone in them, but their cavities seem rather widened than otherwise. The bone of the symphysis at the outward bend is very much augmented in breadth, thickness, and density (fig. 2 *a*); and internally it fits into a large hollow in the

bone of the right side, which last is seemingly worn into a groove by the continued pressure of the left half on it (fig. 2 *b*). Internally and below, the surface of the latter bulging part of the bone has a fibrous appearance, the lines being gently curved round, but in no way as if the jaw had been fractured or received a sudden single powerful twist. Above the last-mentioned place the surface of the bone is roughened and porous in appearance, like what is produced by periostitis. The remainder of the bone to the tip is diminished in thickness.

The right half of the inferior maxillary bone has a similar shep-

Fig. 2.



Abnormal lower jaw of *Catodon* (*Physeter macrocephalus*, Linn.) in the British Museum.

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herd's crook-like bend to the left side. Its six posterior alveoli are normal in position ; the seven or eight anterior to these incline outwards to the middle of the side, and the two most advanced of these last have a direction directly forwards, therefore quite in an opposite manner to their fellows of the left side. The remaining front alveoli of the right side, from being placed laterally, curve back almost to the vertical.

The posterior sockets forwards to where the bend begins, as in the left half, are lined with spongy exostosis ; but on the outer surface of the bend itself, the alveolar cavity becomes exceedingly shallow and superficial, and three sockets at this place are nearly obliterated ; what cavities remain are merely narrow lengthened slits. The next three alveoli anterior to the bend are all but filled with bony matter, and those still more in advance have a similar deposition, but in smaller quantity.

The inner surface of the symphysis at the bend, as already noticed, is scooped out (fig. 2 *b*), and the wall of the bone at this part is worn to a mere shell ; but forwards from this the bone is much more dense and solid.

Hence from this it results, that besides the difference in the direction of the alveoli in the two halves of the jaw, they also differ in the right being hollowed and atrophied at the bend and normal in density at the anterior part of the symphysis ; while, on the other hand, the left side has its bend considerably hypertrophied, with the tip atrophied.

Of such rather extraordinary conditions of the lower jaw Beale, as previously referred to, says :—

“ Besides blindness, this Whale is frequently subject to deformity of the lower jaw, two instances of which I have seen myself, in which the deformity was so great as to render it impossible for the animal to find the jaws useful in catching such fish, or even, one would have supposed, in deglutition ; yet these Whales possessed as much blubber and were as rich in oil as any of a similar size I have seen before or since.

“ In both these instances of crooked jaws the nutrition of the animal appeared to be equally perfect ; but they were different, in one case the jaws being bent to the right side and rolled as it were like a scroll ; in the other it was bent downwards, but also curved upon itself.

“ It would be interesting here to inquire into the cause of this deformity ; but whether it is the effect of disease or the consequence of accident I am unable to determine.

“ Old whalers affirm that it is caused by fighting. They state that the Sperm Whales rush head first one upon the other, their mouths at the same time wide open, their object appearing to be the seizing of their opponent by the lower jaw, for which purpose they frequently turn themselves on the side ; in this manner they become as it were locked together, their jaws crossing each other, and in this manner they strive vehemently for the mastery.

“ I have never had the good fortune to witness one of these com-



bats ; but if it be the fact that such take place, we need not wonder at seeing so many deformed jaws in this kind of Whale, for we can easily suppose the enormous force exerted on these occasions, taking into consideration at the same time the comparative slenderness of the jaw in this animal. Some corroboration of the above statement arises from the fact, as far as my knowledge extends, that the female is never seen affected with this deformity.”

From this it seems Mr. Beale is in doubt whether the deformity arises from disease or is the effect of accidental injury, almost inclining, however, to refer it to the latter ; but this is, in a great measure, founded on hearsay evidence.

Without entering into the question of the nature or in what manner the food is obtained by these deformed Cachalots, if we inquire what, most likely, has given rise to the jaws assuming their curious shape, in the absence of definite information we must take into consideration the condition of the bones themselves. This leads us to assign it to one of the three following causes :—first, congenital malformation ; secondly, direct accidental injury ; and thirdly, disease.

With reference to the first of these causes, I believe we are justified in concluding it not to be a congenital condition, as the consistency of the osseous tissue in the specimens does not present such characters as would indicate that while in the fetal state, or in the after young stage of the animal, the bone had suffered from softening disease, such as rachitis ; thus inherent defect or malnutrition in the constituents of the bony particles themselves is not observable. Again, in the mere deviation of form there would not necessarily be such coexistent and extensive marks of recent inflammatory action ; for the deformed parts at a very early age would have accommodated themselves to their anomalous position.

As regards the second cause, we are enabled to state with certainty that there is no trace of direct fracture of the bones ; so that in whatever manner the turn or curve has been produced, it evidently has not taken place by a single, sudden, sharp twist of the jaw into its present position, as might be inferred from what Mr. Beale tells of the manner these Whales are said to fight.

From these reasons, therefore, the third cause would seem to be the most probable one, although it is difficult to prove, from the paucity of specimens, that disease of the bone has undeniably been the originating cause ; for it is not unlikely that some sudden shock or slight injury may have excited or accelerated the disease, as well as that it should have arisen from pure inherent pathological conditions.

At all events the state of the bones themselves demonstrates, and this most clearly in the last-described specimen, that they have undergone a long-continued process of inflammation (*ostitis*), which has given rise to their becoming condensed and indurated in texture at one place, while in another there has been a corresponding rarefaction, the hypertrophied bone of the left side seemingly having slowly increased and worn the large hollow for itself, which it occupies in the right ramus, as this last, subjected to the continued pres-

sure, has evidently been atrophied to such an extent that little more than a mere shell of bone is left at the bend.

Inflammation of the periosteum (*periostitis*) has likewise occurred, as may be inferred from the appearance and consistence of the spongy bone thrown out on the surface. The gums, sockets of the teeth, and the large nerves sent to the long jaw have also been more or less severely implicated; and the manner in which the occlusion of the alveoli has taken place, together with, at one place, the apparent gradual diminution of the vascular supply by the regular channels from pressure upon the vessels, all point out that no sudden bend has been the means of producing the deformity, or that it has been an original foetal malformation.

On the whole, then, I would be inclined to account for the distortion of these jaws by supposing that when the creature was yet very young, its bones more or less soft or cartilaginous, a state of chronic inflammation had been set up in the bones and periosteum just at the bend, either inherently in the substance or from the effects of a concussion. The inflammatory process, continuing for a lengthened period, would give rise to enlargement and induration of the osseous tissue at the point mentioned, and according to the amount of local irritation and fresh deposition of osseous tissue would the abnormal curve of the bone be produced. The manner in which inflammation of the hoof in Ruminants occasionally causes it to curl upwards may be taken as a familiar example; only in the case of the jaws of the Cachalot the increase of growth and swerving of the bone from its usual direction would be effected by the hypertrophy of the one side pressing against and being reflected from its fellow, which it at the same time would drag along with it, while the increase and corresponding diminution of substance at the different points would produce the twist upon itself which each ramus possesses.

P.S. Since the above was written, Mr. Flower has informed me that he has seen a lower jaw of a small Cachalot distorted in a manner similar to those above described, though less curved. The specimen is in the Museum of the Literary and Philosophical Society of Hull. Along with the two instances recorded by Mr. Beale, this would make a total of six authenticated cases of deformity, and four, *at least*, of these occur in animals not full grown, but whether males or females is uncertain, excepting the British Museum specimen, which may be considered a female. For I find, according to Professor Owen (*Odontography*, pp. 353, 354), that in this species of Cetacean the difference of sex is easily distinguishable by the lower jaws alone, the male having twenty-seven, while the female has only twenty-three, teeth in each ramus, and the size of the jaws in the latter is also a third shorter. The fact of one specimen, therefore, being a female would invalidate Mr. Beale's corroboration of this deformity only taking place in the fighting males.

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1



From Nat & on Stone by J. Erxleben.

M & N. Hanhart, Imp<sup>t</sup>

PLATACANTHOMYS LASIURUS

April 25, 1865.

Dr. J. E. Gray, F.R.S., in the Chair.

A letter was read from Professor William Nation, of Lima, Peru, in reference to certain specimens of Reptiles intended to be transmitted to the Society's Menagerie.

A letter was read from Mr. W. Alford Lloyd, describing the new Aquarium-house lately erected in the Zoological Society's Gardens at Hamburg, and the improved system of management of Aquaria pursued in that establishment.

Mr. Sclater exhibited a collection of birdskins formed by the Society's Corresponding Member, M. Adolph Boucard, in the vicinity of Vera Cruz, Mexico, in November 1864, being the first results of this gentleman's new expedition to that country. The collection contained examples of thirty species, amongst which were two which had not before come under Mr. Sclater's notice in Mexican collections. These were—

1. *Lophophanes atricristatus* (Cassin), Baird's B. A. p. 385, originally described from Texas, and

2. *Ædicnemus bistriatus*, Wagl., of common occurrence in the open plains of Guatemala and Honduras, but not known to have been previously noticed so far north.

The following papers were read :—

I. NOTE ON THE SYSTEMATIC POSITION OF PLATACANTHOMYS LASIURUS. BY DR. W. PETERS, FOR. MEMB.

(Plate XX.)

Amongst the many interesting objects which have come under my observation in the British Museum through the kindness of my friends Prof. Owen, Dr. Gray and Dr. Günther, is a specimen of the curious Rodent shortly noticed by Mr. Blyth (Journ. A. S. B. xxviii. p. 289) under the name *Platacanthomys lasiurus*. The specimen in question is that exhibited by Mr. Sclater at a Meeting of this Society in 1860\*, and subsequently presented by him to the British Museum.

It has always been difficult to me and other workers on the Mammals to understand how a Rodent with only three molars in each jaw could be referred to the *Myoxina*; and I was therefore very anxious to examine this very interesting form. But the results of my observations will show that *Platacanthomys* does not belong to the Dormice, but appertains strictly to the Murine family of Rodents, being nearly allied in many respects to *Phloxomys* and *Meriones*.

The generic characters of *Platacanthomys* may stand as follows :—

\* See P. Z. S. 1860, p. 260.

## PLATACANTHOMYS, Blyth.

*Habitus myoxinus. Rostrum acutum, rhinario nudo, labro fisso; oculi mediocres; auriculæ mediocres nudæ; vellus molle, setis dorsalibus latis sulcatis; artus mediocres, palmæ plantæque pentadactylæ, digito primo abbreviato, falcibus modicis curvatis, acutis; cauda villosa, versus apicem fere disticha. Dentes primores laves, compressi, acuti, molares utrinque  $\frac{3}{3}$ , complicati. Cranium murinum, sed foraminibus incisivis parvis, coarctatis, ossibus intermaxillaribus inclusis, palato perforato et processu coronoidæ brevissimo. Ossa antibrachii sejuncta, cruris connata.*

The resemblance of this genus to the Dormouse, at first sight, is very striking, principally on account of the long-haired tail. But in other respects, in its smaller eyes, very thin ears, and the well-developed, although very short, thumb of the fore foot, it more approaches several Murine genera of Tropical India.

The skull is rather broad and flattened behind; but it is quite impossible for any one who knows anything about the craniological characters of the Rodentia not to recognize at the first sight the typical form of the *Murinæ*, in the two-rooted zygomatic process of the upper jaw, together with the peculiar form of the foramen infra-orbitale, which is very high, narrowed, and widened above, and in the development of supra-orbital ridges, which form together a lyri-form figure. As peculiar and deviating from the typical skull of the *Murinæ*, are before all to be noted the small and narrow foramina incisiva, formed only by the intermaxillary bones, the imperfect perforate palate, and the very short coronoid process of the lower jaw.

The incisors are narrow, compressed, and pointed. The molar series are distant from and parallel to each other. The first and second upper molars are nearly of the same size, and much larger than the third and last. All three are composed of five enamel-folds or laminæ, obliquely directed inwards and hindwards: the first and second of these are united as well on their inner as on their outer side; the third, fourth, and fifth are united on the inner side; but on the outer side only the first and fifth enamel-folds are united. The lower molars are of the same size as the corresponding upper ones; but their enamel-folds are all united on the inner, and separate on the outer side, except in the first (which has six enamel-folds) the three anterior ones, and in the second and third (which have four enamel-folds) the first and second ones.

## PLATACANTHOMYS LASIURUS, Blyth. (Pl. XX.)

*P. magnitudine Muris ratti, auriculis acuminatis, capitis dimidio longioribus, vibrissis longissimis; supra umbrino-fuscus, subtus albidus, jugulo pectoreque flavescens, cauda umbrino-fusca, apice albido.*

Long. a rostri apice ad caudæ basin 0<sup>m</sup>.138; caudæ 0<sup>m</sup>.110.

*Hab.* India orientalis, prov. Malabar.

The size of this curious little animal is nearly the same as that of the Black Rat. The head is rounded, rather flattened, with pointed snout, naked muzzle, extremely long whiskers, eyes of moderate size, ears moderate, pointed, and, with the exception of a few scattered hairs on the outer side, entirely naked. The fur is soft; on the upper part, from neck to tail, intermixed with flat, longitudinally grooved bristles. The limbs are proportionate and of moderate length, the anterior shorter than the posterior ones. The fourth toe is the longest, but only a little longer than the third; the second and fifth toes are much shorter, and nearly of the same length; but the first is very short, and provided with a well-developed claw. The tail is nearly of the same length as the body; it is thickly covered with hair, which is short on its base, and becomes more lengthened and distichous from its second third.

	mètre.
Total length .....	0·248
Distance from snout to base of tail .....	0·138
Length of the head .....	0·030
——— of the ears.....	0·014
——— of the anterior extremity (from the elbow to the end of the fourth finger) .....	0·035
——— of the sole of the hand and fingers .....	0·014
——— of the hinder extremity (from knee to the fourth toe) .....	0·050
——— of the sole of the foot and toes .....	0·025
Total length of the tail .....	0·110
Length of the tail without hair.....	0·080

The specimen represented was obtained by the Rev. H. Baker, of Mundakyum, Alipi, in Southern Malabar, who gives the following note on the species (J. A. S. B. xxviii. p. 289) :—

“I was ignorant of the existence of this animal till about a year ago, when I found it in a range of hills about 3000 feet high. It lives in the clefts of the rocks and hollow trees, is said to hoard ears of grain and roots, seldom comes into the native huts, and in that particular neighbourhood the hill-men tell me they are very numerous. I know they are to be found in the rocky mountains of Travancore; but I never met with them in the plains.”

DESCRIPTION OF PLATE XX.

- Fig. 1. *Platacanthomys lasiurus*, of the natural size.
- Fig. 2. Skull and lower jaw, side view.
- Fig. 3. Skull from above.
- Fig. 4. Skull from below.
- Fig. 5. Front view of the skull.
- Fig. 6. Lower jaw from above.
- Fig. 7. Upper molar teeth of the left side, magnified.
- Fig. 8. Lower molar teeth of the right side, magnified.
- Fig. 9. A bristle, magnified.

2. NOTE ON THE MAMMALIA OBSERVED BY DR. WELWITSCH IN ANGOLA. BY DR. W. PETERS, FOR. MEMB.

Our knowledge of the fauna of Angola is so very limited that any contribution to it may be welcome\*.

Some of the Mammalia collected by Dr. Welwitsch, during his sojourn in that country, and kindly submitted to my examination, are the following :—

1. *CERCOPITHECUS SAMANGO*, Sund.  
Near Sansamanda, district Pungo Andongo.

2. *EPOMOPHORUS GAMBIANUS*, Ogilby.  
One specimen from Loando.

3. *PHYLLORHINA GIGAS*, Wagner.  
Three specimens from Loando.

4. *CANIS ADUSTUS*, Sundevall.

A skin and skull of a young specimen of this peculiar species (not yet in the British Museum) from Golungo Alto.

5. *ZORILLA AFRICANA*.  
One specimen from Golungo Alto.

6. *ZORILLA ALBINUCHA*, Gray, P. Z. S. 1864, p. 69, pl. x.

One specimen from Golungo Alto. I should have taken it for a variety of the former from the same locality. But Dr. Welwitsch tells me that he found them constantly different, and that the natives also distinguish them by different names, calling the *Zorilla africana* "Sangamba onene" (the large Sangamba), and the *Zorilla albinucha*, Gray, simply "Sangamba."

7. *FELIS*, sp.

A skull of a species of this genus, perhaps belonging to *F. caligata*, from Ambaca.

8. *FELIS (CYNÆLURUS) GUTTATA*, Hermann.

Head, foot, and part of skin of a specimen found between Pungo-andongo and Cassange.

9. *MERIONES SCHLEGELII*, Smuts.

Three specimens from the sandy hills near Loando.

10. *PEDETES CAFFER*, Ill.

An imperfect skin from the district of Golungo Alto, which shows the wide distribution of this species.

\* In the 'Proceedings' for 1860, p. 245, Dr. Selater has given a list of nine species obtained by Mr. J. Monteiro in this country.



## 11. HYRAX ARBOREUS, Smith.

A perfect skin, with skull, from a specimen which was killed when it was climbing a tree. The white hairs surrounding the dorsal gland are partly rusty; the hair of the upper parts is black, with a large white subapical ring and without any mixture of brown; the hairs of the sides are dirty brown, with a white ring. There is no specimen corresponding in colour with Smith's *H. arboreus* in the British Museum; and although the skull has the same flattened form as that of *H. capensis*, and the whole animal is of the same size, the *H. arboreus* may prove to be a good species, not only differing in colour, but also in the greater shortness of the ear.

Dr. Welwitsch tells me that this species is common in rocky localities on the shores of the River Maiomba, in the district of Mossamedes, and that it differs always by its larger size from a second species living in the interior of Angola.

## 3. SUR QUELQUES MAMMIFÈRES RARES ET PEU CONNUS, D'AFRIQUE OCCIDENTALE, QUI SE TROUVENT AU MUSÉUM DE LISBONNE. PAR DR. J. V. BARBOZA DU BOCAGE.

Je viens de recevoir d'un de mes plus intelligents et plus zélés correspondants à Angola, M. le lieutenant Bayão, les dépouilles de plusieurs mammifères, dont je citerai les plus rares ou les moins connus.

## 1. GALAGO MONTEIRII, Bartlett, P. Z. S. 1863, p. 231, pl. xxviii.

Deux peaux, et un squelette complet.

*Hab.* Le district du Duque de Bragança (Angola).

## 2. ZORILLA ALBINUCHA, Gray, P. Z. S. 1864, p. 69, pl. x.

Deux peaux, et un squelette complet.

*Hab.* Le district du Duque de Bragança.

La description et la figure citées de M. Gray conviennent parfaitement à mes deux spécimens, excepté ce qui a rapport à la coloration du dessus de la tête. D'après le savant directeur du Musée Britannique, le *Z. albinucha* a, comme son nom l'indique, le dessus de la tête blanc, et les raies dorsales et la queue d'un jaune blanchâtre, tandis que je trouve chez mes spécimens le dessus de la tête, aussi bien que les raies dorsales et la queue, d'une belle couleur jaune. Cependant, malgré ces légères différences, je ne crois pas devoir rapporter mes spécimens à une espèce nouvelle, car je suis persuadé qu'elles sont à peine l'effet du différent état de conservation de mes peaux et de celle qui a servi à M. Gray pour sa description. J'ajouterai que, d'après mes propres observations, le séjour dans l'alcool un peu fort, et l'action constante d'une vive lumière, attaquent sensiblement cette coloration jaune, et doivent finir par la changer dans un blanc sale.

Pour éviter les fâcheux résultats d'une dénomination inexacte, je propose de changer le nom de cette espèce dans celui de *Zorilla flavistriata*, qui lui convient parfaitement.

3. *BDEOGALE NIGRIPES*, Pucheran, Rev. et Mag. Zool. 1855, p. 111; Arch. Mus. t. x. p. 120.

Un individu très-jeune, en alcoöl.

*Hab.* Le district du Duque de Bragança.

4. *CROCIDURA ÆQUATORIALIS*, Pucheran, Arch. Mus. t. x. p. 127, pl. 12. f. 3.

5. *BAYONIA VELOX*.

*Cynogale velox* et *Potamogale velox*, Du Chaillu, Journ. N. H. Soc. of Boston, 1860, p. 361.

*Mythomys velox*, Gray, P. Z. S. 1861, p. 265.

Une peau en très-bon état, un squelette incomplet, un fœtus de 14 centimètres à peau tout-à-fait nue.

*Hab.* Le district du Duque de Bragança.

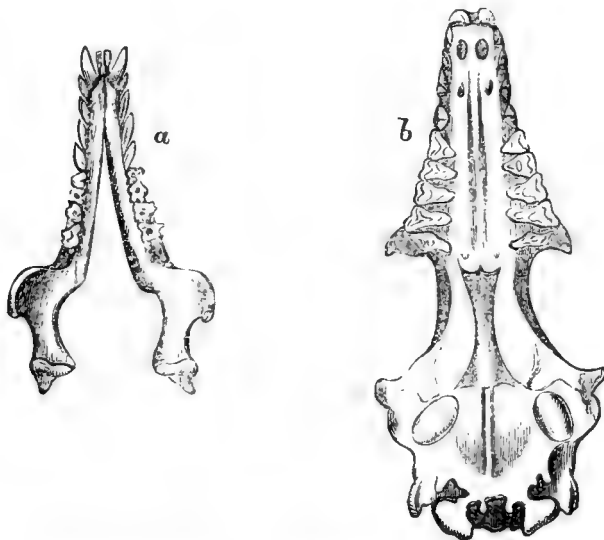
Voici la description succincte de ce curieux *Insectivore*, que M. Du Chaillu a pris pour un Carnassier, et M. Gray pour un Rongeur.

Corps allongé, bas sur les pieds, le ventre devant raser le sol pendant la marche. Tête longue, étroite, déprimée, à museau large et arrondi, avec un petit muflle nu profondément divisé par une dépression verticale. Oreilles de grandeur régulière, arrondies, couvertes de poils courts et rares sur les deux faces. Yeux très-petits. Moustaches longues, raides, implantées sur tout l'espace qui s'étend du bout du museau à l'œil. Bouche médiocre, reculée, inférieure. Queue assez longue, égalant presque le tronc et la tête réunis, comprimée et couverte de poils longs comme ceux du corps dans sa première moitié, très comprimée et couverte de poils très-courts, ras, dans le reste de son étendue. Membres courts, plantigrades, pentadactyles. Doigts libres, à peine réunis à leur base par un rudiment de palmure, tous comprimés; le premier le plus court, après lui le cinquième, le second et le quatrième égaux, le troisième le plus long. Le second et le troisième orteils étroitement unis par la peau jusqu'à la base de la dernière phalange, les autres libres, tous comprimés; le premier et le cinquième presque égaux et les plus courts, le second, le troisième, et le quatrième d'égale longueur. Deux mamelles abdominales.

*Coloration.*—Le dessus et les côtés de la tête, le dos et les flancs, la moitié supérieure de la première portion de la queue, et la portion apicale de cet organe en entier d'un brun foncé, comme chez notre *Loutre vulgaire*. Les lèvres supérieures, le dessous de la tête, le cou, la poitrine, le ventre, et la moitié inférieure de la première portion de la queue entièrement blanches. Sur les flancs des poils blancs sont mêlé aux poils bruns, d'où résulte une nuance moins foncée. La face externe des membres est, en partie, brune. Les ongles sont blancs.

*Dimensions :—*

Longueur totale .....	55·0 centimètres.
—— de la tête.....	5·2 „
—— de la queue.....	27·0 „
Diamètre des yeux .....	2 à 3 millimètres.



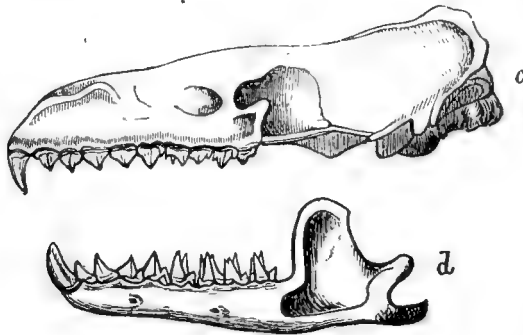
*Caractères ostéologiques.*—Crâne (fig. *b*) très-allongé, sans arcade zygomatique et sans cadre orbitaire complet. Mâchoire inférieure plus étroite en arrière que la mâchoire supérieure, d'où résulte que les dents molaires inférieures vont se placer, quand la bouche est fermée, dans les intervalles des dents molaires supérieures (comparer figs. *c* et *d*). Bassin très-ouvert inférieurement, les pubis très-écartés. La portion caudale de la colonne vertébrale profondément modifiée pour la vie aquatique : les vertèbres de cette région portent en dessus des apophyses épineuses très-développées et très-larges, et terminant supérieurement par une grande lame horizontale ; en dessous, sur les intervalles des corps vertébraux, s'articulent des os en V très-grands et d'une forme particulière. Chacun de ces os est composé de deux branches, qui, après s'être réunies inférieurement, se prolongent de chaque côté en une lame horizontale. Ces vertèbres ont aussi des apophyses transverses bien développées, horizontales, et en forme de lames. De cette façon la queue présente, des deux côtés, deux gouttières longitudinales, parallèles et profondes, l'une comprise entre les apophyses transverses et les lames horizontales des apophyses épineuses, l'autre limitée par les premières apophyses et les lames horizontales des os en V. Deux longs muscles puissants s'adaptent à ces gouttières.

*Dents* 40 ; 20 à chaque mâchoire, mais différemment disposées.

À la mâchoire supérieure (figs. *b*, *c*) :—Une paire de dents antérieures longues, légèrement courbes, prismatiques, rapprochées l'une de l'autre ; ensuite, de chaque côté, quatre dents intermédiaires à cou-

ronne très-comprimée et triangulaire, presque égales, et cinq molaires qui demandent une description plus détaillée. La première de ces dents, tout en conservant en dehors la forme des dents intermédiaires, au lieu d'avoir, comme elles, la couronne simple et comprimée, porte en dedans un talon assez prononcé. Les quatre autres molaires très-allongées dans le sens transversal, vont en se rétrécissant de dehors en dedans jusqu'à finir en pointe, de manière que leur surface libre présente la forme triangulaire; elles ont en dehors, exactement sur le bord externe, une pointe élevée accompagnée de chaque côté d'une autre pointe plus courte, au milieu de leur surface libre elles ont encore un tubercule pointu, et leur extrémité interne, ou le sommet du triangle, se prolonge en un autre tubercule vertical, également pointu.

À la mâchoire inférieure (figs. *b, d*):—En avant deux dents longues et prismatiques, comme la paire antérieure de l'autre mâchoire, mais séparées par une paire de dents plus petites et étroites. De chaque côté, quatre dents intermédiaires, comprimées, triangulaires, toutes égales quant à la forme, mais de diverse longueur; la première est la plus petite, la seconde et la quatrième les plus grandes. Les molaires en nombre de quatre, sont grosses, à couronne de forme quadrangulaire et armée de trois pointes; elles portent en arrière un talon bien distinct, qui s'élève à la mi-hauteur de leurs couronnes.



L'esquisse rapide que je viens de présenter suffira, je l'espère, pour lever tous les doutes au sujet de la parfaite identité de l'animal que je viens de recevoir d'Angola et des espèces créées par MM. Du Chaillu et Gray. J'espère également que tout le monde sera d'accord quant à le placer parmi les *Insectivores*, dont il restera, pour le moment, par ses dimensions la plus grande espèce vivante.

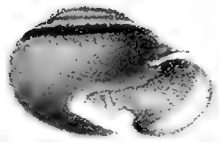
Par son système dentaire et par ses autres caractères ostéologiques il diffère si complètement de tous les genres admis dans cet ordre de mammifères, que j'ai dû ne pas hésiter à en faire un genre nouveau. Puisse-t-il être admis par les zoologistes, et perpétuer notre hommage de reconnaissance aux services rendus au Musée de Lisbonne et à la science par l'indéfatigable explorateur, M. le lieutenant Bayão!

Je n'ai pas le tems de discuter ici la place qu'il convient de donner à ce nouveau genre dans l'ordre où il doit être admis. Je ferai seulement remarquer que par ses dents molaires supérieures il ne ressemble pas à aucun autre *Insectivore*, mais par d'autres caractères ostéologiques il se rapproche un peu des *Tenrecs* et des *Sorex*.





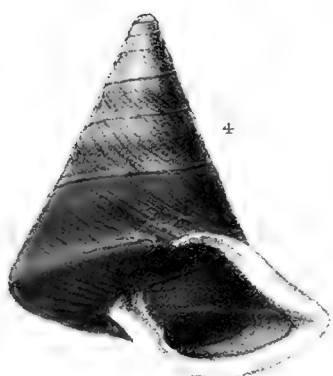
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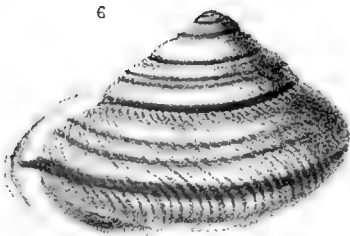
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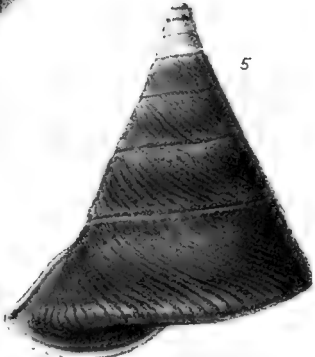
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12



14



Sowerby lith.

M. & N. Hanhart imp.

4. LIST OF THE LAND SHELLS COLLECTED BY MR. WALLACE IN THE MALAY ARCHIPELAGO, WITH DESCRIPTIONS OF THE NEW SPECIES BY MR. HENRY ADAMS. BY ALFRED R. WALLACE, F.Z.S., F.R.G.S.

(Plate XXI.)

The following list has been drawn up principally with the view of recording the localities of the various species collected by me, and thus furnishing materials towards a more accurate knowledge of the geographical distribution of these animals. Of the 125 species in the list, upwards of fifty were first obtained by myself; and of a considerable number of the others, accurate localities are now for the first time given. The restricted range so characteristic of land shells is well shown by my collection, no less than ninety species, or more than two-thirds of the whole, being confined each to a single island. The difference between the faunas of the Indo-Malayan and Austro-Malayan regions is also well marked, a number of characteristic genera and species of true *Helicidæ* being peculiar to the latter; while only four of this family were found by me in the former region. The true thick-lipped *Bulimi* are quite absent from the Moluccas and New Guinea, as they are from Australia; while they abound in the Indo-Malayan islands, and have extended thence into Celebes and through the islands east of Java as far as Timor.

The various species have been named by comparison with the type specimens in Mr. Cuming's collection; and to Mr. H. Adams's kind assistance are due the determination and arrangement of the genera and families. He has also described the eight species which are unique in the collection.

With a very few exceptions, all the shells comprised in this list now form part of the collection of William Wilson Saunders, Esq.

STENOPIDÆ.

1. HELICARION IDÆ.

*Hab.* Bouru (*Wall.*); Celebes (*Pfr.*).

2. MICROCYSTIS MISELLA, Fér.

*Hab.* Aru Islands (*Wall.*); Moluccas; Marian Islands (*Albers*).

*Remark.*—Found on a rotten trunk.

3. MACROCHLAMYS CONSUL, Pfr.

*Hab.* Borneo; Bouru (*Wall.*).

4. MACROCHLAMYS GLUTINOSA, Met.

*Hab.* Borneo (*Wall.*).

*Remark.*—Found among fallen leaves.

5. NANINA CITRINA, Linn.

*Hab.* Aru Islands (*Wall.*): var., small, yellow, without bands.

Ceram (*Wall.*): var., large, variously coloured and banded. Gilolo (*Wall.*): var., small, yellow, with pale bands. Mysol (*Wall.*): var., small, white, with milky bands. Ké Islands (*Wall.*): var., large, cream-coloured, with brown bands. Sulla Islands (*Wall.*): var., various, purple-tinged.

*Remark.*—Found upon foliage and tree-trunks.

6. NANINA AULICA, Pfr.

*Hab.* New Guinea; Waigiou (*Wall.*).

*Remark.*—Found in swamps, among roots and foliage of Sago-palms.

7. NANINA CINCTA, Lea.

*Hab.* Menado (Celebes) (*Wall.*).

8. NANINA WALLACEI, Pfr.

*Hab.* Macassar (Celebes) (*Wall.*).

9. NANINA LUCTUOSA, Beck.

*Hab.* Ceram; Goram; Batchian (*Wall.*). Brown-black variety, Aru Islands (*Wall.*).

*Remark.*—On foliage.

10. NANINA IGNESEENS, Pfr.

*Hab.* Batchian (*Wall.*). Pale and brown varieties.

*Remark.*—Found on foliage.

11. NANINA TUMENS, Desh.

*Hab.* Timor (*Wall.*).

12. HEMIPLECTA HUMPHREYSIANA, Lea.

*Hab.* Singapore (*Wall.*).

13. HEMIPLECTA SCHUMACHERIANA, Pfr.

*Hab.* Borneo (*Wall.*).

14. HEMIPLECTA PEASEANA, Pfr.

*Hab.* Bouru; Timor (*Wall.*).

15. HEMIPLECTA DURA, Pfr.

*Hab.* Waigiou (*Wall.*).

*Remark.* Found on dead trunk of fallen tree.

16. HEMIPLECTA NANINOIDES, Bens.

*Hab.* Singapore (*Wall.*).

*Remark.*—On walls and roads near the town.

17. HEMIPLECTA CIDARIS, Lam.

*Hab.* Celebes (*Wall.*); Timor (*Lam.*).



## 18. HEMIPLECTA RAREGUTTATA, MOUSS.

*Hab.* Solor (*Wall.*): var., pale brown, more or less tinged and irrorated with ashy. Flores (*Wall.*): var., pale or dark brown, immaculate.

## 19. HEMIPLECTA BELLA, PFR.

*Hab.* Ceram (*Wall.*).

20. HEMIPLECTA CIRCUMPICTA, MOUSS. = *Trochus* ...

*Hab.* Macassar (Celebes) (*Wall.*).

21. HEMIPLECTA SULPHUREA, REEVE. = *Trochus* ...

*Hab.* Macassar (Celebes) (*Wall.*).

## 22. HEMIPLECTA NEMORENSIS, MÜLL.

*Hab.* Lombok (*Wall.*).

## 23. HEMIPLECTA COFFÆ, PFR.

*Hab.* Lombok (*Wall.*).

## 24. RYSSOTA BROOKEI, AD. &amp; REEVE.

*Hab.* Sarawak (Borneo) (*Wall.*).

*Remark.*—Among fallen leaves in the mountain forests.

## 25. ? RYSSOTA REGALIS, BENS.

*Hab.* Borneo (*Wall.*).

*Remark.*—Found in the swamps of *Nipa*-palm.

## 26. ? RYSSOTA JANUS, CHEM.

*Hab.* Malacca (*Wall.*).

## 27. ? RYSSOTA NASUTA, MET.

*Hab.* Borneo (*Wall.*).

## HELICIDÆ.

## HELICELLINÆ.

## 28. TROCHOMORPHA LYCHNIA, BENS.

*Hab.* Malacca (*Wall.*); Singapore (*Bens.*).

*Remark.*—Found on rotten trunks.

## 29. TROCHOMORPHA CONICOIDES, MET.

*Hab.* Borneo (*Wall.*).

*Remark.*—Found on rotten trunks.

## 30. TROCHOMORPHA BATCHIANENSIS, PFR.

*Hab.* Batchian (*Wall.*).

## 31. TROCHOMORPHA PLANORBIS, Less.

*Hab.* Macassar ; Batchian ; Aru Islands (*Wall.*) ; New Guinea (*Less.*).

*Remark.*—Found on dead trees and rotten bark.

## 32. TROCHOMORPHA TROPIDOPHORA, Ad. &amp; Reeve.

*Hab.* Borneo (*Wall.*).

*Remark.*—Found on and under rotten bark.

“From the observations of Mr. W. T. Blanford, the animal of *T. lychnia* is without a mucous pore at the extremity of the foot ; and *Trochomorpha* therefore must be removed from the family *Stenopidae*. The species *infula*, Bens., however, hitherto included in *Trochomorpha*, is, according to Mr. Blanford, furnished with one, and must remain in that family, where it may be considered the type of a group, under the name of *Sitala*.”—*H. Ad.*

## HELICINÆ.

## 33. DORCASIA ARGILLACEA, Fér.

*Hab.* Timor ; Flores (*Wall.*).

*Remark.*—On rocks of coralline limestone.

## 34. DORCASIA FODIENS, Pfr.

*Hab.* Macassar (Celebes) (*Wall.*).

## 35. DORCASIA OCCULTA, Pfr.

*Hab.* Aru Islands (*Wall.*).

## 36. DORCASIA COMPTA, H. Ad. (n. s.).

*Hab.* Batchian (*Wall.*).

## 37. RHAGADA SOLORENSIS, Martens.

*Hab.* Solor Islands (*Wall.*).

## 38. PLECTOTROPIS GABATA, Gould.

*Hab.* Menado (Celebes) (*Wall.*) ; Birmah (*Gould*).

*Remark.*—On trunk of a tree in mountain forest.

## 39. PHANIA PYROSTOMA, Fér.

*Hab.* Gilolo (*Wall.*). Var. with yellowish lip, Batchian (*Wall.*).

*Remark.*—Found by the natives on trunks of large forest-trees.

## 40. OBBA PAPILLA, Müll.

*Hab.* Menado (Celebes) (*Wall.*).

## 41. PLANISPIRA KURRI, Pfr.

*Hab.* Batchian ; Waigiou ; Gagie Islands, and small islets near (*Wall.*).

*Remark.*—On shrubby foliage.

42. *PLANISPIRA ZONALIS*, Pfr.  
*Hab.* Gilolo (*Wall.*).
43. *PLANISPIRA ATACTA*, Pfr.  
*Hab.* Gilolo (*Wall.*).
44. *PLANISPIRA EXPANSA*, Pfr.  
*Hab.* Batchian (*Wall.*).
45. *PLANISPIRA COLUBER*, Beck.  
*Hab.* Ceram (*Wall.*), var. white and banded. Amboyna (*Wall.*),  
var. mottled. Bouru (*Wall.*), var. dark and waved.  
*Remark.* Found upon foliage of shrubs.
46. *PLANISPIRA CORNICULUM*, Homb. & Jacq.  
*Hab.* Batchian (*Wall.*).
47. *PLANISPIRA LATIZONA*, Pfr.  
*Hab.* Ceram (*Wall.*).
48. *PLANISPIRA MARGARITIS*, Pfr.  
*Hab.* Ceram (*Wall.*).
49. *PLANISPIRA ATRO-FUSCA*, Pfr.  
*Hab.* Batchian (*Wall.*).
50. *PLANISPIRA PHRYNE*, Pfr.  
*Hab.* Gilolo (*Wall.*).  
*Remark.*—Upon foliage.
51. *PLANISPIRA ASPASIA*, H. Ad. (n. s.).  
*Hab.* Batchian (*Wall.*).  
*Remark.*—Upon foliage.
52. *PLANISPIRA LOXOTROPIS*, Pfr.  
*Hab.* Gilolo, var. (*Wall.*).
53. *PLANISPIRA ZEBRA*, Pfr.  
*Hab.* Ceram; Goram (*Wall.*).  
*Remark.*—Upon foliage.
54. *PLANISPIRA MOLUCCENSIS*, Pfr.  
*Hab.* Mysol, var. (*Wall.*).
55. *PLANISPIRA MARTENSI*, Pfr.  
*Hab.* Ceram (*Wall.*).
56. *PLANISPIRA TORTILABIA*, Less.  
*Hab.* Aru Islands; New Guinea: white, dark, and banded varieties (*Wall.*).  
*Remark.*—Upon foliage.

57. *PLANISPIRA SCHEEPMAKERI*, Pfr.  
*Hab.* Batchian (*Wall.*).
58. *SEMICORNU UNGULINUM*, Linn.  
*Hab.* Ceram (*Wall.*); "Java" (*Albers*). Err. loc.
59. *SEMICORNU GRUNERI*, Pfr.  
*Hab.* Bouru (*Wall.*).
60. *SEMICORNU UNGUICULA*, Fér.  
*Hab.* Amboyna (*Wall.*); "Java" (*Albers*). Err. loc.
61. *SEMICORNU CERAMENSE*, Pfr.  
*Hab.* Ceram (*Wall.*).
62. *SEMICORNU BIOMPHALUM*, Pfr.  
*Hab.* Ceram (*Wall.*).
63. *SEMICORNU ZONARIUM*, Linn.  
*Hab.* Ceram (*Wall.*).
64. *SEMICORNU CIRCUMDATUM*, Fér.  
*Hab.* New Guinea; Waigiou; Aru Islands; Mysol (*Wall.*).
65. *SEMICORNU MOLLISSETUM*, Pfr.  
*Hab.* Mysol (*Wall.*).
66. *SEMICORNU CONCISUM*, Fér.  
*Hab.* Waigiou (*Wall.*).
67. *SEMICORNU QUOYI*, Desh.  
*Hab.* Menado (Celebes) (*Wall.*).
68. *SEMICORNU SULCOSUM*, Pfr.  
*Hab.* Aru Islands (*Wall.*).
69. *SEMICORNU MAMILLA*, Fér.  
*Hab.* Menado (Celebes) (*Wall.*).
70. *SEMICORNU RUBRUM*, Albers.  
*Hab.* Aru Islands; Mysol (*Wall.*).
71. *ALBERSIA GRANULATA*, Quoy & Gaim.  
*Hab.* Waigiou (*Wall.*).  
"The species *granulata* appears to be the type of a distinct group allied to *Semicornu*, for which I would propose the name *Albersia*."  
—*H. Ad.*
72. *ALBERSIA ZONULATA*, Fér.  
*Hab.* New Guinea; Aru Islands; Waigiou; Gilolo; Batchian (*Wall.*).

## 73. ALBERSIA NAJAS, Pfr.

*Hab.* Goram; Bouru (*Wall.*).

*Remark.*—When alive, this shell is of a pure delicate pea-green, the colour of the animal showing through its transparent texture. It is found on the foliage of shrubs of a similar colour.

## 74. PAPUINA LABIUM, Fér.

*Hab.* Dorey (New Guinea) (*Wall.*). Varieties occur without bands, and with the lip white.

## 75. PAPUINA NOVÆ-GUINEENSIS, Pfr.

*Hab.* New Guinea (*Wall.*).

## 76. PAPUINA WAIGIOUENSIS, H. Ad. (n. s.).

*Hab.* Waigiou.

## 77. PAPUINA NODIFERA, Pfr.

*Hab.* Batchian (*Wall.*) (*Coll. Cum.*).

*Remark.*—I will not be answerable for this locality, as I seem to have overlooked the species.

## 78. PAPUINA MYSOLENSIS, Pfr.

*Hab.* Mysol (*Wall.*).

## 79. PAPUINA AURORA, Pfr.

*Hab.* Waigiou (*Wall.*).

## 80. PAPUINA VITREA, Fér.

*Hab.* Gilolo (*Wall.*).

## 81. PAPUINA LANCEOLATA, Pfr.

*Hab.* Gilolo (*Wall.*).

## 82. PAPUINA LEUCOTROPIS, Pfr.

*Hab.* Aru Islands (*Wall.*).

## 83. PAPUINA ARUENSIS, Le Guil.

*Hab.* Aru Islands (*Wall.*).

## 84. GEOTROCHUS TURRIS, H. Ad. (n. s.).

*Hab.* Waigiou (*Wall.*).

## 85. GEOTROCHUS PILEUS, Müll.

*Hab.* Aru Islands (*Wall.*); Amboyna (*Müll.*, but prob. err. loc.).

*Remark.*—Found among decayed vegetation on coral rock near the coast.

## 86. GEOTROCHUS GAERTNERIANUS, Pfr.

*Hab.* Aru Islands (*Wall.*).

## 87. GEOTROCHUS PILEOLUS, Fér.

*Hab.* Batchian (*Wall.*). Var. much depressed, Batchian (*Wall.*).*Remark.*—On foliage.

## 88. GEOTROCHUS GABERTI, Less.

*Hab.* Batchian (*Wall.*).*Remark.*—On foliage.

## 89. GEOTROCHUS RHYNCHOSTOMA, Pfr.

*Hab.* Batchian (*Wall.*).

## 90. GEOTROCHUS BLANFORDI, H. Ad. (n. s.).

*Hab.* New Guinea (*Wall.*).

## 91. GEOTROCHUS FÉRUSSACI, Less.

*Hab.* New Guinea (*Wall.*).

## 92. CORASIA CONFORMIS, Fér.

*Hab.* New Guinea (*Wall.*).

## BULIMINÆ.

## 93. AMPHIDROMUS INTERRUPTUS, Müll.

*Hab.* Malacca (*Wall.*).

## 94. AMPHIDROMUS MACASSARIENSIS, Homb. &amp; Jacq.

*Hab.* Macassar (Celebes) (*Wall.*). = *fulvipes* + *macassar*

## 95. AMPHIDROMUS PERVERSUS, Linn.

*Hab.* Macassar (Celebes) (*Wall.*).Var. *citrinus*, Brug.

## 96. AMPHIDROMUS INVERSUS, Müll.

*Hab.* Malay peninsula (*Wall.*).

## 97. AMPHIDROMUS SINISTRALIS, Reeve.

*Hab.* Menado (Celebes); Timor (*Wall.*).

## 98. AMPHIDROMUS CONTRARIUS, Müll.

*Hab.* Macassar (Celebes); Timor (*Wall.*).

## 99. AMPHIDROMUS SINENSIS, Bens.

*Hab.* Timor (*Wall.*).

## ACHATININÆ.

## 100. CALYCIA CRYSTALLINA, Reeve.

*Hab.* Waigiou (*Wall.*).*Remark.*—Found on tree-trunks; the animal green.“The *Bulimus crystallinus* of Reeve has been placed in *Orthalicus* by Pfeiffer, and in *Limicolaria* by Shuttleworth, but does not appear

to belong to either. It may be considered to form the type of a new group under the name of *Calycia*."—*H. Ad.*

101. OPEAS ACHATINACEA, Pfr.

*Hab.* Borneo (*Wall.*).

CYCLOPHORIDÆ.

CYCLOTINÆ.

102. CYCLOTUS GUTTATUS, Pfr.

*Hab.* Aru Islands; Batchian (*Wall.*).

103. OPISTHOPORUS BIROSTRIS, Pfr.

*Hab.* Sarawak (Borneo) (*Wall.*).

104. OPISTHOPORUS BICILIATUS, MOUSS.

*Hab.* Sarawak (Borneo) (*Wall.*).

105. OPISTHOPORUS ROSTELLATUS, Pfr.

*Hab.* Sarawak (Borneo) (*Wall.*).

106. PTEROCYCLOS BATCHIANENSIS, Pfr.

*Hab.* Batchian (*Wall.*).

CYCLOPHORINÆ.

107. CYCLOPHORUS TUBA, Sow.

*Hab.* Malacca (*Wall.*).

108. CYCLOPHORUS BORNEENSIS, Met.

*Hab.* Sarawak (Borneo) (*Wall.*).

109. CYCLOPHORUS AQUILA, Sow.

*Hab.* Malay peninsula (*Wall.*).

110. LEPTOPOMA UNDATUM, Met.

*Hab.* Borneo (*Wall.*).

111. LEPTOPOMA CINCTELLUM, Pfr.

*Hab.* Gilolo; Gagie Islands (*Wall.*).

*Remark.*—On foliage.

112. LEPTOPOMA PAPUANUM, Dohrn.

*Hab.* New Guinea; Batchian; Ceram (*Wall.*).

113. LEPTOPOMA WALLACEI, Pfr.

*Hab.* Aru Islands (*Wall.*).

114. LEPTOPOMA DECIPIENS, Pfr.

*Hab.* Mysol (*Wall.*).

## 115. LEPTOPOMA LOWEI, Pfr.

*Hab.* Malacca (*Wall.*).

## 116. LEPTOPOMA MELANOSTOMA, Petit.

*Hab.* Aru Islands (*Wall.*).

## 117. LEPTOPOMA SCALARE, H. Ad. (n. s.).

*Hab.* Waigiou (*Wall.*).

## 118. DERMATOCERA VITREA, Less.

*Hab.* Aru Islands ; Macassar (*Wall.*).

## PUPININÆ.

## 119. PUPINA PFEIFFERI, H. Ad. (n. s.).

*Hab.* Batchian (*Wall.*).

## 120. CALLIA WALLACEI, Pfr.

*Hab.* Ceram (*Wall.*).

## POMATIASINÆ.

## 121. OMPHALOTROPIS CERAMENSIS, Pfr.

*Hab.* Gilolo (*Wall.*).

## HELICINIDÆ.

## 122. HELICINA ARUANA, Pfr.

*Hab.* Aru Islands (*Wall.*).

## 123. HELICINA ALBOCINCTA, Jacq.

*Hab.* Aru Islands (*Wall.*).

## 124. HELICINA ELECTRINA, Pfr.

*Hab.* Batchian (*Wall.*).

## TRUNCATELLIDÆ.

## 125. TAHEITIA WALLACEI, H. Ad. (n. s.).

*Hab.* Waigiou (*Wall.*).*Remark.*—On limestone-rocks.*Descriptions of the New Species.* By HENRY ADAMS, F.L.S.

HELIX (DORCASIA) COMPTA, H. Adams. (Pl. XXI. fig. 8.)

*T. umbilicata, depressa, tenuis, cinnamomea; spira brevissime conoidea, apice obtuso; anfr. 5, convexi, lente accrescentes, ultimus vix descendens, basi circa umbilicum infundibuliformem*



*compressus; apertura obliqua, lunato-rotundata, intus pallidior, nitida; perist. albidum, reflexiusculum, marginibus coniventibus, basali arcuato, subreflexo.*

Diam. maj. 14, min. 11, alt.  $6\frac{1}{2}$  mill.

Hab. Batchian (Coll. Saunders).

HELIX (PLANISPIRA) ASPASIA, H. Adams. (Pl. XXI. figs. 2, 3.)

*T. imperforata, globoso-depressa, tenuiscula, epidermide luteo-fulva, pallido-fusca, fascia nigricanti et unica latiore alba ad suturam ornata; spira parum elevata, vertice planata; anfr.  $4\frac{1}{2}$ , convexiusculi, celeriter accrescentes, ultimus breviter descendens; apertura obliqua, ovalis; perist. album, marginibus coniventibus, late expansum et reflexum, basali reflexo, intus tuberculo prominente instructo.*

Diam. maj. 26, min. 20, alt. 15 mill.

Hab. Batchian (Coll. Saunders).

This species is nearly allied to *Helix phryne*, Pfr., which was collected by Mr. Wallace at Gilolo. It is, however, a rather more solid shell, is not so much depressed, and is furnished with a much stronger and more prominent tubercle within the aperture near the base. It also differs in the arrangement of the coloured spiral bands.

HELIX (GEOTROCHUS) WAIGIOUENSIS, H. Adams. (Pl. XXI. figs. 6, 7.)

*T. subobtecte perforata, depresso-turbinata, tenuiscula, plicato-striata, pallido-fulva, ad suturam et peripheriam albo fasciata, et fasciis angustis fulvis ornata; spira conoidea, acutiuscula; anfr. 5, convexiusculi, ultimus depresso-rotundatus, antice descendens; apertura perobliqua, lunato-ovalis; perist. album, late expansum et reflexiusculum, cum margine columellari angulatim dilatato, supra perforationem reflexo, et intus tuberculo elongato munito.*

Diam. maj. 40, min. 32, alt. 21 mill.

Hab. Waigiou (Coll. Saunders).

HELIX (GEOTROCHUS) TURRIS, H. Adams. (Pl. XXI. figs. 4, 5.)

*T. subobtecte perforata, solida, conica, sulcato-striata, luteo-fulva; spira elongata, acutiuscula; anfr. 7, ad suturas convexiusculi, medio subconcavi, ultimus non descendens, angulatus, basi subplanatus; apertura diagonalis, triangularis; perist. simplex, late expansum, album, margine supero sinuoso, antrorsum arcuato, basali reflexo, cum columellari obliquo, triangulatim dilatato, supra perforationem reflexo, et intus subdentato.*

Diam. maj. 36, min. 30, alt. 37 mill.

Hab. Waigiou (Coll. Saunders).

HELIX (GEOTROCHUS) BLANFORDI, H. Adams. (Pl. XXI. fig. 1.)

*T. obtecte perforata, conoidea, tenuiscula, oblique striata, et striis minutis spiralibus ornata, nitida, corneo-alba; spira elongata,*

*acutiuscula*; *sutura marginata*; *anfr.* 6, *convexiusculi*, *sensim accrescentes*, *ultimus non descendens*, *infra medium acute carinatus*, *basi parum convexus*; *apertura diagonalis*, *subrhombeo-lunaris*; *perist.* *album*, *breviter expansum*, *marginem supero acuto*, *basali arcuato*, *reflexo*, *perforationem tegente*.

Diam. maj. 20, min. 16, alt. 17 mill.

*Hab.* New Guinea (*Coll. Saunders*).

LEPTOPOMA SCALARE, H. Adams. (Pl. XXI. figs. 9, 10.)

*T. perforata*, *globoso-conica*, *solidula*, *spiraliter confertissime striata et liris 6 filiformibus cincta*, *carnea*, *ad peripheriam pallidior*; *spira conica*, *acuta*; *anfr.* 5, *convexi*, *ultimus inflatus*, *plicis transversis*, *ad peripheriam fortioribus*, *munitus*; *apertura obliqua*, *subcircularis*; *perist.* *albidum*, *subinterruptum*, *marginibus callo junctis*.

Diam. maj. 11, min. 9, alt.  $9\frac{1}{2}$  mill.

*Hab.* Waigiou (*Coll. Saunders*).

PUPINA PFEIFFERI, H. Adams. (Pl. XXI. figs. 11, 12.)

*T. ovata*, *tenuiscula*, *laevigata*, *subpellucida*, *corneo-fulva*; *spira obtuse conica*; *anfr.* 5, *summi convexiusculi*, *sequentes planiores*, *ultimus spiram superans*, *antice non descendens*; *sutura simplex*; *apertura subverticalis*, *circularis*; *paries aperturalis lamella arcuata*, *tenui*, *marginem dextro soluta munitus*; *columnella dissecta*, *processum linguiformem triangularem exhibens*; *perist.* *incrassatum*, *breviter expansum*, *marginem dextro subsinuato*.

Long. 9, diam. 5 mill.

*Hab.* Batchian (*Coll. Saunders*).

TRUNCATELLA (TAHEITIA) WALLACEI, H. Adams. (Pl. XXI. figs. 13, 14.)

*T. elongata*, *subulata*, *tenuis*, *decollata*, *albida*, *clathris acutis undulatis confertissime instructa*; *anfr.* *superst.* 8, *convexiusculi*, *ultimus penultimo late sejunctus*; *apertura rotundato-lunaris*; *perist.* *continuum*, *subincrassatum*, *undique reflexiusculum*, *extrorsum expansum*.

Long. 18, lat. 4 mill.; ap. diam. 3 mill.

*Hab.* Waigiou (*Coll. Saunders*).

DESCRIPTION OF PLATE XXI.

Fig. 1. *Helix (Geotrochus) blanfordi*.

Figs. 2, 3. *Helix (Planispira) aspasia*.

Figs. 4, 5. *Helix (Geotrochus) turris*.

Figs. 6, 7. *Helix (Geotrochus) waigiouensis*.

Fig. 8. *Helix (Dorcasia) compta*.

Figs. 9, 10. *Leptopoma scalare*.

Figs. 11, 12. *Pupina pfeifferi*.

Figs. 13, 14. *Truncatella (Taheitia) wallacei*.

May 9, 1865.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

The following extracts were read from a letter addressed to Dr. J. E. Gray by Mr. E. L. Layard, of Cape Town, Corr. Memb. :—

“I send you herewith figures and descriptions of a new species of Zebra. You have had a skin sent you\* which you rejected as a ‘stray specimen of *E. montanus*, which had got down on the plains and had been shot by accident’†. I am sure you will, on perusal of these notes, alter your opinion; and I shall be obliged to you to read them at the Zoological Society. I wish to name the animal *Equus chapmani*, after its discoverer, my friend James Chapman, who has done so much for African discovery, and who has hitherto reaped no reward. I send you photographs of a horse and a mare of this Zebra in different positions to show the markings, which differ entirely from those of *E. montanus* (vel *E. zebra*) in the union of all the black stripes with a medial one on the belly; also on the back, in wanting the ‘gridiron’ pattern, as Baines calls it, on the rump. I also send coloured sketches by Baines to show the colour. This new animal also differs from the other Zebras in having the callosities on the legs far larger and of a more rounded shape, in having shorter and more equine ears, measuring only  $6\frac{1}{2}$  inches instead of  $11\frac{1}{2}$ , and in having a shorter and more equine head and tail. The hoofs also are flatter than in *E. montanus*, and not adapted for mountain-work. The mane grows several inches down on the forehead, and stands up between the ears, so that when seen in full face it stands far higher than them. Chapman and Baines give the dimensions of several individuals; and all who have seen them here, who are competent to judge from knowing the other species well, at once detect the differences. I am quite convinced of them myself; and, if you still doubt, please read this letter and the notes, and exhibit the drawings, to the Zoological Society in my name. They roam in large herds, and are first met with about 200 miles from the coast inwards on leaving Walwich Bay, where *Equus montanus* (or rather a variety of that animal) prevails. I add some extracts from the journals of Mr. Chapman and Mr. Baines relating to this Zebra.”

“*Extract from Mr. J. Chapman’s Journal, dated May 21, 1862.*

“The Quaggas here, I think, from about Sechellies’, though by no means new to me, are different to any we see described in books of natural history. The brush of the tail of one I shot to-day, and which is rather a young specimen, is a dark grey, while the base is

\* The skin sent me by Mr. Baines arrived in bad condition, with scarcely any hair on it. It was that of a very young animal, and I could not see any difference, as far as I could judge in its very bad state, from that of a young Common Zebra.—J. E. G.

† I have no recollection of having made such a statement as the latter part of this quotation.—J. E. G.

white. In older specimens the brush is black, with a few white hairs intermixed. It has a head band traversing the middle of the belly, from which the transverse bands diverge alternately. The stripes are of a very deep rich brown, nearly black; while the ground-colour is raw sienna on the upper parts (back, rump, sides, &c.), but gradually fading into white on the lower parts. It has an erect mane of alternate bands of white and black, edged with brown. The ears are white, with a dark band near the tip and broader band at the base. The muzzle is grey or lead-coloured, and behind the nostrils a brown coffee-colour. It has a bare spot on all four fetlocks, with a brown crescent-shaped spot on either side of it. A bare patch above the knee, on the inside of each fore leg. The pastern joints are brown, excepting at the back, where it is divided vertically by a white line from fetlock to hoof. The ears are decidedly equine. The mane is 6 inches long on the back; commencing from about 4 inches down the forehead, extends to the length of  $2\frac{1}{2}$  feet down the back. The markings of it are continuations of the transverse lines which cross the back. The white bands on the mane are quite superficial, the hair underneath being actually black, edged with brown. Length of ears 6 inches. The head measures 2 feet from the top of the skull to the point of upper lip. From the root of the mane on the forehead and from top of forehead narrow lines of white and black (the latter sometimes streaked with brown in the middle) diverge in a triangular manner towards the eyes, where the outside lines, making an angle, continue down the face, drawing closer towards the extremity of the face (the inside lines being straight), where they blend and form a dark brown patch behind and above the nostrils, the muzzle and the lips being grey. Broader bands emanate from this dark muzzle, and cross the chest in a crescent shape, leaving a white margin around the eyes, behind which the regularity of the lines is interrupted by those of the neck; and the space from below the eye is filled up with markings of a hieroglyphical character. The stripes under the chin are light brown. The circumference of the neck is 2 feet. The dorsal line extends to the brush of the tail, which is of a dark grey; and on the base of the tail, which is white, it becomes narrower, and is dotted all the way down on either side with spots of black, edged with brown. The form of the tail approaches nearer to that of the Horse in the largeness of the brush than the Zebra or the Ass; but it is still not exactly like a Horse's tail. On the thighs the stripes are alternately pale brown and deep brown, horizontal, but curving and forming a right-angled triangle on the flank; and an acute and more perfect triangle is formed on the shoulder-blades by the junction there of the stripes from the neck and breast with the transverse stripes. A longitudinal dark band traverses the whole length of the belly, becoming narrower and deeper on the breast, around which it winds and continues, forming one of the oblique lines, to the centre of the shoulder-blades. From out of this ventral line diverge the transverse lines tending towards the dorsal line, but not connected therewith. On the legs the stripes gradually assume a horizontal direction from the top downwards, but continuing the ob-

lique direction longer on the hind legs, and are distinctly, though sometimes only faintly, visible to the hoofs in this specimen. Others are more strongly marked. In some cases the transverse lines do run into the dorsal line; but in no two specimens do the markings seem to be exactly alike, the lines sometimes branching into two or three as they approach the dorsal line on the flank, and the angle at the junction of the horizontal or oblique lines, these with the transverse being sometimes filled up with disconnected hieroglyphical characters.

“The height of a young male shot in June 1862, at the shoulder, was  $4\frac{1}{2}$  feet, at the rump 5 feet.”

“Notes of a supposed new variety of Quagga observed on the elevated flats between the Botlette and Zambesi Rivers during the late journey of J. Chapman and T. Baines. By T. BAINES.

“Extract from my diary:—

“20th May, 1862.—Chapman had shot a Quagga answering most nearly to the Bonte Quagga or Burchell's Zebra, which is striped over the neck and body, the legs only, from the knees and houghs, being white; in this, however, faint markings were continued all the way down, and a peculiar line was run along the centre of the stomach, making me think it must be a new variety. Unfortunately it is already cut up by Damaras and Bushmen.

“As nearly as I can remember, Chapman, on returning, remarked, ‘The Quaggas here are not like those of Vaal River; they have stripes on their legs;’ then said, ‘and if they are not Zebras they must be new, for only two kinds are described—the common one of Kafirland with no stripes on the rump or legs, and *E. burchellii*, the Bonte Quagga, with no stripes on its legs’\*. Chapman considered they were not Zebras (as the animal is called here), *E. montanus* having longer ears and asinine head and tail, whereas the head and ears of these were more like those of a Horse, and the tail more bushy. Besides this, *E. montanus* is strictly confined to hills and broken ground, while these live in immense herds on the flat, with no mountains within many days' journey. We determined on further investigation.

“Latitude of the camp  $20^{\circ} 5' 55''$  south.

“June 26th.—Chapman shot a Quagga strongly marked, like the former ones, on the parts of the legs that are usually white; he sent to let me know; but John, who has no idea of anything that has not a market value, had called the Damaras to cut it up.

“30th.—The head and legs of a Quagga were brought in, the latter being, as before, strongly marked quite to the hoofs, the recurrence of this peculiarity showing that it cannot be a mere individual accident, such as is seen in difference of colour in domestic animals.

“July 10th.—Chapman shot a Quagga and Sable Antelope at a

\* This passage reads obscurely. Baines means only two kinds of Quagga: the hunters call *E. quagga* and *E. burchellii* “Quaggas,” while *E. montanus* they call “Zebra.”—E. L. L.

distance from the waggons. I sketched from the skin and horns of the latter, and the legs and ears of the Quagga. This had been a smaller animal, but of stouter and more compact build than those hitherto seen. I have already mentioned those at the Salt-pan with decided markings on the legs below the knees and houghs, while the two described species are perfectly white; and now this animal, besides being stouter and shorter of limb, is more strongly marked, the colours being distinct and pure black and white, the black spreading almost half over the pastern-joint and fetlock, and having a small white edging between it and the hoofs; the ears are strongly banded and slightly tinted with brown. I thought at first it might be a Zebra; but Chapman considered it a true Quagga, and I am inclined to think so too.

“This was at Dāká (lat.  $18^{\circ} 40' 1''$ ). After coming down off the elevated plain into the mountainous valley of the Zambesi system, we were encamped on one of the spruils of the Luisi, the first running water we had seen since leaving the Botletle River.

“Thursday, 17th, Matietue River.—Chapman had shot a Quagga mare; and, hastening to the spot, I found an eager group of natives with difficulty restrained from rushing at once upon the prey. In this case we had to omit the measurement; but I sketched the stripes carefully, and the camera of course cannot be gainsaid. The general colour was a yellowish or raw-sienna brown on the upper parts, and deepest on the rump, fading into white on the neck, belly, and legs; the stripes were of the deepest brown or nearly black, and the difference between this and the known varieties consisted in their being continued quite down to the hoof on all four legs, slightly fainter on the inside; the belly was marked by a broad black band along the centre, to which all the side stripes were joined; on the back was a similar black line, but only the stripes above the shoulder were connected with it; the mane was upright, as usual (the neck-stripes being continued vertically through it); the ears small and equine, and a bare spot (rather small) was observable on the inside of the fore legs only, the Zebra, I believe, having it on all four, as well as large ears.

“I made two sketches of this, and Chapman two photographs. There are intermediate brown stripes between the black ones on the hind legs above the hough.

“Saturday, July 19th.—We proceeded about a mile north-east by north, when, near the small conical hill on our left, Chapman brought down a fine young Quagga stallion of the same kind as the mare previously killed; but age, I suppose, not having deepened the colours, its whole body was of the purest white, marked with jet-black bands down to every hoof, in the manner of the other, but slightly fainter on the inside of the legs, and also where the stripes of the sides joined to the longitudinal line of the belly, some of those on the flanks having these points so faintly marked that the junction could not be called complete; like the other, a central stripe ran along the back, with which two or three of the shoulder-stripes (on each side) were connected, the broad stripes of the hinder parts

originating near the central line about the insertion of the tail, and diverging laterally over the hip, flank, and side till they completely or nearly reached the ventral line, the longest of them meeting on their way the ventral stripes of the sides, and forming the most beautiful possible combination of curves and angles, even the slight variation of regularity on either side conducing to the effect; the ears were small, and banded and tipped with black and dark brown; the head well shaped, with a little sienna-brown towards the nose; and the whole form lighter and more elegant than in the older specimens.

“Sunday, September 14th.—I shot two, which at first I took for Mountain-Zebras; but on comparing notes with Chapman, I came to the conclusion they were also Quaggas. The stallion fell at a distance, and was cut up while I was sketching and observing the mare. She was full striped, somewhat smaller than most of those Chapman had killed; ears, if anything, shorter and more equine. Callosities or small bare patches of skin on the inside of the fore legs only, and not on the hinder legs; striped right down to the hoofs; inside more faintly marked than the outer. Dokkie and others thought it like the Wilde Paard of Ozembengue, and different to the Quacha of the plains. I believe they would have said anything, so that I would have done talking and let them begin to cut it up.

“Sunday, December 7th.—Went out from Logu Hill, Zambesi River; tracked spoor several hours; wounded a mare, which was run down late in the afternoon, and killed with a stone. Fully striped, as before, down to the hoofs, all four legs, the inside of the forearm and thighs being more faintly marked; the ears small and tipped with black; the stripes on the sides extended from the dorsal line to the ventral, which last, reaching from between the fore legs to the hinder, was of not quite so deep a black; the ground-colour was light-yellowish brown on neck, back, and sides, passing into white on the cheeks, throat, and under parts of body; the teats, two in number, were situated in the after part of the black ventral lines. She had warts or callosities on the inside of the forearms only, and none on the inside of the thigh.

“I sketched carefully, and took the skin home, attempting to preserve it; but the weather was so damp that, even in a hut with a fire in it, I could not dry it.

“Tuesday, 14th April, 1863 (after our return to the salt-pan on the elevated plain between the Zambesi and Botletle Rivers).—A few Quaggas were standing on the further plain, and creeping behind a point at 300 yards' range. I shot one through the neck and forehead: it proved to be a well-grown, handsomely marked filly of the first year; and as the rest retreated, I noticed that the mare hung back and looked frequently round for her lost little one, returning when the others were out of sight and gazing wistfully at the spot where it lay.

“I had no means of measuring the beautiful little creature on the spot; and for convenience of carrying I had only my small sketch-book, so carefully outlined out one of the fore legs. I sent Pompey

back for assistance, and in the interval sketched on a small scale, and, stripped off the skin, which is a good size for a small museum, and, as carriage is a consideration, suits me better than a large one.

“It is perfectly marked after the manner of Quaggas in this locality, but not so fully as those of Dāká and the Zambesi, and is most certainly an intermediate link between already described varieties and the Zebra. The chief points worthy of note are that the legs, instead of being white as in the Bonte Quagga (*E. burchelli*) from the houghs and knees, are marked with transverse bands, not so dark as those on the body, quite down to the hoofs; there is a dark stripe, commencing between the fore legs and extending along the belly to between the hinder, where it becomes broader and somewhat fainter; the first three stripes behind the shoulder are joined to this; the dark stripes on the rump are alternated with others of a medium brown, but those on the fore part of the body and neck are of a full deep black; there are callosities on the inside of the fore legs only, and none on the hinder.

“Chapman killed two Quaggas during the day. I believe they were very faintly marked on the legs; but the vultures and Damaras destroyed them. The skins are quite worthless, which is much to be regretted, as we think it certain they are true Quaggas undescribed in any work we know of, and, as a new variety, would have been a handsome gift to any museum.

“Pereira told me subsequently, the Quagga of Damaraland has legs very nearly white; there are faint stripes, but not visible till you come close to them; there are warts on the fore legs only. The Wilde Paard is darker, the stripes blacker; the head is larger, and the ears also; they stand up so as to be visible above the mane. The Wilde Paard goes in the hills, the Quagga on the flats.

“I sent down the skin of the filly to Mr. Logue in Cape Town, and he forwarded it to the British Museum.”

With reference to this communication, Mr. Sclater remarked that the female Zebra in the Society's Gardens (presented to the Menagerie, May 26th, 1861, by H. E. Sir George Grey), which he had hitherto referred to *Equus burchelli*, appeared to answer the description above given in every way, and must probably be referred to *Equus chapmanni* if that species were allowed to stand. Mr. Sclater exhibited a drawing by Mr. Wolf (Plate XXII.) representing this animal.

The following papers were read :—

1. ON THE DEVELOPMENT OF THE STERNAL CALLOSITIES IN CYCLANOSTEUS SENEGALENSIS, AND ON THE SYNONYMS OF CYCLANOSTEUS AND ITS ALLIED GENERA. BY DR. J. E. GRAY, F.R.S.

The British Museum has recently purchased, at a sale of the natural-history specimens collected by the late Dr. William Balfour Baikie, R.N., during his recent explorations up the Niger, a series of five specimens of the Tortoise, which I figured in the 'Catalogue





J. Wolf del. et lith.

M. & N. Hanhart imp.

EQUUS BURCHELLI.



of Shield Reptiles in the British Museum,' under the name of *Cyclanosteus petersii* (t. 29), but which, I have been induced since to believe, may be the more adult state of *Cryptopus senegalensis* (Dum. et Bibr. Erp. Gén. ii. 504), and have hence, in my "Revision of the Species of *Trionychidæ* found in Asia and Africa" (P. Z. S. 1864, p. 76), named *Cyclanosteus senegalensis*.

The specimen which is figured in the 'Catalogue of Shield Reptiles in the British Museum' represents all the callosities in the sternum as developed when the animal is approaching maturity, with the two hinder ones of a small size.

The series which we have now received shows that the animal sometimes reaches nearly the adult size without any indications of the hinder callosities being developed; in another specimen of nearly the same size, the place they occupy is only marked by a small smooth tubercle, showing through the skin. In the specimen figured in the catalogue above referred to, the callosities are of a small size and rounded form. In one of the specimens now received they are of a larger size and more oblong form; in a second rather larger specimen they are much larger, oblong-elongate, occupying nearly the whole length of the bones on which they are placed; and in a third specimen, which has all the sternal callosities very much developed, and some additional ones on the side of the front ones, the hinder pair of callosities are of a very large size, covering the greater part of the hinder portion of the sternum between the hinder moveable lobes; the callosities are of an elongated subtrigonal shape, with nearly straight sides and a rounded hinder end; they have a double notch on the front edge, fitting into two similar notches in the outer hinder edge of the abdominal callosities.

The five gular callosities are very similar in disposition; but they vary greatly in form and size, compared with each other, in the different specimens of this series.

In one which is destitute of the hinder callosities, the second pair of gular callosities are long and narrow, forming with the hinder gular callosity a nearly circular disk (see fig. 2, p. 424); while in all the other specimens the second pair of callosities are broad and separated from the edge of the third callosity by the rounded form of the outer hinder angle; the single hinder callosity is generally wider than the others; the first pair in two specimens are square, nearly as broad as long; but in the four other specimens they are much broader than long, from front to back, forming together a broad band with an arched outline in front of the second pair (see fig. 1, p. 424).

In the specimen without any hinder callosities there is a single, small, roundish, additional tubercle on the right side of the hinder outer angle of the second pair of gular plates; but there is none to match it on the other side of the sternum. In all the other specimens there is no indication of such additional plates, except in the one which has all the callosities so much developed. This specimen has several distinct well-marked callosities, besides the usual number: thus there is a small triangular one at the outer hinder edge of the right plate of the first pair; there is a roundish smooth bony plate

on the middle of the outer side of the left ; a rugose callosity, of a triangular shape, on the outer side of the right callosity of the second pair ; the space between the outer hinder angle of the second pair of gular callosities, the side of the odd third plate, and the front edge of the middle of the abdominal callosity is filled up with an additional callosity ; on the left side this callosity is single and of a square form ; on the right side it is divided into two parts, the anterior part being triangular, and the hinder rather irregular in its outline (see fig. 1).

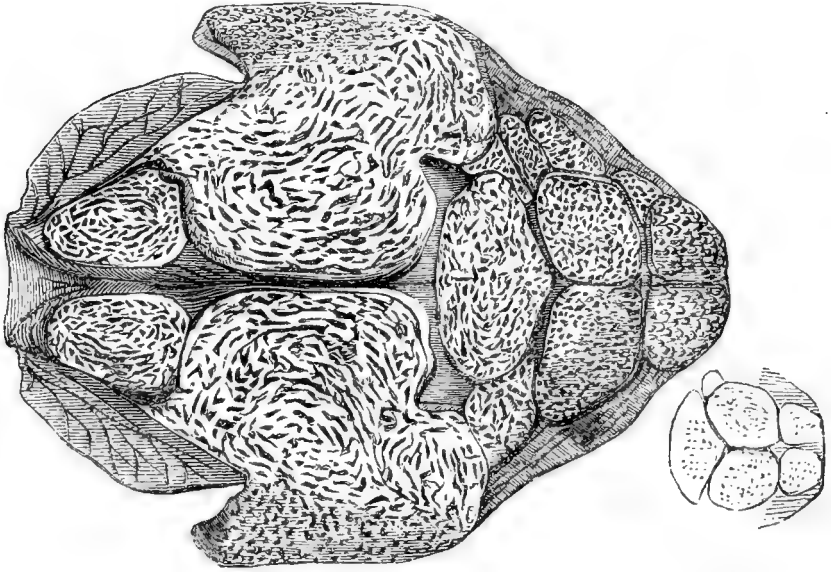


Fig. 1.

Fig. 2.

The middle lateral abdominal callosity of this specimen is large ; but these callosities differ greatly in size and form in the different specimens. This specimen seems to show the callosities in the maximum state of development ; and if I had not possessed a series of specimens apparently coming from the same locality, showing how mutable the form and size of the callosities are in this species, I should have been induced to believe it exhibited the characters of a distinct and well-marked species.

As in all other *Trionychidæ*, the young specimen of this species is destitute of any callosities ; but, from the foregoing observations, the gular and abdominal callosities appear to be developed nearly at the same time ; and the hinder pair do not make their appearance till later in the life of the animal, and seem to be gradually developed, being at first small and roundish, until they cover the whole length of the bone on which they are placed ; hence they vary considerably in shape and size in the different individuals of the species.

The Tortoises under examination may be referred to three principal varieties :—

a. *equilifera*.—The sternal callosities moderately far apart; frontal square; second pair and hinder ones forming a circular disk; abdominal moderate; posterior absent.

b. *normalis*.—The sternal callosities moderate, far apart; the gular broad, transverse; the abdominal well developed; the posterior pair, at first small, at length becoming oblong-elongated, covering the bone.

c. *callosa*.—The sternal callosities very large, and almost entirely covering the sternum, with some additional, irregular, non-symmetrical callosities on the sides of the gular ones; the posterior callosities very large, elongate-trigonal.

Dr. Peters is of opinion that in my former paper on *Trionychidæ* (P. Z. S. 1864, p. 76) I ought to have used the generic name of *Cycloderma* instead of Mr. Cope's term *Heptathyra*. To this I reply that I always wish to give every zoologist, whatever may be his country, his due, and to use the generic name which, after examination and comparison, appears to have priority; and I am always ready to give up my own name for a genus when any other has claims to priority over it. Indeed, in this as in other affairs of life, the best rule is to do unto others as you would they should do unto you. If I fail in this, it is from error of judgment, and not from design.

In this special instance I do not think there is any ground for complaint; and no objection could have been made, if I had not committed an injustice to myself in my anxiety to do what I believed was a kindness to Dr. Peters.

In 1850, having received a *Trionyx* from the Gambia, I formed it into a genus, which I characterized. But recollecting, before I sent the MS. to press, that Dr. Peters, in one of his letters to me, had stated that he had a *Trionyx* from Africa, which he shortly described, and on which, he said, he had formed a genus in his MS. under the name of *Cyclanorbis*, when I read my account of this Tortoise before the Zoological Society, in November 1852 (see P. Z. S. 1852, p. 135), I erased my own name and well-defined characters and adopted the name of Dr. Peters, giving an extract from his letter as the character of the genus, and called the Tortoise *Cyclanorbis petersii* in honour of Dr. W. Peters.

Dr. Peters subsequently informed me that he had changed the name of the genus *Cyclanorbis* to *Cyclanosteus*; so in the 'Catalogue of Shield Reptiles in the British Museum,' which was published in 1855, but which was printed many months before it appeared, as it had to wait to have the plates finished, I adopted his new name, taking my generic characters from the Gambian specimen, which I had named *petersii*, and, referring to Dr. Peters's MS. notes on his species from Mozambique, which I had not seen, quoted it as a second species; so that *petersii* is doubtless the type of the genus *Cyclanosteus* as published in that catalogue.

Some time after the publication of this work I discovered that Dr. Peters had very briefly characterized the genus under the name

of *Cycloderma*, for he had changed the name again before he published it in the 'Monatsbericht' for 1854, p. 216. This work, I believe, was not in this country when my catalogue was published; and the paper certainly was not read when my account of the genus was printed. Dr. Peters's type is *C. frenatum* from the Zambesi.

It is to be observed that when I quoted Dr. Peters's MS. in 1852, and when he published his characters of the genus under the third name in 1854, he simply characterized it as a genus of *Trionychidæ* with flaps over the feet, and without any bones in the margin of the disk.

When I characterized the genus *Cyclanosteus* in the 'Catalogue of the Shield Reptiles in the British Museum,' I restricted the genus to those animals that have nine sternal callosities, as well as a flexible boneless margin to the shield.

In 1856, M. Auguste Duméril, in the 'Revue Zoologique' for that year, described a *Trionyx* that would agree with Dr. Peters's character of *Cycloderma*, under the name of *Cryptopus aubryi*.

In 1859 I received a Tortoise from the Zambesi, which was sent by Dr. Livingstone, with only seven callosities on the sternum. Not recognizing it as the one so shortly and imperfectly described by Dr. Peters (who does not mention the number of the callosities either in his generic or specific characters), and seeing that it was decidedly different from my genus *Cyclanosteus*, I described it before the Zoological Society, in January 1860, as a new genus, under the name of *Aspidochelys livingstonii* (see P. Z. S. 1860, p. 6). I have now no doubt that this is the *Cycloderma frenatum* of Dr. Peters, as they both inhabit the Zambesi, and as Dr. Selater, who has examined the Berlin specimen, informs me they are undoubtedly alike.

It may be distinct from *C. aubryi* from the Gaboon; but these Tortoises evidently have an extended distribution in Africa.

In 1859, in the 'Proceedings of the Academy of Natural Sciences of Philadelphia,' Mr. Cope redescribed *C. aubryi*, and founded on it a genus under the name of *Heptathyra*. This genus is evidently synonymous with my genus *Aspidochelys*, which appeared nearly simultaneously.

In my paper "On the *Trionychidæ* of Asia and Africa" in the 'Proceedings of the Society' for 1864, finding that the *Trionyx* with nine and the one with seven tubercular callosities had very different skulls, and that it was requisite not only to separate them into genera but into distinct tribes, and that in my catalogue I had distinctly characterized the one with nine under the name of *Cyclanosteus*, and that Mr. Cope had characterized the one with seven, very shortly before I had named it *Aspidochelys*, under the name of *Heptathyra*, while Dr. Peters's genus *Cycloderma* applied equally well to both of them, I used the two former genera, observing that "the genus *Cycloderma* of Peters was constituted to contain the *Cryptopus* 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 different-shaped skull, and doubtless different habits in the animal." I therefore adopted the genera *Cyclanosteus*

and *Heptathyra* to the exclusion of Peters's genus *Cycloderma* and my own genus *Aspidochelys*.

The synonyms of the genera stand thus :—

I. *The feet covered with flaps ; the margin of the shield without any bones.*

*Cyclanorbis*, "Peters, MS. 1848 ;" Gray, P. Z. S. 1852, p. 133.

*Cyclanosteus*, Peters, MS. 1850 (type, *C. frenatus*).

*Cycloderma*, Peters, Monatsb. 1854.

This group includes—

A. *Callosities seven ; head ovate.*

*Heptathyra*, Cope, Proc. Acad. N. S. Philad. 1859, p. 296 ; Gray, P. Z. S. 1860, p. 315 ; 1864, p. 92.

*Aspidochelys*, Gray, P. Z. S. 1860, p. 6.

B. *Callosities nine ; head depressed.*

*Cyclanosteus*, Gray, Cat. Shield Rept. B. M. 1855 ; P. Z. S. 1860, p. 315.

C. *Callosities four.*

*Tetrathyra*, Gray, P. Z. S. 1865.

Since I have made out the history of these generic names, it has been suggested that I ought to have used *Cyclanorbis* and *Cycloderma*. I do not agree with that theory, as they were so defined as to include all the other forms ; while *Cyclanosteus* and *Heptathyra* accurately defined the species they each contained.

It could make no difference to me, if I valued (as some zoologists seem to do), which I do not, having my name placed after a generic name ; for in either case I should have established one genus, and another author the other ; but I consider that a genus that is carefully and definitely characterized has a claim not to be put aside, and I think the following synonyma of the species will confirm my view of the case :—

1. CYCLANOSTEUS SENEGALENSIS.

*Cryptopus senegalensis*, Dum. & Bibr. Erp. Gén. 505 ; Gray, P. Z. S. 1860, p. 316 (junior).

*Emyda senegalensis*, Gray, Cat. Tort. B. M. 47 ; Cat. Shield Rept. B. M. 64, 1855 ; P. Z. S. 1860, p. 316 (junior).

*Cyclanosteus petersii*, Gray, Cat. Shield Rept. 64, t. 29, 1855 ; P. Z. S. 1860, p. 315.

*Cyclanosteus senegalensis*, Gray, P. Z. S. 1864, p. 95.

*Hab.* West Africa ; Gambia.

2. HEPTATHYRA AUBRYI.

*Cryptopus aubryi*, A. Dum. Rev. Zool. 1856, p. 37, t. 20.

*Heptathyra aubryi*, Cope, Proc. Acad. N. S. Philad. 1859, p. 296 ; Gray, P. Z. S. 1860, p. 315.

*Heptathyra frenata* (partly), Gray, P. Z. S. 1864, p. 94.

*Hab.* Gaboon. I have not seen this species.

### 3. HEPTATHYRA FRENATA.

*Cyclanorhis frenata*, Peters's MS. 1848.

*Cyclanosteus frenatus*, Peters's MS. 1850 ; Gray, Cat. Shield Rept. B. M. 64, 1855.

*Cycloderma frenatum*, Peters, Monatsbericht, 1854, p. 216.

*Aspidochelys livingstonii*, Gray, P. Z. S. 1860, p. 6, pl. xxii. ; *ibid.* p. 315.

*Heptathyra livingstonii*, Gray, P. Z. S. 1864, p. 94.

*H. frenata* (partly), Gray, P. Z. S. 1864, p. 94.

*Hab.* Central Africa ; River Zambesi (*Peters*, Mus. Berlin) ; (*Livingstone*, Mus. Brit.).

These two species may be the same ; they both have black marks on the head ; but I have not been able to compare them.

The difference in the form of the callosities (pointed out in my last paper) may depend on the age or the individual peculiarities of the two specimens figured.

Dr. Sclater informs me that, judging from a cursory examination, the specimen in the Berlin Museum seemed exactly like that figured in the 'Proceedings.'

## 2. ON TWO NEW SPECIES OF AFRICAN BIRDS.

BY DR. G. HARTLAUB, FOR. MEMB. Z.S.

(Plate XXIII.)

### 1. TCHITREA SPEKII, n. sp.

*Minor ; læte rufa, subtus parum pallidior, pileo vix cristato chalybeo-nigro ; capitis lateribus infra oculum, mento et gula rufis ; alarum tectricibus albis ; remigibus primariis in margine externo tenuissime albis, secundariis externe et interne albo limbatis, tertiariis rufis ; subalaribus albis ; cauda tota rufa ; rostro et pedibus nigricantibus.*

Long. circa  $8\frac{1}{2}''$ , rostri  $5''$ , al.  $2''\ 9''$ , caud.  $5\frac{1}{2}''$  (rectr. 2 mediar.), tarsi  $6\frac{1}{2}''$ .

*Hab.* in Africa orient. interiore (*Speke*).

The individual described seems to be an adult male. It is the specimen mentioned by Dr. Sclater (P. Z. S. 1864, p. 109) as *Tchitrea*, sp.

### 2. SAXICOLA SPECTABILIS, n. sp. (Plate XXIII.)

*Pileo et nucha nigricanti-fuscis, gutture nigerrimo ; fascia lata superciliari in fronte conjuncta et utrinque elongata isabellina ; dorso fusco, fulvescente vario ; alis nigricanti-fuscis, remigibus in margine interno albicantibus, tertiariis in margine apicali*





J. Jennens del. et lith.

SAXICOLA SPECTABILIS.

M. & N. Hanhart imp.







J. Wolf del et lith.

M & N Hanhart, imp

LEUCOPTERNIS PRINCEPS

*pallide fulvescentibus; cauda unicolore nigra; uropygio isabellino, gastræo toto intense fulvo; subalaribus nigris; subcaudalibus fulvis; rostro et pedibus nigris.*

Long. circa 6<sup>l</sup>, rostr. 6<sup>l</sup>, al. 3<sup>l</sup> 7<sup>l</sup>, caud. 2<sup>l</sup> 3<sup>l</sup>, tars. 14<sup>l</sup>.

Jun. *Fusco-brunnea; subtus pallidior, uropygio fulvescente.*

*Hab.* Windvogelberg, in Africa merid. inter. (*Capt. Bulger*).

3. DESCRIPTION OF A NEW ACCIPITRINE BIRD FROM COSTA RICA.  
BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XXIV.)

My friend Mr. Osbert Salvin has requested me to bring before the notice of the Society this evening a specimen of a very fine and well-marked species of Accipitrine bird, which he has lately received from Costa Rica. This bird was procured by Enrique Arcé—the same collector who obtained the several conspicuous novelties which Mr. Salvin described in these ‘Proceedings’ for last year\*, at Tucurrique. Mr. Salvin proposes to call it

*LEUCOPTERNIS PRINCEPS*, sp. nov. (Pl. XXIV.)

*Plumbescenti-nigra, plumis ad basin albis: cauda albo unifasciata: abdomine toto et alarum tectricibus inferioribus albis, nigro frequenter transvittatis: rostro pallide corneo, cera flava: pedibus aurantiacis, unguibus nigris.*

Long. tota 20 poll. Angl., alæ 14·3, caudæ 8·0, tarsi 3·5, dig. int. cum ungue 2·5, dig. med. c. ungue 2·9, dig. ext. c. ungue 2·6, dig. post. c. ungue 2·4; rostri a rictu ad ap. mand. inf. linea directa 1·5.

*Hab.* Costa Rica, in montibus.

This bird is very distinct in coloration from any other species of the group with which I am acquainted. The bill is strongly hooked at the tip, and the margins of the upper mandibles festooned. The nostrils are large and open, regularly oval; the cere is yellowish in the dried skin, thinly planted with black bristles, which also occur on the sides of the lower mandible. The whole plumage above and below to the middle of the breast is nearly uniform plumbeous black, rather lighter on the edgings of the feathers. At their bases the feathers are white, which colour shows through, especially on the head and nape, when the feathers are slightly disturbed. The tail is crossed by a narrow white band in the middle of its exposed portion. Other less complete bands follow towards the base of the tail; but the whole apical portion of the tail is uniform black, like the back. Externally the wings are uniform, like the back; but the inner (and partly the outer) margins of the secondaries are broadly barred with white. The whole belly, from the middle of the breast to the lowest tail-coverts, is white, thickly barred across with narrow black bands, there being seven or eight of these bands on each feather. The

\* See P. Z. S. 1864, p. 579.

under wing-coverts are similarly marked, but the bars are much narrower here. The primaries above are faintly marked with lighter bars on their inner webs. Below they are pearl-grey on the inner webs, variegated with white, and faintly barred with dark grey. The first primary is 2.5 inches shorter than the second, and 3.5 inches shorter than the fourth, which is longest, though very slightly exceeding the fifth. The third is rather longer than the sixth. The first three primaries are distinctly emarginated on the inner web at about one-third of the total length of their exposed portions; the next succeeding two less distinctly so. The legs are well feathered, the feathers projecting above an inch below the heel behind, and in front covering the upper part of the tarsus for a quarter of an inch. The tarsus is covered in front with a row of ten or eleven broad plates, behind by fifteen or sixteen rather narrower plates, with the divisions almost obsolete. These rows nearly join on the inner side, leaving on the outer side a space occupied by three irregular rows of small oval plates. The tarsi and toes are bright orange; the claws black.

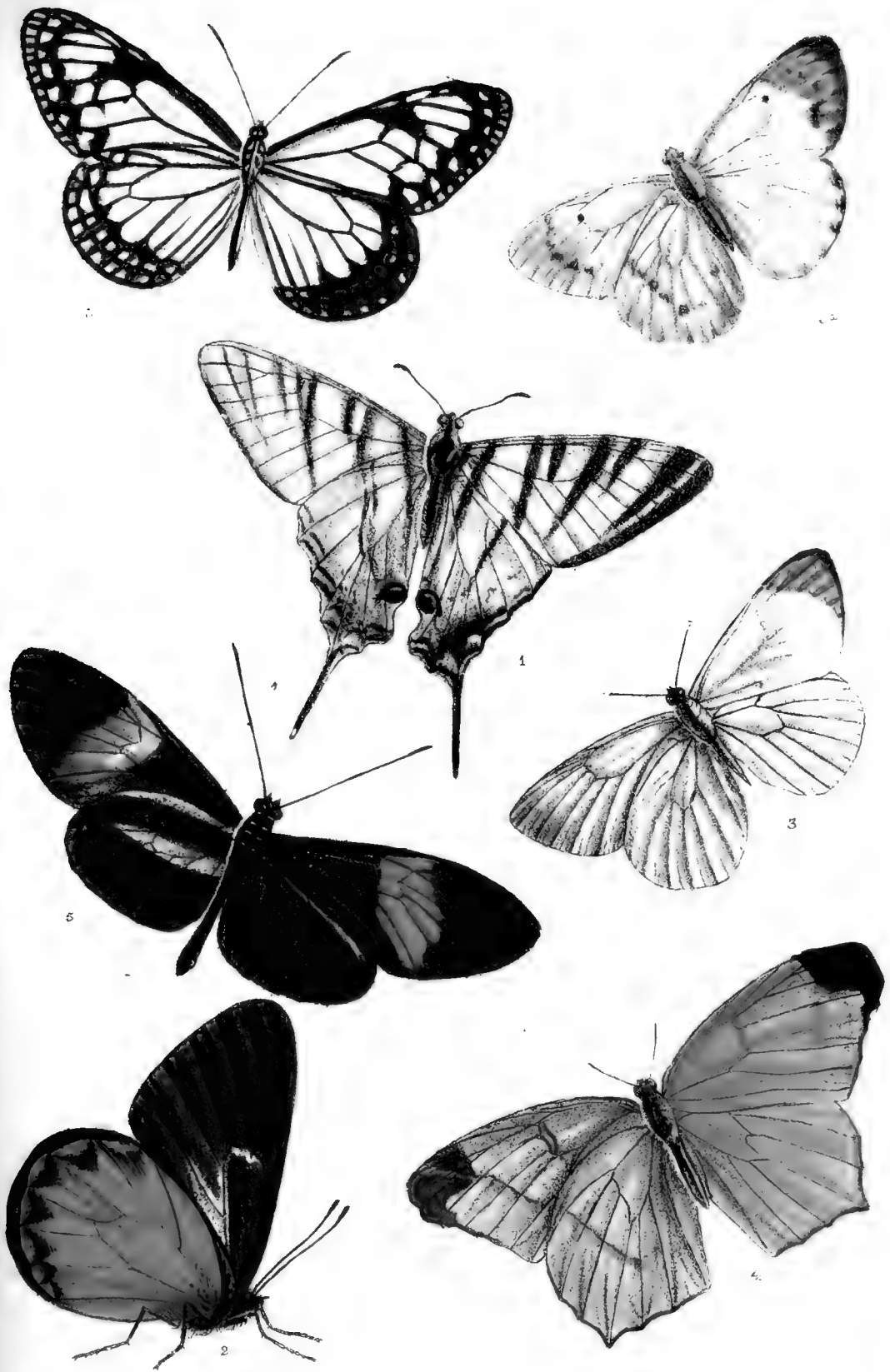
The only specimen obtained is no doubt quite adult: the sex is not marked. Probably the adults of both sexes would be alike, except in size.

#### 4. DESCRIPTION OF SIX NEW SPECIES OF DIURNAL LEPIDOPTERA IN THE BRITISH MUSEUM COLLECTION. BY A. G. BUTLER, BRITISH MUSEUM.

(Plate XXV.)

##### 1. *PAPILIO VIRGATUS*. (Pl. XXV. fig. 1.)

Upperside cream-colour, with a deeper tint at the base, hind margin, and anterior margin; anterior wings with a broad, elongate, triangular black band at the outer margin, its point touching the anal angle, and divided in the centre by a narrow cream-coloured band running parallel to the outer margin; a short black band just beyond the cell, and a long band upon the cell, and tapering to near the anal angle; two bands crossing the middle of the cell, the outer one bounded by the median nervure, the inner one by the interior margin; two black bands at the base of the wing, the inner one touching the body. Posterior wings tailed, with an irregular black spot enclosing a pale blue lunule and with a dull yellow margin inclining to orange above, at the anal angle; a narrow black band crossing the wing at the end of the cell, slightly uncatated at its outer extremity and tapering towards the anal angle, four blue-grey lunules surrounded with black along the lower edge of the outer margin; a cream-coloured lunule surrounded with black on the outer margin between the subcostal nervules; margin between the apex and first subcostal nervule black; a large cloudy black spot above the supra-caudal lunules. Tail black. Body greyish black, with the caudal extremity silver-grey; a cream-coloured band on each side of the thorax, and a ring of the same colour round the eyes; antennæ black.

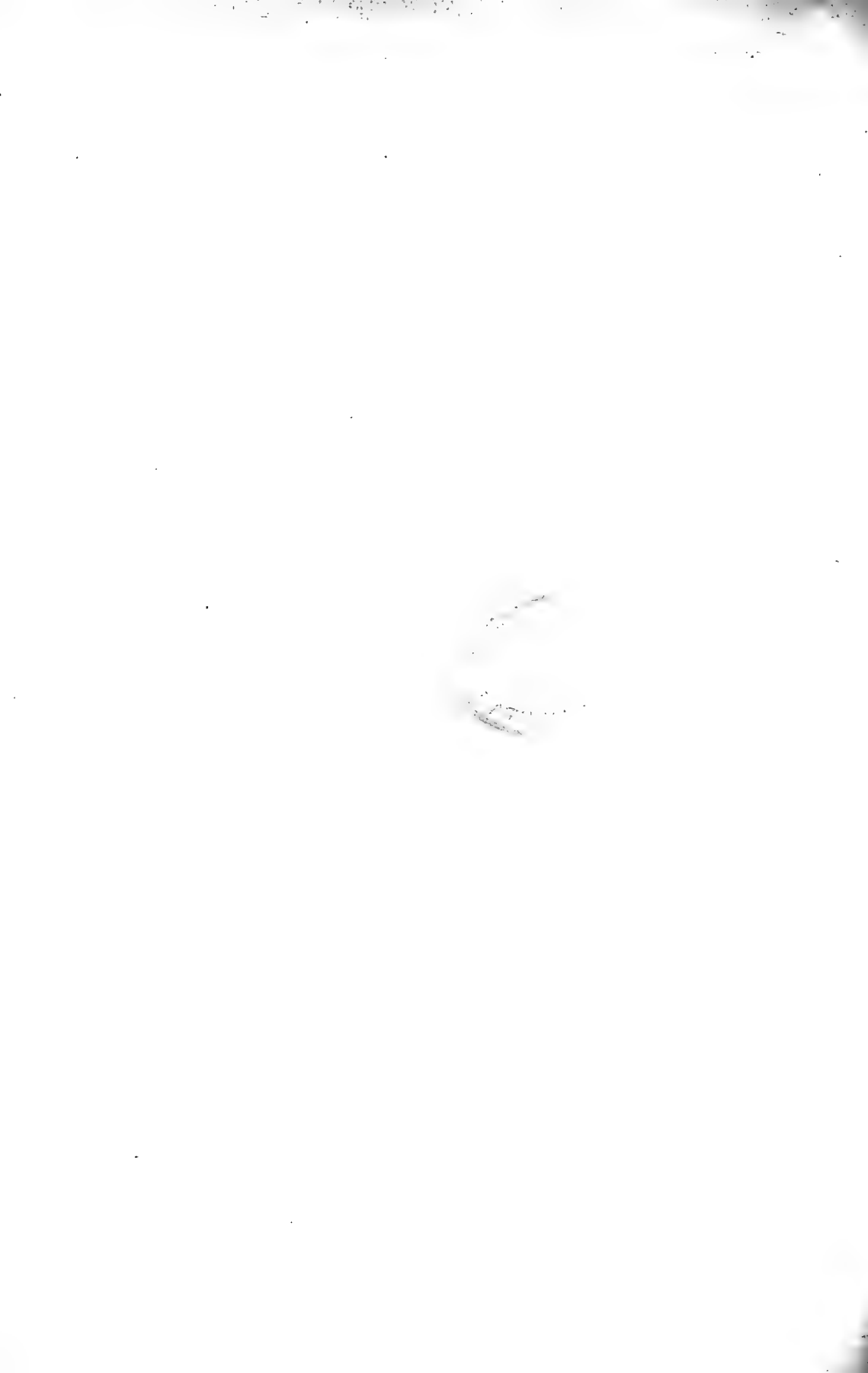


Hübner, del et lit.

M. G. K. Hannhart imp.

- 1 PAPILIO VIRGATUS
- 2 PIERIS GLAUCE.
- 3 3<sup>e</sup> ANTHOCHARIS PHLECYAS

- 4. GONEPTERYX GOBRIAS. How.
- 5. HELICONIA VULCANUS.
- 6. DANAIS AENONE.





Underside—ground-colour in the anterior wings as above; in the posterior a little brighter. Anterior wings with black hind margin; a greyish elongate triangular band, margined with black and sprinkled with yellow scales, its point towards the anal angle, a little way from and nearly parallel to the hind margin; the rest of the wing as above, except that all the bands are intersected by the nervules, which are yellow. Posterior wings—a bright orange lunule above the anal ocellus; an additional shorter black band outside and parallel to the central band; an additional black line above the black margin to the apical situation. Tail tipped with white; the cloudy spot above the tail only marked by a scattering of black scales; the rest of the characters as above. Body—prothorax yellow; mesothorax and metathorax grey; abdomen cream-coloured, with a yellow band along its outer margin.

*Hab.* Syria.

This species, taken by Mr. B. Lowne at Damascus, is closely allied to *P. podalirius* of Europe, but differs from it in having the posterior wings and tails proportionally much longer, the orange spot above the ocellus barely indicated on the upperside, the blue lunules much larger. On the underside the orange band crossing the wings between the two centre bands is wanting; the black band between the hind margin and the centre bands is also wanting; and the entire insect is smaller and not so highly coloured.

## 2. PIERIS GLAUCE. (Pl. XXV. fig. 2.)

*Male.* Upperside—anterior wing, basal half white, apical half deep brown, inner edge deeply indented; the base and the end of the cell deep brown. Posterior wing white, with broad black outer margin; base deep brown. Body black.

Underside—anterior wing deep brown; end of the cell, median nervure, base of submedian nervure and of the second and third median nervules sprinkled with white scales; a few white scales between the subcostal nervules near the apex, and between the third median nervule and the submedian nervure near the anal angle. Posterior wing rich yellow; base sprinkled with black scales; margin deep brown; a few yellow scales at the base; a broad crimson dash just below the basal portion of the anterior margin; six deep-brown hastate spots enclosing yellow spots along the hind margin. Body—head grey; thorax yellow, sprinkled with black; abdomen pale brown.

*Female* unknown.

*Hab.* Borneo.

Allied to *P. belisama* (Java); but has a broader apical band to the anterior wing on the upperside, and a broader margin to the posterior wing. On the underside the apical row of yellow spots in the anterior wing is only represented by a few white scales; in the posterior wing the crimson dash near the base is much broader, and the marginal row of spots much blacker and broader.

## 3. ANTHOCHARIS PHLEGYAS. (Pl. XXV. figs. 3, 3 a.)

*Male.* Upperside—anterior wing white, apex lilac, margined

with brown on its outer edge. Posterior wing white; nervures black.

Underside—anterior wing silky white; nervures yellow. Posterior wing silky white; nervures yellow at their outer extremities, black at the base.

*Female.* Upperside—anterior wing white, yellowish at the base and anterior margin; a broad orange apical band reaching along the outer margin nearly to the third median nervule, bordered on its outer edge by a brown band, and enclosing six brown spots, the two lowest ones being connected to one another and to the margin, and intersecting the orange band; a few brown scales on the interior margin of the orange band; an indistinct brown spot near the anal angle; a black spot at the end of the cell. Posterior wing white; five brown spots at the outer extremities of the nervures.

Underside—anterior wing white, yellowish at the base and anterior margin; a broad salmon-coloured apical band reaching along the outer margin, nearly to the third median nervule, and enclosing six brown spots; a black spot at the end of the cell. Posterior wing pale salmon-colour; a row of four lunular brown spots crossing the wing obliquely from the anterior margin, a little beyond the middle, and joining at an angle two similar brown spots running parallel to the outer margin; a small brown spot on the inner side of the submedian nervure at two-thirds of its length from the base.

*Hab.* White Nile.

Closely allied to *A. ione* (Port Natal), but much less robust; the violet apical band of the male and the orange band of the female much broader and fuller, and not enclosed in brown as in *A. ione*, the inner black margin being almost indistinguishable. The male without the black spots in the anterior wing, or the black terminations to the nervures of the posterior wings; all the other markings are also much less distinct, and the whole insect is much smaller.

#### 4. GONEPTERYX GOBRIAS, Hew. (Pl. XXV. fig. 4.)

*Male.* Upperside bright yellow; all the wings with hind margins deeply sinuated; cilia (except at anal angle), front of the head, and base of the antennæ crimson; the remainder of the antennæ brown above and white beneath, with orange tips; thorax greenish grey; abdomen yellow. Anterior wing—apex and hind margin brown, with orange inner margin, the inner side deeply sinuated and dentated; a curved orange band at the end of the cell, and a band of orange spots crossing the wing a little beyond the middle, and connecting the apical band with the anterior margin. Posterior wing with very narrow chocolate-brown hind margin; orange on its inner side.

Underside—anterior wing pale yellow; apical band dark brown on its inner and light brown on its outer side, enclosing an almost triangular metallic-violet dash, the base of which touches the anterior margin; the band at the end of the cell only marked by a reddish outline; base of the wing reddish; a red spot at the outer termination of the costal nervure and the first subcostal nervule; a faint silver spot at the end of the cell. Posterior wing pale yellow; an

irregular pale orange band crosses the wing from beyond the middle of the costa to the second median nervule, where it is met by a smaller band crossing the space between the second and third median nervules; base of the wing reddish.

*Female.* Upperside cream-white; markings the same as in the male, but much less distinct.

Underside pale greenish yellow; markings the same as in the male.

*Hab.* Borneo.

This species, of which we have three examples in the British Museum, is closely allied to *G. verhuelii* (N. India), but differs from it in the deeper sinuations of the hind margins, the abrupt termination of the apex of the anterior wings, the breadth of the apical band, the dark margin to the posterior wings, and the absence of any sinuation in the anterior margin of the apex\*.

#### 5. *HELICONIA VULCANUS.* (Pl. XXV. fig. 5.)

Upperside—anterior wing deep brown, glossed with blue, crossed beyond the middle by a broad irregular oblique scarlet band. Posterior wing deep brown, glossed with blue; anterior margin light brown.

Underside—anterior wing rich chocolate-brown, with a broad irregular salmon-coloured band enclosing three small indistinct white spots, one within the cell, and one on either side of it; inner margin glossy light brown. Posterior wing rich chocolate-brown; anterior margin yellow; a broad yellow band crossing the wing a little above the middle and tapering towards the apex.

*Hab.* Demerara and Panama.

I found this species amongst the *Heliconidæ*, under the name of *H. melpomene*, to which it is allied; it differs from it, however, in having a broad yellow band across the middle of the posterior wing on the underside, and a brighter blue gloss on the upperside.

#### 6. *DANAIS CÆNONE.* (Pl. XXV. fig. 6.)

Upperside—anterior wing transparent, with a broad black band along the outer margin, and black anterior margin; an irregular oblique black band at the end of the cell, connecting the anterior with the outer margin, and connected by a narrow black band with the middle of the last median nervule; a row of fourteen brown spots in couples between the nervules, close to the outer margin and upon the black band, the second, fourth, and sixth to fourteenth enclosing minute white spots; an oval white spot between the first and second and another between the second and third subcostal nervules; a brown spot in the middle and a white triangular spot at the base of the space between the third and fourth subcostal nervules; a row of seven white spots, the lowest one bilobed, running parallel to the hind margin and through the centre of the black band; nervures

\* I had intended to describe this species under another name; but as Mr. Hewitson informs me that he has lately described it as *G. gobrias* in the 'Transactions of the Entomological Society,' I have of course adopted his name.

black. Posterior wing transparent, with a broad black band along the outer margin; a row of fourteen brown spots within the band, between the nervules and close to the outer margin, the second to sixth and the eighth to fourteenth enclosing minute white spots; a row of ten brown spots between the marginal row and the inner edge of the black band, the second to fourth, sixth, ninth, and tenth enclosing white spots; nervures black. Body—thorax black, spotted with white; abdomen black.

Underside the same as above, except that white spots take the place of all the brown ones, and the abdomen is white.

*Hab.* Philippine Islands.

5. DESCRIPTION OF A NEW GENUS OF TRICHIUROID FISHES OBTAINED AT MADEIRA, WITH REMARKS ON THE GENUS DICROTUS, GÜNTHER, AND ON SOME ALLIED GENERA OF TRICHIURIDÆ. BY JAMES YATE JOHNSON, CORR. MEM. Z. S.

Order ACANTHOPTERYGII.

Fam. TRICHIURIDÆ.

NEALOTUS, gen. nov.

Body elongate, compressed, incompletely clothed with delicate scales. Cleft of the mouth deep. Small teeth in the jaws and on the palatine bones; none on the vomer. First dorsal fin continuous, extending to the second; finlets behind the second dorsal and anal fins. Each ventral fin represented by a single small spine. A dagger-shaped spine behind the vent. No keel on the tail. Caudal fin well developed. Seven branchiostegal rays.

This genus may be entered in the synopsis of Trichiuroid genera in the 'Catalogue of the Collection of Fishes in the British Museum' thus:—

Each ventral represented by a single spine; a dagger-shaped spine behind the vent.

NEALOTUS TRIPES, sp. n.

First D. 21. Second D. 19. P. 13. A. 18. C. 16.

The compressed body is very elongate, and has a few large deciduous simple scales of delicate structure scattered here and there on the skin, which is faintly reticulated with oblique grooves or wrinkles, and has a steel-grey colour with a silvery lustre. The height of the body, compared with the total length, is as 1 to  $9\frac{1}{2}$ ; whilst the length of the head, compared with the total length, is as 1 to  $4\frac{1}{6}$ . The black compressed head is flattened above, and is concave between the eyes, where there are four low ridges, the inner pair of which enclose an elongated diamond-shaped space. The lower jaw is longer than the upper, and each is armed with a single series of small deltoïd distant teeth. Those of the upper jaw are inserted in the pre-

maxillary. In front there are seven longer teeth, which are conico-compressed, and curve slightly backwards; two of them at each side stand within the outer row of teeth. On the palatine bones there is a single row of minute teeth; whilst the vomer is unarmed. The tongue is also without teeth, and is black like the rest of the mouth and the inside of the gill-covers. A membrane with a tongue-like lobe stretches across the palate.

The diameter of the round lateral eye is contained in the head about five times, and is distant from the muzzle  $1\frac{2}{3}$  of its diameter. Near the angle of the preopercle are three very small flat teeth. The opercle terminates in two obtuse projections separated by a notch.

The first dorsal fin commences a little in front of the root of the pectoral fin. Its height is rather more than half the height of the body; and its length is less than half that of the fish. It rises out of a groove, and is supported by twenty-one slender spines, which are not tuberculated. The second dorsal fin commences shortly behind the termination of the first, to which it is not quite equal in point of height, and it is less than half as long. It is supported by nineteen rays, of which the first one or two are short; and it is followed by two longish finlets. The pectoral fin is inserted under the angle of the opercle; it contains thirteen rays, and equals in length the second dorsal fin. The pair of spines representing the ventral fins are inserted close together under the hinder part of the roots of the pectoral fins. Their length is about a fourth of the height of the body; and, being longitudinally grooved, each appears to consist of two or three spines fused together. The vent is a little behind the middle of the fish. Behind the vent there is a flat dagger-shaped spine, which is longitudinally grooved. Its length is less than half the greatest height of the body; but it is rather longer than the ventral spines. The anal fin commences about the length of the spine behind it, and is opposite to, but rather shorter than, the second dorsal fin. It contains eighteen rays, and is followed by two finlets, the second of which is elongated. The deeply forked caudal fin contains sixteen rays, with five or six short exterior rays on each side.

The lateral line falls obliquely from its commencement above the opercle to the middle of the length of the fish, and is then continued with a gentler obliquity along the posterior part of the body to the tail, where it has two-thirds of the height above it.

The single specimen of this fish which has occurred was obtained in the month of December, and it has been deposited in the British Museum. The fish bears a close external resemblance to the "Coelho" of Madeira (*Thyrsites prometheus*, Gthr.; *Prometheus atlanticus*, Lowe). From that fish it may be distinguished by the possession of a dagger-shaped spine in front of the anal fin\*, by the spines of the first dorsal fin being twenty-one in place of eighteen, by the rays of the second dorsal fin being nineteen in place of twenty-one, and by the rays of the anal fin being eighteen in place of six-

\* *Aphanopus carbo*, Lowe, and *Nesiarchus nasutus*, a fish described by me in the Society's 'Proceedings' for 1862, p. 173, pl. XXII., have a similar spine between the vent and the anal fin.

teen. It may be further noticed that in the present fish the ventral spines are placed under the posterior angle of the base of the pectoral fin, instead of being inserted a little before that fin, and that the lateral line does not descend rapidly under the anterior part of the first dorsal fin, as in *Prometheus atlanticus*. With *Nesiarchus nasutus* it cannot be confounded, since the latter has perfect ventral fins and fleshy and cartilaginous prolongations of the jaws.

The dimensions of the fish which has afforded materials for this description are given in the following table:—

	inches.
Total length of fish . . . . .	10
Height . . . . .	$1\frac{1}{10}$
Thickness behind pectoral . . . . .	$\frac{6}{10}$
Head, length . . . . .	$2\frac{4}{10}$
Eye, diameter, nearly . . . . .	$\frac{1}{2}$
Teeth, length of largest . . . . .	$\frac{1}{5}$
First dorsal, distance from muzzle . . . . .	2
First dorsal, length . . . . .	$4\frac{1}{8}$
First dorsal, height in front . . . . .	$\frac{6}{10}$
Second dorsal, length . . . . .	$1\frac{3}{10}$
Second dorsal, height . . . . .	$\frac{6}{10}$
Pectoral, distance from tip of lower jaw . . . . .	$2\frac{3}{10}$
Pectoral, length . . . . .	$1\frac{3}{10}$
Ventral spines, length . . . . .	$\frac{1}{4}$
Ventral spines, distance from tip of lower jaw . . . . .	$2\frac{4}{10}$
Spine in front of anal, length . . . . .	$\frac{7}{10}$
Anal, length . . . . .	$1\frac{1}{10}$
Anal, height in front . . . . .	$\frac{7}{10}$
Caudal, length . . . . .	$1\frac{1}{2}$

The family of *Trichiuridae* is composed, according to Dr. Günther's Catalogue, of the genera *Aphanopus*, *Lepidopus*, *Trichiurus*, *Epinula*, *Dicrotus*, *Thyrsites*, and *Gempylus*. To these have to be added the recently described genera *Nesiarchus* and *Nealotus*. With respect to *Dicrotus*, Günther, a genus founded on a small fish only  $2\frac{1}{2}$  inches in length, it appears to me that it ought to be abolished, the fish having been most probably a young individual of some species of *Thyrsites* or *Gempylus*—an opinion which has been entertained by Dr. Günther himself for some time. From *Thyrsites prometheus*, for example, it would seem to differ only by the absence of finlets and the presence of minute teeth on the vomer. But finlets are not developed in very young fishes, such as *Dicrotus armatus* probably was; and teeth are apt to disappear from the vomer when fishes acquire their full growth. It may be mentioned in confirmation of this view, that I obtained a scaleless fish, not quite six inches in length, which had its ventrals reduced to single spines, had teeth on both palatines and the vomer, and had the last four or five rays of the second dorsal fin distant from, and unconnected by membrane with, the rest of the fin; whilst the last two or three rays of the anal fin were separated from the anterior portion. This was therefore a *Di-*

*crotus* with imperfectly formed finlets, showing a closer approach to a fully developed *Prometheus atlanticus* than *D. armatus*.

After attentively considering the descriptions of the species placed by Dr. Günther under the genus *Thyrsites* (Brit. Mus. Cat. ii. 350), as well as some of the fishes themselves, it appears to me that a more satisfactory arrangement would be to distribute the species amongst three genera, thus:—

1. **THYRSITES.** Fishes having teeth on the palatines, perfect ventrals, finlets, and a skin naked or furnished with simple scales.

*T. atun*, C. & V., and *T. lepidopoides*, C. & V.

2. **RUVETTUS.** Includes a single very distinct species, remarkable for having a keeled abdomen, and the skin everywhere furnished with bony bodies, each bearing several spines—possessing also teeth on the palatines, perfect ventrals, and finlets.

*Ruvettus pretiosus*, Cocco.

3. **PROMETHEUS.** Distinguished by having each ventral reduced to a single spine, as well as by having teeth on the palatines, finlets, and a skin either naked or furnished with simple scales.

*P. atlanticus*, Lowe; *P. solandri*, C. & V.; *P. prometheoides*, Bleek.

The genus *Gempylus* is distinguished from all these by the absence of teeth from the palatines.

To return for a moment to *Ruvettus pretiosus* (“ce curieux, ce précieux poisson,”—*Valenciennes*), the “Escolar” of Madeiran fishermen, it may be noted that, although one of the characters given in the ‘British Museum Catalogue’ is the want of a lateral line, this line may be made out in fishes fresh from the sea. It commences on a level with the upper border of the opercle, but at some distance behind it, and then descends gently until it arrives at the middle of the height of the fish, which position it keeps on the posterior half of the body.

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May 23, 1865.

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

Mr. Sclater called the attention of the Meeting to a rare and interesting Parrot lately presented to the Society’s collection by Mr. P. N. Bernard, being an example of the *Chrysotis augusta* (*Psittacus augustus*, Vigors, P. Z. S. 1836, p. 80) from the West-Indian Island Dominica. Mr. Bernard stated that this Parrot was very rare in Dominica, being seldom seen, and that only one or two were caught during the year; its abode was in the very centre and most mountainous part of the island. Mr. Bernard was well acquainted with

all the West-Indian Islands, and had been several times in Dominica. But it was only in last year that he saw one of these Parrots for the first time. The only inhabitant of the island who had one domesticated was the Governor; and although Mr. Bernard offered a large price to the native sportsmen, it was only at the end of twelve months that they had succeeded in obtaining the young one now in the Society's possession. The natives of Dominica called this bird "*Ciceroo*."

The tenth of a series of memoirs, by Professor Owen, on the extinct Dinornithine Birds of New Zealand, was read. The present memoir contained the description of parts of the skeleton of a flightless bird, indicative of a new genus and species of the family, which Professor Owen proposed to call *Cnemiornis calcitrans*. The materials upon which the present paper was based had been gathered from the bottom of a fissure in a limestone rock at Timaru, in the Middle Island of New Zealand, by Dr. David S. Price. The *Cnemiornis* was supposed to have been of about the same stature as Bennett's Cassowary. The name chosen bore relation to the remarkable size of the processes of the tibia in this form.

This paper will be printed entire in the Society's 'Transactions.'

The following papers were read:—

1. ON THE MORBID APPEARANCES OBSERVED IN THE DISSECTION OF THE PENGUIN (*APTENODYTES FORSTERI*). BY PROF. OWEN, F.R.S., F.Z.S., ETC.

The Penguin was a male, but with the testes small, as at the non-breeding season. The coats of one of the large abdominal air-cells were thickened, and roughened by granular deposits of a caseous, quasi-strumous nature; and larger flattened masses of the same substance were scattered in the connecting substance of the diseased air-cell with the thoracic abdominal parietes. These appearances indicated old-standing disease. But the more immediate cause of death was inflammation of the coats of the stomach and adjoining peritoneum or air-cells. The stomach—a full oval cavity, about 6 inches in longest diameter—was distended with a mass of putrid yellow-grey pultaceous matter and portions of half-digested fishes. It occupied the hinder and under part of the abdominal cavity, extending from the sternum to the pelvis, and so closely adherent to the abdominal parietes that its coats seemed, on dissection, to be an inner or deep-seated layer of the abdominal muscles. The peritoneum, when separated, had a rough or finely gritty or granular surface, with red vascular inflammatory patches, and was adherent, beyond the stomach, to the mass of intestines.

The contents of the stomach were in so putrid a state as to lead to the inference that, for want of power of digestion, the ordinary chemical changes had commenced before the death of the bird, and been concomitant with, if not the cause of, the inflammation of that



viscus and of the abdominal membranes immediately external to it (*peritonitis*), which was the chief lethal morbid appearance observed in the dissection of the Penguin.

Among the rarer anatomical characters in birds may be noticed the well-developed urinary bladder, which, in the present species, in the almost empty state, was continued from the fore part of the urogenital compartment of the cloaca for  $1\frac{1}{2}$  inch in length and 1 inch in breadth: the muscular tunic was well developed.

2. NOTICE OF A NEW SPECIES OF AUSTRALIAN SPERM WHALE (*CATODON KREFFTII*) IN THE SYDNEY MUSEUM. BY JOHN EDWARD GRAY, PH.D., F.R.S., V.P.Z.S., F.L.S., ETC.

In a letter which I lately received from Mr. Gerrard Krefft, the intelligent Secretary and Curator of the Australian Museum, he sent me some photographs (taken like those formerly sent by Mr. Henry Barnes) of a separate atlas vertebra and of the second and other cervical vertebræ united into one mass of a species of Whale, which are contained in the museum under his charge. The two bones, though not united, fit one another so exactly that Mr. Krefft has no doubt of their having belonged to the same animal; and the photographs sent justify this conclusion. However, should there be any mistake in this matter, it will not in the least invalidate the conclusion that I have come to, from the examination of these photographs, that they indicate the existence of a second species of Sperm Whale in the Australian Seas, very distinctly characterized by the subcircular form of the atlas vertebra and of the neural canal in it.

The mass formed by the second and other cervical vertebræ is somewhat similar to these bones in the skeleton of the Australian *Catodon* lately received by the Royal College of Surgeons, which I hope will shortly be described by Mr. Flower, the energetic Curator of their Museum, who, in his late paper on the *Balenidæ*, has shown how well he can describe and determine the species of Whales.

The genus *Catodon* should be divided into two subgenera, according to the form of the atlas, thus:—

I. *The atlas oblong, transverse, nearly twice as broad as high; the central canal subtriangular, narrow below.* *Catodon*.

1. *CATODON MACROCEPHALUS* of the Northern Ocean. A skeleton from Scotland, in the British Museum.

2. *CATODON AUSTRALIS*, Macleay, of the Southern Ocean. A skeleton in the Museum of the Royal College of Surgeons, from Hobart Town.

II. *The atlas subcircular, rather broader than high; the central canal circular in the middle of the body, widened above.* *Meganeuron*.

## CATODON (MEGANEURON) KREFFTII, sp. nov.

The atlas vertebra oblong transverse, about one-third wider than high; the lateral processes only a little produced beyond the articular surface, with an arched edge; the lower edge arched; the neural arch low, broad, with a slight central prominence on the upper surface; the canal for the spinal marrow very large, circular, rather contracted on the sides above, and then dilated, becoming oblong and transverse.

The atlas is thin, high, being only about one-fourth wider than it is high. The lower and lateral margins are arched, the lower edge being the most so. The neural arch is low, transverse, with a nearly straight lower edge. It is thickest in the middle. The upper surface is shelving on the sides, with an angular central prominence.

The central aperture is very large, nearly circular, and dilated above into an oblong transverse aperture, which is rather wider than the widest part of the central circle. The front articulating surface is horseshoe-shaped, continued to the upper outer angle, and obliquely shelving off on the upper edge to the base of the oblong part of the aperture. The articulating surface of the hinder side is similar; but the articulating surface is shorter at the sides, and transversely truncated in a line with the middle of the upper, oblong, transverse opening (figs. 1, 2).

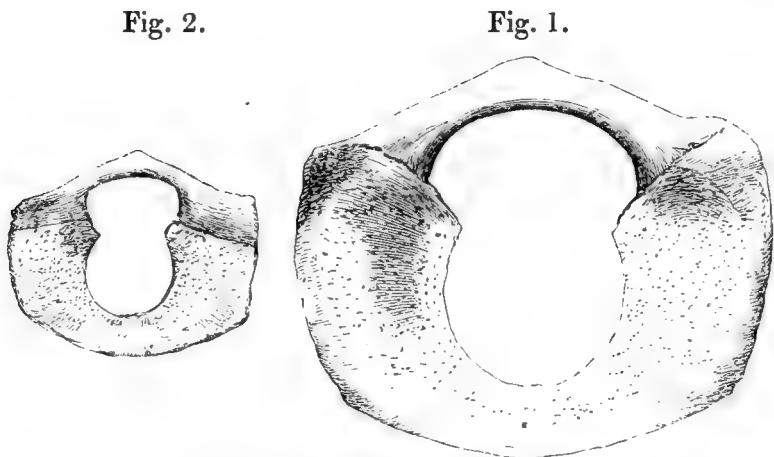


Fig. 1. Front of atlas of *Catodon krefftii*.  
2. Hinder side of ditto (reduced).

The second and other cervical vertebræ are all united together into one mass, ankylosed by their bodies, lateral processes, and neural arches. The neural arches form a triangular mass, which is strongly keeled on the central line; and the keel is stronger and produced into an acute point at the hinder end (figs. 3, 4).

The lateral processes of the second, third, and fourth vertebræ are produced and united into a broad, thick, angular process, which is

expanded at the side, giving the united mass a rhombic appearance, the width of the side being about one-fourth more than the height of the mass.

Fig. 3.

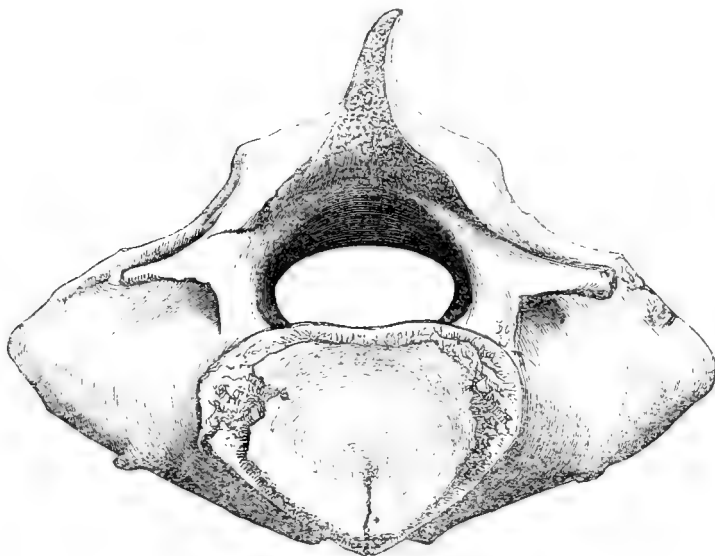
Hinder view of cervical vertebræ of *Catodon krefftii*.

Fig. 4.

Side view of the hinder side of the cervical vertebræ of *Catodon krefftii*.

There is a tubercle, which is most probably the end of the lower lateral process of one of the anterior cervical vertebræ, at the lower part of the hinder side of the front lateral expansion.

The three hinder vertebræ have no distinct lower lateral processes; their place is only marked by three slight ridges on the lower edge of the hinder side of the mass. The upper lateral processes of the hinder cervical vertebræ are small, slender, forming a strap-like section, rather tapering towards and truncated at the tips on the side of the apertures for the passage of the nerves for the neural canal. The neural canal is rather large, oblong transverse, the height being about two-thirds of the width; it is rather larger and higher behind.

The hinder surface of the body of the last cervical vertebra is oblong transverse, about two-thirds of the height of its width at the widest part; the lower edge is rounded and rather angularly produced in the centre, and the upper margin transverse, with a slight central depression; the surface is concave, with a central, linear, perpendicular, compressed line.

The cervical vertebræ in *Catodontidæ* are united into a single mass by their bodies, the neural arch, and the lateral processes. The lateral processes of the anterior vertebræ are produced, and form a thick, subconical, triangular prominence on the side of the mass. The front side is nearly flat, and the lateral processes of the hinder vertebræ are shorter and shorter to the last. The hinder surface shelves from before backwards, and is crested with some conical prominences which indicate the lateral processes of the different vertebræ of which the mass is formed. The first dorsal vertebra is sometimes partially ankylosed with the seventh cervical.

The arm-bones are very short.

### 3. A REVISION OF THE GENERA AND SPECIES OF AMPHISBÆNIANS, WITH THE DESCRIPTIONS OF SOME NEW SPECIES NOW IN THE COLLECTION OF THE BRITISH MUSEUM. BY DR. JOHN EDWARD GRAY, F.R.S., F.L.S., V.P.Z.S., ETC.

Sir Andrew Smith having kindly presented to the British Museum, along with a number of other reptiles which he has described, the types of his genus *Monotrophis*, which I had not before seen, and having received from Mr. Welwitsch and from the collection of my late excellent and lamented friend Dr. Balfour Baikie two Amphisbænians from Africa, and from Mr. Bates a species from the Amazons which I believed had not hitherto been recorded in the Catalogue, I proceeded to examine them; and, for the purpose of making the comparison the more complete, I was led on to study all the specimens of this tribe which we have in the Museum.

The natural result of such an examination was, that I was dissatisfied with the manner in which the species had hitherto been arranged and described, and, after repeated examination, I have reduced my observations to the following results:—

The determination of the species themselves, and the means which a paper resulting from the re-examination and comparison of all the species in a large collection afford to a student, are much more certain than any isolated description of the species regarded as new,

however detailed and particular the description may be; and in a comparative review of the species of a group or order the distinctions be stated in a more condensed form.

The Amphisbænians are very rarely collected; hence few species are found in museums and noticed in systematic catalogues. This is explained by their living almost exclusively in the nests of ants, and being seldom seen by the casual observer. There is reason to believe that every country which has ants has some form of Amphisbænians. Until lately they were thought to be confined to Tropical America, though one was described by Vandeli as occurring in Spain as long ago as 1780; but his essay and the animal itself were alike so little known to naturalists, that Professors Hemprich (in 1820) and Wagler each described Vandeli's species as new, the latter as a South-American species. Professor Kaup described a species from North Africa in 1830, and M. Gervais redescribed it as new in 1835. MM. Dumeril and Bibron have described a specimen in the Leyden Museum from Guinea; Dr. Andrew Smith one as occurring at the Cape, and Dr. Peters has added another from the east coast of Africa. The number of African species is in this essay raised to seven. As yet none have been received from Asia Proper; but Sir Charles Fellows brought from Xanthus the same species that is found in Spain, Portugal, and North Africa.

The following table shows the geographical distribution of the species here recorded:—

#### EASTERN HEMISPHERE.

##### Fam. *Trogonophidæ*.

1. *Trogonophis wiegmanni*. N. Africa.

##### Fam. *Amphisbænidæ*.

2. *Blanus cinereus*. Spain, N. Africa, Asia Minor.
3. *Amphisbæna? violacea*. East Africa.
4. *Cynisca leucura*. Guinea.
5. *Baikia africana*. W. Africa.

##### Tribe *Cephalopeltinæ*.

6. *Monotrophis capensis*. S. Africa.
7. *Dalophia welwitschii*. W. Africa.

#### WESTERN HEMISPHERE.

##### Fam. *Chirotidæ*.

1. *Chirotos lumbricoides*. Mexico.

##### Fam. *Amphisbænidæ*.

2. *Amphisbæna alba*. Brazil.
3. *A. americana*. British Guiana.
4. *A. petraei*. Brazil.
5. *A. vermicularis*. Brazil.
6. *A. darwinii*. Monte Video, Buenos Ayres.

7. *Bronia brasiliana*. Brazil.
8. *Sarea cæca*. W. Indies.
9. *Cadea punctata*. Cuba.
10. *Anops kingii*. Buenos Ayres.

Fam. *Lepidosternidæ*.

11. *Lepidosternon microcephalum*. Brazils.
12. *L. grayii*. Tropical America.
13. *L. phocæna*. Buenos Ayres.

Tribe *Cephalopeltinæ*.

14. *Cephalopeltis lepidosterna*. Brazils.

The rings of oblong scutella on the skin are in most species interrupted on the sides, and in some species also on the vertebral line; these interruptions form a more or less wide depressed groove on the surface of the body, and are called the lateral and dorsal lines.

The skin at this interruption is usually marked at each transverse ring with two oblique grooves, which form a cross and divide the space into four minute triangular shields; in some cases, where the line is wider and less sunken, the transverse ring of shields is only divided at the sunken line by a single oblique groove caused by the tapering end of one of the oblong shields going before the end of the other. Sometimes this is the case with the dorsal line, and not with the lateral one. In some species, instead of only the four triangular shields in the lateral line, the shield between the cross groove is divided into several minute scale-like shields.

In some of the larger species, as *Amphisbæna alba*, some of the rings of shields are marked with an oblique groove crossing several shields, dividing each of them into two parts; but these seem to be mere individual variations occurring on several parts of the back of some specimens, and not present in others.

Duméril and Bibron give the number of the teeth as one of the specific characters. I have not been able to verify their observations; they give the following as the number. There seems to be always an odd number of intermaxillary teeth, the middle one being usually large.

<i>Trogonophis wiegmanni</i> .....	$\frac{4.5.4}{9.9} = \frac{13}{18}$
<i>Chirotos caniculatus</i> .....	$\frac{3.7.3}{6.6} = \frac{13}{12}$
<i>Amphisbæna americana</i> et <i>A. alba</i> .....	$\frac{5.5.5}{8.8} = \frac{15}{16}$
— <i>petrei</i> .....	$\frac{5.7.5}{8.8} = \frac{17}{16}$
— <i>darwinii</i> .....	$\frac{4.7.4}{7.7} = \frac{15}{14}$
<i>Sarea cæca</i> .....	$\frac{5.5.5}{7.7} = \frac{15}{14}$
<i>Cadea punctata</i> .....	$\frac{4.7.4}{8.8} = \frac{15}{16}$
<i>Anops kingii</i> .. } .....	$\frac{4.7.4}{7.7} = \frac{15}{14}$
<i>Blanus cinereus</i> } .....	$\frac{4.7.4}{7.7} = \frac{15}{14}$

## Fam. 1. TROGONOPHIDÆ.

Head oblong, depressed, rounded below; nostrils lateral, in large nasal shields; teeth conical, on the edge of the maxilla. Body cylindrical, covered with rings of uniform, elongate, oblong, four-sided shields, without any sternal disk; lateral line sunken, narrow, covered with a few minute scales; preanal pores none; tail conical, acute.

*Glyphodermes acrodontes*, Dum. et Bibr. Erp. Gén. v. 467.

## TROGONOPHIS, Kaup, Isis, 1830, p. 880.

Head oblong, depressed; nasal shields large, united by a short straight edge, behind the large triangular convex rostral; crown with two pairs of shields; temple with many small shields; upper labial plate moderate; lower labial shield larger, with a series of large chin-shields on each side, and a central gular one. Tail conical, acute; preanal pores none.

The skull of this genus has been figured by Dr. Kaup in his paper in the 'Isis' above quoted.

TROGONOPHIS WIEGMANNI, Kaup, Isis, 1830, p. 880, t. 861; Féruss. Bull. Sci. Nat. xxv. 203, 1831; Dum. et Bibr. Erp. Gén. v. 470.

*Amphisbæna elegans*, Gervais, Bull. Sci. Nat. de France, 1855, p. 135; Mag. Zool. 1835, class 3. t. 11 (details not good).

*Hab.* Tangiers (*Fraser*, B.M. 1848); N. Africa (B.M. 1846); Algeria (*Duméril*, B.M.).

This animal was first described by Dr. Kaup, who showed that the teeth of it were placed on the edge of the jaw, as in the genera of the family *Agamidæ*, which are all confined to the eastern hemisphere and Australia; while all the other genera of the order that have been examined have the teeth on the inner side of the jaw, as in the family *Iguanidæ*, which is restricted to the New World.

It was afterwards described by M. Gervais; and even when Dr. Kaup had informed him, after inspecting the specimen, that it was the same as he had previously described, he still regarded it as new, because he said the skull did not agree with Dr. Kaup's figure: but this was a mistake. Dr. Kaup figured the skull of *Trogonophis* and of an *Amphisbæna* for the sake of showing the difference between them; and M. Gervais must have compared his animal with the wrong figure.

## Fam. 2. CHIROTIDÆ, Gray, Cat. Tortoises, &amp;c., B. M. 74.

Head depressed, rounded on the sides; nostrils on sides; teeth on the inner side of the maxillæ. Body cylindrical, covered with rings of uniform oblong four-sided shields, and with two short weak front limbs, provided with five subequal clawless toes; lateral line sunken, covered with scales; preanal pores distinct. Tail cylindrical.

CHIROTÉS, Duméril; *Bimanus*, Ooppel; *Chamæsauro*, Schneid.

Characters those of the family.

CHIROTÉS CANICULATUS, Cuvier.

*Chirotes lumbricoides*, Gray, Cat. Tortoises, &c., B. M. 74.

*Hab.* Tropical America, Mexico (B. M.).

Professor J. Müller has figured the skeleton and skull of this animal.

### Fam. 3. AMPHISBÆNIDÆ.

Head oblong, rounded below; nostrils lateral, in nasal shields; teeth conical, on the inner edge of the maxillæ. Body cylindrical, covered with rings of uniform, elongate, four-sided shields, without any sternal disk; preanal pores distinct; lateral line linear, sunken, with a few small scales. Legs none. Tail cylindrical, rounded at the end.

Tribe 1. AMPHISBÆNINA. The head depressed, rounded on the sides in front; nostrils on the upper part of the sides of the head.

A. *Lateral and dorsal lines distinct, sunken, covered with small triangular scales; nasal shields large, square, lateral, forming part of the edge of the upper lip, and separated in front by a broad, square, convex rostral shield.*

### BLANUS.

The rostral square, convex; the nasal shields large, forming part of the edge of the upper lip; the crown with a large pentagonal frontal shield and two pairs of square shields behind it; eye-shield triangular, between upper edge of the front labial shield and the frontal. Temples covered with a series of squarish shields; labial shields large, the hinder smallest; the lower shields without any chin-shield between them and the gular one. Tail rather tapering, blunt; preanal pores distinct.

BLANUS CINEREUS, Gray, *l. c.* 72.

*Amphisbæna cinereus*, Vandeli, Mem. Acad. Lisbon, i. 1780.

*A. oxyura*, Wagler.

*A. rufus*, Hempr.

*Blanus rufus*, Wiegman.

*Hab.* N. Africa, Tangiers (*Fraser*, B. M.); S.W. Europe, Spain (*Vandeli*, 1780); Oporto (*Allen*).

M. Gervais (*Mag. Zool.* 1837, class 3. t. 10) gives a figure of *A. cinerea*; but the details of the head do not perfectly agree with our specimens; perhaps this may be from want of care in the artist. The number of pairs of plates on the occiput varies from two to four.



B. *Lateral lines linear, distinct, sunken; dorsal none, or very indistinct; nasal shields not forming part of the upper lip.*

a. *Nasal plates large, extending across the muzzle, united by a long straight suture, or united into one cross band; the rostral triangular, under front edge of nasals; crown with two pairs of broad shields.*

#### AMPHISBÆNA.

Head depressed, broad, and rounded in front; frontal plates with one or two pairs of rather smaller similar plates behind them; preanal pores eight.

\* *Head depressed, broad; occiput covered with square shields, like the body; preanal plates numerous.*

1. AMPHISBÆNA ALBA, Linn.; Gray, Cat. Tort., &c., B.M. 70.

Body thick, one-coloured, with only one pair of plates behind the frontal plates; occiput shielded like the body.

*Hab.* Brazil.

Varies in the size and form of the hinder pair of frontal plates; preanal pores eight, often seven.

There is a specimen in the British Museum sent by Mr. Brandt under the name of *A. darwinii*.

2. AMPHISBÆNA AMERICANA, Schreb.; Gray, Cat. Tort., &c., B.M. 70.

Body rather thick, black, varied; two or more pairs of plates behind the frontal plates.

*Amphisbæna fuliginosa*, Linn.

*A. vulgaris*, Laur.

*Hab.* Tropical America: British Guiana; Berbice; Demerara (B.M.).

The labial shields vary in number and shape; the shields behind the frontal vary in number and size, but they are generally in pairs and subsymmetrical.

Gervais figures the skull of the species (Ann. Sci. Nat. 1854, xx. t. 14. f. 4).

\*\* *Head rounded, narrow; preanal pores and preanal shields ten or twelve.*

3. AMPHISBÆNA PETRÆI, Dum. et Bib. Erp. Gén. v. 487; Gray, l. c. 80.

*Hab.* Brazil (Mus. Paris).

\*\*\* *Head rounded, narrow, rather produced in front; crown-shields large; occipital shields polygonal. Body slender, one-coloured; preanal pores two or four; preanal plates six, middle ones elongate.*

4. AMPHISBÆNA VERMICULARIS, Dum. et Bibr. Erp. Gén. v. 489; Gray, *l. c.* 71.

*Hab.* Brazil (*Dr. Gardner*, B. M.; *Mus. Paris*); Porto Bello (*Capt. Austin*, R. N., B. M.: head in a very bad state).

5. AMPHISBÆNA ? DARWINII, Dum. et Bib. Erp. Gén. v. 491; Gray, *l. c.* 71.

*Hab.* Monte Video (*Mr. Darwin*; *Mus. Paris*).

6. AMPHISBÆNA ? VIOLACEA, Peters, Berlin Monatsb. 1854, p. 620; Wiegmann, Arch. 1855, p. 49.

*Hab.* East Africa, Inhambane (*Peters*).

This species is unknown to me; it is without a single frontal shield, and has four preanal pores and visible eyes.

#### CYNISCA, Gray, Cat. Tort., &c., B. M. 71, 1844.

Head flat, narrow; nose conical, four-sided, rounded at the end; rostral triangular; nasal plates very large, soldered together, covering the front of the head; crown with a small frontal and a pair of parietal shields; eyes distinct; temples and occiput with large shields. Body very slender; lateral line distinct. Tail cylindrical, elongate, truncated; preanal pores numerous.

CYNISCA LEUCURA, Gray, *l. c.* 71.

*Amphisbæna leucura*, Dum. et Bibr. Erp. Gén. v. 498.

*A. macrura*, Schlegel, Mus. Leyden.

Brown; end of tail white.

*Hab.* Guinea (*Mus. Leyden*) (not Guiana, as stated by mistake in the Catalogue).

b. *Nasal shields small, separate above, on the side of a large swollen rostral shield.*

#### BRONIA.

Head ovate, rather convex; rostral shield very large, hemispherical, with the small nasal shields inserted in notches on its hinder edge, which is placed over the front labial; crown convex, rounded on the side, covered with two pairs of shields; the front pair square, the hinder smaller, triangular, with a small triangular occipital shield on its outer side; eye-shield triangular; labial shields  $\frac{3-3}{2-2}$ , the second upper and front lower large; gular shield single, square, with a cross series of shields behind it. Body cylindrical; lateral line well marked; the dorsal shields elongate, narrow; the ventral ones rather broader, smooth; preanal pores four; the preanal shields six or eight, the central pair largest, the lateral ones very small. Tail blunt.

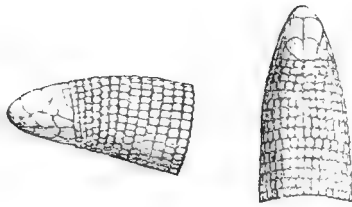
#### BRONIA BRASILIANA.

Pale brown; dorsal shields with a dark central spot.

*Hab.* Tropical America; Santarem, on the Amazons (*Bates*, B. M.).

Fig. 2.

Fig. 1.

*Bronia braziliana.*

- C. *Lateral and dorsal lines not defined, or the lateral line only visible on the hinder part of the body; rostral shield small; nasal shields far apart, small, placed on the side of the high rostral.*

SAREA, Gray, Cat. Tort., &c., B. M. 71, 1844.

Head conical; rostral narrow, higher than broad, rounded in front, placed behind the triangular nasal; crown with two pairs of shields, the front largest, elongate, the hinder trigonal; eye-shield triangular; the labial shields  $\frac{3-3}{3-3}$ ; the second upper and lower labial shields very large, the others smaller; with one large gular plate. Body slender; the dorsal scutella square, as long as broad, with a dark central dot; two central longitudinal series of ventral scutella broader than long, smooth, white; the lateral line very indistinct, scarcely visible except on the hinder part of the body; preanal pores four; preanal shields six, square. The eyes are slightly visible through the shields.

SAREA CÆCA, Gray, Cat. Tort. &c., B. M. 71.

*Amphisbæna cæca*, Cuvier, R. A. 773; Dum. et Bibr. Erp. Gén. v. 492.

*Hab.* West Indies, St. Thomas's (*A. H. Riise*, B. M.).

The specific name is not characteristic, as the eyes are as much seen through the shield as in many *Amphisbænians*.

CADEA, Gray, Cat. Tort., &c., B. M. 71, 1844.

Head conical; rostral narrow, higher than broad, truncated at the tip, convex in front; nasals ovate, lateral; crown with two large, triangular shields; frontal with a small linear shield on each side of it; and two pairs of square occipital shields, the hinder pair smaller; eye-shield rhombic; eyes hidden; labial shields  $\frac{3-3}{3-3}$ , subequal, middle one in each lip largest; temples covered with square shields; gular plate single, elongate. Body cylindrical; lateral line very indistinct, scarcely to be distinguished except on the hinder part of the body; shields of the back square, of the under surface rather wider, but scarcely wider than long; preanal pores four; the preanal shields six, central ones elongate.

CADEA PUNCTATA, Gray, *l. c.* 71.

*Amphisbæna punctata*, Bell, Zool. Journ. ii. 236, t. 20. f. 2.

*A. cæca*, La Sagra, Cuba, 195, t. 21.

Pale brown, dotted and varied with deeper brown.

*Hab.* Cuba (*W. S. Macleay*, B. M.): the specimen described by Mr. Bell.

Tribe 2. ANOPININA. Head compressed, keeled on the sides in front; the nostrils lateral, on the under side of the keel.

A. *Lateral line distinct and impressed.*

ANOPS, Bell, Proc. Zool. Soc. 1833, p. 99; Zool. Journ. v. 391, t. 16. f. 1; Gray, Cat. Tortoises, &c., B. M. 72, 1844.

Lateral line distinct, sunken; preanal pores "none" (*Bell*); "four" (*Dum. & Bibron*).

ANOPS KINGII, Bell, Proc. Zool. Soc. 1833, p. 99; Zool. Journ. v. 391, t. 16. f. 1; Gray, Cat. Tortoises, &c., B. M. 72.

*Amphisbæna kingii*, Dum. et Bibr. Erp. Gén. v. 497.

*Hab.* S. America (*P. P. King*; *Charles Darwin*); Buenos Ayres (*D'Orbigny*, Mus. Paris).

I have not been able to examine this genus, which was described by Mr. Bell from a specimen brought from South America by Capt. P. P. King, R.N.; it is described in more detail by MM. Duméril and Bibron from specimens obtained by Mr. Charles Darwin.

The existence of the lateral line, which, according to Mr. Bell, "is more distinct than in *Amphisbæna*, though less so than in *Chirotes*," and the account of the plates of the head as described by MM. Duméril and Bibron, show that it must be distinct from the following, which comes from Africa.

B. *Lateral line none, or only very slightly visible on the hinder part of the body.*

BAIKIA.

The head compressed, elevated; rostral plate very large, compressed, forming an arched crest from the mouth to the forehead, with a groove on the hinder part over the nostrils; crown with two pairs of band-like shields behind the upper edge of the rostral, the front pair narrow; eye-shield very minute; eye invisible; temples with two small shields; the upper labial shields 3—3; the second upper large, produced, keeled on the side; the hinder, under the temporal shield, larger, square; lower lip covered with a single large shield on each side, separated by a square inferior rostral shield and by two small gular plates placed one behind the other; nostrils large, lateral, under the edge of the keel of the frontals. Body and chest covered with rings of similar oblong square shields; preanal pores

2—2, separated by a central shield. Tail cylindrical, rather conical at the tip.

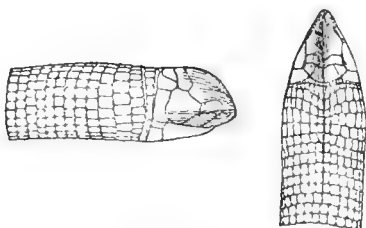
In spirits the skin is loose and inclined to form a fin-like fold, sometimes on one and sometimes on another part of the body, with a central longitudinal ventral groove, without any appearance of a lateral line.

**BAIKIA AFRICANA.**

*Hab.* West Africa (*Dr. Balfour Baikie*). B.M.

Fig. 4.

Fig. 3.



*Baikia africana.*

**Fam. 4. LEPIDOSTERNIDÆ.**

*Lepidosternidæ*, Gray, Cat. Tortoises, &c., B. M. 73, 1844.

Head oblong, depressed, with a short horizontal keel in front; nostrils in shields, under the keel of the rostral shield; teeth conical, on the inner side of the maxilla. Body cylindrical, covered with rings of oblong four-sided shields; the sternum with a disk formed of differently shaped shields; preanal pores distinct.

**Tribe 1. LEPIDOSTERNINA.** Head conical, covered with symmetrical polygonal shields; the pectoral disk covered with many polygonal shields placed in oblique lines; the dorsal and lateral lines well marked, broad, smooth, formed by the overlapping of the narrow ends of the sections of the rings. *America.*

**LEPIDOSTERNON.**

Head conical, covered with three pairs of symmetrical and a vertebral shield; rostral shield large, broad, rounded in front; the pectoral shield formed of regular, nearly equal, symmetrical rhombic or six-sided shields, sometimes united into long shields which are not symmetrical.

\* *Sternal plate of central series united into elongated bands.*

**Lepidosternon.**

1. **LEPIDOSTERNON MICROCEPHALUM**, Wagler, Serp. Bras. 70, t. 26; Müller, Tiedem. Zeitsch. 1832, iv. t. 22. f. 4; Dum. et Bibr. Erp. Gén. v. 505; Gray, Cat. Tortoises, &c., B. M. 73.

"*L. macrocephalum*, Müller" (*vide* A. Smith).

*Amphisbæna punctata*, Neuwied, Abh.

*Lepidosternon maximilianus*, Wiegmann.

Head short, broad; the vertebral plate broader than long, six-sided; frontal short, broad, band-like; parietal small, square; ocular higher than broad.

*Hab.* Brazil, Rio (*Dr. Gardner*, B. M.).

The specimen in the British Museum has the shields on each side of the central line of the sternal disk united into an elongate shield, which is not symmetrical on the two sides, and appears like an accidental peculiarity.

In the Free Museum at Liverpool there are two specimens of this species, obtained by Mr. Jobert in Brazil. They are similar, but show that the sternal plates are liable to coalesce and form larger plates in an unsymmetrical manner.

In the larger specimens the first series of sternal plates on each side of the central line are united into longitudinal shields, which are not of equal length. The series of plates on the outer side of them are separate, but not quite symmetrical.

In the other specimen, which is rather smaller, the first series of sternal plates on the sides of the central line, and the second series on the outside of it on the right side, and second and third series on the left side, are united into longitudinal parallel plates, which are of unequal length, the two central ones being the longest, and the two outer plates on the left side much longer than the outer one on the right side.

The head-shields in both these specimens are exactly alike, the central crown-shield being much broader than long; the hinder pair of frontal shields rather shorter than the front pair, and narrower on the central edge by the angular front edge of the crown-shield; the two pairs of occipital shields are shorter than broad, the hinder pair being the smaller, and in one instance coalesced on one side with the plate of the front pair.

They all have a brown spot on the centre of each of the dorsal scutella.

\*\* *Sternal plates all separate, symmetrical.* Sphenocephalus.

## 2. LEPIDOSTERNON GRAYII, A. Smith, MS. Brit. Mus.

Head rather short, broad; the vertebral plate hexagonal, elongate, as long as broad; the frontal plate very short and broad; the parietal shields oblique; the occipital much longer than broad; temporal shields larger on the side of the occipital; plates of the sternal disk symmetrical, in oblique diverging lines.

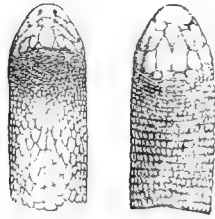
*Hab.* South America? (*Brit. Mus.*).

Sternal disk formed of four diverging lines of uniform, similar-sized, symmetrical shields; the shields on the central line smaller, being divided down the centre by a straight suture.

In 1848, Dr. (now Sir Andrew) Smith sent to the British Museum

this specimen, with the name of *Lepidosternon grayii*, informing me that he had described (or intended to describe) it in the 'Proceedings of the Zoological Society' under that name. I cannot find that it has been so described, nor can I find any notice of it in any other work, though it is very like, but evidently distinct from, the *Lepidosternon phocæna* of Duméril and Bibron, figured by M. d'Orbigny (Voy. Amér. Mérid.).

Fig. 6.      Fig. 5.



*Lepidosternon grayii*.

3. **LEPIDOSTERNON PHOCÆNA**, Dum. et Bibr. Erp. Gén. v. 507; Gray, Cat. Tortoises, &c., B. M. 73; D'Orbigny, Voy. Amér. Mérid. Rept. t. 6. f. 7-10.

Head broad; the vertebral plate elongate, small, larger than broad, acute at each end; the frontal and occipital plates large, shorter than broad, the frontal the largest; the parietal plates short, broad, band-like; the plates of the sternal disk uniform, symmetrical, oblique.

*Hab.* Buenos Ayres (*Bridges*, B. M. : stuffed).

M. d'Orbigny's figure is very like the preceding species; but the head is represented shorter, the frontal plates are rather larger. The long occipital shield of that species is here represented by two pairs of square shields, as if the large plate of the former species were divided across; it also appears to be a shorter, thicker species.

The stuffed specimen which we received from Mr. Bridges agrees with the figure in all these particulars; but the head appears rather larger, perhaps from its being rather distorted in the preparation.

Both the figure and the specimen belong to a species evidently very distinct from *L. grayii*, and much thicker.

**Tribe 2. CEPHALOPELTINA.** The head depressed, covered above with a single simple or transversely divided, flat, horny, nail-like shield; pectoral disk formed of elongated, symmetrical shields; the dorsal and lateral lines very narrow, indistinct, except near the hinder part of the body.

A. *The pectoral disk formed of large, diverging, unequal, polygonal, symmetrical shields; crown-shield divided into two by a transverse suture.* America.

**CEPHALOPELTIS**, J. Müller, Tied. Zeitsch. für Phys. 1831, iv. 269.

Head covered with two large shields, the front one smaller; the

sternal disk of eight or ten large shields, the two central pairs parallel, one in front of the other; the lateral pairs diverging.

CEPHALOPELTIS SCUTIGERA, Gray, Cat. Tort., &c., B. M. 73.

*Cephalopeltis lepidosternon*, Müller, l. c. t. 21. f. 6 (skull), t. 22. f. 5 (head).

*Amphisbæna scutigera*, Hempr. Naturf. Freund. zu Berlin, 1820, p. 127.

*Lepidosternon scutigerum*, Dum. et Bib. Erp. Gén. v. 509.

*Cephalopeltis cuvieri*, Müller (*vide* Dum.).

*Coleopeltis cuvieri*, J. Müller (*vide* A. Smith).

*Hab.* Brazils (Müller).

B. *The pectoral disk formed of six or eight elongate, longitudinal, parallel shields; head-shield single.* Africa.

#### MONOTROPHIS, A. Smith.

The head covered with a single nail-like shield, without any slits on the hinder part of its side edge; the rostral plate between the nasal plates, transverse, four-sided, broader than high; the shields of the sternal disk regular, broad, and truncated in front; the rings of shields in front of the sternal disk formed of regular square shields, like the rest of the body.

MONOTROPHIS CAPENSIS, A. Smith, Zool. S. Africa. Rept. t. 47 (white; pink when alive).

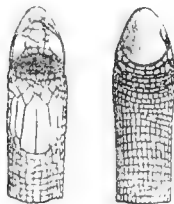
*Hab.* S. Africa (B. M.). The type specimen of Sir Andrew Smith.

Dr. Peters records *Monotrophis capensis* as found in Mozambique; but on comparison it may prove a distinct species. In my notes I have a reference to *Lepidosternon sphenorhynchum*, Peters, MS., as an East-African species, but I cannot find it described or noticed anywhere. Can it be the name Dr. Peters gave to his *Monotrophis* before he discovered it had been described by Sir Andrew Smith?

#### DALOPHIA.

The head covered with a single nail-like shield, with a linear slit on the hinder part of its side edges; the rostral plate small, triangular, with the point upwards between the nasal plates; the shields of the sternal disk rather irregular, but symmetrical, each with an

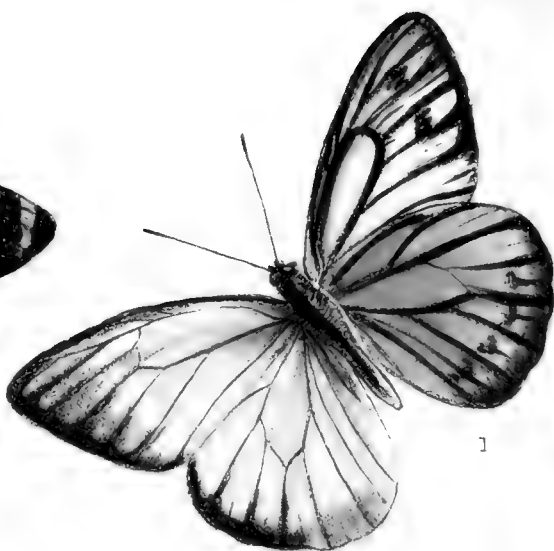
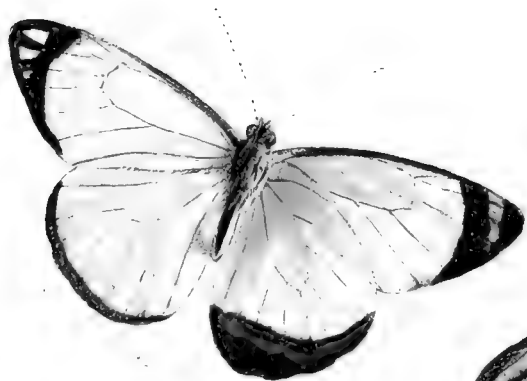
Fig. 8. Fig. 7.



*Dalophia wehwitschii.*







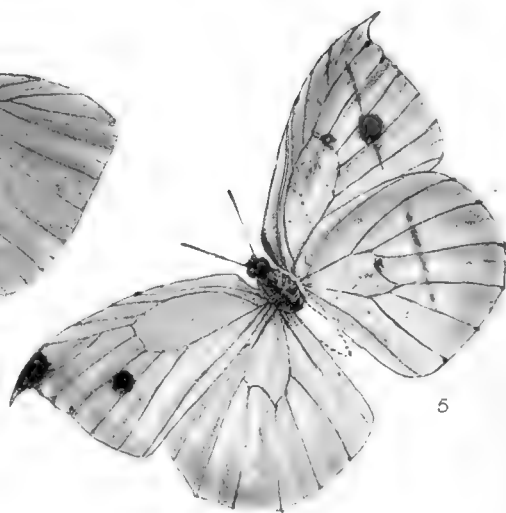
1



3



6



5

A. C. Butler del.

M. & N. Hanhart imp.

- 1. PIERIS PACTOLICUS.
- 2. PIERIS CRUENTATA.
- 3. PIERIS VECTICLOSA.

- 4. PIERIS AVIVOLANS.
- 5. GONEPTERYX URANIA.
- 6. CALLIDRYAS BRACTEOLATA.

acute front edge; the rings of shields in front of the sternal disk formed of unequal but symmetrical polygonal shields.

*DALOPHIA WELWITSCHII.*

*Monotrophis capensis*, Günther, MS. B.M. (not A. Smith).

Pale brown.

*Hab.* Angola; Pungo Andongo (*Welwitsch*). B.M.

4. DESCRIPTION OF SIX NEW SPECIES OF EXOTIC BUTTERFLIES  
IN THE COLLECTION OF THE BRITISH MUSEUM. BY A. G.  
BUTLER, BRITISH MUSEUM.

(Plate XXVI.)

1. *PIERIS PACTOLICUS.* (Pl. XXVI. fig. 1.)

*Upperside.* Front wings, basal half white; apical half, inner portion of anterior margin, and base grey; exterior edge of front margin and outer margin rich brown; nervures, except the base of the third median nervule and nearly the whole of the submedian nervure, brown. Posterior wings white, with broad bicoloured outer margin; the anal half grey; the apical half rich brown, forming sinuations with the nervules, which are also brown for nearly their entire length. Body silver-grey.

*Underside.* Front wings white, yellow at the base and apex; anterior margin greyish; all the nervures, except the interior portions of the third median nervule and the submedian nervure, deeply bordered with rich brown, the brown margins of the nervules gradually widening at the extremities into a marginal band; a brown spot crossing in the centre between the first and second discocellular, and another between the first and second median nervules. Posterior wings bright yellow, greyish on the outer margin; all the nervures deeply bordered with rich brown, except at the end of the cell, which gives it the appearance of being open; lower portion of folds between the median nervules and submedian nervure brown, and terminated inwardly by brown lunules, their concavities towards the base. Body dark grey.

*Hab.* ~~Bogota~~ *Bogota*. *Bogota*.

2. *PIERIS CRUENTATA.* (Pl. XXVI. fig. 2.)

*Upperside.* Front wings white, with faint roseate reflection; apical edge rich brown, tapering nearly to the anal angle, and enclosing two small hastate, longitudinal, cream-coloured spots, and two barely perceptible dots of the same colour on either side of them; anterior margin brown, sprinkled with white scales near the base. Posterior wings white, with faint roseate reflection; base sprinkled with a few black scales; outer margin rich brown; anal portion faintly showing the markings of the underside. Body—prothorax and mesothorax olivaceous; metathorax and upper half of abdomen blue grey; anal portion white.

*Underside.* Front wings white, yellowish at base; anterior margin brown; apical edge rich brown, tapering nearly to the anal angle, and crossed near its centre by a band of five spots (the lowest one a mere speck), the three upper ones yellow, the other two white. Posterior wings, basal half yellow, and inner margin broadly yellow; apical half white; outer margin with a broad rich brown marginal band, widest at the anal angle, and tapering to a point at the apex; crossed by a band of scarlet, interrupted by the nervures, beginning at the inner anal edge, and crossing the band obliquely to near the extremity of the first median nervule, and thence upwards through the centre of the band to the apex.

*Hab.* Mysol.

This species is closely allied to *Pieris mysis*, Godt. (Australia). The points of distinction are as follows:—

*Pieris cruentata.*

*Upperside.* Front wings much more suddenly angulated; front margin more curved; hind margin much shorter; apical band beginning much nearer the apex, and only enclosing two full-sized spots, which are yellow instead of white. Posterior wings much longer; marginal band not sinuated on its inner edge.

*Underside.* Front wings, anterior brown margin not running gradually into the apical band, but meeting it at a sharp angle; spots on apical band not all white, as is usually the case with *P. mysis*. Posterior wings much more suffused with yellow, which is paler, and softened off into the white, instead of terminating abruptly; marginal band only extending from the anal angle to the apex, not continued halfway up the interior margin.

3. *PIERIS VECTICLUSA.* (Pl. XXVI. fig. 3.)

*Upperside.* Front wings cream-colour, ferruginous at the base; apical edge rich brown, tapering nearly to the anal angle, sinuated on its inner edge, and enclosing a nearly triangular yellow spot, its point touching the anterior margin; a broad brown band at the end of the cell, widest on the anterior margin, and terminated at the median nervure. Posterior wings deeper cream-colour, slightly ferruginous at the base; rich brown along the outer margin; an oblique band showing through from the underside, crossing the wing, at the end of the cell, from the anterior to the inner margin near the anal angle. Body ferruginous.

*Underside.* Front wings cream-colour, deeper towards the base; anterior and basal half of the cell bright orange; apical edge rich brown, tapering nearly to the anal angle, sinuated on its upper edge, and enclosing a nearly oval, oblique, ochreous spot, its upper end touching the front margin; a broad brown band at the end of the cell, widest on the anterior margin, and terminated at the median nervure. Posterior wings ochreous, basal portion greyish; base orange, interrupted by the nervures; an oblique brown band crossing the wing at the end of the cell from the anterior to the interior margin, near the anal angle, its upper extremity slightly widening

along the front margin; a band of brown, irregularly denticulated on its inner side, along the outer margin. Body brown.

*Hab.* —?

4. *PIERIS AVIVOLANS.* (Pl. XXVI. fig. 4.)

*Upperside.* Front wings bright yellow; anterior margin and base of the nervures black; a small black spot at the end of the cell; a quadrate olivaceous spot between the cell and anterior margin, halfway between the base and the apex; a second quadrate olivaceous spot, also touching the anterior margin, halfway between the first spot and the apex; nervules black at their outer extremities, and surrounded with olivaceous blotches; the black anterior margin interrupted by yellow within the extremities of the nervules; five olivaceous lunules near the outer margin between the nervules, the first and fourth nearly halfway between the outer margin and the cell, the fourth little more than a spot. Posterior wings bright yellow; outer margin deeply sinuated, especially near the anal angle, where the second and third median nervules terminate in short obtuse tails, that of the second median being the longer of the two; outer extremities of the nervules black. Body brown, densely clothed with coarse silvery and yellow hair.

*Underside.* Front wings creamy ochreous, cell and apical half deeper-coloured; anterior margin and base of the nervures black; an irregular black spot at the end of the cell; a nearly triangular black spot between the cell and anterior margin, halfway between the base and the apex; a second black spot, oblique, elongate, touching the anterior margin, halfway between the first spot and the apex; nervules greenish, black at their outer extremities, and almost connected by a marginal termination of brown scales; five narrow black lunules near the outer margin between the nervules, the first three placed obliquely, the third one nearest to the outer margin, the fourth irregular, on a level with the first, the fifth on a level with the third. Posterior wings creamy ochreous, increasing in depth towards the base and inner margin; nervures, except the second and third median nervules, faintly black for their entire length; two contiguous lunules close to the base above the costal nervure, their concavities towards the costal nervure; an elbowed black marking just beyond the lunules, and touching the anterior margin, its angle towards the outer margin; the costal and subcostal nervures densely black at the base, a black spot near the base between them; a transverse band between the costal nervure and subcostal nervule, halfway between the base and the apex, and forming an angle with a black termination to the costal nervure; a second minute transverse band crossing them close to the apex, and continuing in an oblique zigzag to the second subcostal; five transverse angulated black bands, resembling birds in flight, between the other nervules, the first, third, and fifth halfway between the margin and the cell, the second and fourth only half as far from the margin as the others; cell enclosing three elongate black spots, two in the centre, placed obliquely, the third near the end of the cell, placed longitudinally.

dinally; basal end of median nervure broadly black internally; a black spot at the end of and within the cell, crossing halfway between the discocellular nervules; interior extremities of second and third median nervules, end of cell between them, and between the first and second clothed with black scales; a black angular lunule between the interior extremity of the third median nervule and the submedian nervure, but only extending to the interneurial fold; both ends of the fold black; a transverse spot of black between the fold and the submedian nervure near the base, and a small transverse band near the anal angle, extending to the fold between the submedian and the internal nervules; another band between the fold and the internal nervure, which is broadly black on its outer edge near the centre; all the nervures of the outer and interior margins with sagittiferous outer extremities. Body pale ochreous.

*Hab.* Mexico\*.

5. *GONEPTERYX URANIA.* (Pl. XXVI. fig. 5.)

*G. wallichii*, Doubl.?

*Upperside.* Front wings pale yellow, deeper at the outer margin; anterior margin much curved, and ending at its outer extremity in a sharp, uncatenated apical point; outer margin slightly sinuated on its upper edge; apex brown, deeply sinuated and dentated; a large, perfectly circular, deep-brown spot between the first and second submedian nervules. Posterior wings somewhat quadrate, pale yellow, deeper at the outer margin.

*Underside.* Front wings dirty yellow, paler on the inner margin; discoidal cell irrorated with brick-red; a small irregular silver spot surrounded with red in the middle of the end of the cell, with a minute vertical lunule just above it; the costal and subcostal nervures ending in small red spots; a somewhat triangular silver dash on the anterior margin, close to the apex; a large ferruginous round spot, ending below in a fine oblique red line, between the first and second submedian nervules; two small, longitudinal, oblong, pale-brown spots placed obliquely between it and the silver apical dash. Posterior wings dirty yellow; cell irrorated with brick-red, a small irregular silver spot, surrounded with red, in the middle of the end of the cell, with a minute red lunule just above it; a small brown lunule above the end of the cell, and halfway between it and the anterior margin; a band of oblong pale-brown spots crossing the wing between the nervules, and following the direction of the outer margin.

*Hab.* Northern India.

6. *CALLIDRYAS BRACTEOLATA.* (Pl. XXVI. fig. 6.)

*Upperside.* Front wings sulphur-yellow, pale roseate at the base; anterior margin convex; apex and nervules of outer margin faintly tipped with brown; a faintly indicated deeper-yellow spot near the

\* Nearly allied to *Hesperocharis graphites* ♂, Bates (from the central valleys of Guatemala), Ent. Month. Mag. vol. i. pt. 2. p. 33, but, as it seems to me, not identical.

inner end of each of the folds between the nervules; a large deep-brown spot at the end of the cell. Posterior wings sulphur-yellow, the base, inner margin, and cilia pale roseate; inner margin deeply emarginate at its lower edge for more than one-third of its length, and forming a long caudate projection with the outer margin, which slopes gradually from the apex to the anal angle; a faint orange spot at the end of the cell, and another smaller spot of the same colour above it and just beyond the cell; an indistinct yellow spot at the inner end of each of the folds between the nervules. Body pale roseate, with yellow hair on the thorax; head and antennæ brown.

*Underside.* Front wings pale ochreous, with deeper-coloured front, margin, and cilia; wings sparsely irrorated with orange; a few black scales between the costal nervure and the cell; base tricoloured, the interior portion red, the middle bright ochreous, the exterior, which with the lower wings forms almost a complete circle, greenish grey; nervures bright yellow; two dull copper-brown oval spots, faintly margined with black, placed one beneath the other at the end of the cell, the lower one about six times as large as the upper, with a silver outer edge; a silver, oblong, oblique dash near the inner end of each of the folds between the nervules, those between the first and fourth subcostals slanting towards the outer margin, those between the fourth subcostal and the third discocellular slanting towards the interior margin, and forming an oblique band; the spots between the median nervules running parallel to, but outside, this band; outer extremities of the nervules black, those on the outer margin sprinkled with silver scales. Posterior wings pale ochreous, gradually increasing in intensity towards the base; wings irrorated with orange; a few black scales, intermingled with silver, placed obliquely just beyond the end of the cell; base tricoloured, the interior portion ochreous sprinkled with red, the middle bright ochreous, the exterior greenish grey; a quadrate silver spot surrounded with orange at the end of the cell, and another smaller spot placed obliquely to and just above it; eight small, oblong, silver dashes crossing transversely between the nervules, near the inner end of the folds, each of them with a few brown scales in the centre; nervules yellow, greenish near the base, their outer extremities tipped with black and surrounded with silver; all the silver markings on the underside are distinctly raised above the surface of the wings. Body ochreous.

*Hab.* Brazil.

5. DESCRIPTION OF A NEW SPECIES OF GOULDIA FROM PORT JACKSON. BY GEORGE FRENCH ANGAS, CORR. MEMB.

GOULDIA AUSTRALIS, Angas.

*G. t. parva, suborbiculari, crassiore, vix tumida, pallide rufocastanea; plerumque radiis duobus albidis, extus et intus plus minusve se monstrantibus; umbonibus prominentibus, antice flect-*

*tentibus, dense rufo-castaneis; marginibus undique regulariter excurvatis; lunula planata, satis definita; sublævi, secundum incrementa lirulis concentricis, antice solum definitis, vix sculpta: intus colore intensiore; dent. card. ii., iii.; lat. ant. curto utraque valva uno; cicatr. adduct. suborbicularibus; linea palliari a margine simplici valde remota, haud infecta: ligamento curtiore, omnino extus sito.*

Long. 6 lin., lat. 5 lin., alt. 4 lin.

*Hab.* Port Jackson, New South Wales; dredged in 5 fathoms (*Angas*).

An interesting addition to the few known species of the original genus *Gouldia*, C. B. Ad., à *primâ manu*, of which the British *Circe minima*, auct., is typical. The *Gouldiæ* of the Panama and Mazatlan Catalogues prove to belong to an aberrant form of *Crassatella*.

## 6. NOTES UPON THE CUCKOOS FOUND NEAR SYDNEY, NEW SOUTH WALES. BY EDWARD P. RAMSAY.

(1.) The BRONZE CUCKOO (*Chalcites lucidus*): Gould, B. Austr. iv. pl. 89.

We have for many years been under the impression that the females of this species lay two distinct varieties of eggs, which, although in many instances exactly the same in size, differ widely in colour and in style of marking.

The most satisfactory way of determining this question was to procure specimens of each of these different eggs, and to place them in nests of the *Malurus cyaneus*, or of various *Acanthizæ* (which had been built sufficiently near our residence to admit of our occasionally visiting them), until they were hatched, and then to compare the young birds so hatched from each of the different eggs. This we succeeded in doing in more instances than one, and found that the young birds were in every case alike, and that when they were sufficiently fledged we had no difficulty in recognizing them to be the young of the Bronze Cuckoo (*Chalcites lucidus*).

The first variety of the eggs in question (var. A), usually recognized as the egg of the Bronze Cuckoo, varies in colour from a uniform ashy grey to a rich dark olive-brown or bronze, many of the light ashy-grey specimens having minute dots of deep olive towards the larger end. In one specimen, in which these dots form a blotch, they are more inclined to reddish brown.

Var. B has a purely white ground, blushed with pink before the egg is emptied, and minutely freckled over the whole surface with dots of light brownish red or dull salmon-colour, running in some instances into blotches which stretch half across or round the surface, leaving patches of the white ground without any markings. Occasionally we find a specimen in which the salmon-colour and bronze seem to be blended, forming a curious brownish-lilac tint.

Both varieties vary much in size: we have specimens of var. A



varying from 8 by 6 lines to 10 by  $5\frac{1}{2}$  lines; of var. B, from 8 by 5 lines and  $8\frac{1}{2}$  by 6 lines to  $9\frac{1}{3}$  by 6 lines in breadth. The colouring-matter of both varieties easily rubs off, especially when the eggs are freshly taken. The Bronze Cuckoo seems to give no preference to any particular character of country, being found equally numerous in all parts. In the thick shrubs and low brushwood it finds a secure place for depositing its eggs in the nests of *Malurus lamberti* and *Acanthiza pusilla*. In the half-cleared patches of land and even in our gardens and shrubberies it seeks for the nests of the *Malurus cyaneus*, *Acanthiza lineata*, *A. reguloides*, and *A. nana*.

From a nest of this last-mentioned species (*A. nana*) I remember taking, in the year 1855, no less than six eggs. Among them were three of the Bronze Cuckoo—two of var. A and one of var. B. In November last (1864) we took another nest of the same species, containing one of each variety. In this instance one of the eggs, var. A, was imbedded below the lining of the nest, and had evidently been laid before the nest was completed, as is not unfrequently the case. The other egg, which was a specimen of var. B, my brother Percy placed in a nest of *Acanthiza lineata*, which he had found on the previous day and left for such an occasion. On returning to it about a week afterwards we found that the young Cuckoo had been hatched. After the lapse of seven days the bronze feathers were just commencing to appear, and in about a week or ten days more the young bird was nearly able to fly, the bronze on the wings, head, and back now showing plainly.

All the species of *Acanthizæ* that we have met with construct oval dome-shaped nests, having the entrance near the top, and more or less covered with a hood. The nests are either suspended (as in the case of *A. lineata*) from the end of some drooping or horizontal bough, or, like those of the *Maluri*, placed in some low bush or cluster of vines, or, as is often the case with *A. reguloides*, placed in the thick forks or loose hanging pieces of bark of the *Eucalypti* and white-barked Tea-trees (*Melaleuca*).

Now, as the apertures of the nests of the *Acanthizæ* are exceedingly small, a question naturally arises whether the Bronze Cuckoo lays its eggs in the nest, or places them there by some other means. To this I can only answer that the apertures of those nests which have contained Cuckoos' eggs are nearly twice as wide as the openings of those nests which we have taken before the Cuckoo's egg has been deposited in them. This is more easily noticed in the nest of *A. lineata*, of which the aperture is very small, and neatly covered over with a hood.

The following are a few extracts from my note-book, showing the species which are most frequently the foster-parents of the Bronze Cuckoo:—

	Nest.	Eggs of owner.	Eggs of Cuckoo.
Sept. 29th, 1862 ...	<i>Acanthiza pusilla</i>	2	1 of <i>C. lucidus</i> , var. B.
Sept. 11th, 1863* ...	"	2	1 of <i>C. lucidus</i> , var. A.
Sept. 12th, 1864 ...	<i>A. lineata</i> .....	3	1 of <i>C. lucidus</i> , var. A.
Sept. 12th, 1864 ...	<i>A. reguloides</i> .....	2	1 of <i>C. lucidus</i> , var. B.
Sept. 14th, 1864 ...	<i>Malurus cyaneus</i> .	3	1 of <i>C. lucidus</i> , var. B.
Sept. 14th, 1864 ...	<i>A. reguloides</i> .....	3	1 of <i>C. lucidus</i> , var. A.
Nov. 1864 .....	<i>A. nana</i> .....	4	2 of <i>C. lucidus</i> : 1 of var. A and 1 of var. B.
Sept. 16th, 1864 ...	<i>Meliphaga sericea</i>	1	1 of <i>C. lucidus</i> , var. B.
Oct. 2nd, 1864 .....	<i>Meliphaga sericea</i>	1	1 of <i>C. lucidus</i> , var. B.

Mr. Gould tells us that the Bronze Cuckoo is dispersed over the whole continent of Australia, as well as New Zealand. In the latter country I have myself met with it at every port I visited, from Stewart's Island to Auckland, where it arrives about September, and leaves during February and March.

(2.) The UNADORNED CUCKOO (*Cuculus inornatus*): Gould, B. Austr. iv. pl. 85.

When the eggs of two or more species of Cuckoo are found in the same locality, and the birds themselves equally plentiful during the same months, it becomes difficult to determine which is the egg of each species, except perhaps where there is a great difference in the size of the birds. Even this, however, must not be depended upon in too great a degree, as will be seen in the present case. Following the same plan as in the case of the Bronze Cuckoo (*Chalcites lucidus*), we succeeded in procuring two young Cuckoos from eggs which we had left in the nests of the Yellow-whiskered Honey-eater (*Ptilotis auricomis*). These, when fledged, we at once recognized to be the young of *Cuculus inornatus*.

The young, upon leaving the nest, have the throat, face, and shoulders black; the rest of the upper and under surface and tail irregularly marked with dashes and stripes of black, scarcely two feathers, even of wings, being alike. They retain this plumage until March and April, during which months all the specimens I procured were commencing to assume the more dusky plumage of the adult. During these months all the old birds seem to have left us, the young of the last season alone being found.

The present species arrives early in September, and is usually met with in pairs, showing a preference for the half-cleared land and belts of trees skirting the more cultivated parts. They may frequently be seen perched upon the dead tops of trees, or among the lower open branches, or often on the posts and fences, from which they pounce down upon any unhappy grasshopper or cricket that they may have discovered lurking in the grass.

Their food consists chiefly of *Gryllidæ* and *Phasmidæ*, various species of *Mantis*, and often the beautiful larvæ of the *Cæquosa triangularis* and *Antheræa eucalypti*, which they obtain among the

\* This nest also contained one of *Cuculus cineraceus*.

leafy tops of the *Eucalyptus* trees. The crops in some specimens, procured in October last, contained nothing but grasshoppers, which appear to be their favourite food.

In this neighbourhood they usually deposit their eggs in the nests of *Ptilotis auricomis*, but also occasionally in those of *Ptilotis chrysoptera*, but rarely in those of *Ptilotis fusca* and *Melithreptus lunulatus*; in other districts, doubtless, in any nests suitable for the purpose. I have frequently observed that whenever the eggs of Cuckoos have been deposited in open nests, there is manifested a decided preference for those of birds which lay eggs similar to their own.

The Cuckoo's eggs mentioned in my notes upon the Yellow-whiskered Honey-eater (*P. auricomis*) in the 'Ibis' (vol. vi. 1864, p. 245) as being found in the nest of that bird, I have now no doubt belong to *Cuculus inornatus*, and not, as I then supposed from their small size, to *Cuculus cineraceus*.

The eggs of the Brown Cuckoo (*C. inornatus*) closely resemble the large and almost spotless variety of the Yellow-whiskered Honey-eater; they are, however, somewhat more rounded, and of a much lighter tint, being of a pale flesh-colour, sprinkled with a few dots of a deeper hue, but often without any markings at all. In length they vary from 11 to 12½ lines, being from 8½ to 9 lines in breadth.

They are usually hatched about the twelfth or fourteenth day, when the young Cuckoo, a little fat helpless creature, is scarcely larger than its foster-brethren. However, as it grows more rapidly, it soon fills up the greater part of the nest, and its unfortunate companions, either smothered by its weight or starved to death through its greediness, are thrown out by their parents.

On the 30th of October last (1864) we found two unhappy young birds which had been hatched in company with a Cuckoo in a nest of *Ptilotis auricomis*, tossed out and lying upon the ground just under the nest; they were of course quite dead, and appeared to have been about three or four days old.

During the months of October and November it is no uncommon sight to see the smaller birds feeding the young Cuckoos; even the little *Acanthiza*, which I believe are never the foster-parents, at least of this species (*C. inornatus*), join in supplying their wants, which are easily made known by their continual peevish cry, stopping only when being fed, or when their appetites are appeased.

While walking towards home, through a half-cleared paddock, on the 27th of last October, I was not a little surprised, upon hearing the cries of a young Cuckoo, to see a pair of adult birds of the same species (*C. inornatus*) flying after it, settling beside it, and apparently paying it great attention. Several times they flew away, but returned to it again; and from their actions I feel convinced that they were feeding it, although, much to my regret, I was unable to obtain a view sufficiently close to make sure of the fact.

(3.) The CINEREOUS CUCKOO (*Cuculus cineraceus*): Gould, B. Austr. iv. pl. 86.

This, the third and remaining Cuckoo which annually visits us, arrives much earlier than either of the former species.

During May I have found it very plentiful, preferring the lonely and more closely wooded parts, and the sandy scrub-lands studded with aged *Banksia* (*B. serrata*) and widely branching *Eucalypti*, where the undergrowth consists of low, thick, scrubby *Lambertia* (*L. formosa*), Acacias, and dwarf Banksias, &c. Such are the parts of our neighbourhood frequented by this species for nearly a month after its arrival. Their clear wailing cry is often heard from the depths of the bush, giving quite a melancholy tone to the surrounding neighbourhood.

June comes, and they leave their lonely haunts for the more open wooded parts. Here they may be seen, either singly or in pairs, often frequenting the gardens and orchards, where, among the leafless fruit-trees, their undulating flight and the peculiar cuckooish upward jerk of their tails at once render them conspicuous. As spring advances, their melancholy cry assumes a more cheerful tone, but is less often heard, giving place to a quicker and more harsh note.

The shrill whistle of the Bronze Cuckoos (*Chalcites lucidus*) is now more often heard, accompanied by the mellow notes of the Brown Flycatcher (*Micræca macroptera*), singing on the topmost bough of some neighbouring tree; and the twittering of the *Acanthiza* as they sport among the leafy branches of the *Eucalypti*, clinging to the ends of the twigs and leaves in every possible attitude, the tremulous anxious piping of the Spine-bills (*Acanthorhynchus tenuirostris*), the varied inward note of the Silver-eye (*Zosterops dorsalis*), with other species far too many to mention here, keep up a merry chorus, and, tired of the winter fogs, welcome the bright spring mornings.

As the birds pair off and the nesting-season commences, this Cuckoo seems to be less plentiful. Either some of them leave us, or they scatter over the bush so thinly that we do not observe their numbers. If some do migrate at this time, still many remain to deposit their eggs and to avail themselves of the nests of those species most suited to become the foster-parents of their young, after which they commence to leave us, and, with the exception of a few stragglers and young, appear to have all departed before the end of December.

Among those species the nests of which are favoured by visits from this "parasite" is *Acanthiza pusilla*, from a nest of which, in September 1863, we took no less than four eggs—two laid by the rightful owner of the nest, the other two by Cuckoos. One of these was a very fine specimen of var. B of *Chalcites lucidus*, the other an egg of the present species—*Cuculus cineraceus*. The entrance of this nest was greatly enlarged, being in width fully two inches; and the hood, which usually conceals the entrances (which are near the top of the nest, and not generally wider than one inch across), was pushed back to such an extent that the eggs were rendered quite visible.

I have now before me ten nests of *Acanthiza* and four of *Maluri*, the former comprising *Acanthiza lineata*, *A. nana*, *A. pusilla*, and what at present I believe to be that of *A. reguloides*, the latter *Malurus cyaneus* and *M. lamberti*.

Now, having compared the greatly enlarged entrances of those from which we have taken Cuckoos' eggs with the entrances of those which did not contain the egg of a Cuckoo, and which we took as soon as the bird had laid its full number of eggs for a sitting, I cannot but feel convinced more than ever that the eggs of these parasites are laid in the nests, and not deposited in any other manner. The average width of the entrances of the nests of *Acanthiza lineata* which have not been visited by a Cuckoo is 1 inch, while those which have contained Cuckoos' eggs vary from 2 to 2½ inches. In addition to the nests of *Acanthiza pusilla*, we have known this Cuckoo (*C. cineraceus*) deposit its eggs in the nests of *A. reguloides* (?) and *Chthonicola minima*. How great is the difference between the Cuckoo's eggs and those of this last bird (*Chthonicola minima*), which are of a bright reddish chocolate!

The eggs of *Cuculus cineraceus* are from 10 to 10½ lines in length, by 7 to 7½ in breadth. The ground-colour is a delicate white, spotted and dotted with wood-brown, deep brownish lilac, and fair lilac dots, which appear beneath the surface.

Some specimens are faintly sprinkled all over, and the dots have a washed-out appearance; others are marked more strongly, and in these the markings formed are in a distinct zone at the larger end, which is sometimes broken by a batch of very deep-coloured dots.

I have seldom met with the eggs of this species in collections (although sometimes I have seen those of *Cuculus inornatus*), whereas the eggs of *Chalcites lucidus* are to be found in almost every collection of eggs made in New South Wales. It is curious that one variety of the egg of the *Chalcites lucidus* (var. A) should be so different from the eggs of the species in the nests of which it is placed, whereas both the other species here mentioned lay eggs very similar to those of their foster-parents.

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June 13, 1865.

Dr. J. E. Gray, F.R.S., in the Chair.

Mr. P. L. Sclater exhibited a photograph of a pair of Gayals (*Bos frontalis*, Lambert), intended for transmission to the Society's Menagerie by Mr. W. Dunn, of Akyab, Corr. Memb. The animals were stated to be about half-grown.

Mr. Sclater also exhibited a drawing of the Paradise-bird lately discovered in the Island of Waigiou by Dr. H. A. Bernstein, and described by Professor Schlegel as *Paradisea calva*, and remarked that it appeared to be the same as the *Paradisea wilsoni*, Cassin\*.

\* Journ. Acad. Sc. Phil. ii. p. 57, pl. 15.

The Secretary called the attention of the Meeting to several interesting additions to the Society's Menagerie. Amongst these were—

1. A specimen of the Letter-winged Kite (*Elanus scriptus*, Gould), which had been procured from a native at King George's Sound, West Australia, and presented to the Society on the 29th of May last by Ernest de St. Jean, Esq.

2. A specimen of a species of *Hæmatornis* from the Andaman Islands, presented to the Society by Arthur Grote, Esq., of Alipore, Calcutta, Corr. Memb. This bird was forwarded by Mr. Grote as a specimen of *Hæmatornis elgini*, Blyth, but was considered by Mr. Gurney not to be different from *Hæmatornis bacha* (*H. bido*, Horsf.) of the Malayan region.

3. A *Paradoxurus* from the same islands, also presented by Mr. Grote as *Paradoxurus tytlerii* of Blyth.

4. A third living *Apteryx*, presented to the Society on the 23rd of May last by Mr. Henry Slade, R.N., of H. M. S. 'Miranda.' This specimen had been purchased in Auckland by Dr. Slade, from a person who had obtained it in the south part of the North Island, about six months before. A second living example of this bird, forwarded in the same vessel by His Excellency Sir George Grey for the Society, had died on the passage.

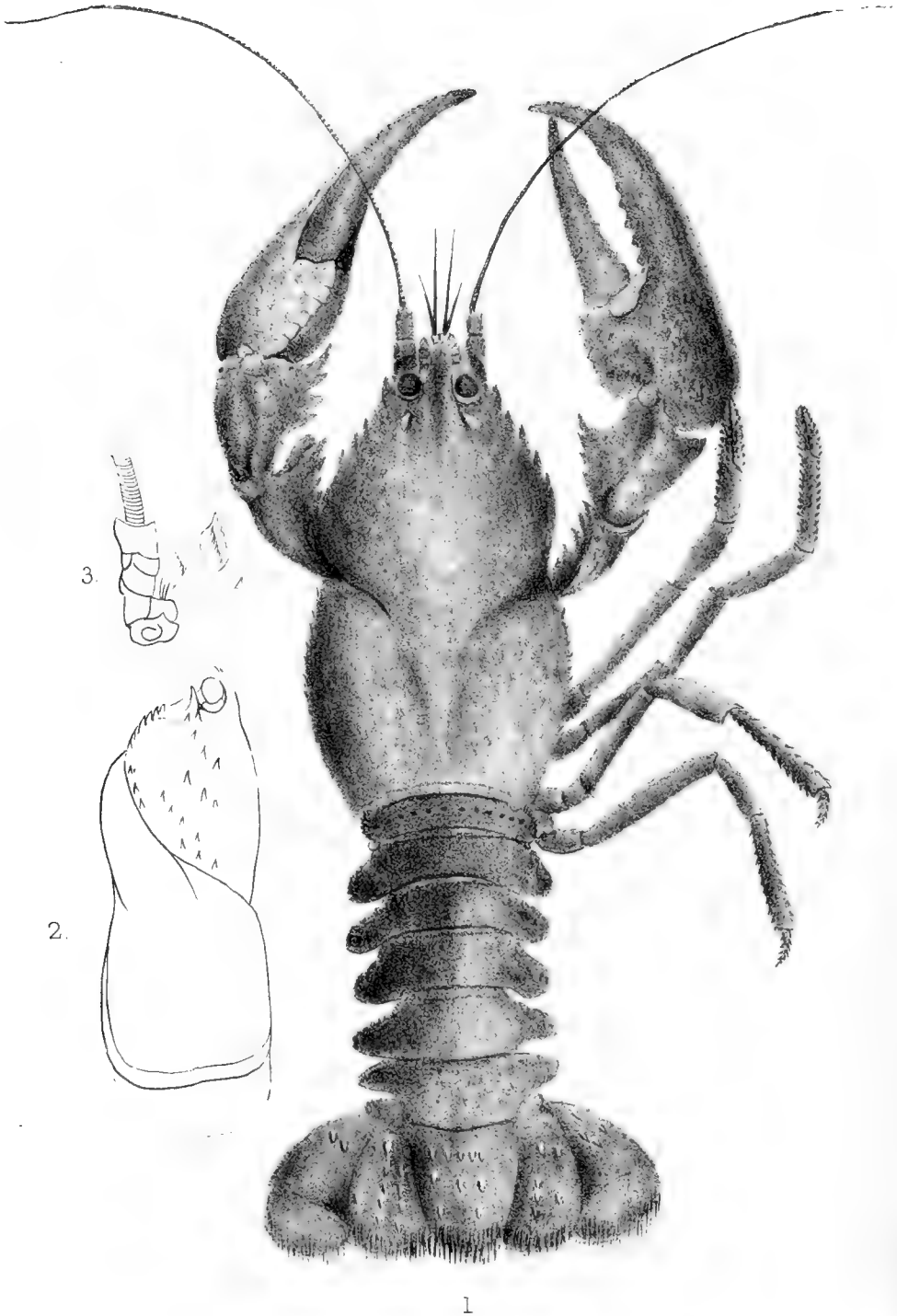
5. Two specimens of the Japanese Badger (*Meles ankuma*, Temm. Faun. Japon. Mamm. pl. 6), believed to be the first examples of this scarce animal received alive in Europe.

6. A fine young female example of the Japanese Pig (*Sus leucomystax*, Temm. Faun. Japon. Mamm. pl. 20), presented by Messrs. Glover and Co., Nagasaki, Japan, and transmitted to the Society in the ship 'Comet,' Capt. Wright.

Mr. P. L. Sclater exhibited some specimens of *Heliomaster angelæ* (Gould's Mon. Troch. iv. pl. 263), and read the following extract from a letter received from Prof. Burmeister, For. Memb., relating to them:—

"I take the liberty of sending you four Humming-birds of this country, all belonging to *Trochilus angelæ*, Lesson, which is not uncommon in the vicinity of Buenos Ayres. I have also found the same species at Parana, but only in the young state; and as I could not procure the bird, I described it in my 'Reise' as a new species (*Campylopterus inornatus*). Afterwards, in Tucuman, I procured the bird in full dress; but I did not see the young at the same time, and therefore did not think it was of the same species. The species was long ago described by Azara, the male as the 'Cola de tixera' (no. 299), and the female as 'Blanco debajo' (no. 297); but as Azara did not know the male in its full summer dress, no one would understand that his 'Cola de tixera' was the *Trochilus angelæ* of Lesson. I have given some notes on the Humming-birds of Azara in the work accompanying my letter; but when I wrote them I did not know that the 'Cola de tixera' was the old male in the winter dress, and therefore described that dress as being that of immatu-





1

*Astacus caldwelli.*



riety. Now I understand it all, and send you this notice to communicate to the Zoological Society at their next Meeting.

“The *Trochilus angelæ*, in full dress, as described by Lesson in the ‘Illustrations de Zoologie,’ pt. 5, has this full dress only during the months from October to January, which are the summer months here. In the beginning of February, or in some cases already at the end of January, the large blue-coloured feathers of the side of the neck fall out, and also the ruby-red feathers of the gorget, and white feathers with a black spot in the middle come out in their place. When this change is finished the bird becomes ‘la cola de tixera’ of Azara. I send you an individual which is in the middle of the change, killed in the middle of February. The female is in all seasons whitish green on the underside, with a shorter tail, and with white spots on the tips of the three external tail-feathers. These spots are generally lost by wearing off, and were therefore seen by Azara only on one feather. The young male before the first change of the plumage has the colour and dress of the female, differing only in having yellow points on the feathers, which points are lost in the somewhat older individuals. In the same manner the colour of the underside is not whitish green, but yellow green. I send you a young male beginning to show the plumage of the full dress of the summer in some spots on the throat-feathers.

“In my notes in the ‘Anales,’ before referred to, I have made an error in determining the ‘*Mas bello*’ of Azara as *Trochilus bicolor*. It is a different species, which Heine has named in Cabanis’s Journal *Chlorostilbon phaëthon*—the *Trochilus phaëthon* of Gould (see Journal f. Orn. 1863, p. 197).”

A paper was read by Professor Allman, F.R.S., on the characters and affinities of *Potamogale*, a genus of insectivorous mammals recently discovered in Western Africa. Professor Allman came to the conclusion that this singular form was more closely allied to *Solenodon* than to any other known genus, but that it presented such striking peculiarities as would render it necessary to regard it as the type of a new family of Insectivora, to which the name of *Potamogalidæ* might be given.

This paper will be published with illustrations in the Society’s ‘Transactions.’

The following papers were read :—

1. REPORT ON A COLLECTION OF ANIMALS FROM MADAGASCAR, TRANSMITTED TO THE SOCIETY BY MR. J. CALDWELL. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XXVII.)

Mr. J. Caldwell, of Port Louis, Mauritius, has recently transmitted to me a small collection of animals in spirits, collected in Madagascar, in the vicinity of Antananarivo, which was alluded to in his letter

read before this Society on the 27th of January, 1863\*. The species represented in the series are two Mammals, five Reptiles, and a Crayfish.

The Mammals, which have been kindly determined for me by my friend Dr. W. Peters, are of the following species:—

1. NYCTINOMUS (MORMOPTERUS†) JUGULARIS, Peters, n. sp.

*N. supra fuscus, pilis basi albis, subtus fusco-canus, alis nigris; capite depresso, rostro lato; auriculis triangularibus, sejunctis; fovea jugulari magna.*

The only specimen of this very interesting species is a male, distinguished from all other species by a deep transverse fossa immediately before the manubrium sterni.

The head appears more flattened than in any other species, and terminates with a broad flattened snout. The triangular large ears are, compared with those of other species, rather thin, not united, but separated by an interspace of 4 millim.

The fur is soft, of moderate length. The hair of the upper parts is dark brown, at the base white; that of the underside greyish. The skull is more flattened than in other species, and remarkable for a strongly developed ante-orbital crista.

	millim.
Total length . . . . .	0·089
Length of the head . . . . .	0·021
——— of the ear in front . . . . .	0·014
Breadth of the ear . . . . .	0·012
Length of humerus . . . . .	0·024
——— of forearm . . . . .	0·037
——— of thumb . . . . .	0·0085
——— of second finger . . . . .	0·0335
——— of third finger . . . . .	0·067
——— of fourth finger . . . . .	0·0565
——— of fifth finger . . . . .	0·035
——— of thigh . . . . .	0·013
——— of tibia . . . . .	0·0105
——— of foot with claws . . . . .	0·008
——— of tail . . . . .	0·019
——— of free end of the tail . . . . .	0·011

2. Mus, sp. ?

A very young, indeterminable specimen, with only two molars de-

\* See P. Z. S. 1863, p. 48.

† *Mormopterus*, nov. subg. In the formula of the teeth ( $\frac{3.1}{3.2} \frac{1}{1} \frac{1-1}{6} \frac{1}{1} \frac{1.3}{2.3}$ ) when younger it differs from *Nyctinomus* with  $\frac{5}{5}$  molars, and approaches more to *Molossus*. The lips also are not so much plicated as in *Nyctinomus*. It is a species intermediate between *Nyctinomus* and *Molossus*, thus showing another instance of the relationship of the fauna of Madagascar to the American fauna.

veloped. Above brown, penicillated with black, with the bases of the hairs blackish grey; below white. In its colour and the length of the ear, this species is allied to the South-African Fieldmice, as *Mus colonus*, *M. natalensis*, &c.

The Reptiles, which Dr. Günther has named for me, consist of two Snakes (*Dipsas colubrina* and *Herpetodryas bernieri*), a Chameleon (*Chamaleon lateralis*, Gray), several fine specimens of a Lizard of the genus *Gerrhosaurus* (*G. lineatus*, Cocteau = *Cicigna ornata*, Gray), and an example of another Lizard (*Liolepisma belli*, Gray). All these are species already known to the fauna of Madagascar.

The Crayfish I have submitted to Mr. Spence Bate, as our leading authority on this branch of natural history. Mr. Spence Bate pronounces it to be a new species of *Astacus*, which he proposes to call after its discoverer, with the following characters:—

**ASTACUS CALDWELLI**, Spence Bate, sp. nov. (Pl. XXVII.)

The eyes are planted on short peduncles. The first pair of antennæ have the third joint of the peduncle reaching to the extremity of the rostrum. Both branches of the flagellum are slender; and the primary branch, which is half as long again as the secondary, is about half the length of the anterior division of the cephalon. The second pair of antennæ are about three times the length of the first; and the flagellum is minutely articulate, each articulus being, in length, less than half its breadth, and at the basal extremity being about half the breadth of the last joint of the peduncle. The squamigerous process of the third joint is rounded and thickened upon the outside, straight, thin, and ciliated upon the inner, and obtuse at the apex. The rostrum reaches to the extremity of the penultimate joint of the peduncle of the external antennæ, rounded at the extremity, dorsally concave, the margins fringed within and above the actual edge with a rim of short, blunt denticles. The ocular orbit is deeply excavate, and armed posteriorly near the centre by a small denticle, and at the infero-lateral extremity by a short, sharp, curved, and anteriorly directed strong tooth. The lateral walls of the cephalon are thickly covered with numerous, subequally distant, short, spinous protuberances, which gradually lessen in importance towards the dorsal surface of the carapace, which is perfectly smooth, except for the well-defined fissure that distinguishes the anterior portion of the carapace from the posterior—the demarcation between the antennal and mandibular somites. The first or large chelate pair of pereopoda are subequal in size, but differ in form from those of every other species of the genus with which I am acquainted, and resemble more in general aspect those of the genus *Homarus*. The dactylos is curved inwards, and tipped with a sharp unguis; the dactyloid process of the propodos is similarly formed, and meets the dactylos only at or near the apex; the approximating edges, however, are armed with a few small and one large tubercle opposite to

corresponding ones. The inferior and external margin of the propodos, from the extremity of the dactyloid process to the carpal articulation, is convex, and longer than that of the intero-superior margin of the propodos and dactylos together. The carpus is armed with three blunt and one sharp anteriorly directed teeth upon the inner edge, and two sharp strong teeth upon the under surface. The meros is furnished with two rows of teeth, that converge together towards the ischium upon the inner surface. The other pereopoda have little to attract attention. The second somite of the pleon has a tuberculous ridge just above the lateral margin. The inner scale of the posterior pair of pleopoda is furnished with a central row of short, sharp teeth; and the telson is armed with similar teeth, of which there are a few in the median line and others in two lateral obsolete rows.

The specimen from which the description is taken is a male. Of all the species of this genus, this form approximates the nearest to its marine allies, in the appearance of the great chelate pereopoda, of any that we are acquainted with. The generally close resemblance of the several species of this genus is certainly very remarkable, when we take into consideration the vast geographical distribution that it has—larger, perhaps, than that of any genus of Crustacea that is not of marine habits. Species have been taken in the frozen waters of North American rivers, in the hot latitudes of Chili, in temperate Europe and Tasmania, and now from the African island of Madagascar. We do not know of any having yet been recorded from the inland rivers of that continent.

#### DESCRIPTION OF PLATE XXVII.

- Fig. 1. *Astacus caldwelli*.  
 2. Carapace, seen laterally.  
 3. Second pair of antennæ.  
 4. Squamigerous process of the same.

#### 2. NOTE ON PSEUDORCA MERIDIONALIS. BY W. H. FLOWER, F.R.S., ETC.

In the last volume of the Society's 'Proceedings' (1864, p. 420) I described two Cetacean skulls from Tasmania, presented to the Museum of the Royal College of Surgeons by Mr. W. L. Crowther, under the name of *Orca meridionalis*. Having obtained some further information regarding this species, I wish to add a few notes to my previous paper.

As before mentioned, I had requested Mr. Crowther to obtain, if possible, a complete skeleton of the so-called "Blackfish," to which these skulls were said to belong. That gentleman, with a most praiseworthy desire to advance our knowledge of the Cetaceous animals of the part of the world in which he resides, set to work with great energy to collect specimens; and among a most valuable

consignment lately forwarded by him to the College Museum are two skeletons of animals called "Blackfish," accompanied, however, by the following important note:—"The Blackfish skeletons are of a different variety to the heads I sent you. In these this portion is *obtuse*, in the former ones *pointed* at the snout, whence they are called by the whalers, for the sake of distinction, 'peaked noses.'"

We learn from this that two very different animals are included under the common name of Blackfish by the inhabitants of the Australian coasts, and that the description given by Mr. Crowther, quoted in my notice of *Orca meridionalis*, does not apply to that animal at all, but rather to the "Blackfish" of which the skeletons are now sent, and which belong to the genus *Globiocephalus*.

Of the external appearance, habits, and geographical distribution of the *meridionalis* we know, therefore, next to nothing at present; but the fact of their having "peaked noses" corresponds with the external characters assigned by Reinhardt to the individuals stranded on the Danish coast, on which his genus *Pseudorca* is founded\*, and entirely removes them from *Globiocephalus*.

A perusal of the memoir of the distinguished Copenhagen Professor, a translation of which will shortly be published by the Ray Society, has convinced me that *Pseudorca* is a distinctly characterized genus, intermediate between *Grampus* and *Orca* of Gray, separated from the latter more especially by the pectoral fins being small and pointed, instead of large, very broad, and oval†, and by the different form and very inferior size of the dorsal fin.

Until the remainder of the skeleton can be examined, or an accurate description of the external form obtained, there may still be some uncertainty as to whether the new Tasmanian species should be referred to the genus established by Reinhardt, although the probabilities are very greatly in favour of such a supposition. As to its specific distinction from *P. crassidens*, of course the external characters formerly given are now of no value; but from a comparison of the figures of the cranium in the 'Proceedings' with the specimens at Copenhagen, Professor Reinhardt has arrived at the same conclusion with myself.

I should take this opportunity of mentioning that in the figure of the upper surface of the skull (P. Z. S. 1864, p. 421) the artist has neglected to reverse his drawing on the block; the consequence is that the distortion of the nasal apertures is represented in the wrong direction.

\* "*Pseudorca crassidens*, et for den Danske Fauna nyt Hvaldyr," K. Danske Vid. Selsk. Nov. 1862.

† The genus *Orca*, as Reinhardt has mentioned, is distinguished from other Cetaceans by having *all* the phalanges broader than long.

3. ON *PHYSALUS SIBBALDII*, GRAY.

BY W. H. FLOWER, F.R.S., ETC.

This species of Fin-Whale was founded by Dr. Gray (Proc. Zool. Soc. 1847, p. 92) upon a skeleton preserved in the Museum of the Literary and Philosophical Society of Hull, which up to the present time has remained the only known representative of the species. Passing through Hull a few days since, I availed myself of the opportunity of examining the skeleton, not perhaps with sufficient minuteness to be able to give a detailed description of its osteological characters, but closely enough to satisfy myself upon two important points,—first, that it is quite distinct from the Common Fin-Whale (*P. antiquorum*, Gray); secondly, that it agrees very closely with the specimen recently acquired by the Trustees of the British Museum, from the collection of the late Professor Lidth de Jeude, of Utrecht, to which I have given the name of *P. latirostris* (Proc. Zool. Soc. 1864, p. 410). The two specimens certainly belong either to the same species, or to two nearly related species forming a distinct section of the genus. As the former supposition is probably the correct one, I lose no time in withdrawing the specific name of *latirostris* in favour of the prior one given by Dr. Gray.

I will now give a sketch of the principal characters of the two skeletons, showing where they agree with each other, and differ from *P. antiquorum*.

1. *Size*.—The Hull and the Utrecht skeletons are at nearly the same stage of growth; the epiphyses are disunited in almost all the vertebræ, as well as on both ends of the humerus, radius, and ulna. In the Hull specimen the ossification of the transverse process of the second cervical vertebra has proceeded so far as to surround the vertebral foramen; in the Utrecht skeleton the foramen is still open, though only by a narrow fissure on one side. I should judge from this that the former is rather the older of the two. In both, the transverse processes of all the remaining cervical vertebræ are incompletely ossified, and not united at their ends by bone. In general size and proportions the two specimens very nearly correspond, the advantage being in favour of the Hull one, which is stated to have a total length of 47 feet, the cranium being 10' 6"; while the Utrecht specimen is about 43 or 44 feet long, the skull being 9' 10". Either example when full-grown would probably be not far short of 60 feet, or somewhat less than the average size of the common species.

2. *Number and Characters of the Vertebræ*.—The two skeletons agree in possessing sixty-four vertebræ, both being in this respect, fortunately, complete. In *P. antiquorum* the number never appears to exceed sixty-two. In the Hull skeleton the foramen in the transverse process of the axis is very small, and nearly circular, about 2" in diameter; in the Utrecht specimen it is more oval, 3¼" high, and 4¼" long. This difference in so variable a part is probably only individual. The four following vertebræ have in both a converging upper and lower process, which are, as said before, incomplete and ununited. In the Hull specimen the seventh has a

short but distinct inferior process, which in that at Utrecht is represented by a mere tubercle. In the terminal caudal vertebræ there is a great similarity: the last is very small, short, and disk-like; the second from the end is of similar form, but somewhat larger; the third presents a sudden increase of size in every direction, so marked that, if it did not occur in both skeletons, one might easily suppose that a bone had been lost from this region.

3. *Skull*.—The principal peculiarity of the skull, which I pointed out in the Utrecht specimen, was the breadth of the rostral portion; this is repeated, though to not quite the same extent, in the Hull skeleton. The breadth across the middle of the beak of the former is to the length of the skull as 27 to 100, in the latter as 26 to 100. In six specimens of *P. antiquorum* it varies between 18 and 21 to 100. The actual breadth (measured across the upper surface following the curve) in the Hull specimen is 33", each maxillary being 10" and the premaxillary 5", the space between the latter 3". The nasal bones agree together, and differ from *P. antiquorum* in being but slightly hollowed on their upper surface and anterior margins. This character is most strongly marked in the Hull specimen.

4. The *stylo-hyals* are thicker, especially near the lower end, in both the Utrecht and Hull skeletons than in the common Fin-Whale.

5. The *sternum*, which is so remarkable in the Utrecht specimen for its almost rudimentary state, is, unfortunately, wanting in the Hull skeleton; but even this absence may not be without significance, for if it had been a large, well-developed bone, it is most unlikely that it should have been lost in a skeleton prepared with such care as to be in every other respect perfect.

6. *Ribs*.—In the Utrecht skeleton (not articulated) I counted but fifteen pairs; while in that at Hull there are sixteen, the last well developed—as long, in fact, as those which precede it. If one could be certain that one pair had not been lost in the former case, this difference might be of some importance; but in different specimens of *P. antiquorum* the last rib is in some completely developed, and in others represented by a mere splint of bone totally unconnected with the vertebral column, and therefore easily overlooked in preparing the skeleton. If sixteen is the normal number of the pairs of ribs in *P. sibbaldii*, this makes a good specific distinction from *P. antiquorum*, which has never been known to have more than fifteen. The first rib agrees in both specimens, and differs from *P. antiquorum* in wanting a well-developed capitular process. In the Utrecht specimen this process is present in the second, third, and fourth ribs—longest in the third. In the Hull skeleton it is found from the second to the sixth, being longest in the third and fourth. In *P. antiquorum* it is usually longest in the second, and obsolete in the fourth.

7. The *phalanges* of the digits of both skeletons are articulated artificially, and yet they correspond exactly in number and arrangement, except that the Hull specimen has an additional bone on digit III. The numbers are—II. 4; III. 5 (Utrecht), 6 (Hull); IV. 5; V. 3,—an arrangement differing somewhat from that of *P.*

*antiquorum*. But one of the most striking and characteristic differences in this part of the skeleton is the greater length of the metacarpal bones and phalanges, which in both the Hull and Utrecht specimens, not only relatively but even actually, exceed those of the full-grown *P. antiquorum*, 70 feet in length.

8. Lastly, the *baleen*. This is not preserved in the Utrecht specimen; but in the Hull skeleton it is in excellent condition, and shows a striking difference from that of the common species in being of a uniform deep black, instead of dark olive-brown or horn-colour, variegated towards the ends of the series with patches and stripes of a lighter colour.

#### 4. DESCRIPTIONS OF NEW BIRDS FROM THE MALAY ARCHIPELAGO. BY ALFRED R. WALLACE, F.Z.S.

(Plates XXVIII., XXIX.)

I have here given the characters of twenty-one species of birds which appear to be new, and which, together with those already described by Mr. G. R. Gray and myself in the 'Proceedings' of this Society, and also a few described by Mr. Gould and Dr. Sclater, make up the number of 212 new species collected by me in the islands of the Malay archipelago. Of those now described, eight are from Celebes, and the rest from Sumatra, Borneo, the Moluccas, and the New Guinea group.

##### ACCIPITER ÆQUATORIALIS.

*Supra cinereo-plumbeus, subtus cum torque humerali rufo-castaneus; capitis lateribus cinereis, gula pallide rufo-cinerea, cauda alisque immaculatis.*

Above slaty ash-colour; beneath light chocolate-brown, which extends in a broad collar between the shoulders; sides of the head ash-colour; throat light ashy, tinged with rufous; wing and tail uniform light ash-colour beneath; under wing- and tail-coverts scarcely paler than the belly; bill and claws black; cere, eyelids, and legs orange-yellow; iris golden orange-yellow.

♂. Total length  $14\frac{1}{2}$  inches; wing  $7\frac{3}{4}$ ; tail 6; tarsus 2; bill, to gape,  $\frac{1\frac{1}{2}}$ .

♀. Total length  $16\frac{1}{2}$  inches; wing 9; tail  $7\frac{1}{2}$ ; tarsus  $2\frac{5}{8}$ ; bill, to gape,  $1\frac{2}{1\frac{1}{2}}$ .

*Hab.* Batchian, Gilolo, Morty Islands, Waigiou, and Salwatty.

*Remarks.*—This species was pointed out to me by Mr. Gurney as being near *A. rufitorques*, Peale, which inhabits the Feejee Islands. It differs from that species in its rather larger size, different proportions, and coloration. It is also near *A. griseogularis*, G. R. G., which inhabits the same district; but differs from that species by its much smaller size, and in the entire absence of bands on the body, wings, or tail in the adult birds. Both these seem to be included





J. Wolf del. et lith

RHIPIDURA TORRIDA

M. H. Harcourt sculp





J. Walp del. et lith.

M & N. Hartert imp.

1. PRIONOCHILUS AUREOLIMBATUS.
2. NECTARINIA FLAVO-STRIATA.



by Prof. Schlegel, in the 'Muséum des Pays-Bas' (Astures, p. 41), as forms of *A. cruentus*, Gould, which is confined to Australia and the adjacent island of Timor.

**ACCIPITER MUELLERI.**

*Supra fusco-plumbeus, subtus rufo-cinnamomeus, capite plumbeo, gula albo-rufescente, cauda tenuiter fasciata.*

Very like *Accipiter hiogaster*, Müller, but much larger, the throat less distinctly rufous, the under parts faintly white-banded, and the tail with about ten narrow bands; bill black; cere and feet bright yellow. The comparative dimensions of the two species will best show the difference between them.

	Total length.	Wing.	Tail.	Bill to point.	Height of upper mandible.	Tarsus.	Middle toe.
	inches.	inches.	in.	inch.	inch.	inches.	inch.
<i>A. hiogaster</i> , ♀ ..	15½	8	6½	1 <sup>1</sup> / <sub>10</sub>	<sup>1</sup> / <sub>20</sub>	2 <sup>1</sup> / <sub>10</sub>	1 <sup>3</sup> / <sub>10</sub>
<i>A. mülleri</i> , ♀ ..	18½	9½	9	1 <sup>1</sup> / <sub>6</sub>	<sup>1</sup> / <sub>20</sub>	2½	1 <sup>4</sup> / <sub>10</sub>

*Hab.* Gilolo.

**GERYGONE NEGLECTA.**

*Viridi-olivacea, subtus alba flavo tincta; remigibus reetricibusque fuscis flavo-viridi marginatis, rostro pedibusque pallidis.*

Above rich greenish olive; beneath white, tinged with yellow, deepest on the belly; under wing-coverts white; quills and wing-coverts dusky, margined with olive-yellow; tail dusky, the feathers more obscurely margined; bill dusky; lower mandible very pale; feet pale.

Total length 4½ inches; wing 2½; bill, to gape, ½.

*Hab.* Waigiou; Mysol.

*Remarks.*—This species is most like *G. chloronota*, Gould. It is rather abundant in the island of Waigiou, frequenting thickets and bushes, catching insects on the wing, or picking them from the bark, and may often be heard snapping its bill like the larger true Fly-catchers.

**GERYGONE PALPEBROSA.**

*Supra olivaceo-viridis, subtus flava; gula alba, loris et tectricibus aurium albo-cinereis, palpebris nigris; remigibus reetricibusque fuscis flavo-viridi marginatis.*

Above olivaceous green; beneath bright yellow; throat white; lores and ear-coverts ashy white; eyelids black; under wing-coverts light yellow; quills and tail-feathers dusky, margined with olive-yellow; bill black; feet lead-colour; iris reddish brown.

Total length 4 inches; wing 2; bill, to gape, ½.

*Hab.* Aru Islands.

**MUSCICAPA HELIANTHEA.**

*Olivaceo-flava, corpore subtus, cum fascia uropygiali, loris et palpebris, flavo; tectricibus alarum, remigibus reatricibusque fuscis olivaceo-flavo marginatis.*

Above olive-yellow; beneath bright yellow; band across the rump, eyelids, and space before the eye yellow; wing and tail dusky, with the feathers yellow-margined; bill black above, beneath and feet dusky orange; claws pale; iris dark.

Total length  $4\frac{3}{4}$  inches; wing  $2\frac{3}{10}$ ; tail 2; bill, to gape,  $\frac{1}{2}$ .

*Hab.* Menado (Celebes).

**CYORNIS RUFIGULA.**

*Cinereo-plumbea, gula et pectore rufis, abdomine et tectricibus caudæ inferioribus albis, genis plumbeo-nigris, lateribus cinereis, remigibus reatricibusque fuscis cinereo-marginatis.*

Dark ashy blue; throat and breast bright rufous, becoming pale on the belly and pure white on the under tail-coverts; front of the eye and ear-coverts blackish; under wing-coverts rufescent white; quills and tail-feathers dusky, ashy-margined; iris dark; bill black; feet nearly white.

Total length 5 inches; wing  $2\frac{1}{2}$ ; tail 2; bill, to gape,  $\frac{6}{10}$ .

*Hab.* Menado (Celebes).

**CYORNIS RUFIFRONS.**

*Obscure cyanea; uropygio tectricibusque caudæ superioribus cæruleis; fronte, loris, linea superciliari et corpore subtus, rufis; mento genisque cyaneo-nigris; tectricibus caudæ inferioribus albis rufo tinctis; alis caudaque fusco-nigris, remigibus reatricibusque cæruleo marginatis.*

Above dusky blue; bright blue on the rump and edges of the tail-feathers; forehead, a line above and below the eye, and the under surface bright rufous; under tail-coverts whitish; chin and cheeks blue-black; wings dusky, the quills narrowly blue-edged; the lesser wing-coverts tipped with rufous spots; tail black, the feathers blue-margined; bill large and broad, black above, pale beneath; feet pale purplish.

Total length 6 inches; wing  $2\frac{7}{8}$ ; tail  $2\frac{3}{8}$ ; tarsus  $\frac{7}{12}$ .

*Hab.* Borneo.

**RHIPIDURA LONGICAUDA.**

*Fusca; capite, mento, fascia gulari, lateribus pectoris caudaque fusco-nigris; gula, pectore et superciliis albis; ventre ochraceo-albo; alis fusco-nigris, tectricibus alarum rufo terminatis; cauda longa, reatricum extimarum utrinque trium apicibus albis.*

Very near *Rhipidura javanica*, from which it differs in the longer tail, narrower white tips to only three outer tail-feathers, and the black chin; iris dark; bill and feet black.

Total length  $7\frac{1}{4}$  inches; wings  $3\frac{1}{8}$ ; tail 4 (*R. javanica*,  $3\frac{1}{2}$  inches).

*Hab.* Sumatra.

**RHIPIDURA TORRIDA.** (Pl. XXVIII.)

*Rufo-fusca, subtus alba; pectore nigro, parte inferiore albo squamata; fronte, superciliis, uropygio et caudæ dimidio basali intense rufis; rectricibus omnibus albo terminatis.*

Olive-brown; beneath white; vent and under tail-coverts rufous-tinged; in front of and beneath the eye, ear-coverts, lower part of the neck, and breast black; on the lower parts each feather is white-edged; forehead and a short stripe above the eye, lower part of the back, upper tail-coverts, and half the tail (less on the outer feathers) rust-red; lower eyelid white; all the tail-feathers, decreasing to the middle ones, white-tipped; bill dusky, very short, bristles from gape very long; feet dusky olive; iris dark.

Total length  $6\frac{1}{2}$  inches; wing 3; tail  $3\frac{1}{2}$ .

*Hab.* Ternate, on the summit of the volcano, 4000 feet above the sea.

*Remarks.*—Near *R. semicollaris*, Müll., from Banda, from which it differs in the shorter bill, as well as in the arrangement of the colours.

**RHIPIDURA CINEREA.**

*Fusco-cinerea; alis caudaque fuscis; subtus alba, pectore cinereo albo maculato.*

Dusky ash-colour; head rather darker; wings dusky brown; tail rather darker; over the eye a nearly concealed white stripe; neck and throat white; breast and sides ash-colour, feathers on upper part of the breast with each a white oval spot; middle of the lower breast, belly, under tail- and wing-coverts white; bill black, large and strong; feet dusky.

Total length  $6\frac{3}{4}$  inches; wing  $3\frac{1}{2}$ ; tail  $3\frac{1}{2}$ .

*Hab.* Ceram.

*Remark.*—Nearest to *R. assimilis*, G. R. Gray, from which it may be at once distinguished by its want of any terminal white spots on the tail-feathers.

**PRIONOCHILUS AUREOLIMBATUS.** (Pl. XXIX. fig. 1.)

*Fulvo-olivaceus, alis caudaque nigris; fascia a fronte ad aures fusco-nigra; subtus albus, pectore grisescente, lateribus corporis tectricibusque caudæ inferioribus luteis.*

Fulvous olive; wings and tail black; a band over the eyes and ears dusky black; chin and throat white; breast greyish white; sides of the breast and body rich yellow, leaving a median stripe white; under tail-coverts yellow; iris light reddish brown; feet black; bill black in the male, with the base of the lower mandible plumbeous in the female.

Total length  $3\frac{1}{2}$  inches; wing 2; tail 1.

*Hab.* North Celebes, in the mountains of Minalhassa.

*Remarks.*—About low bushes and shrubs, feeding on fruit.

## PACHYCEPHALA BRUNNEA.

*Supra rufo-brunnea, subtus brunneo-alba; gula alba, capite fusco-cinerea, remigibus fuscis brunneo marginatis, tectricibus alarum inferioribus albis.*

Above earthy brown; crown slaty ash-colour; space before the eye darker; throat white; rest of body beneath dirty brownish white; under wing-coverts and inner margins of secondaries and tertiaries pure white; quills dusky, brown-margined; bill black; feet pale brown.

Total length  $6\frac{1}{4}$  inches; wing  $3\frac{4}{10}$ ; bill, from gape,  $\frac{17}{20}$ .

*Hab.* Banda Islands and Salwatty.

*Remark.*—The Banda specimen is rather lighter-coloured on the sides of the head, and the brown of the back is a little brighter, but in other respects it exactly agrees with that from Salwatty.

## DICRURUS LEUCOPS.

*Irides albæ; D. pectorali paulo major.*

Exactly like *D. pectoralis*, Wall., in coloration, except the irides, which are milk-white. As every other species of the genus I have met with has eyes of a crimson-red colour, and as I found this species abundantly both at Macassar in the south and at Menado in the north of Celebes, and in every individual having the eyes milky white, I think it right to separate it under a distinct name. It is, however, rather larger in all its dimensions than the allied form.

Total length  $12\frac{1}{4}$  inches; wing  $6\frac{1}{4}$ ; tail  $5\frac{1}{2}$ ; bill, from gape,  $\frac{1}{3}$ .

*Hab.* Celebes.

## PTILOTIS ROSTRATA.

*Ptilotis megarhynchus*, G. R. Gray, Proc. Zool. Soc. 1859, p. 155.

*Fusco-rufa, subtus cinereo-olivacea; gula pallidior, e, ventre rufescente, tectricibus alarum inferioribus marginibusque rectricum pallide rufis; mandibulæ superioris apice forte serrato.*

Dark brown; crown dusky; beneath ash olive; belly rufescent; under wing-coverts and inner margins of the quills light rufous; bill black, long, and strongly serrated at the end of the upper mandible; iris salmon-red; feet pale lead-colour.

Total length  $9\frac{1}{4}$  inches; wing  $3\frac{3}{4}$ ; bill, from gape,  $1\frac{2}{3}$ .

*Hab.* New Guinea, Waigiou, and Mysol.

*Remark.*—This differs from *P. megarhynchus*, G. R. Gray, from Aru, in the want of the yellow ring round the eye and the markings of the under surface, as well as in the remarkably serrated bill.

## NECTARINIA FLAVO-STRIATA. (Pl. XXIX. fig. 2.)

*Fronte et vertice cæruleo-metallicis; occipite, collo et dorso rubris, uropygio flavo, tectricibus superioribus et rectricibus mediis cæruleo-metallicis, rectricibus lateralibus nigris cæruleo marginatis; alis fuscis, remigum et tectricum marginibus luride rubris, gula (utrinque cæruleo vittata) et pectore coccineis flavo*



*striatis; partibus inferioribus fusco-olivaceis, tectricibus alarum inferioribus albis.*

Very near *N. siparaja*, Raffl., from which it differs by the yellow-striped throat, the red-margined quills, the blue instead of violet tail-coverts, the darker under parts, and the shorter tail. The whole bird is also larger. Bill olive, reddish below; feet dusky.

Total length  $4\frac{3}{4}$  inches; wing  $2\frac{1}{10}$ ; tail  $1\frac{3}{4}$ ; bill, to front,  $\frac{7}{10}$ .

*Hab.* Menado (Celebes).

#### NECTARINIA PORPHYROLEMA.

*Purpureo-nigra; pileo aureo-viridi; dorso infimo, uropygio et humeris æneo-cæruleis; jugulo violaceo, linea æneo-cærulea utrinque marginato.*

Purple-black; crown golden green; bend of the wing, lesser wing-coverts, lower part of the back, upper tail-coverts, and outer edges of the tail-feathers steel-blue; throat changeable violet-purple, with a line from the gape on each side steel-blue.

Total length  $4\frac{1}{2}$  inches; wing  $2\frac{3}{10}$ ; tail  $1\frac{1}{2}$ ; bill, from gape,  $\frac{8}{10}$ .

*Hab.* Macassar.

#### NECTARINIA GRAYI.

*Purpureo-nigra; pileo aureo-viridi; nucha, dorso supremo et pectore purpureo-ferrugineis; dorso infimo, tectricibus alarum et caudæ superioribus cæruleo-æneis; jugulo violaceo-amethystino linea æneo-cærulea utrinque marginato.*

Purple-black; crown golden green; nape, back, and breast rich purplish rust-colour; rump, upper tail- and wing-coverts, and margins of the tail-feathers steel-blue; throat violet-red, margined on each side by a line from the gape of steel-blue.

Total length  $4\frac{1}{3}$  inches; wing  $2\frac{1}{8}$ ; tail  $1\frac{9}{10}$ ; bill, from gape,  $\frac{8}{10}$ .

*Hab.* Menado.

*Remark.*—Mr. G. R. Gray had proposed to name this richly coloured species after myself; but as he has left it hitherto undescribed, I have called it after him.

#### MUNIA TRISTISSIMA.

*Fusco-brunnea; alis caudaque fusco-nigris; plumis medio singulis pallide striatis, tectricibus alarum superioribus tenuiter pallide marginatis, inferioribus remigumque marginibus ochraceo-albis.*

Dusky brown; wings and tail blackish; the feathers of the head and body with a fine median pale line; upper wing-coverts very narrowly tipped with whitish; under wing-coverts and margins of the quills buffy white; bill black; feet dusky.

Total length 4 inches; wing  $1\frac{1}{2}$ ; tail  $1\frac{1}{2}$ ; bill, from front,  $\frac{1}{3}$ .

*Hab.* New Guinea (north-western extremity).

*Remark.*—This is the first Finch that has been recorded from New Guinea, and its sombre plumage contrasts strongly with the many

brilliant birds which inhabit the same great island, whose surface, clothed with perpetual forests, seems ill-adapted to this grass-loving group of birds.

#### TURNIX RUFILATUS.

*Supra olivaceo-rufescens, tenuiter nigro undulato-fasciatus; plumis capitis et in medio dorsi nigro maculatis; fronte nigra, linea superciliari, facie et gula nigro et albo punctulatis; pectore et lateribus nigro et albo fasciatis; abdominis medio albescente ejusque lateribus et tectricibus caudæ inferioribus rufis, tectricibus alarum albo et nigro fasciatis et maculatis.*

Above olive-brown, the feathers very finely undulated with black; forehead black; feathers of the head towards the sides black-spotted, and towards the middle of the back a few largish round black spots; a line over each eye to the nape of black-and-white-spotted feathers; the throat and breast ashy, banded regularly with black and white; the middle of the belly whitish; the flanks and under tail-coverts light rufous; the outer margin of the first primary is white, and the wing-coverts and tertiaries have a roundish black spot and one or two white and black bands towards the end of each feather; bill and feet are pale greenish yellow; claws pale.

Total length 6 inches; wing  $3\frac{1}{2}$ ; bill, from gape,  $\frac{8}{10}$ ; tarsus 1; middle toe and claw 1.

*Remark.*—The bill varies much in thickness, in old birds being  $\frac{3}{10}$  inch high. It resembles most *T. fasciatus*, Temm., which has a black head and darker belly.

*Hab.* Macassar (Celebes).

#### PORZANA MOLUCCANA.

*Supra olivacea; uropygio, alis caudaque olivaceo-brunneis; subtus cinerea, gula pallidiore; femoribus, crisso et tectricibus caudæ inferioribus pallide cinnamomeis.*

Dusky olive, shading into olive-brown on the wings, rump, and tail; beneath ashy; throat whitish; thighs, vent, and under tail-coverts light cinnamon-brown; bill greenish, tinged with reddish at the base of the culmen; feet olive, tinged with yellow or purplish; iris brown.

Total length  $11\frac{1}{2}$  inches; wing  $5\frac{5}{8}$ ; bill, to front,  $1\frac{4}{10}$ ; tarsus  $2\frac{1}{10}$ ; middle toe and claw  $2\frac{1}{2}$ .

*Hab.* Amboyna; Ternate.

#### PORZANA RUFIGENIS.

*Supra olivaceo-fusca, subtus rufescens; fronte genisque rufis, gula alba, abdomine medio albescente, crisso lateribusque fuscis albo-fasciatis, tectricibus alarum exterioribus tenuiter, inferioribus late albo-fasciatis, remigibus fuscis, prima externe albo marginata, cauda fusca immaculata.*

Above dark olive-brown, with a bronzy tinge; beneath palish

rufescent; forehead, cheeks to above the eye, and sides of the neck rufous; middle of the belly whitish; vent, flanks, and under tail-coverts dusky, with rather broad white bands; wings dusky olive, the first quill white-edged, the upper coverts narrowly banded with whitish, the under coverts with more white; tail entirely dusky; bill greenish, pale beneath; legs reddish; iris yellowish brown.

Total length 9 inches; wing 5; bill, to front, 1; tarsus  $1\frac{1}{2}$ ; middle toe and claw  $1\frac{5}{8}$ .

*Hab.* Sarawak (Borneo).

*Remark.*—This species seems near *P. fasciata*, Raffles, and *P. rubiginosa*, Temm., but differs considerably from both in coloration.

## 5. DESCRIPTIONS OF THE CHARACTERS OF SIX NEW SPECIES OF RHOPALOCEROUS LEPIDOPTERA IN THE COLLECTION OF THE BRITISH MUSEUM, WITH NOTES ON THE ALLIED SPECIES. BY A. G. BUTLER, ESQ., F.Z.S.

### 1. DANAIIS INUNCTA.

*Upperside.* Front wings greasy white, semitransparent, yellow clouded with olivaceous at the base; anterior margin rich brown, enclosing two elongate white spots, one before and one beyond the end of the cell; hind margin rich brown, deeply sinuated and dentated, enclosing four white spots near the apex, between the nervules, the last one just before the first median nervule; three small white spots close to the edge, one between the first and second, and the other two between the second and third median nervules; a large quadrate white spot and a small marginal spot between the third median nervule and the submedian nervure; all the nervures brown. Posterior wings white, basal half greasy white, base yellow; nervures brown, from the anterior margin to the first median nervule connected by a broad, irregular, rich-brown transverse band which runs into the hind margin; hind margin rich brown, sinuated on its inner edge between each of the folds, enclosing twelve spots near the edge between the nervules, the first and second and the eleventh and twelfth brown, the others white. Body, head, and thorax black, spotted with white; abdomen pale brown.

*Underside.* Front wings as above; but with three additional, small spots on the hind margin. Posterior wings as above; but all the marginal spots white. Body as above.

*Hab.* Waigiou.

### 2. CYRESTIS ACHATES.

*Upperside.* Front wings white, with faint roseate reflection; anterior margin, basal portion ochreous, the remainder olivaceous; an oblique, glaucous, elongate-triangular patch close to the base, its point touching the interior margin; a second similar larger patch crossing the centre of the cell, two converging narrow oblique lines, apparently closing the cell, uniting into a single line beneath it, and

enclosing a small triangular glaucous patch, its base resting on the anterior margin; an irregular oblique line crossing the middle of the wing; apical portion of the wing and outer margin brown, enclosing two grey ocelli, and interrupted by three longitudinal paler brown lines, the two inner ones varied with white; three blue-grey lunules near the anal angle and parallel to the outer margin, bordered by a black band on their inner edge, the upper one, between the second and third median nervules, larger than the other two, and having an oval black spot on its outer edge, which gives it the appearance of an ocellus; the two lower ones bordered on their outer edge by a broad bright ochreous dash, widening below and extending to the anal angle, enclosing two minute transverse white spots. Posterior wings white, with faint roseate reflection; hind margin deeply sinuated, with two caudal projections, the one at the extremity of the first nervule acute, slightly inclining inwards, elongate, the other, at the anal angle, obtuse, nearly quadrate; interior margin slightly emarginate; a narrow oblique line crossing the middle of the cell, and terminating just below it; two converging narrow oblique lines apparently closing the cell, and disappearing in an ochreous patch at the anal angle; a broad ocellated band crossing the wing at two-thirds of the distance from the base, following the direction of the outer margin, its inner edge deep brown, intersected by a blue-grey line which runs into the outer edge at the median nervules, forming the lower portion of the brown into ovate spots, its outer edge pale brown, enclosing small white spots between the nervules; outer margin deep brown, intersected in the middle by a pale line, brown to beyond the tail, where it becomes violaceous; anal angle, inner margin, and a broad, irregular, elongate fascia above the outer margin suffused with bright ochreous; the patch changes to deep brown near the apex; the anal caudate projection ferruginous, enclosing, with the anal ochreous suffusion, three irregular roseate markings.

*Underside.* Front wings white, with faint roseate reflection, bright ochreous at the anal angle; the markings the same as above, except that they are all brown, and the narrow trigonate basal patch is wanting. Posterior wings as above; but the ocellated band more distinctly separated into ocelli.

*Hab.* Mysol.

The allies of this species are *Cyrestis mænalis*, Erichs. (Philippine Islands), and *Cyrestis nivea*, Zinck (Java, Borneo, &c.).

### 3. CYRESTIS SERICEUS.

*Upperside.* Front wings white, with roseate reflection; six oblique, irregular, double ochreous lines, extending to the middle of the wing at nearly equal distances from each other, crossing from the anterior margin to the median nervure, the third and fifth enclosing a fine central line; the fifth one deeper-coloured; three paler ochreous irregular, oblique, double lines at regular distances below the cell, the outer one extending as far as the fifth supramedian double line; an oblique pale ochreous band crossing the wing at two-thirds of the

distance from the base; a paler, irregular, double ochreous band not far from, and parallel to, the outer margin, enclosing two minute longitudinal brown spots near the apex; outer margin pale ochreous, longitudinally intersected by a white line, enclosing a fine black line. Posterior wings white, with roseate reflection; outer margin sinuated, with two caudal projections, the anal one short, rounded, obtuse; a pupillate cream-coloured spot at the anal angle; two obliquely placed black spots just above the anal projection; four double, irregular, oblique, ochreous lines crossing the cell, the first and third only extending to the median nervure, the third darker-coloured, the fourth deeply dentated and angulated near the inner margin, the second meeting the fourth near the anal angle; five ochreous bands following the direction of the outer margin, converging towards the anal angle, where they disappear in a bright ochreous anal suffusion; the second, third, and fourth intersected at the nervures, the third and fourth enclosing an ovate black spot near the anterior margin, and four oblong black lines between the nervures; outer margin pale brown, with a narrow black line just above it following the direction of the outline of the wing.

*Underside.* Front wings the same as above; but the extremities of the nervures of the outer margin tipped with brown, and all the markings much paler. Posterior wings the same as above, except that all the markings are much less distinct, and there is a large, nearly circular, black spot just above the anal projection.

*Hab.* Borneo.

Allied to *Cyrestis cocles*, Fabricius (Sylhet).

#### 4. VICTORINA APHRODITE.

*Upperside.* Front wings falcated, elongate, deeply sinuated on the outer margin, especially below the first discocellular; rich brown, paler towards the apex; crossed in the middle by a broad silky-white band; four oblong indistinct copper-red spots between the nervures, halfway between the band and the apical portion of the hind margin; four paler brown lunules between the nervures near the hind margin, extending from the first discocellular to the anal angle. Posterior wings rich brown, very deeply sinuated, forming a short tail at the end of the second subcostal and the second and third median nervures, and a long tail at the end of the first median nervule; wings rich brown, crossed beyond the middle by a broad white band glossed with pink, margined with blue at its lower extremity and outer edge, extending from the anterior margin to near the end of the first median nervule, broader above than below; a pale brown lunule over each of the sinuations, blue ones at the anal angle; indications of blue lunules above each of the marginal ones; two connected dull red lunules above the two small anal ones; a dull red streak close to the inner margin, just below the end of the abdomen. Body rich brown.

*Underside.* Front wings golden brown, paler a little beyond the middle, crossed in the middle by a broad silky-white band, glossed with pink, deeply sinuated and dentated on its outer edge; a large

lunular white mark glossed with pink near the apex; three very indistinct white lunules glossed with pink between the nervules, the upper one placed obliquely to the apical lunule; an indistinct white mark just beyond the cell; four distinct white lunules glossed with pink, the lowest one geminate, between the nervules, near the hind margin, extending from the first disco-cellular to the anal angle; outer margin and basal portion of anterior margin dull red; cell crossed in the centre by four small blue-white spots, the two upper ones placed vertically, the lower ones obliquely; a small blue-white spot and an obliquely placed, elongate, elbowed line at the end of the cell; base marked by three small cream-coloured spots; outer margin dull orange. Posterior wings rich golden brown, deeper beneath; crossed beyond the middle by a broad white band glossed with pink, broader above than below, extending from the anterior margin to near the end of the first median nervule, where it turns off at an angle towards the inner margin, becoming rufous brown at its outer extremity; an indistinct cloudy band of white scales glossed with pink from near the anal angle to the end of the cell; base dull rufous, outer margin dull orange; a marginal row of eight white lunules, glossed with pink, near it; above them, and contiguous to them, a series of blue lunules with rufous centres. Body reddish; palpi white.

*Hab.* Mexico.

This species, which is the most beautiful in the genus, somewhat resembles *Victorina trayja*, Hübner (Brazil), on its upper surface; on the underside it is nearer to *Victorina epaphus*, Latreille (South America and Mexico)\*.

\* *Victorina aphrodite* differs from the description given by Mr. Bates of *A. superba* in the following particulars:—

A. SUPERBA.

“Above: both wings crossed by a white belt, much broader on the fore than hind wing, and edged with light blue.

“Beneath light brown; belt same as above; fore wing, outer border has a row of brownish-white lunules, not reaching the apex; the hind wing has a similar row placed between two lunulated red streaks, both edged on each side with dusky.”—*Ent. Month. Mag.* vol. i. p. 161, sp. 61.

V. APHRODITE.

“Above: both wings crossed by a white belt, edged with blue; that of the hind wing blue below for one-fourth of its length.

The wings with reddish markings in various parts; there is no mention made of any such markings in the description of *A. superba*.

“Beneath: hind wing, outer margin reddish; above it a row of white lunules reaching the apex, and not similar to those of the upper wing; and above these lunules not a lunulated red streak edged with dusky, but a lunulated blue streak with a reddish spot in the centre of each lunule.

The belt is not the same as above on either of the wings; it is sinuated and dentated on the outer edge of the upper wing; and in the hind wing it turns off at an angle at the first median nervule, and continues to near the anal angle, where it becomes suffused with reddish.

There is also a broad indistinct dusky band of white scales reaching from near the anal angle to the end of the cell, which does not appear to be the case with *A. superba*.

## 5. ZEUXIDIA AMETHYSTUS.

*Upperside.* Front wings deep brown glossed with purple; a broad lilac band glossed with purple near the apex, extending from the anterior margin, just beyond the cell, to the third median nervule, wider above than below; outer margin pale. Posterior wings, anal angle caudate; wings rich brown, lower portion glossed with purple; a broad lilac patch, glossed with purple, bisinuate on its inner edge, at the anal angle, extending from just below the body to the fold between the second and third median nervules; cell hirsute, hair ochreous; outer margin pale.

*Underside.* Front wings golden brown, dusky towards the inner margin; a narrow, irregular, oblique, deeper-brown band crossing the middle of the wings; three irregular paler brown bands crossing the cell at equal distances; a pale brown spot on the anterior margin, just beyond the central band; two similar spots near the apex. Posterior wings golden brown; a deeper, oblique, narrow, irregular, brown band crossing the wings at the end of the cell, from near the end of the costal nervule to beyond the middle of the third median nervule; two indistinct, pale brown, irregular bands near the base, the inner one extending to the median nervule, the outer one to the middle of the cell; a large, oval, ochreous ocellus, pupillated with white, between the first and second subcostal nervules, and a circular ochreous ocellus pupillated with white between the second and third median nervules.

*Hab.* Sumatra.

This species is the third of the genus, unless we include in it *Amathusia amythaon*, Doubleday (Sylhet), which should, as I think, belong to it. The latter appears to be allied to my species, which, however, seems to be intermediate between *Zeuxidia luxeri*, Hübner (Java), and *Zeuxidia doubledaii*, Westwood (India), though evidently quite distinct from both of them.

## 6. HETEROCHROA CALIFORNICA.

*Upperside.* Front wings deep brown, crossed beyond the middle by an irregular band of cream-coloured spots; hind margin pale; two short orange transverse bands margined with black, the one crossing the middle, the other the end of the cell, between them a short black band; a large subapical orange blotch; a lunulate pale brown submarginal band, extending from the subapical blotch to the anal angle; cell blue-grey. Posterior wings deep brown, crossed before the middle by a cream-coloured band tapering to just above the anal angle, slightly trisinate on its outer edge, its inner edge slightly undulating; outer margin pale, a lunulate submarginal pale brown band; an orange lunule at the anal angle.

*Underside.* Front wings, apical half deep brown; cell pale blue, interrupted as above; front margin pale ochreous; beneath the cell pale brown; a pale orange spot below the median nervule near its origin, angulated on its outer edge; cream-coloured band as above; subapical blotch extending to the middle of the wing, bordered by

a submarginal band of white; hind margin pale, bordered with dark brown on its inner edge. Posterior wings bright orange-ochreous, crossed before the middle by a cream-coloured band bordered with deep brown; basal half to just below the cell violaceous, crossed before the middle of the cell by an orange band extending along the front margin to the cream-coloured transverse band, and from the front margin to the median nervure; a second orange band beyond it, and touching the cream-coloured band, bounded on both sides by the cell; a pale blue band extending from just above the anal angle along the outer edge of the central band to the first median nervule, where it becomes suffused with dusky, and continues up to the anterior margin; hind margin edged with a lunular brown band enclosing a narrow, grey, lunular, submarginal band, and margined within by a broad blue-grey band, having a narrow, interrupted, irregular black line on its inner edge.

*Hab.* California.

Closely allied to *Heterochroa bredowii*, Hübner (South America and West Indies); but differs from it above in having the lowest cream-coloured spots of the fore wing very small, so as to separate the band from that of the lower wing. In the hind wing it has a simple orange lunule at the anal angle, instead of a double one.

On the underside orange takes the place of rich reddish brown, blue of grey; the orange subapical blotch only extends along the outer margin to the middle of the wing, and does not terminate below in two lunules. The basal upper half of the hind wing is crossed by an additional short orange band; the wings are much more rounded than those of *H. bredowii*, and are not produced at the end of the second median nervule.

6. LIST OF DIURNAL LEPIDOPTERA COLLECTED BY CAPT. A. M. LANG IN THE N.W. HIMALAYAS. BY FREDERIC MOORE.

(Plates XXX., XXXI.)

The following list comprises an enumeration of the Rhopalocerous Lepidoptera recently collected by Capt. Lang, together with his notes as to the particular locality, &c., of the several species.

PAPILIONIDÆ.

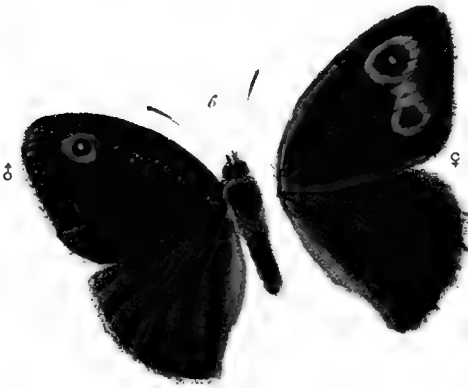
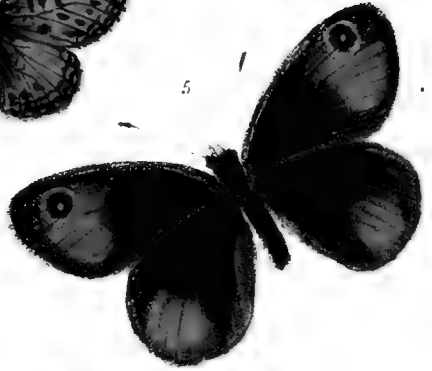
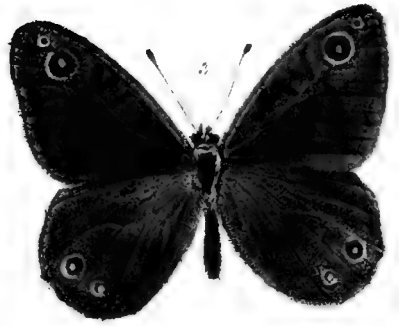
1. PAPILIO DISSIMILIS, Linn.

The only place in which I have seen this species is Subbathoo, altitude 4000 feet, in June, frequenting a grassy undulating down, flying rapidly in long circuits, pitching occasionally on grassy knolls, and generally returning by the same route to the same spot after a flight.

2. PAPILIO GOVINDRA, Moore.

*Papilio agestor*, Kollar in Hügel's Kaschmir, pl. 3. f. 1, 2 (nec Gray).





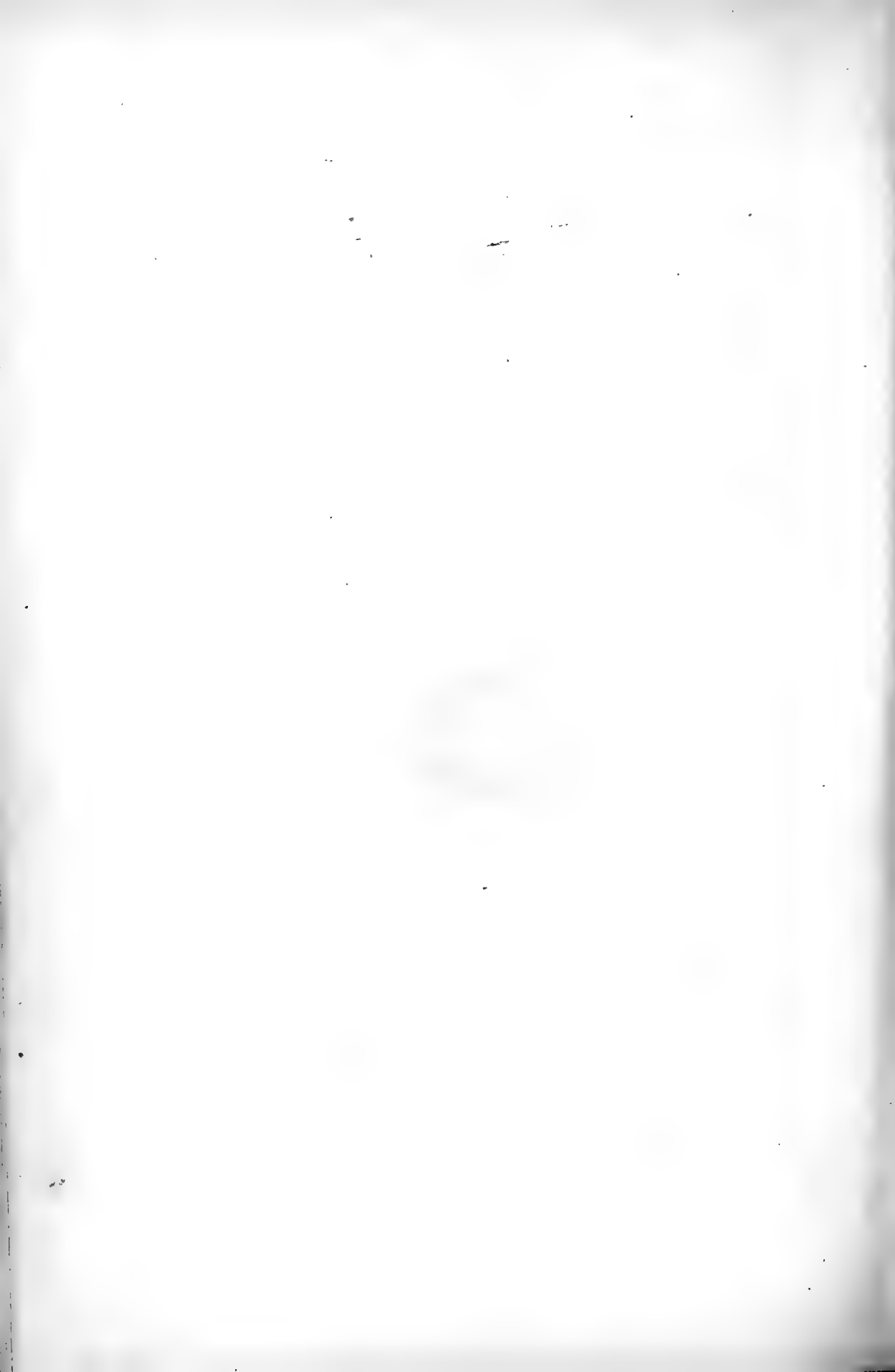
E. Cooke

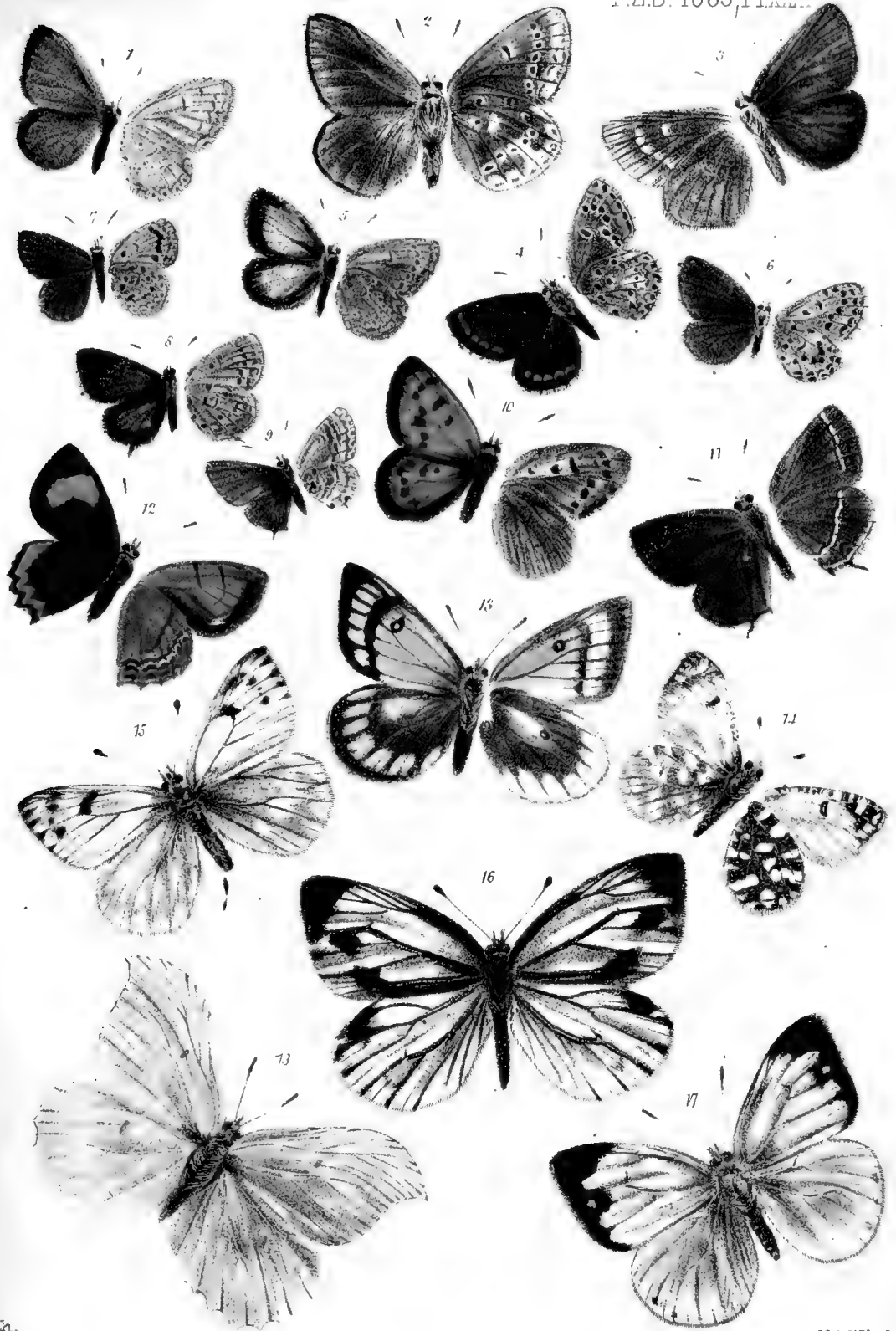
M.&N. Hanhart. imp.

- 1. *Argynnis Iainadeva*
- 2. *Melitaea Sindura*
- 3. *Lasiommata Mnava*
- 4. ———— *Baldiva*, ♂.

- 5. *Erebia Kalinda*
- 6. *Epinephile Cheena*, ♂.♀.
- 7. ———— *Davendra*, ♂.♀.
- 8. *Pamphila Danna*

9. *Pamphila Maesa*





Booke Jitri.

M. & N. Hanhart imp

- |                                 |                                  |                                  |
|---------------------------------|----------------------------------|----------------------------------|
| 1. <i>Polyommatus Kasmira</i> ♂ | 7. <i>Polyommatus Karsandra</i>  | 13 <i>Colias Shipkei</i> .       |
| 2. _____ <i>Ariana</i> ♂        | 8. <i>Lycena Dipora</i> .        | 14 <i>Anthocharis Daphalis</i> . |
| 3. _____ <i>Nycula</i> .        | 9. _____ <i>Zena</i>             | 15 <i>Pieris Kalora</i> . ♂      |
| 4. _____ <i>Nazira</i> .        | 10 <i>Chrysophanus Kasyapa</i> . | 16 _____ <i>Ajaka</i> . ♀        |
| 5. _____ <i>Chandala</i>        | 11 <i>Thecla Deria</i>           | 17 _____ <i>Hira</i> . ♀         |
| 6. _____ <i>Vicrama</i> ♀       | 12 <i>Iterda Oda</i> . ♀         | 18 <i>Gonepteryx Zaneka</i>      |



Allied to *P. agestor*, and figured as such by Kollar, but differs from that species in being somewhat smaller. Markings similar, but grey instead of a slaty colour, those on the disk of the hind wing being defined by three graduating series of pale spots, the interspaces being black. Exp.  $3\frac{1}{2}$  inches.

*Hab.* N.W. Himalayas.

*Note.*—"Appears rare, as I have only taken two specimens, both in identically the same spot, in April, at Kussowlie, on the first range of the Himalayas, 6000 feet altitude. Each of these individuals affected a high spray of bramble, whence it dashed off for a rapid soar for a short distance, returning to its post."

3. *PAPILIO PAMMON*, Linn.

Rare in the N.W. Himalayas, and at low elevations.

4. *PAPILIO POLYTES*, Linn.

Rare in the N.W. Himalayas, and at low elevations.

5. *PAPILIO POLYCTOR*, Boisd. Spéc. Gén. Lép. p. 205; Jacquemont's Voy. dans l'Inde, Ins. t. 1. f. 1, 2; Hügel's Kaschmir, iv. pt. 2. tab. 1.

Abundant about springs, rivulets, and on the damp sandy margins of larger streams in all parts of the N.W. Himalayas, at least as far as the crossing of the Sutlej at Wangtoo; but as we approach the bleaker Tibetan uplands it disappears. Larva feeds on *Xanthoxylon hostile*.

6. *PAPILIO ERITHONIUS*, Cramer, Pap. iii. t. 232. f. A, B.

This is constant to the Aurantiaceæ, mountains and plains.

7. *PAPILIO MACHAON*, Linn.

Abundant in the N.W. Himalayas, on grassy downs and slopes, from 6000 to 10,000 feet altitude.

8. *PAPILIO SARPEDON*, Linn. (Cramer, Pap. t. 122. f. D, E).

Seen but in few places, and never more than one at a time. It is bold and rapid in flight, and not easily captured.

9. *PAPILIO CLOANTHUS*, Westwood, Arc. Ent. pl. 11. f. 2.

Equally rare with *P. sarpedon*, affecting the same localities, and can hardly be distinguished from it when on the wing. Both species taken sitting with closed wings by the moist margins of a trickling rill. Altitude 5000 to 7000 feet, N.W. Himalayas.

10. *PAPILIO PROTENOR*, Cramer, Pap. t. 49. f. A, B.

A considerable number seen together, floating and flapping their wings lazily and then settling on the blossoms, in waste marshy ground overgrown with Compositæ (thistles). I have also seen a number congregated with *P. polyctor* on the damp sandy margins of

streams in the hills. On these occasions, if disturbed, they disperse, only to collect in groups again. N.W. Himalayas; elevation 4000 to 7000 feet.

11. *PARNASSIUS JACQUEMONTI*, Boisd. Spéc. Gén. Lép. p. 400; Hügel's Kaschmir, iv. t. 2. f. 3, 4; Gray, Catal. Lep. Brit. Mus. pt. 1. pl. 12. f. 1, 2.

Replaces *P. hardwickii* on the high passes of Upper Kunawur, Spiti, and Tibet. I first saw it on the "Kongma" pass, leading from Kunawur into the Chinese province of Gughe in Tibet, at an altitude of 18,000 feet. This pass is 16,000 feet; but I ascended up its flank another 2000 to enjoy the far view over the distant Tibetan ranges, brown and treeless, closed to European foot, and backward among the sharp icy pinnacles of our own more familiar Himalayan ranges: and here I saw this *Parnassius* coursing rapidly up and down the frozen snow-beds, where beaches, as it were, of boulders and stones cropped out. What could tempt *Parnassius* there I know not, for I saw not a *Sedum*, nor a Saxifrage, nor any other vegetation. I met this *Parnassius* again at high elevations in similar regions along the confines of Kunawur and Tibet. It does not occur, apparently, with the next.

12. *PARNASSIUS HARDWICKII*, Gray, Lep. Ins. Nepal, pl. 4. f. 1, 1a; Catal. Lep. Brit. Mus. Pap. pt. 1. pl. 12. f. 8-11.

Commences at the Runang Pass, becoming commoner as we travel south and west towards Lower Kunawur and Simla, not extending nearer the plains than Simla, however. It is tolerably abundant on the Mahâsoo ridge, near Simla, on bare grassy hill-tops, just clear of oak-woods: grassy open downs it certainly affects, and at a high elevation—8000 feet. Has a slow flight, somewhat like that of *Pieris*, although it has a strong as well as slow flight. It flies low over the turf and rocks which crop up amidst the grass. There appear to be two broods, early spring and late autumn. The red and blue spots vary much in different specimens, being quite obsolete in some. I have seen it in December and February, on bright days succeeding weeks of snow-storms.

13. *PARNASSIUS*, sp.?

This is a more handsome and rarer species. I caught it on but two passes, the "Runang" and "Hunglung,"—at the former in company with *P. hardwickii*, and at the latter with *Pontia nina*, thus apparently occupying the debateable ground between the two, and linking them together. I saw many more than I caught, for, as may be imagined, rapid pursuit, now up a steep hill-side, now down, and then up again, at 14,000 to 15,000 feet altitude above the sea, is trying to the best of lungs. This species has a peculiar flight, swimming very fast and close to the ground in a zigzag course, as if beating the ground like a hen harrier beating a meadow.

## PIERIDÆ.

## 14. APORIA AGATHON, Gray, Lep. Ins. of Nepal, pl. 8. f. 1.

This is a mountain-insect, frequenting forests and shady glens. At Simla I saw it in considerable numbers in June. Its flight much resembles that of *Danais chrysippus*, and it is of easy capture. It appears local, as I have seen it only at Simla, and in some richly wooded glens upwards of 100 miles in the interior of the Himalaya.

## 15. APORIA SORACTA (Boisd.); Moore, Catal. Lep. Mus. E. I. C. i. p. 83.

An Himalayan species, and may be seen in some abundance in forests, at altitudes of 6000 to 8000 feet. It is essentially a forest insect, not affecting gardens or grassy slopes.

## 16. PIERIS DAPLIDICE, Linn.

*Note.*—"I saw this *Pieris* in considerable numbers, flying about the village-fields of cereals and turnips, in the villages on the Spiti River, Leo, Chango, Shiálkur, &c., and in the Chinese frontier village of Shipkee."

## 17. PIERIS MESENTINA, Cram. Pap. t. 270. f. A, B.

Obtained at Kussowlie, 6000 feet elevation, on the first plainwards range of the Himalayas.

## 18. PIERIS KALORA, n. sp. (Pl. XXXI. fig. 15.)

White. *Male.* Fore wing with a transverse quadrate black spot at end of discoidal cell; apex and submarginally before it with a series of ill-defined blackish spots. Underside dull white; fore wing as above; hind wing with all the nervures broadly margined with pale greenish brown, with a submarginal series of lanceolate marks of the same colour, the intermarginal spaces being white.

*Female.* Base of wings, nervures, and exterior margin of hind wing suffused with greenish grey. Fore wing with the discoidal, black, transversely quadrate spot large, the black marginal and submarginal band broad, the interspaces forming a series of white outwardly pointed spots. Hind wing with a similar submarginal, apically black, zigzag band, the intermarginal spaces forming a series of white inwardly pointed spots.

Expanse of ♂  $1\frac{1}{2}$  inch, ♀  $1\frac{7}{8}$  inch.

*Hab.* Passes over the spurs of the Himalayas which run from Spiti southward to the Sutlej.

Allied to *P. calidice* of Europe.

*Note.*—"This insect I saw but twice; once on the 'Hungrung' Pass (15,000 feet elevation), where I saw but one, flying very fast at the top of the pass over the dwarf Tibetan furze (*Caragana versicolor*). On the next pass, the 'Runang,' about 14,800 feet, I saw a good many of this species flying very fast up and down the bare stony slopes just at the summit of the pass. I never saw the insect

again, unless on the Tari pass into Spiti, 15,000 feet, over glaciers and snow-beds, where the rarified air prevented any pursuit of insects, but where I saw some fast-flying white Butterflies which I could not secure."

19. *PIERIS NIPALENSIS*, Gray, Lep. Ins. of Nepal, pl. 6. f. 1, 3.  
Everywhere in the N.W. Himalayas, up to 10,000 feet altitude.

20. *PIERIS GLICIRIA*, Cram. Pap. t. 171. f. E, F.  
Abundant in the same localities as preceding.

21. *PIERIS AJAKA*, n. sp. (Pl. XXXI. fig. 16.)

White. *Male* with the costal margin for half its length from the base and extreme base of both wings suffused with black; a patch at the apex of fore wing, and a suffused spot beneath it between the third and second median branches, an indistinct spot at the end of the costal, and the tips of the nervures of hind wing fuliginous black. *Female*. Base of the wings suffused with black; fore wing with the apex, two large spots on the disk, the upper one being between the third and second median branches, the lower on the posterior margin before the angle, the submedian and median nervures, and branches black; hind wing with the nervures and patch near the apex, between the costal and subcostal, black.

Underside yellowish white; nervures and the two discal spots on fore wing blackish. Body and antennæ black.

*Hab.* Lower Kunawur.

"Somewhat local, and not common. Of weak flight, affecting damp glens, and flying low amidst wet herbage. Occurs chiefly in autumn."

Allied to *Pieris gliciria*, but decidedly distinct from that common species.

22. *PIERIS HIRA*, n. sp. (Pl. XXXI. fig. 17.)

White. *Male*. Base of wings and half of costa greyish. Fore wing with the exterior margin irregularly black, this colour commencing from the costa one-third from the apex, extending obliquely across it, enclosing a white spot between the third and second median branches, and then running to the posterior angle. Hind wing with or without indistinct blackish spots on the margin.

*Female*. Fore wing with the base and costal margin fuliginous grey, the exterior marginal black band with two white spots within at the apex; a small black spot near posterior angle; the nervures closing the discoidal cell black. Hind wing with indistinct blackish marginal spots. Underside—hind wing and apex of fore wing yellowish; fore wing with a streak at the end of discoidal cell and two spots on the disk blackish.

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

*Hab.* Punjab and Oudh.

Allied to *P. durvasa* (P. Z. S. 1857, p. 103, pl. 44. f. 6).



23. *PIERIS SANACA*, Moore, P. Z. S. 1857, p. 103, pl. 44. f. 4, ♀.

Very rare; obtained only in one richly wooded glen far in the interior of the N.W. Himalayas. Its flight was very strong and fast.

24. *ANTHOCHARIS DAPHALIS*, n. sp. (Pl. XXXI. fig. 14.)

White. *Male*. Fore wing with the costal margin and apex delicately chequered with black; a transverse black spot at end of discoidal cell. Hind wing traversed with irregular pale-greenish bands; a slight apical streak, a small spot at end of the cell, and small spots on cilia black. Body blackish. Underside—fore wing with costa chequered with black; the discoidal black spot with a white centre; the apex chequered with pale greenish brown, the interspaces being pale silvery white. Hind wing yellowish brown, interspersed with numerous large and minute silvery-white spots.

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

*Hab.* Middle Kunawur.

*Note.*—“An early spring insect, among cliffs; not common.

25. *THESTIAS ÆNIPPE*, Cram. Pap. t. 105. f. C, D, ♂; t. 229. f. B, C, ♀.

This species is subject to considerable variation, and the varieties seem constant to localities. The larvæ feed on *Capparis*. I observe a constant difference in the Himalayan and plains varieties, apparently coexistent with and dependent on the species of *Capparis* growing in their separate habitats. The Himalayan specimens from the Sutlej valley are much greyer and finer insects than those from the plains, as the luxuriantly growing, large-leaved, and finely coloured lilac-flowered *Capparis* (sp. ?), which covers like ivy the bold cliffs over the Sutlej, and affords pabulum to the hill *ænippe* larvæ, is a handsomer plant than the coarse straggling thorny bush of the *Capparis sepiaria* of the dry plains with its small white flowers. None but an entomologist, who knew the species well, would say that the two insects were of the same species, were I to put side by side an immense black female from Wangtoo and a small clean white female from Umballa. The upper surface of anterior wing of the former is dark black, with an interrupted white fascia transverse; the posterior wing dull black, with a dusky-white disk; whereas the whole upper surface of the Umballa female is clean white, the anterior wing only having the outer margin and apex black, and a short black streak from the middle of the costa. The two insects are wonderfully unlike. The males are similarly, though not to so great an extent, unlike. Some females have the apical half of the anterior wing pale yellow.

26. *THESTIAS MARIANNE*, Cram. Pap. t. 217. f. C, D, E.

Abundant in the Himalaya. The females vary a good deal, as in *T. ænippe*. I have seen no large black variety, however, to match my Wangtoo *T. ænippe*.

27. *COLIAS EDUSA*, var. *myrmidone*.

Abundant in the Himalayas.

28. *COLIAS HYALE*, Linn.

*Note*.—"Tolerably abundant in the Himalayas, 5000 to 10,000 feet. Common in the meadows and pasture-lands of the Simla Hills and Kunawur; of rapid flight, coursing over the turf and beds of thyme, not dawdling so much as *C. edusa*, which affects the same grounds."

29. *COLIAS NERIENE*, Fischer, Ent. Russ. Lep. t. 11. f. 3, 4.

*Note*.—"This white *Colias* is very common in Lower and Middle Kunawur; an early spring insect, scouring over the gentian-studded turf of the pasture-lands, 6000 to 10,000 feet altitude. It is a very fast flyer, faster than *C. edusa*."

30. *COLIAS SHIPKEE*, n. sp. (Pl. XXXI. fig. 13.)

*Colias shipkee*, Lang, MS.

*Upperside*. Fore wings rich primrose-yellow, some individuals with a warmer tint on the disk; exterior margin broadly black, broadest at apical angle, and having a sinuous inner edge, within which is a series of slightly curved yellow spots, the four upper spots rather lanceolate, the three lower more square; a black spot closing the discoidal cell, which spot in some is annular, enclosing a yellow centre; cilia at apical angle and along exterior margin rosy. Hind wings primrose-yellow, more or less suffused in different individuals with dusky irrorations; a series of acute oval yellow spots within the exterior margin, their edges more or less defined with black; base black; discoidal cell closed by a very faintly defined orange spot; cilia rosy.

*Underside*. Fore wings yellow, the black margin of upperside appearing faintly beneath of a greenish grey colour, and having also indistinctly the series of yellow spots as above; costal margin greenish grey, black spot closing the cell as above. Hind wings dull greenish grey; exterior margin yellow, showing the form of the spots of the upperside; a rufous spot with silvery centre at end of discoidal cell. Antennæ, legs, head, with frontal tuft, and fore part of thorax rosy; palpi greenish yellow; thorax and abdomen greenish grey.

Expanse 2 inches.

*Hab.* Tibet.

*Note*.—"Flies with rapidity over the pastures on the mountain-slopes above the Sutlej, near Shipkee, at an altitude of 13,000 to 15,000 feet, frequenting the meadow-land, rich in grasses and flowers, just below the melting snow-beds in June."

The species of *Colias* that appears to be nearest allied to this is *C. vauthieri* from Chili.

31. *TERIAS HECABE*, Linn.

Has a wide range; Himalayas and plains.

32. *TERIAS SARI*, Horsf.

Same habitat as the preceding.

33. *TERIAS LÆTA*, Boisd. Spéc. Gén. Lép. p. 674.

Taken at Kussowlie, in the Himalayas. It has a very weak flight, amongst low herbage on the skirts of woods and gardens.

34. *GONEPTERYX NIPALENSIS*, Doubleday, Gray's Lep. Ins. of Nepal, pl. 5. f. 1.

Abundant in the N.W. Himalayas, 3000 to 10,000 feet altitude.

35. *GONEPTERYX ZANEKA*, n. sp. (Pl. XXXI. fig. 18.)

Anterior wings falcate; the costal margin constricted at half its length. Hind wings with the outer margin deeply sinuated.

*Male*. Upperside—fore wings brimstone-yellow; posterior wings pale cream-yellow, almost white in old specimens. *Females* duller-coloured; costal margin of fore wing and the whole of hind wing covered with delicate minute corrugated striæ; costal and subcostal veins terminated with minute dark-brown dots; a small ochreous-yellow discocellular spot on both wings. Antennæ and head reddish brown; thorax white, covered with long silky-white hairs; abdomen yellow.

Underside paler and duller cream-colour, having the delicate corrugated striæ as above; the veins of both wings terminated with a dark brown dot; the discocellular spot pale dull brown; both wings with a lower discal series of four small black dots, one between each vein.

Expanse 2 inches.

*Hab.* N.W. Himalayas.

*Note*.—"This is local, and I have seen it in June only in the thick dark forests about Kotgurh and Narkunda, fifty miles from Simla."

36. *CALLIDRYAS PHILIPPINA*, Cram. Pap. t. 361. f. C, D.37. *CALLIDRYAS PYRANTHE*, Linn.

Both species taken in the Himalayas.

38. *CALLIDRYAS ALCMEONE*, Cram. Pap. t. 141. f. E.39. *CALLIDRYAS HILARIA*, Cram. Pap. t. 339. f. A, B, ♂; t. 229. f. D, E, ♀.

Both the preceding seem to frequent the *Cathartocarpus fistula*, which is an indigenous plant to the lower slopes of the outer Himalayan ranges, 2000 to 5000 feet.

## DANAÏDÆ.

40. *EUPLŒA CORE*, Cram. Pap. t. 266. f. E, F.

Not common in the N.W. Himalayas.

41. *EUPLEA MIDAMUS*, Linn. (Cram. t. 127. f. C, D, ♂; t. 266. f. C, ♀).

A single specimen obtained in a valley in the N.W. Himalayas. It appears to be rare in these regions.

42. *DANAIS CHRYSIPPUS*, Linn. (Cram. Pap. t. 118. f. B, C).  
Abundant everywhere.

43. *DANAIS PLEXIPPUS*, Linn. (Cram. Pap. t. 206. f. C, D).  
Tolerably abundant everywhere.

44. *DANAIS LIMNIACÆ*, Cram. Pap. t. 59. f. C, D.

45. *DANAIS MELISSA*, Cram. Pap. t. 377. f. C, D.  
Same localities as above.

46. *DANAIS TYTIA*, Gray, Lep. Ins. Nepal, pl. 9. f. 2.

Entirely Himalayan. Obtained in wooded glens, 6000 to 7000 feet altitude. Flight high and soaring.

#### NYMPHALIDÆ.

47. *VANESSA CHARONIA*, Drury, Ins. i. t. 15. f. 1, 2.

This is a thoroughly Himalayan forest-insect, of swift flight.

48. *VANESSA XANTHOMELAS*, Denis et Schiff.

A local Himalayan forest-insect.

49. *VANESSA KASCHMIRENSIS*, Kollar, Hügel's Kaschmir, iv. t. 9. f. 3, 4.

As abundant in the Himalayas as *V. urticæ* in England.

50. *PYRAMEIS CALLIRHOË*, Hübner (Cram. t. 84. f. E, F).

Abundant in the Himalayas, 5000 to 10,000 feet.

51. *PYRAMEIS CARDUI*, Linn.

Everywhere common in the Himalayas at all seasons.

52. *JUNONIA LEMONIAS*, Linn. (Cram. Pap. t. 35. f. D, E, F).

Observed in the Himalayas.

53. *JUNONIA GENONE*, Linn. (Cram. Pap. t. 35. f. A, B, C).

Same localities as preceding.

54. *JUNONIA ORITHYIA*, Linn. (Cram. Pap. t. 32. f. E, F, ♂; t. 19. f. C, D, ♀).

Same localities as preceding. Partial to bare, dry grass-land. To be seen in the hottest hot winds, and in the bleak wintery weather pitched on the grass, flitting quickly away and pitching again after a short circuit. Larva reared on *Antirrhinum orontium*.

55. *PRECIS IPHITA*, Cram. Pap. t. 209. f. C, D.

Rather abundant in the Himalayas.

56. *PRECIS HARA*, Moore, Catal. Lep. Mus. E. I. C. i. pl. 3 a. f. 1.

An Himalayan species. Not so abundant as the preceding. Generally seen on the banks of streams.

57. *ATELLA PHALANTA*, Drury, Ins. i. t. 21. f. 1, 2.

Tolerably abundant up to 8000 feet elevation.

58. *LAOGONA HYPOCLA*, Cram. Pap. t. 220. f. C, D.

59. *ARGYNNIS NIPHE*, Linn. (Cram. Pap. t. 14. f. C-E; Hügel's Kaschmir, iv. pl. 13. f. 12 ♂).

Tolerably abundant in certain localities, 6000 to 8000 feet in the Himalayas. The males seem much more abundant than the females.

60. *ARGYNNIS ISSÆA*, Gray, Lep. Ins. Nepal, p. 11.

Very abundant in the Himalayas, 5000 to 8000 feet. At all seasons of the year, even in winter, when snow lies deep on sheltered slopes, this insect may be seen on open sunny sites.

61. *ARGYNNIS CHILDRENI*, Gray, Lep. Ins. Nepal, pl. 11.

An Himalayan species, frequenting grassy slopes near woods, open copses, and gardens, 7000 to 10,000 feet elevation. Flight bold and very fast. Affects Compositæ and Cruciferæ. Not a very common species.

62. *ARGYNNIS KAMALA*, Moore, Catal. Lepid. Mus. E. I. C. i. p. 156.

Abundant throughout a tract of 120 miles, at an altitude of 6000 to 10,000 feet, in the summer and autumn months, in the Simla district and Lower Kunawur. It affects open glades and the borders of forests, pitching on low shrubs, brambles, and banks of thyme, thistle, scabious-heads, &c.

63. *ARGYNNIS JAINADEVA*, n. sp. (Pl. XXX. fig. 1.)

*Male*. Upperside rich fulvous; markings black; fore wing with four discoidal streaks, the fourth double and closing the cell; a transverse discal series of narrow lunulated spots irregularly disposed, but each joined to the other by being continued in a line on the vein; a small suffused spot before the apex; a second discal series of round spots, a submarginal row of lunules, and a double marginal line. Hind wing with a double mark closing the cell; an irregular transverse discal series of lunules; a second discal series of three round spots and an upper intermediate dot; a submarginal row of well-defined lunules, and a double marginal line; cilia pale fulvous yellow. Underside—fore wing pale fulvous, greenish yellow apically; markings as above, except that those at the apex and the marginal

line are pale green, the inner apical spaces being silvery white. Hind wing pale green, yellowish across the disk and along exterior margin; basal and a transverse discal series of spots, and a marginal row of lunules, silvery white, those of the two former more or less with a black border, the latter bordered by a black marginal line; a few rufous-brown spots outside the discal series.

*Female* of a deeper colour; markings the same, but larger.

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

*Hab.* Upper Kunawur.

Very common in Upper Kunawur; not appearing in Lower Kunawur. This is a companion to the above (*A. kamala*), but only for some twenty miles of its furthest northern range, appearing first on the meadows of "Cheni," the finest village of Kunawur; this and the next ten miles appear its head quarters. I caught it, however, far to the eastward, on the bare, treeless, shrubless regions of the Zungcham River, in Tibet (an affluent of the Spiti). It flies from May till November.

This species is allied to *A. clara*, Blanchard, figured in Jacquemont's 'Voy.' Ins. pl. 2. f. 2, 3.

#### 64. MELITEA SINDURA, n. sp. (Pl. XXX. fig. 2.)

Wings ferruginous; costa and base of wings blackish. Fore wing with narrow marginal band, two marks within discoidal cell, and two transverse series of discal spots black; a series of black-margined, pale-centred submarginal lunules. Hind wing with the marginal black band and submarginal lunules as in fore wing, also a series of three small black spots from anal angle. Cilia white, spotted with black. Body ferruginous black. Underside—fore wing clear ferruginous, yellowish about the apex, with the discal markings as above, but less defined, and a marginal series of yellowish lunules. Hind wing with ferruginous base, yellow disk, a pale ferruginous submarginal and marginal band (each with bright ferruginous spots), and an intermarginal series of yellowish lunules. Sexes alike.

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

*Hab.* Kongma Pass, N.W. Himalayas.

This is very local, apparently. I have seen it but in one place, on one acre of ground I may say, on a patch of very stony pastureland, at 16,000 feet altitude, on the "Kongma" pass, leading from Kunawur into the Chinese province of Gughe in Tibet: ground not clear of snow for more than four months in the year. Here one day I saw a great number of these insects flying, an icy-cold wind blowing all the time, so that the insects were blown about, and never more than an inch or so above the ground. No other Lepidoptera near them did I see but a stray *Colias edusa*, and several *Parnassii* coursing up and down the snow-banks a little higher up.

#### 65. CYRESTIS THYODAMAS, Boisd. in Crochard's edit.; Cuv. Règ. An. Ins. t. 138. f. 4; Hügel's Kaschmir, iv. t. 7. f. 3, 4.

An Himalayan forest-insect, difficult to capture at all. It generally frequents a well-wooded glen; and in such a place I have often

watched its elegant soaring flight, far out of reach, as it floated over the blossoms of the horse-chestnut (*Pavia indica*), or rested on its broad leaves in the sunshine. I have also seen it floating up and down the foliage-covered face of a steep cliff overhanging a hill-torrent, and rarely would it come within reach.

66. *NEPTIS ACERIS*, Esper, t. 81. f. 3, 4; t. 82. f. 1.

Common in woods and gardens in the Himalayas. It has a beautiful flight, floating in and out of the sunlight in the shade of trees, occasionally basking on the sun-bathed foliage, or resting, in groups of half a dozen or more, on the moist fern-covered rocks in the midst of the stream in some Himalayan glen.

67. *NEPTIS NANDINA*, Moore, Catal. Lep. Mus. E. I. C. pl. 4 a. f. 7.

68. *NEPTIS ZAIDA*, Doubleday, Gen. Diurn. Lep. pl. 35. f. 3.

An Himalayan species. Has somewhat the same flight as *N. aceris*, but more fond of pitching on the ground in the shade of trees or rocks, as the two following species.

69. *ATHYMA LEUCOTHOË*, Linn. (Cram. Pap. t. 203. f. E, F).

70. *ATHYMA OPALINA*, Kollar, Hügel's Kaschmir, iv. p. 427; Moore, Catal. Lep. Mus. E. I. C. i. pl. 5 a. f. 2.

71. *LIMENITIS LIGYES*, Hewitson, Trans. Ent. Soc. Lond. 3rd ser. ii. p. 246 (Nov. 1864).

*Limenitis trivena*, Moore, Ent. Monthly Mag. November 1864, p. 131.

Not common, although it has a wide range of some 200 miles north and east of Simla; appearing to prefer the rich woods and forests of the moister ranges, but continuing as far as the cedar- and Gerard's pine-forests extend, to Soongnum, the capital of Upper Kunawur. On the wing from May to July; flight quick—sometimes slow, floating in and out of the sunlight.

72. *HESTINA PERSIMILIS*, Westw. Doubleday & Hewitson, Diurn. Lep. p. 281.

Rare, N.W. Himalayas, 4000 to 7000 feet. One I caught in a narrow glen, well wooded with undergrowth; others in an orchard of plum and apricot, on the ripe fruit of which these insects (with *Castalia* and *Athyma*) were settling, both on the trees and on the fallen fruit below the trees.

73. *CASTALIA DICHROA*, Kollar, Hügel's Kaschmir, iv. p. 429, t. 8. f. 1, 2.

Same habits and somewhat the same locality as the former; but I have also seen it in open woods further in the interior of the Himalayas, pitching on the sprays of tall shrubs; making rapid flights, and returning to the same spot.

74. *ADOLIAS GARUDA*, Moore, Trans. Ent. Soc. Lond. n. s. v. pl. 3. f. 2, ♂ ♀.

N.W. Himalayas.

75. *ADOLIAS DOUBLEDAYI*, Gray, Lep. Ins. Nepal, pl. 13.

*Adolias epiona* (Gray), Moore, Trans. Ent. Soc. v.

Frequents oak-forests, at altitudes of 6000 to 8000 feet, in the Himalayas during the rainy season, July and August. It flies very swiftly over the tops of the trees, with a skimming flight like a Swallow. Two or three may be seen chasing one another in and out of the shade, among the branches of the trees. They pitch abruptly, often with expanded wings, basking in the sunlight, until some passing insect—another *Adolias* or a *Neptis* floating near—tempts the quarrelsome insect to dash off, buffet the passer-by, and, after a rapid skim, return to pitch again suddenly near its former resting-place, and bask again. It soon gets battered, and is difficult to capture.

76. *NYMPHALIS ATHAMAS*, Drury, Ill. i. t. 2. f. 3, 4.

An insect of extremely rapid flight, flashing like lightning up and down rocky-bedded streams in Himalayan glens, 3000 to 5000 feet. It pitches on rocks in mid-stream, and flashes off again if approached. It is not common, and very difficult to capture; yet one very hot day in June I saw seven individuals sitting with closed wings motionless on a foul spot (by the damp sandy margin of a stream), so close together that I might have put my hat on all of them. Except on that occasion, I have never seen more than one at a time.

#### SATYRIDÆ.

77. *DEBIS EUROPA*, Fabr. (Cram. Pap. t. 313. f. E, F, ♂; t. 79. f. C, D, ♀).

A common species, obtained at Kussowlie (6000 feet), frequenting grassy slopes in the shade or near hedges; constantly pitching under bushes or at roots of trees, and lying *perdu*.

78. *DEBIS ROHRIA* (Fabr.).

*Satyrus isana*, Kollar, Hügel's Kaschmir, t. 16. f. 3, 4, p. 448.

This frequents another region, 200 miles from Kussowlie, in damp glens, where tall rocks cast a shadow all day: this insect affects the shade, pitched on the rocks or at their foot, or in the rank vegetation near, never seeking the broad sunshine.

79. *DEBIS VERMA*.

*Satyrus verma*, Kollar, Hügel's Kaschmir, t. 16. f. 1, 2, p. 447.

Frequents the same region as *Debis rohria*, but is more autumnal, and affects trees in preference to rocks, pitching on the trunks of rhododendrons and oaks.



## 80. ENOPE PULAHA, Moore, Catal. Lep. Mus. E. I. C. i. p. 227.

Observed only in two localities far apart in the interior of the Himalayas, in dark forests of oak, sycamore, and horse-chestnut, affecting shade, and pitching on trunks of trees.

## 81. LASIOMMATA SCHAKRA.

*Satyrus schakra*, Kollar, Hügel's Kaschmir, p. 446, t. 15. f. 3, 4.

A very common Himalayan species, to be seen at all seasons flitting about the rocky roadside, and pitching on the rocks or banks; more abundant on the outer Himalayan ranges, on bare grassy slopes.

## 82. LASIOMMATA SATRICUS, Doubleday; West. &amp; Hewits. Diurn. Lep. pl. 64. f. 4.

Observed only late in the autumn, in a forest glade in the Himalayas, near a stream with rich vegetation about its banks.

## 83. LASIOMMATA MENAVA, n. sp. (Pl. XXX. fig. 3.)

*Male* fuliginous brown; fore wing with a large apical jet-black ocellus, with white pupil and ferruginous iride; also a much smaller ocellus between it and the apex. Hind wing with two similar ocelli, placed submarginally midway between the anterior and posterior angles. Underside with the discal portion of the fore wing ferruginous; a series of four transverse discoidal streaks and a submarginal line dark brown, each bordered with pale grey; the ocelli as above, but with yellow irides. Hind wing pale greyish brown, with irregular transverse basal brown lines; a series of six black submarginal ocelli, the first five with each a white pupil and a double brown-bordered yellow iris; the sixth, at the anal angle, without the white-pupilled black centre; a submarginal series of whitish-grey lunules.

Expanse  $1\frac{6}{8}$  inch.

*Hab.* Middle Kunawur.

Allied to *L. schakra*, Kollar (Hügel's Kaschmir, pl. 15. f. 3, 4).

*Remark.*—Is this a geographical variety of *L. schakra*? It comes from Middle Kunawur, the pleasant villages of Pangi and Rarung, where the last showers of rain fall, at rare intervals. It does not venture to the drier regions above described; and its uniformly dark colour remains constant, and seems to distinguish it from the more fulvous *L. schakra* so common on every rocky roadside in Lower Kunawur and the Simla Hills.

## 84. LASIOMMATA BALDIVA, n. sp. (Pl. XXX. fig. 4.)

*Male.* Upperside—fore wing fuliginous grey; hind wing ashy grey; both wings with a broad, irregularly margined, discal ferruginous band, which has on the fore wing an upper and a lower blackish spot, on the hind wing a small spot at its lower end.

*Female* paler; the fore wing with the spots on the discal band larger, there being also a third intermediate smaller spot; the spot

on the hind wing with a white pupil. Underside grey, of the female greyish white, with numerous short blackish striæ; fore wing with the disk pale ferruginous, the margins of the band (as seen from above) defined by irregular black lines; fore wing in the male with a single, in the female with two black spots; the apical with white pupil and yellow iride; the black dot on the hind wing also with white pupil and yellow iride. Cilia silvery grey.

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

*Hab.* Spiti and Tibet.

Allied to *L. telephassa*.

On the bare, brown, stony mountain-slopes of Spiti, Upper Kunawur, Tibet; this species seems to delight in the hot weather of June and July.

85. SATYRUS SWAHA, Kollar, Hügel's Kaschmir, p. 444, t. 14. f. 1, 2.

Very common during the rains (August and September) in the interior of the Himalayas, chiefly on grassy slopes and in fields near woods; also in open woods.

86. SATYRUS SARASWATI, Kollar, Hügel's Kaschmir, p. 445, t. 14. f. 3, 4.

Frequents the same ground as the preceding, at the same season, and has the same flight.

87. SATYRUS AVATARA, Moore, Catal. Lep. Mus. E. I. C. i. p. 229.

N.W. Himalayas, 8000 to 10,000 feet; frequenting bare grassy, rocky slopes close to oak-forests. A bolder insect than the preceding: Nymphalidan in flight and habit, and appearing in May and June before the rainy season.

88. HIPPARCHIA PARYSISIS.

*Satyris parysatis*, Kollar, Ins. Faun. S. Persia (Mem. Acad. Vienna), i. p. 11.

Obtained on steep precipices over bare hill-sides above the Sutlej; and these Himalayan precipices are not quite the ground for the entomologist, net in hand, and eye fixed on the soaring insect. The aspect of the insect on the wing is quite Nymphalidan—a soaring flight, swift if frightened, pitching in all sorts of inaccessible spots. Subsequently found very common in Upper Kunawur, always on steep cliffs, pitching on rocks.

89. EREBIA ANNADA, Moore, Catal. Lep. Mus. E. I. C. i. p. 226.

The species of *Erebia* are autumnal insects of weak flopping flight, with an irregular pitching action, frequenting bare grassy slopes.

90. EREBIA SCANDA, Kollar, in Hügel's Kaschmir, iv. p. 452, t. 17. f. 3, 4.

*Hab.* Lower Kunawur.

This species appears in the height of the rainy season (July and August) about the hedges and banks in Lower Kunawur, altitude 6000 to 7000 feet. Good fresh specimens are of a velvety black-brown above, and beneath have the lower wing very whitely salted, so that as they fly they look distinctly party-coloured.

91. *EREBIA NIRMALA*, n. sp.

*Male*. Upperside uniform dark brown; fore wing with a subapical black ocellus, having two white pupils and a dark ferruginous iride; hind wing with a similar but single-pupilled ocellus near anal angle. Underside greyish brown, discal portion of fore wing maroon-brown; ocelli of both wings as above, but with the iride yellow; a white dot below the ocellus of fore wing, and a discal series of four white dots anterior to the ocellus of hind wing. Cilia brown. Expanse 2 inches.

*Hab.* N.W. Himalayas.

*Remark*.—Allied to *E. scanda*, Kollar (Hügel's Kaschmir, p. 452), but differs in having a somewhat more elongated fore wing. On the underside it may be distinguished by the absence of the numerous white striæ on the hind wing, and by there being a single ocellus only near the anal angle.

92. *EREBIA KALINDA*, n. sp. (Pl. XXX. fig. 5.)

*Female*. Upperside greenish velvety brown; both wings with a ferruginous discal patch, that on the fore wing being subapical; fore wing with an apical black spot, having a white pupil and yellow iride. Underside dull brown; fore wing as above, but the ferruginous colour extending anteriorly across the discoidal cell; hind wing with a submarginal series of white dots; ferruginous patch obsolete. Expanse  $1\frac{7}{8}$  inch.

*Hab.* N.W. Himalayas.

This is local, and I saw very few; at two places, on the hill-sides below the Runang and Werang passes—not at the summit of the pass, but some 2000 feet lower down. A weak low flight it has, amongst the grass and flowers.

93. *EPINEPHILE CHEENA*, n. sp. (Pl. XXX. fig. 6.)

Dark brown. *Male* with a subapical, black, ferruginous-encircled spot; also a similar minute spot some distance below it. Underside pale greyish brown; fore wing with its discal portion ferruginous; a medially submarginal dark brown streak and an ill-defined discal transverse line; the subapical ocellus as above, but with a white pupil and yellow iride; hind wing covered with minute delicate brown striæ.

*Female* with three black ferruginous-encircled ocelli, the upper and lower large, the central small. Underside as in male, but having the lower ocellus as in upperside, the central one being obsolete.

Expanse of ♂  $1\frac{6}{8}$  inch, ♀ 2 inches.

*Hab.* Kunawur.

Allied to *E. janira*.

“The ‘meadow-brown’ of the meadows of Rogi and Cheeni in Kunawur. It is limited in its range, not appearing to the westward, nor venturing further north and east into the drier lands affected by the other two *Satyri* (*Epinephile davendra* and *Lasiommata baldiva*).”

94. *EPINEPHILE DAVENDRA*, n. sp. (Pl. XXX. fig. 7.)

*Male* greyish brown; fore wing with the space within the discoidal cell to near the apex and then descending to near the posterior margin ferruginous, this colour being distinctly defined; within it is a single black apical spot. Underside with the costal and exterior margins of fore wing greyish brown, the inner space pale ferruginous, the apical ocellus with white pupil and brown-bordered yellow iride, which latter, however, does not encircle the spot, being cut off as it were posteriorly; a short streak before the ocellus, and a submarginal line, dark brown. Hind wing grey, with delicate minute brown striæ; a discal and a submarginal line dark brown, the former irregularly across the disk from middle of anterior to posterior margin, both bordered outwardly with pale white, and having a single anterior and two posterior black ocelli, each with a yellow brown-bordered iride, and the anterior with a white pupil.

*Female* pale grey; the ferruginous space in the fore wing ill defined; and with a second black spot situated near the posterior angle. Underside as in male, but with the lower black spot on fore wing as above, the anterior ocellus on the hind wing being minute or nearly obsolete.

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

*Hab.* Spiti and Tibet.

Allied to *E. eudora*.

This is a Tibetan and Spiti insect, affecting the dry hot summer of the rainless region of the Chinese frontier. On a hot June or July day, these sober insects may be seen flitting about the stony hill-sides, 9000 to 12,000 feet altitude—hill-sides where the Graminaceæ are scarce and brown, and grey *Artemisia* and *Ephedra* form the principal vegetation. They do not occur in the moister and more wooded regions of the Himalayas; but first appear on the confines of Upper Kunawur, in Spiti, and the Chinese provinces of Gughe (? Cughe) and Nâri Khorsum (Tibet).

95. *YPHTHIMA SAKRA*, Moore, Catal. Lep. Mus. E. I. C. i. p. 236.

*Hab.* Simla Hills and Lower Kunawur.

96. *YPHTHIMA*, sp. ?

The species of *Ypthima* are all Himalayan insects of very feeble flight, frequenting banks, hedges, and grassy land.

97. *LIBYTHEA MYRRHA*, Godt. (Gray's Lep. Ins. Nepal, pl. 12. f. 4).

Not uncommon in Himalayan woods.

## ERYCINIDÆ.

## 98. DODONA DURGA.

*Melitæa durga*, Kollar, Hügel's Kaschmir, p. 411, t. 13. f. 3, 4.  
*Dodona durga*, Hewitson.

Common on pasture and grassy slopes in the Himalayas, 5000 to 8000 feet. Fond of sunshine; flight quick, almost Hesperidan.

## 99. DODONA EGEON.

*Emesis egeon*, Boisd.; Doubleday & Hewitson's Diurn. Lep. pl. 69. f. 2.

Observed once only, in September, in a richly wooded Himalayan glen, full of horse-chestnut, maple, sycamore, oak, and rhododendron, through which fell, in numerous little cascades, a clear stream, bordered with bushes (*Rubus*, &c.) and an undergrowth of grasses, ferns, &c.—quite a different country to that of the preceding. I passed this glen once in September. In former or subsequent months I never saw this insect there; it appears therefore to have but one short-lived, autumnal brood. The insects were pretty numerous, seated on tall Umbelliferæ, and flitting from plant to plant with short quick flights, in an open glade in the glen, close to the stream.

## LYCÆNIDÆ.

## 100. POLYOMMATUS KASMIRA, n. sp. (Pl. XXXI. fig. 1.)

*Male*. Upperside purplish lavender-blue; exterior margin of both wings blackish. Underside cream-white; fore wing with an indistinct discocellular streak, beyond which, one-third from the apex, a single white-encircled black spot; a transverse discal series of four white-encircled black spots; a marginal double row of indistinct blackish lunules; hind wing with twelve basally disposed, white-encircled, black spots; a marginal row of blackish spots, bordered by a submarginal series of indistinct blackish lunules.

*Female* brighter blue above; costa and exterior margin of fore wing and anterior margin of hind wing broadly dull black; hind wing with a marginal row of blackish spots, bordered by a submarginal series of lunules. Underside as in male. Cilia white.

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

*Hab.* N.W. Himalayas.

## 101. POLYOMMATUS NYCULA, n. sp. (Pl. XXXI. fig. 3.)

Upperside dark lilac-blue; cilia and inner margin of hind wing whitish. Underside—fore wing pale purplish cream-colour, bluish grey along exterior margin; a spot closing the discoidal cell and a linear series of five spots medially across the disk white; hind wing metallic bluish-grey. Body white.

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

*Hab.* Kunawur.

This species is not common. It frequents the beautiful flower-

carpeted pasture-lands on the mountain-sides in Kunawur, at 11,000 to 12,000 feet—those smiling “alps” where the villagers drive their herds when the early summer has set in, and the melting snow leaves this gay carpet of flowers on spots which for many months had remained hidden beneath a thick snowy mantle.

102. *POLYOMMATUS NAZIRA*, n. sp. (Pl. XXXI. fig. 4.)

Upperside satin-brown; fore wing with a black spot closing the discoidal cell; both wings with a marginal series of blackish dots, bordered inwardly with a submarginal row of deep-red lunules. Underside purplish cream-colour; both wings with a submarginal red band, bordered exteriorly with black dots, internally with blackish lunules, and margined on both sides with white lunules; fore wing with a spot closing the cell, five and a geminated sixth irregularly across the disk; and hind wing with eight spots also irregularly across the disk, three basal and one closing the cell black, each encircled with white; a dash of white longitudinally on the disk of hind wing. Cilia broad, white, with black spots.

Expanse 1 inch.

*Hab.* Kunawur.

103. *POLYOMMATUS ARIANA*, n. sp. (Pl. XXXI. fig. 2.)

*Male.* Upperside brilliant blue; anterior margin of hind wing black, inner margin whitish; cilia broad, white. Underside purple-grey, suffused with metallic greenish grey at base of hind wing; fore wing with a small spot within discoidal cell, another closing the cell, a submarginal discal series of six spots (the posterior, sixth, geminated), black, each encircled with white; a marginal series of ill-defined double whitish spots, the posterior having slight dark centres; hind wing with two basal and a submarginal discal series of seven black spots encircled with white; a marginal row of whitish spots, each centred exteriorly with a dark and interiorly with a reddish spot; a triangular spot in centre of the wing, and a streak from middle of exterior margin, whitish. Body white.

*Female* duller lilac-blue, with the exterior margin of both wings brownish. Underside as in male.

Expanse of ♂  $1\frac{3}{8}$  inch, ♀  $1\frac{1}{2}$  inch.

*Hab.* Kunawur.

An abundant species, frequenting pasture- and meadow-land in the summer months, at altitudes of 8000 to 10,000 feet, lighting on the gentians which stud the green turf.

104. *POLYOMMATUS CHANDALA*, n. sp. (Pl. XXXI. fig. 5.)

*Male* dull silvery blue, with purplish-brown exterior margins. Underside pale grey, with a spot within discoidal cell, a discocellular streak, a transverse discal linear series of six clear-white-encircled black spots, between which and exterior margin a series of indistinct pale-bordered lunules; hind wing with basal and discal

series of pale brown, whitish-encircled spots, and a marginal row of indistinct pale-bordered lunules: cilia purplish brown.

Expanse 1 inch.

*Hab.* Lower Himalayas and plains of N.W. India.

This is a generally distributed species, affecting both the plains and the Lower Himalayan valleys, occasionally ascending the mountain slopes to 6000 feet altitude. I have taken it in the later autumn months in Oudh, the Punjab, and Lower Himalayas.

105. *POLYOMMATUS VICRAMA*, n. sp. (Pl. XXXI. fig. 6.)

*Male* dull greyish blue; exterior margins brown; cilia broad, white, with brownish spots. Underside greyish cream-colour, exterior margins defined by a black line: fore wing with a central discoidal spot, another closing the cell; a series of spots recurving transversely from costa to posterior margin and a submarginal row of spots black, each encircled with white: hind wing with thirteen white-encircled black spots, and a marginal double row of red-inter-spaced black lunules: cilia as above.

*Female* bluish-purple brown; marked as in male.

Expanse of ♂  $\frac{10}{12}$  inch, ♀  $\frac{11}{12}$  inch.

*Hab.* Kunawur; Tibet.

An uncommon species; to be seen flitting from flower to flower on moist meadow-land fed by streams from melting snow-beds. Cheeni in Middle Kunawur, and the Alps above the Chinese village of Shipkee in Tibet, are the localities; May, June, and July the season.

106. *POLYOMMATUS KARSANDRA*, n. sp. (Pl. XXXI. fig. 7.)

Upperside purple-brown. Underside greyish brown, exterior margins defined by a brown line: fore wing with a spot within discoidal cell, a discocellular streak, a spot above it, and a transverse discal series of six spots black, each encircled with white; a marginal and submarginal row of pale brown, white-bordered lunules: hind wing with a series of twelve black spots, and a pale discocellular streak, encircled with white; a marginal row of pale brown, whitish-encircled spots, and a submarginal row of whitish lunules: cilia greyish brown.

Expanse  $\frac{10}{12}$  inch.

*Hab.* Plains of N.W. India.

A common species in the plains, from Oudh to the Punjab.

107. *LYCÆNA ZENA*, n. sp. (Pl. XXXI. fig. 9.)

Upperside pale purple-brown; hind wing with a small brown spot near anal angle of exterior margin. Underside pale grey, exterior margins defined by a brown line: fore wing with a black dot on costa, one-third from the apex; a discocellular spot, an interrupted transverse discal band, and a submarginal lunulated line pale brown, each with whitish borders: hind wing with three subbasal spots, another on anterior margin, and two from anal angle black, encircled

with white ; a discal series of pale whitish lines, and a marginal row of white circles.

Expanse  $\frac{9}{12}$  inch.

*Hab.* Plains of N.W. India.

Common in Oudh in the winter months, November to February. I have caught it also at Umballa, in the Punjab. It is not an Himalayan insect.

108. *LYCÆNA DIPORA*, n. sp. (Pl. XXXI. fig. 8.)

Upperside dull violet-blue ; hind wing with a tail ; a discocellular spot on fore wing and exterior margins of both wings broadly brown ; cilia grey, with a narrow medial brown line. Underside greyish cream-colour, exterior margins defined by a brown line : fore wing with a narrow discocellular streak, and a transverse discal straight series of white-encircled black spots ; a submarginal row of pale brown spots : hind wing with three basal and a thrice-interrupted discal series of eight white-encircled black spots ; a medially disposed marginal orange-red band, bordered inwardly with brown lunules, outwardly with (two clear, the rest ill-defined) black spots : cilia as above.

Expanse  $\frac{11}{12}$  inch.

*Hab.* Kussowlie, N.W. Himalayas.

A slight delicate species, from Kussowlie ; not very common ; generally found near water.

109. *CHRYSOPHANUS TIMEUS*.

*Pap. timeus*, Cramer, *Pap.* t. 186. f. E, F.

*C. phlœas* of India.

This has a wide distribution in the N.W. Himalayas ; common in the outward ranges, Kussowlie, &c. ; appearing here and there, up to Upper Kunawur, in very various climates. It, however, disappears in certain gaps, as it were, which are occupied by *C. pavana*.

110. *CHRYSOPHANUS PAVANA*, Kollar in Hügel's Kashmir, iv. p. 416, t. 5. f. 5, 6.

*Hab.* N.W. Himalayas.

111. *CHRYSOPHANUS KASYAPA*, n. sp. (Pl. XXXI. fig. 10.)

*Male* bright coppery red, with purple reflexions : fore wing with the extreme edge of the costa and exterior margin black, the latter submarginally bordered with purple ; a black spot within discoidal cell, a second transversely closing the cell, four near the apex obliquely from the costa, and four others descending the disk : hind wing with the anterior and exterior margins black, bordered submarginally with purple, which latter colour also borders the anal margin ; a minute dot within discoidal cell, a narrow streak closing the cell, and a series of five discal spots black : body black. Underside metallic greyish blue, with greenish reflexion at base of hind wing ; fore wing with the black spots as above, also a short black



submarginal streak from posterior angle, between which and the discal spots the space is ferruginous; hind wing with a discal series of minute black dots: body and legs white; cilia white.

Expanse  $1\frac{2}{3}$  inch.

*Hab.* Lower Kunawur.

Very uncommon. It occurs in June, in richly wooded country, in Lower Kunawur, 7000 to 8000 feet altitude. The female is much darker brown.

112. *THECLA DERIA*, n. sp. (Pl. XXXI. fig. 11.)

Upperside purple-brown; hind wing with the exterior margin defined by a narrow black line; tail black; cilia grey. Underside dark greyish cream-colour; fore wing with a clear white transverse discal line, with black inner border, from before the apex, between which and exterior margin are two or more black spots; hind wing with a similar transverse discal white line, extending from anterior to inner margins, between which and a marginal white line is a series of more or less distinct black spots, and two ocellated black spots, one at anal angle, the other beyond, the space between which is grey; cilia greyish.

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

*Hab.* Upper Kunawur.

I but once caught two or three of this species, on the steep bare mountain-sides over the Spiti River, altitude 11,000 feet, on a hot fine day; they were flitting about the low shrubs.

113. *DIPSAS ODATA*, Hewitson.

*Dipsas odata*, Hewitson, *Illustr. of Diurnal Lep., Lycænidæ*, pt. 2, pl. 30. f. 13, 14.

*Male.* Upperside—basal half of both wings violet-blue; the outer half dark brown, paler on the posterior wing; cilia white. Underside grey white: fore wing with a pale linear spot closing the cell; two small dark-brown spots near the middle of inner margin; a transverse rufous band beyond the middle, bordered on both sides with white; a submarginal band of pale brown terminating near the anal angle in two large black spots: hind wing with a spot closing the cell; a central transverse rufous band and a submarginal brown band, both bordered with white; two lunular orange spots near the base of the tail, bordered above and below with black; the outer margin brown.

*Female* marked as in male, except that the whole of the hind wing is rufous brown.

Expanse  $1\frac{4}{10}$  inch.

*Hab.* Upper Kunawur.

This species I have caught in Upper Kunawur, in July and August, frequenting the orchards of the charming villages of that fine country, at altitudes of 8000 to 10,000 feet. They settle in great numbers on the walnut-trees; sometimes on neighbouring apricots and poplars. As one strikes the boughs, troops of these little black-

purple hair-streaks, with silvery-grey underside, flit about the thick foliage like a cloud of tortrices shaken out of an oak: they settle again at once. They fly about thus till very late.

114. *DIPSAS SYLA*.

*Thecla syla*, Kollar, H $\ddot{u}$ gel's Kaschmir, p. 414, t. 4. f. 7, 8.

*Hab.* N.W. Himalayas.

Observed in the same locality as *Dodona eyeon*, flitting up and down the stream, pitching on moist rocks or pieces of wood in mid-stream.

115. *ILERDA ODA*, Hewitson, n. sp. (Pl. XXXI. fig. 12.)

*Ilerda oda*, Hewitson, Illust. of Diurnal Lep., Lycænidae, pt. 2, pl. 24. f. 9, 10.

*Male.* Upperside black; basal portion of both wings clear blue; hind wing with or without indistinct reddish streak at anal angle. Underside greenish saffron-yellow; fore wing with three decreasing black, white-bordered spots, ascending from posterior angle; hind wing with a broad ochrey-red marginal band, bordered on both sides with white black-bordered lunules: cilia black, slightly margined with white.

*Female.* Upperside blackish brown; fore wing with a short, sub-apical, medially oblique, broad red band, a distinct black spot closing the discoidal cell; hind wing with a broad, marginal, sinuous red band; cilia brown. Underside dull greenish yellow: fore wing with the medial portion reddish yellow; a short narrow blackish line sub-apically from costa, and a second elongated spot closing the discoidal cell; a black spot, with white inner border, at posterior angle: hind wing with a broad marginal red band, bordered inwardly with a linear series of white, and exteriorly with black lunules; an indistinct transverse discal dark line.

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

*Hab.* North of Simla.

Frequents rich deep forests north of Simla, occurring with *I. tamu* in sunny glades carpeted with strawberry-blossoms, in May.

116. *ILERDA TAMU*.

*Polyommatus tamu*, Kollar, H $\ddot{u}$ gel's Kaschmir, p. 417, t. 5. f. 7, 8.

*Hab.* North of Simla.

HESPERIDÆ.

117. *PAMPHILA DANNA*. (Pl. XXX. fig. 8.)

*Pyrgus danna*, Moore, Catal. Lep. Mus. E. I. C. i. p. 249.

Upperside dark greenish brown; fore wing with a narrow longitudinal streak within discoidal cell, terminating in two small spots ascending towards the costa, a small geminated spot before the apex, and three irregular-shaped spots obliquely on the disk pale yellow;

hind wing with a slightly defined longitudinal discoidal streak, a nearly parallel spot, and a transverse series of four discal spots pale yellow; cilia whitish. Underside grey; basal portion of fore wing and broadly on inner margin of hind wing brown-black, the latter with a pale yellowish inner border; base of costa of fore wing, with spots and marks on both wings, as above, but more clearly defined, pale yellow; cilia grey.

Expanse 1 inch.

*Hab.* Simla Hills and Kunawur.

Frequents thistle-heads and banks of thyme, at hot midday, with a rapid, flashing, skipping flight. June.

118. *PAMPHILA MÆSA*, n. sp. (Pl. XXX. fig. 9.)

Upperside blackish brown; fore wing, with base of costa, discoidal cell, a spot before the apex, a discal oblique row of spots, and middle of inner margin pale orange-yellow; hind wing with a streak within discoidal cell, inner border of abdominal fold, and a curved row of discal spots pale orange-yellow; cilia brown, yellowish white from anal angle. Underside greenish grey; base of fore wing brown; markings as above, pale yellow.

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

*Hab.* Simla Hills and Kunawur.

119. *HESPERIA LEUCOCERA*, Kollar, Hügel's Kaschmir, p. 454, pl. 18. f. 3, 4.

*Hab.* Lower Kunawur.

Not common; flying, at very early dawn or in the evening, about the long wet grass and rank herbage which luxuriantly clothe the hill-sides in Lower Kunawur, at altitudes of 6000 to 7000 feet.

EXPLANATION OF PLATES XXX., XXXI.

PLATE XXX.

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| <p>Fig. 1. <i>Argynnis jainadeva</i>.<br/>         2. <i>Melitæa sindura</i>.<br/>         3. <i>Lasiommata menava</i>.<br/>         4. — <i>baldiva</i>, ♂.<br/>         5. <i>Erebia kalinda</i>.</p> | <p>Fig. 6. <i>Epinephile cheena</i>, ♂ ♀.<br/>         7. — <i>davendra</i>, ♂ ♀.<br/>         8. <i>Pamphila danna</i>.<br/>         9. — <i>mæsa</i>.</p> |
|---|---|

PLATE XXXI.

- |   |  |
|---|--|
| <p>Fig. 1. <i>Polyommatus kasmira</i>, ♂.<br/>         2. — <i>ariana</i>, ♂.<br/>         3. — <i>nycula</i>.<br/>         4. — <i>nazira</i>.<br/>         5. — <i>chandala</i>.<br/>         6. — <i>vicrama</i>.<br/>         7. — <i>karsandra</i>.<br/>         8. <i>Lycæna dipora</i>.<br/>         9. — <i>zena</i>.</p> | <p>Fig. 10. <i>Chrysophanus kasyapa</i>.<br/>         11. <i>Thecla deria</i>.<br/>         12. <i>Iterda oda</i>, ♀.<br/>         13. <i>Colias shipkee</i>.<br/>         14. <i>Anthocharis daphalis</i>.<br/>         15. <i>Pieris kalora</i>, ♂.<br/>         16. — <i>ajaka</i>, ♀.<br/>         17. — <i>hira</i>.<br/>         18. <i>Gonepteryx zaneka</i>.</p> |
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June 27, 1865.

Professor Huxley, F.R.S., V.P., in the Chair.

The following extracts were read from a letter addressed to the Secretary by Robert Swinhoe, Esq., H.B.M. Vice-Consul, Formosa, dated Takow, S.W. Formosa, 27th March, 1865 :—

“A friend of mine, who has been some time located in the river Yangtze, at Chinkiang, tells me that large herds of a Hog Deer are found periodically on an island in that river. These animals have coarse bristles and pig-like faces, with tusks. I have never seen the animal, but from his description should take it to be the *Hyelaphus porcinus*. It swims across to the island at the flooding of the great river, and when the water sinks is left isolated, owing to the high banks of the island. It then lurks about the bushes and high coarse grass. Parties of Europeans and Chinese then land on the island with fire-arms and make easy prey of the poor beasts, driving them from one end of the island to the other. Every season large numbers of them are thus slaughtered. They are rather coarse eating, but are said to make pretty fair venison when hung for some days. I have lately procured you a fine female of the *Cervus taiwanus*; it has gone on to Hongkong, and I trust will be thence forwarded all safe to you.

“I am sorry I cannot give you any particulars as to the whereabouts exactly of the pair of *Sus*\*, which I obtained for the Society in July 1862, and one of which reached you in safety. The person from whom I got the pair told me he purchased them off a boat in Dampier's Straits. This is all, I regret to say, I can tell you about their origin.”

The Secretary announced the safe arrival in the Society's Gardens, on the previous evening, of a young male African Elephant, received in exchange from the Jardin des Plantes, Paris.

Mr. G. F. Busk communicated a memoir upon the fossil Elephants of Malta, based upon collections formed in that island by Captain Spratt, R.N., which had been originally placed in the hands of the late Dr. Falconer for examination. Upon Dr. Falconer's decease, Mr. Busk had undertaken the task of identifying these remains, which he was induced to refer to three species of the genus *Elephas*. One of these, not much inferior in bulk to the existing Indian Elephant, was, as Dr. Busk believed, probably referable to *Elephas antiquus*. The two others were both of diminutive stature as compared with the existing species of Elephant, neither of them having exceeded 5 feet in height. To one of these, slightly the larger of the two, Mr. Busk proposed to restrict Dr. Falconer's name *Elephas melitensis*, and to call the other and smaller one after the lamented naturalist who had done so much towards increasing our knowledge

\* *Sus*, sp. 235 of 'List of Vertebrated Animals,' 1865, p. 37.

of these animals, *Elephas falconeri*. The two latter species were distinguished by very well-marked dental and other characters.

This paper will be published in full in the Society's 'Transactions.'

A paper was read by Professor Owen containing descriptions of new species of Indian Cetaceans, which had been observed and collected on the eastern coast of the Indian peninsula by Walter Elliot, Esq., F.Z.S. Of the seven species described as new, six belonged to the family *Delphinidæ*; the seventh was referred to the Sperm-Whales (*Physeteridæ*), and proposed to be called *Physeter (Euphysetes) simus*.

This paper will likewise be published in full in the Society's 'Transactions.'

The following papers were read:—

I. DESCRIPTION OF TWO SPECIES OF CHITONIDÆ, FROM THE COLLECTION OF W. HARPER PEASE, ESQ. BY PHILIP P. CARPENTER, B.A., PH.D.

CHITON (LOPHYRUS) PERVIRIDIS, Cpr.

*C. t. parva, angustiore, elevata, jugo acuto; colore intense prasinato; tota superficie sub lente minutissime squamuloso; areis diag. et valv. externis radiatim liratis, liris obtusis, parum conspicuis, lateraliter iv.-v., antice et postice xx.-xxv.; areis centr. sulcis distantibus, jugo parallelis, circ. xii., parum impressis; mucrone antice subcentrali, satis conspicuo; intus laminis insertionis valv. term. viii.-xi., centr. unifissatis; dentibus acutioribus, alte pectinatis, subgrundis curtis; sinu latiore, planato, ad jugum dentato: pallio squamis magnis, solidis, imbricatis sed striatis instructo.*

Long. .45, lat. .25, alt. .12 poll.

*Hab.* Central Pacific (Pease) (no. 299).

A solitary specimen of this interesting species is very like *C. virescens*, Rve.\*, in general appearance; but the mantle of that species is nearly smooth, and the valves scarcely sculptured. This shell is of a uniform bright green. It has the aspect of *Lepidopleurus*; but the insertion-plates, though sharp, are deeply pectinated. It differs from most other Chitons in having the scales distinctly striated, as in *C. striatosquamosus*, Maz. Cat. no. 250.

ACANTHOPLEURA NIGROPUNCTATA, n. s.

*A. t. parva, satis elongata, olivaceo et fusco eleganter nebulosa; satis fornicata, jugo obtuso; areis later. satis definitis, rugis radiantibus et longitudinalibus irregulariter decussantibus ornatis, inter quas punctula nigra subradiatim sparguntur; ar. centr. rugis subparallelis, subdecussatis, vix regularibus, ad*

\* Four out of the five specimens in Mus. Cuming. have a brown-marbled anterior valve, with brown dots along the sutures.

*jugum obsoletis; mucrone postico, elevato: intus lam. insert. v.-, ant. viii.-x.-, post. xii.-xiv.-, centr. unifissatis; dentibus v. post. solidis, declivibus, reliquis acutioribus, omnino pectinatis; subgrundis latioribus, curtis; sinu latiore, denticulato; pallia squamulis subpilulosis copiose induto.*

Long. .48, lat. .25, alt. .07 poll.

*Hab.* Society Islands (*Pease*) (no. 298).

This curious little species, with the aspect, but not the posterior insertion-plates, of *Onithochiton*, is closely related to *confossus*, Gld. The details of sculpture, however, do not agree; and the U. S. Expl. species is said to have nine posterior and twenty-five anterior insertion-plates, in addition to which the artist has (probably for uniformity's sake) sketched five on each of the central valves! The plates are those of *Acanthopleura*, but the mantle is scarcely bristly, the minute hair-like scales being more akin to those of *Leptochiton*.

## 2. DESCRIPTIONS OF NEW GENERA AND SPECIES OF MARINE SHELLS FROM THE ISLANDS OF THE CENTRAL PACIFIC. BY W. HARPER PEASE, OF HONOLULU, CORR. MEMB. (COMMUNICATED BY P. P. CARPENTER.)

### Genus LIBRATULA, Pse. (Family GALEOMMIDÆ.)

*T. æquivalvis, valvis planis, semilunaribus, medio ligamento junctis; margine cardinali recto, serrato.*

Like *Galeomma*; but with the valves flattened as in *Placuna*, and without the ventral gape. They lie wide open.

#### LIBRATULA PLANA.

*L. t. parva, æquilaterali, albida; valvis lævibus, marginibus tenuibus; lamina cardinali subprominente, subtilissime serrata; umbonibus medianis, parvis, contiguis.*

This singular creature was found living on coral. When at rest, the valves are perfectly horizontal, and so closely connected that it has the appearance of, and may have been heretofore mistaken for, an operculum. The animal does not extend beyond the shell. When in motion, however, it protrudes a round lobe to a distance as great as its own length, by which it draws itself along, at the same time depressing its valves to an angle of about 90°, and raising them again when reaching the end of the lobe. This motion of the valves is so rapid that, without observing closely, the progress of the animal might be supposed to depend on it altogether. It is very active in its habits—a rare thing among bivalves—in this respect resembling *Solemya*.

#### MITRA SALTATA.

*M. t. parva, fusiformi, subulata, tenui, nitida, pellucida, cornea; basi subtruncata, transversim striata, longitudinaliter subti-*

*lissime striata; anfractibus planis seu subconvexis, marginatis; columella tri- seu quadriplicata, plicis obliquis; apertura ampliore, dimidium longitudinis testæ æquante; labro tenui.*

Long. .3, lat. .09 poll.

This elegant little species was found living in the hollows of coral-rock. When disturbed, the animal would skip 5 or 6 inches in a horizontal line, from one side of the cavity to the other, at the same time spinning out a very fine web. When held in the hand, it would jump off, suspending itself by a thread to a distance of 2 or 3 feet\*.

#### ENGINA FUSIFORMIS.

*E. t. fusiformi, utrinque attenuata, medio angulata, basi contracta, canali recurvata, spira acuminata, longitudinaliter nodoso-costata, transversim sulcata et striata; anfractibus superne parum concavis; columella superne subexcavata et plicata; nigra, luteo irregulariter maculata et fasciata; apertura dimidium longitudinis testæ æquante, purpureo-rufescente.*

Long. .6, lat. .34 poll.

#### ENGINA OVATA.

*E. t. abbreviato-ovata, utrinque acuta, basi parum recurvata; longitudinaliter costata, transversim nodoso-lirata et striata; apertura superne regulariter arcuata, infra contracta; nigra, lirarum interstitiis albis vel pallide luteo-fuscis, denticulis aperturae albis.*

Long. .5, lat. .32 poll.

#### NASSA OBLIQUA.

*N. t. crassa, solida, oblique globoso-ovata, transversim nodoso-lirata; nodis parvis, compressis, longitudinaliter oblique costulata, et striis rugata; spira curta, acuta; anfr. superne concavo-indentatis; apertura parva, oblique ovali; columella lævi, excavata; callo amplo, incrassato, spira tenuis extenso; labro calloso, intus lirato; pallide fulva, liris transversis castaneis, nodis albidis; apertura et columella aurantiaco-luteis; callositate albida.*

Long. 14, diam. 12 mill.

#### CORALLIOBIA SCULPTILIS.

*C. t. alba, valde depressa, planulata, ovata; labro continuo, expanso, radiatim costulato; spira minima, in labro inclusa; longitudinaliter imbricatim laminata, transversim costata, costis tribus rotundatis; labro radiatim costulato; canali brevi, angusta.*

Long. 9, diam. 7 mill.

This elegant little species, of a rare genus, was brought up on coral from a depth of 90 fathoms.

\* From the large size of the nuclear whorls, which are seldom seen in adult Mitrids, it is probable that this delicate little shell is not mature.—P. P. C.

## TORINIA CONICA.

*T. t. conica, elevata, ad peripheriam obtuso-angulata, concentricè sulcata et creberrime striata; sulcis tribus, punctulatis, longitudinaliter vix oblique insculpta; umbilico angusto; apertura subcirculari; albida, irregulariter pallide purpureo vel cinereo strigata et maculata.*

Alt. 10, diam. 10 mill.

## TURRICULA PUTILLUS.

*T. t. abbreviato-fusiformi, subventricosa, sulcis angustis decussata, sulcis longitudinalibus tenuiter striatis; spira breviscula, acuta, suturis valde impressis; apertura intus valde lirata, labro denticulato; columella quadriplicata; nigra, spira et anfractu ultimo superne albo maculatis, interdum fascia interrupta alba cingulatis, sulcis transversis rufo-fuscis.*

Long. 10, diam. 5 mill.

The shell has some of the characters of *Mitra alveolus*, Rve.

## Genus MITROIDEA, Pease.

*Testa mitriformis; columella multiplicata; antice valde truncata.*

## MITROIDEA MULTIPLICATA.

*M. t. oblonga, subfusiformi, solida, transversim tenuiter striata; spira brevi, acute acuminata; basi truncata; columella producta, recurvata, subcontorta; labro simplici, intus lævi, extus incrassato, subvaricoso; apertura angusta, longissima, duobus trientibus longitudinis testæ adæquante, antice vix dilatata; columella decemplicata, plicis confertis, regularibus, vix obliquis; albida, epidermide tenui straminea induta, lineis castaneis distantibus cingulata.*

Long. 25, diam. 9 mill.

This very remarkable little shell differs from all other known Mitrids (1) in having ten plaits crowded on the anterior half of the pillar-lip, and (2) in having the base truncate, in a manner somewhat approaching *Terebellum*, beyond which the projecting columella is somewhat recurved.

## MITRA NIGRICANS.

*M. t. fusiformi, elongata, lævigata, transversim tenuiter striata, striis subdistantibus punctatis; epidermide tenui induta; spira gracili, elongata, acuta; labro simplici; columella quadriplicata; nigrescente, fascia angusta castanea cincta; apertura plumbea.*

Long. 20, diam. 7 mill.

## NERITINA RUBIDA.

*N. t. oblongo-ovata, tenui, striis incrementi rugulosa; spira parva; area columellari lævi, cinerea; fusciscenti-rubida.*

Long. 5, diam. 3 mill.



This species may be compared with *N. succinea*, inhabiting the West Indies.

**EULIMA SUBPELLUCIDA\*.**

*E. t. elongata, pyramidati, alba, nitida, subpellucida, polita, tenuiore, apice submucronato; anfr. ix., plano-converxis, vix tenuiter decussato-striatis, ultimo ventricosus, ad peripheriam subangulato; suturis subimpressis, marginatis; apertura elongato-ovata; labro tenui.*

Long. 16, diam. 7 mill.

**PURPURA MARMORATA.**

*P. t. oblongo-ovata, solida, spira acuminata, acuta, conica; anfr. transversim impresso-striatis, infra suturas vix concavis, ultimo medio biserialim, spira uniserialim tuberculatis, tuberculis compressis; anfr. ultimo infra biserialim obsolete noduloso; apertura supra subcanaliculata, intus lirata; albicanti-rubra, fusco marmorata.*

Long. 50 mill.

This form is allied to *P. mancinella*.

**CYPRÆA FUSCO-MACULATA.**

*C. t. oblongo-ovata, vix umbilicata, latere dextro subangulato, marginato, extremitatibus productis; apertura subflexuosa, angusta, dentibus parvis; albicante, ad dorsum irregulariter castaneo-fusco picta, lateribus fusco punctatis, extremitatibus maculis castaneo-fuscis conspicue ornatis.*

Long. 13, diam. 7 mill.

We have a number of specimens of the above species in our collection from different localities, all of them more or less worn. It is allied to "*C. goodallii*," from which the spots on both sides of the extremities serve to distinguish it; they are conspicuous and never absent, even on those most weathered.

**CYPRÆA CANDIDA†.**

*C. t. oblongo-ovata, omnino alba, lateribus subincrassatis rotundatis, basi rotundata; extremitatibus vix productis, subflexis; longitudinaliter tenuissime striata; apertura subflexuosa, dentibus fortibus subdistantibus instructa, interstitiis profunde incisus.*

Long. 15, diam. 8 mill.

**PLANAXIS ABBREVIATA.**

*P. t. ovata, solida, purpureo-nigrescente, intus purpurea; spira brevi, acuta; suturis bene impressis; anfr. v., convexis, spiralliter striatis, striis interdum in medio anfractus ultimi evanescentibus; apertura ovata, superne sulcata; labro margine in-*

\* = *Stylifer pyramidalis*, Pse., MS.; allied to *Eulima pyramidalis*, A. Ad.

† Not to be confounded with *Trivia candida*.—P. P. C.

*terno crenulato; labio superne calloso, lævi; canali brevissima; basi spiraliter sulcata.*

Long. 10, diam. 6 mill.

= *P. buccinoides*, Pse., à prima manu, nom. præoc.

**PEDICULARIA PACIFICA\***.

*P. t. tenuiuscula, oblonga, irregulari, in medio contracta, radiatim striis elevatis ornata, striis concentricis decussata, apice conspicuo involuto; rubida, interdum omnino violacea vel cornea.*

Long. 7 mill.

The following list of synonyms, drawn out from a careful comparison with the Cumingian Collection, and with the types described in Dr. Gould's 'Otia,' which happened fortunately to be temporarily in my possession, may be useful to those who have received the shells under Mr. Pease's MS. names.—P. P. C.

*Atys debilis* appears to be identical with *A. succisa*, Ehr., and simply a slender variety of *A. alicula*, A. Ad.

*Fissurella granifera*, Pse., is a good species of *Glyphis*.

*Rimula fenestrata*, Pse., is a very young *Glyphis*.

*Conus fusiformis*, Pse. (= *C. pusilla*, Pse., olim), is a small species of *Conella*, Swains.

*Daphnella bella*, Pse., belongs to one of the Columbelloid genera, probably to *Anachis*.

*Cithara costulifera*, Pse., = *Anachis atomella*, Sby., var.

*C. varia*, Pse., is probably an *Anachis* := *Columbella virginea*, Gld. (from type).

*C. garrettii*, Pse., is a *Mitrella*.

*Borsonia corrugata*, Pse., = (*Clathurella*) *nebulosa*, Pse. (teste H. Cuming).

*Torinia corrugata*, Pse., = *T. variegata*, Lam. (teste H. Cuming).

*Natica undulata*, Pse., appears to be the young state of the Pacific variety of *N. maroccana*, Chemn.

*Nassa plicata*, Pse., is a dwarf, strongly sculptured variety of *N. olivacea*, Brug. (teste H. Cuming). The characters of the mouth exactly agree.

*N. microstoma*, Pse., is a white variety of *N. dermestina*, Gld.

*N. turricula*, Pse., and *N. unifasciata*, Pse., appear to be varieties of *N. paupera*, Gld., = *plebecula*, Gld. (from types).

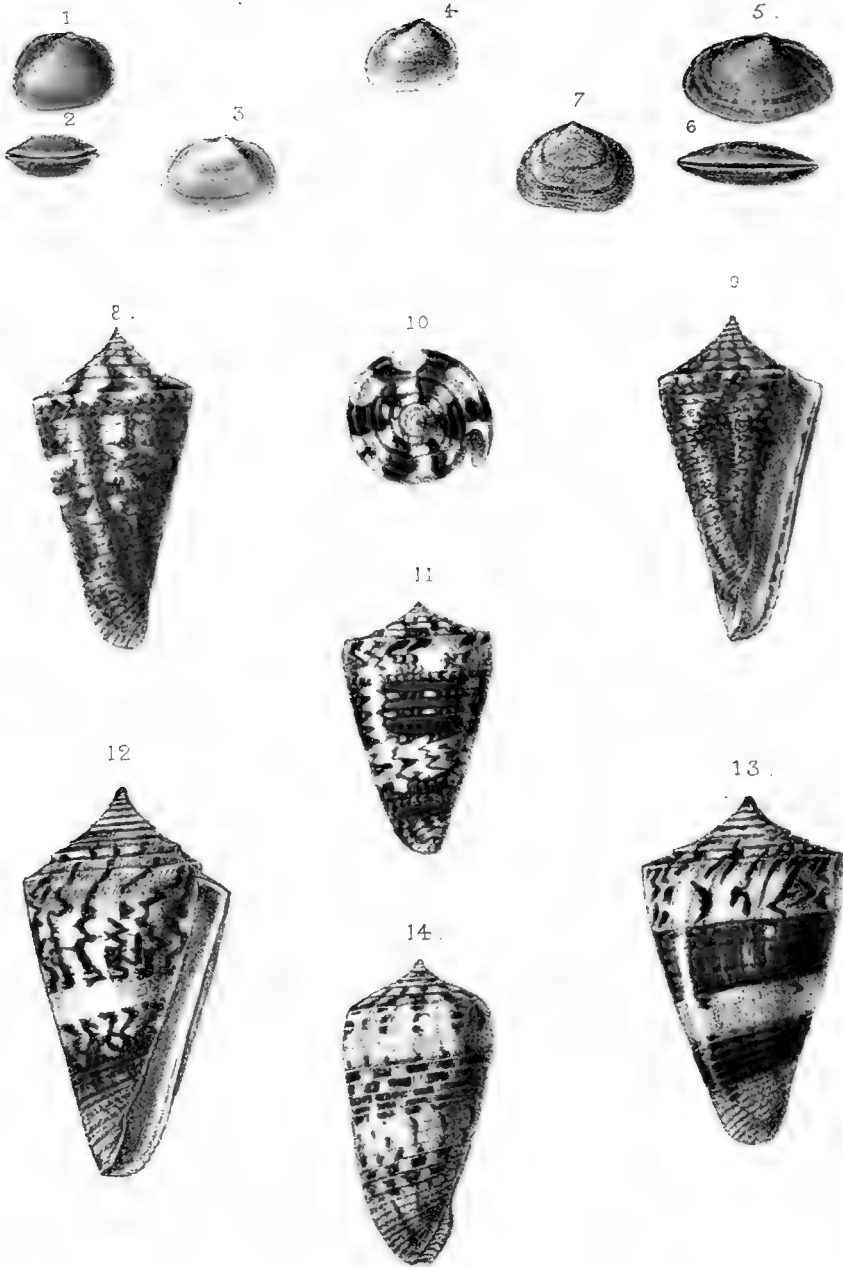
*Columbella pellucida*, Pse., is probably a *Nitidella* (or *Mitrella*).

*C. flammea*, Pse., belongs to the same section: it appears to be a variety of *C. tæniata*, Ad. & Rve. (non Phil.). *C. lineolata*, Gld., and *C. decolor*, Gld., are conspecific, (teste type specimens in Mus. Smiths.).

*Columbella*, sp. ind. (like *australis*), Pse., = *C. araneosa*, Gld., var. It belongs to *Amycla*.

\* This shell, when first examined by Mr. Cuming, was pronounced to be a variety of *P. sicula*. Similar forms have been found on both sides of the North-American continent.—P. P. C.





G.B. Sowerby.lith.

M & N Hanhart imp

NEW SPECIES OF SCINTILLA, PYTHINA AND CONUS.

*C. sagitta*, Gask., is also an *Amycla*. In Mr. Pease's series of specimens, the arrow-pattern gradually passes away.

*Sistrum seminodosum*, Pse., = *elatum*, Blainv., var.

*Mitra brunnea*, Pse., = *Strigatella fuscescens*, Pse., var. (teste H. Cuming).

*M. tessellata*, Pse., = *M. puella*, Rve. (teste H. Cuming).

*Triton crenulatus*, Pse., = *Epidromus antiquatus*, Hds.

3. DESCRIPTIONS OF FOUR NEW SCINTILLÆ AND ONE NEW PYTHINA FROM THE COLLECTION OF MR. H. CUMING. BY G. B. SOWERBY, F.L.S.

(Pl. XXXII.)

SCINTILLA SEMICLAUSA. Pl. XXXII. f. 1, 2. *Testa oblongo-subquadrata, subventricosa, paulo obliquata, succinea, ad marginem ventralem clausa; lateribus vix hiantibus; apice acuminato; latere antico brevior et angustior.*

*Hab.* Borneo (*Mus. H. Cuming*).

Less obtusely angled on the anterior side than *S. succinea*, and deeper than *S. crocea*.

SCINTILLÆ LACTEA. Pl. XXXII. f. 4. *Testa oblique ovalis, alba, clausa, subventricosa, latere postico subextenso.*

*Hab.* Borneo (*Mus. H. Cuming*).

More oblique and less obtuse at the sides than *S. layardi*.

SCINTILLA ROSEA. Pl. XXXII. f. 5, 6. *Testa ovali-oblonga, compressa, rosea, antice subacuta, breviuscula, postice lata rotundata; margine ventrali expanso.*

*Hab.* Lizard Islands (*Mus. H. Cuming*).

More expanded at the ventral margin, and more pointed anteriorly, than *S. pudica*.

SCINTILLA OBLONGA. Pl. XXXII. f. 3. *Testa pallide straminea, oblonga, lateribus subquadratis, marginibus dorsalibus et ventralibus rectis.*

*Hab.* Borneo (*Mus. H. Cuming*).

More quadrately oblong than *S. borneensis* and similar species.

PYTHINA STRIATISSIMA. Pl. XXXII. f. 7. *Testa pallide straminea, minutissime divaricatim striata; complanata, subtrigona, marginibus latero-dorsalibus declivis, margine ventrali rectiusculo, medio vix sinuato.*

*Hab.* Borneo (*Mus. H. Cuming*).

4. DESCRIPTIONS OF TWO NEW SPECIES OF CONUS FROM THE COLLECTION OF H. CUMING, ESQ., AND TWO FROM THE COLLECTION OF THE LATE MR. DENISSON. BY G. B. SOWERBY, F.L.S.

(Plate XXXII.)

CONUS SUBCARINATUS. Pl. XXXII. f. 12, 13. *Testa turbinata, sublævigata, infra rude sulcata, alba, pallidissime purpureo tincta, flammulis fuscis irregulariter angulatis longitudinalibus, medio interruptis plus minusve in fascias latas duas junctis; lateribus rectis; angulo subcarinato; spira prope angulum convexa, apice acuminato. Variat fasciis duabus latis, lineis interruptis cinctis ornata.*

*Hab.* Nicobar Islands (*Mus. Cuming*).

With something of the aspect of *C. voluminalis*, this shell differs from that species in being much more solid and broad. The angle is sharpened so as to form almost a keel. The two specimens in Mr. Cuming's cabinet are distinct varieties, one of which has two broad chestnut bands, girt by white-spotted brown lines.

CONUS STRATURATUS. Pl. XXXII. f. 14. *Testa oblonga, subpyriformis, supra subinflata, infra angustata subtorta, alba, pallidissime cæruleo tincta; maculis subquadratis pallide fuscis, in fascias duas latas dispositis, et aliis irregularibus ornata; sulcis distantibus supra medium subevanidis, infra profundis, ad fascias albas apparentibus cincta; angulo subrotundo; spira vix elevata, spiraliter striata, maculis fuscis linearibus radiata; apice acuminato; apertura lata; columella lineari, distincta.*

*Hab.* Borneo (*Mus. Cuming*).

This species belongs to the same group with *C. spectrum*, but most nearly resembles *C. collisus*. From the latter, however, it is distinguished by the thread-like white lines of sulci crossing the interrupted bands of colour, giving a paved appearance to the ornamentation. Mr. Cuming possesses several specimens.

CONUS SAGITTATUS. Pl. XXXII. f. 8, 9. *Testa gracilis, longitudinaliter minute striata, spiraliter liris leviter elevatis subdistantibus cincta; alba, flammulis fuscis longitudinalibus seu angulatis et super liras maculis sagittatis regulariter picta; lateribus medio paululum courctatis; spira conica, apice mucronato; anfractibus minute cancellatis, marginibus internis versus apicem elevatis; sutura lineari.*

*Hab.* —? (*Mus. Denisson*) (olim).

Although this elegantly formed, neatly sculptured, and delicately painted shell belongs to the same group with *C. marginatus*, *C. cancellatus*, &c., there is no known species with which it comes into immediate comparison. It has a cancellated sculpture formed by very delicate raised longitudinal lines crossing more raised and distant spiral ones; and besides the longitudinal flames and angular patches of light brown-colour, the spiral ridges are ornamented by a series

of minute arrow-headed markings of brown with white intervals. Purchased at the Denisson sale, and not yet placed.

CONUS MULTICATENATUS. Pl. XXXII. f. 10, 11. *Testa brevis, solida, acutangulata, lævis, alba, prope angulum distanter nigro maculata, fasciis latis duabus interruptis et linea textili interrupta mediana cincta; super fascias lineis fuscis, maculis rotundis albis catenatis ornata; lateribus rectiusculis; spira brevi, distanter et late maculata, anfractibus supra concavis.*

*Hab.* —? (*Mus. Denisson*) (olim).

A rather short shell, with straight sides; the spire flat, excepting close to the apex, where it becomes acuminate; but the top of the whorls are excavated. The angle is marked with distant angular black spots; above it is formed a sort of star by the centripetal bearing of six large chestnut spots. Upon the broad chestnut bands are chain-like cinctures formed of round or oval white spots interrupting dark lines. Purchased at the Denisson sale, and not yet placed.

#### DESCRIPTION OF PLATE XXXII.

Figs. 1, 2. *Scintilla semiclausa.*

3. — *oblonga.*

4. — *lactea.*

5, 6. — *rosea.*

7. *Pythina striatissima.*

Figs. 8, 9. *Conus sagittatus.*

10, 11. — *multicatenatus.*

12, 13. — *subcarinatus.*

14. — *straturatus.*

#### 5. ON THE HABITS OF THE WATER-SHREW (*CROSSOPUS FO- DIENS*). BY N. L. AUSTEN, ESQ.

I am induced to offer you the following account of the Water-Shrew, as the animal in question, though tolerably abundant in many localities, may not have come under the personal observation of some of my hearers. I have also never seen it mentioned as having been kept with success in confinement, and therefore will attempt to describe as accurately as possible the habits of a pair that lived in my possession for a considerable time, hoping that the details may not prove altogether uninteresting. In form this Shrew closely resembles the common species, the snout being lengthened in the same manner, and the fur having the same velvety softness of texture. In size, however, it is superior, a full-grown male measuring a little more than 5 inches in total length, whereas the Field-Shrew rarely exceeds 4 inches; the feet and tail are fringed with stiff white hairs, which are of great assistance to the creature when swimming. The colour on the head and back is commonly of a rich jetty black, on the sides and underparts pure white; the line of demarcation between the two colours very distinctly defined, adding much to the beauty of the fur; a small tuft of white hairs is also noticeable at the corner of the ear.

The Water-Shrew, as its name implies, is usually found in the vicinity of pools and rivulets, where it forms in the banks long and winding burrows, which penetrate for a considerable distance into

the loose soil, and end in a small chamber, furnished with a bed of moss and dry grass. In this secluded retreat the young are produced about the middle of May, there being usually from six to ten in the litter. When first born, they are curious pinky-white little animals, with round blunt noses and semitransparent bodies, bearing as little resemblance as possible to their parents. A small colony of these Shrews frequently inhabit the same spot, and towards the cool of the evening may be observed searching for food, and sporting with each other in the water, now hiding behind stones or large leaves to elude their companions, and then darting out to engage in a general skirmishing chase, diving and swimming with the greatest activity, and occasionally taking a plunge into their holes. By constantly traversing the same ground, in going and returning from their burrows, they gradually tread down a path among the grass and herbage, by which their presence may readily be discovered by an experienced eye. When under water their fur is covered with multitudes of tiny air-bubbles, that shine like silver, and have a beautiful effect when seen against the dark surface of the body. Spots where the stream in some bend of its course forms a little pool are the favourite resorts of this pretty little creature; and, although easily startled by the slightest noise, their range of vision seems far from extensive, as, by quietly approaching, I have often succeeded in watching their gambols without causing alarm among the small community. The food of the Water-Shrew includes insects, worms, young frogs, and small fish, which latter it pursues and captures with all the graceful dexterity of the Otter. I am enabled to speak with certainty as to this fact, by observing the mode employed by my own pets in seizing their prey. I obtained them in the following manner:—Having noticed a very fine pair that frequented a small pond, I set several circular wire mouse-traps, baited with small frogs, in what I supposed to be their favourite runs, and secured both male and female by the next morning. I had already had a cage constructed as much as possible in accordance with what I knew of their mode of life. It was shaped like an ordinary arched dormouse-cage, but considerably larger than those used, being 12 inches in height by 18 in length; a zinc tank was also adapted to hook on to the doorway, so that they might enjoy the comfort of a bath. When first introduced into their new dwelling, the Shrews evinced no symptoms of fear, appearing quite at home, and feeding freely on worms, raw meat, and insects. A few days after I procured them, I placed three or four minnows in the bath attached to the main part of the cage. Directly the Shrews caught sight of the fish, they both plunged instantly into the water, and quickly reappeared, each having secured a victim, which they proceeded to discuss with great apparent gusto, having first killed it by a bite through the head. I remarked that while feeding they held the fish firmly between their fore paws, in the same manner as the Otter, and, commencing at the head, ate gradually downwards, by a succession of sharp snapping bites. Their appetites were very good, as they frequently consumed two or three minnows each in one day—a very tolerable amount, considering their size. When



running about their cage, these Shrews often uttered a shrill sibilant chirp, resembling the note of the Grasshopper-Lark. They would also play in the water, half rearing up and striking with their fore paws, or rolling over and over each other on the surface. Though appearing perfectly reconciled to captivity, they manifested no attachment, nor especial tameness, biting viciously when touched. They lived with me in this way several months in perfect health, till, the cage-door being accidentally left open one day in my absence, the inmates levanted, as a matter of course, and were never seen or heard of afterwards. I hope, however, shortly to obtain more, as when treated properly, and supplied with plenty of water, they thrive, and might probably be induced to breed in confinement. Besides the Common Shrew, which is exclusively terrestrial, another species, the Oared Shrew (*Crossopus remifer*), is found in Britain. For some time this animal was confounded with the Water-Shrew, as its habits are similar, and it frequents the same situations. It differs, however, in colour, the black on the back and sides being flecked with white hairs, the throat and abdomen blackish grey tinged with yellow. Though scarcer than the two other kinds, the Oared Shrew is more abundant than is often supposed by naturalists, as I have several times caught it in different parts of Hertfordshire and Surrey. I must here remark that the ears of both the Oared and Water-Shrew are furnished with a peculiar and beautifully contrived apparatus by which the water is excluded from those organs. It consists of three small valves, which fold together when the animal dives, effectually preventing the entrance of a single drop of moisture. As soon, however, as the pressure is removed, on the Shrew rising to the surface, they reopen spontaneously. Without this provision of nature, the animal would constantly be annoyed by the water filling the cavities and irritating the delicate membranes of the ear.

The dimensions of full-grown individuals of the three species are as follows:—

	<i>Common Shrew.</i>	
	in.	lines.
Total length .....	4	1
Head .....	1	2
Tail .....	1	9
Hind foot .....	0	3

	<i>Water-Shrew.</i>	
	in.	lines.
Total length .....	5	7
Head .....	1	5
Tail .....	2	1
Hind foot .....	0	5

	<i>Oared Shrew.</i>	
	in.	lines.
Total length .....	6	1
Head .....	1	7
Tail .....	2	4
Hind foot .....	0	7

6. NOTICES OF A NEW GENUS OF DELPHINOID WHALES FROM THE CAPE OF GOOD HOPE, AND OF OTHER CETACEANS FROM THE SAME SEAS. BY DR. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S.

Mr. Layard has most kindly sent to me for examination and comparison the skulls of the Cetacea which are contained in the South-African Museum, under his charge. A short notice of them, extracted from a letter from him, was read at a former Meeting of the Society (see Proc. Zool. Soc. 1865, p. 357).

As the specimens are to be returned to Africa, I intend to have a cast made of each of the skulls here described, as a well-made cast is the best substitute for a real skull that we can have for comparison.

The collection consists of six skulls, which belong to the following species:—

1. *Delphinis doris*, Gray, Zool. Erebus & Terror.
2. *Delphinus euphrosyne*, Gray, Zool. Erebus & Terror.
3. *Steno frontatus*, Gray, Zool. Erebus & Terror.

4. The skull of a species of *Steno* with numerous small slender teeth, which appears to be distinct from any that I have before seen. It may be thus described:—

STENO CAPENSIS.

The beak of the skull elongate, rather compressed, tapering, and more compressed in front. Teeth  $\frac{37-37}{37-37}$ , small, slender, about five in an inch. Lower jaw slender, attenuated, and without any gonyx in front; the symphyses nearly one-fifth the length of the jaw.

“*Delphinus obscurus*, Gray,” Cat. S. A. Museum.

*Hab.* Cape of Good Hope (*Capt. Carew*, South-African Museum).

Length of the skull 16, of beak from the notch 10, of the lower jaw 13, of symphyses  $2\frac{3}{4}$  inches; width of the beak at the notch  $3\frac{1}{2}$ , of the brain-case at the hinder part of the orbit  $6\frac{3}{4}$  inches.

The skull is somewhat like that of *Steno attenuatus* in the British Museum; but the beak of the skull is longer compared with the size of the brain-case, and it is more gradually attenuated and slender, and higher in front.

5. *Grampus richardsonii*, Gray, Zool. Erebus & Terror; Cat. Cetacea Brit. Mus. 85.

*Hab.* Cape Seas (South-African Museum).

The skull resembles in most particulars that of *Grampus cuvieri*, and may be considered that of a typical species of the genus. It agrees with *Beluga* in the convexity of the triangle in front of the blowers, and in the general form; but it differs from that genus in the elevation of the margins of the maxillæ over the orbits, and on the side of the hinder part of the beak in front of the notch, showing that the genus is intermediate in form between *Beluga* and *Orca*.

*Grampus* and *Beluga* are peculiar for having teeth only in the front part of the lower jaw, as in *Globiocephalus*; but the teeth of *Grampus* are permanent, while those of *Beluga* are early deciduous.

The lower jaw is so nearly like the lower jaw which the British Museum received from the Museum at Haslar Hospital, without any habitat, and which I described in the 'Catalogue of Cetacea' under the name *Grampus richardsonii*, that I have been induced to refer the skull to that species.

The lower jaw from the Cape Seas only differs from the lower jaw of the typical specimen of *G. richardsonii* in being rather more slender in front, just behind the gonyx and the end of the teeth-line, and in the teeth being apparently rather shorter and more slender; but the base of the teeth of the typical specimen is entirely exposed, and in the one from the South-African Museum they are still imbedded in the dried gums; so that the difference is more apparent than real.

The upper edge of the orbit is raised into a decided marginal ridge. The maxillary bones in front of the notch are rather expanded and well bent up on the edge.

The triangular space in front of the blower is convex, evenly rounded, and with a well-marked oblique groove on each side in front.

The intermaxillary bones are very broad, with a hard, shining, smooth, rather convex upper surface; they cover fully two-thirds of the upper part of the hinder portion, and much more, or at least four-fifths, of the front part of the beak. The palate is flat in front, and rather convex behind. The upper jaw is rather bent down at the tip, and is destitute of teeth, but has a submarginal line with a few small pits. The lower jaw has four conical teeth on each side in front, placed over the gonyx.

Length of the skull 18, of beak from the notch  $10\frac{1}{2}$ , of lower jaw  $14\frac{1}{2}$  inches; width of the brain-case at the centre of the orbit 11, of beak at the notch  $7\frac{3}{4}$  inches.

The triangle in front of the blowers in the skulls of the European species is much elongated, the slender front part being produced between the intermaxillaries nearly to the end of the beak.

(1) *G. rissoi*, of Nice, with 5—5 teeth on the front of the lower jaw (Gervais, Zool. et Paléont. Franç. t. 57. f. 1, 2).

(2) *G. griseus*, of Brest, with only 2—2 teeth on the front of the lower jaw (Gervais, l. c. t. 57. f. 5).

In the Cape species the triangle is shorter and much broader compared with its length, the front side-margin being more transverse.

(3) *G. richardsonii*.

In *G. rissoi* the outer edges of the intermaxillaries are sinuous and rather contracted to nearly the middle of their length. In *G. richardsonii* the outer edges are rather slightly arched and bent out, the bones are widest in the middle of their length, and the nostrils are bent to the left side, the right side of the skull being most developed.

6. The skull which I described from the notes of Mr. Layard and the drawing of Mr. Trimen, under the name of *Ziphius layardii* (see

Proc. Zool. Soc. 1865, p. 358), proves on examination to be a very distinct species of the genus, allied to *Z. micropterus*, as I decided from the notes and drawing. The peculiar form of the teeth, which are elongated and arched over the outer surface of the upper jaw, so as to prevent the animal from opening its mouth beyond a very limited extent, it has been suggested to me, may be only an individual peculiarity or malformation. I scarcely think this is the case; but even if it should be, it will not in the least militate against the distinctness of the species, as the proportion of the beak to the size of the brain-case, and the form of the beak and position and form of the teeth, with a small point near the tip, are sufficient to clearly characterize the species.

The front edges of the lower teeth are absorbed or worn away by the friction of the upper jaw against them, and the vomer forms a large fusiform prominence on the upper surface of the base of the beak, in front of the blowers, between the narrowed part of the elongate, slender intermaxillaries, which are enlarged and thickened behind, forming the outer sides of the blowers.

In this respect it agrees with the figure of the skull of *Z. densirostris* from the Indian Seas, given by M. Gervais (Zool. et Paléont. Franç. t. 40. f. 3-6); but the vomer is more prominent in the Cape species. The Cape species has the slender, elongated, tapering lower jaws, and a very much longer beak to the skull, like that of *D. micropterus* of Havre (Gervais, l. c. t. 49. f. 1).

7. The skull which, from the inspection of the drawing of Mr. Trimen, I was inclined to regard as a new species of *Hyperoodon*, forming a peculiar section of the genus, and which I had provisionally named *Hyperoodon capensis* (Proc. Zool. Soc. 1865, p. 359), proves on examination to be an entirely new form, which appears to be intermediate in structure and form between *Hyperoodon* and *Catodon*. It agrees with *Catodon* and *Kogia* in having a large concavity on the crown of the skull, to contain the spermaceti (or "head-matter," as it is called by the whalers), over the blowers, and with *Hyperoodon* in having an elongated beak, with thick prominent nasal bones over the blowers, and in having none or only two or four deciduous teeth in the front of the lower jaw.

What I believed, in the small drawing made by Mr. Trimen, were the slightly developed lateral expansions of the maxillaries, which are characteristic of the genus *Hyperoodon*, prove on examination of the skull to have represented the much thickened intermaxillaries and the very large callous prominent vomer which is between them on the upper surface of the beak. The skull, as is generally the case in the Cetacea, is considerably distorted, the left side being much the smallest and least developed.

The genus may be thus defined:—

#### PETTORHYNCHUS.

The skull beaked; the brain-case hemispherical, margined behind and on the sides by the prominent edges of the maxillæ, occipital,

and other bones, with a large oblong concavity under the prominent enlarged nasal bones in front of the deeply seated blowers; the inner surface of the concavity lined on the side by the expanded hinder end of the intermaxillaries, and edged on the sides by the raised edges of these bones and the inner margins of the hinder parts of the maxillæ, the confines of the concavity being separated from the side-margin of the brain-case by a deep impression. The beak elongate, slender, compressed on the sides, fringed on the upper part of the sides by the edges of the enlarged callous intermaxillaries, which contain between them a much-enlarged callous vomer, which tapers in front into the end of the beak, and is truncated behind, filling up the narrowed fore part of the frontal concavity.

The upper jaw toothless. The lower jaw slender, produced in front, toothless; it may have had two teeth in front in the young state, as there are obscure indications and two pits.

The skull is much more like the usual form of that of the Delphinoid Whales than that of *Catodon* or *Kogia*, and somewhat like that of an *Hyperoodon* without the elevated ridges of the maxillæ on the sides of the beak.

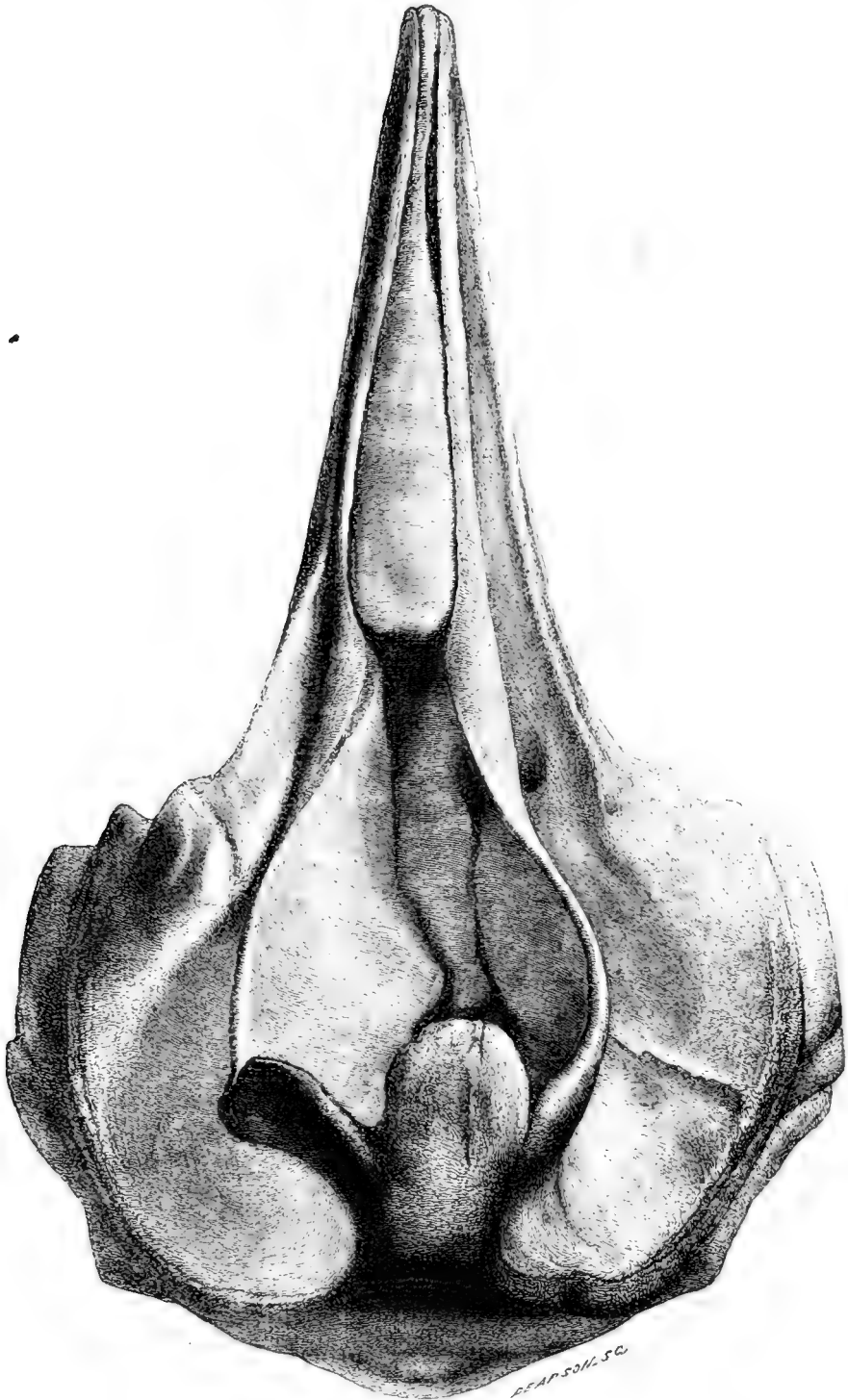
The peculiarity of the genus is the great development of the intermaxillaries and the large size and callous state of the upper surface of the vomer.

The intermaxillary bones which fringe the upper part of the sides of the beak are thick, hard, and shining, forming with the enlarged vomer the upper part of the beak; they are expanded behind so as to form the large hemispherical cavity in the crown, with nostril and blower at the base of its hinder part. This cavity is lined on the inner side with the expansion of the intermaxillaries, which are supported on each outer side by a wall formed by the elevation of the inner edge of the hinder part of the maxilla. The wall of the cavity is separated from the outer margin of the maxilla, which forms the inner part of the outer edge of the brain-case, by a deep concavity.

The upper part of the spermaceti-concavity is arched over by the thickened prominent nasal bones, and by the dilatation of the thick hinder edge of the walls.

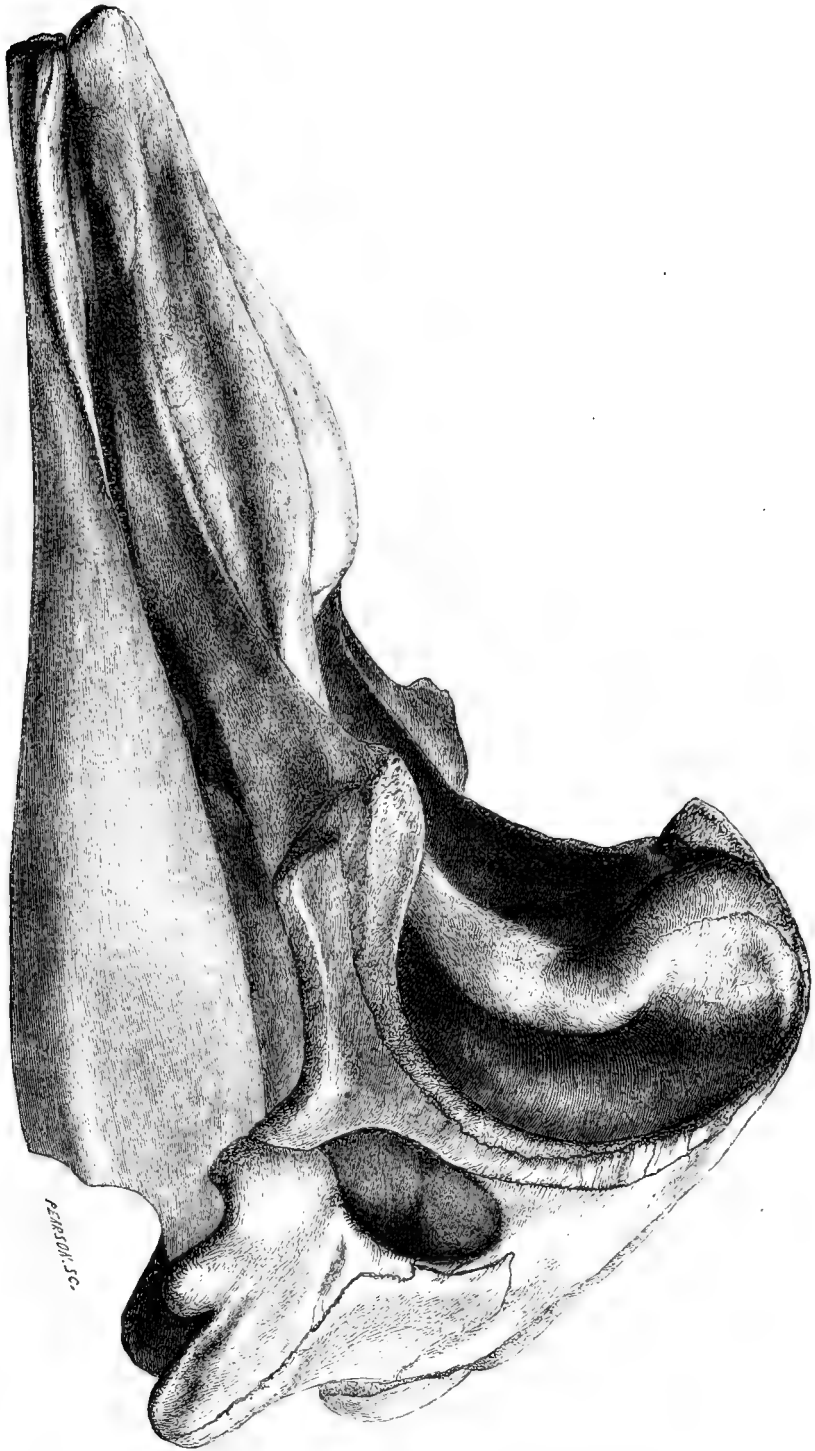
In *Catodon* and the allied genus *Kogia* the spermaceti-cavity occupies the whole upper surface of the skull, and is surrounded by an erect wall formed by the elevated hinder and lateral edges of the maxillæ. It is continued in front to the end of the broad expanded beak of the skull. The blowers are in the base of the hinder part of the concavity.

The intermaxillary bones are narrow, elongate, with the linear vomer forming a sunken groove between them on the upper surface of the beak. In *Catodon* the hinder part of the intermaxillary is only slightly dilated, and forms but a small part of the base of the crown concavity, as shown in Cuvier's figure (Oss. Foss. v. t. 22. f. 1-3); and from Mr. Macleay's description they seem to form a smaller part of the surface of the concavity in *Kogia* (see p. 39).



Skull of *Petrorhynchus capensis*.

(By a mistake of the artist, the sides of the skull in the figure are reversed.)



Skull of *Petrorhynchus capensis* (side view).  
(By a mistake of the artist, the sides of the skull in the figure are reversed.)

## PETRORHYNCHUS CAPENSIS.

*Hyperoodon capensis*, Gray, P. Z. S. 1865, p. 359.

*Hab.* Cape Seas.

The skull of this Whale resembles in several particulars the skull of *Ziphius cavirostris*, figured by Gervais (Zool. et Paléont. Franç. t. 39); but the cavity on the crown of that species is only slightly developed, though it is apparently rather more developed in the other specimens figured on the plate (t. 38. f. 1, 2) of that work; and the vomer is sunk in a groove as in the other Ziphioid genera, except in the specimen figured at t. 38. f. 2, which has the most developed frontal cavity, and in this there is an appearance as if the vomer was larger.

The study of this skull and of the *Ziphius* described by M. Van Beneden, received from the Cape, has induced me to reconsider the arrangement of the genera of Ziphioid Whales, which I have formed into a family, *Ziphiidæ*, which may be thus characterized:—

Head beaked; blower linear, transverse, on the back of the head. The upper jaw toothless, or with a few rudimentary teeth, which are not or only rarely developed. Lower jaw with a few teeth on the side or in front, which are sometimes early deciduous or not exposed. Body elongate; dorsal fin falcate; pectoral fins small, low down, and rather close together on the middle of the chest; fingers five, of four or five phalanges. Skull with an enlarged nasal over the blowers, which are more or less sunken.

This family may be divided into three sections.

1. HYPEROODONTINA. *Teeth in front of the lower jaw conical. Beak with a high crest on each side, formed by the elevation of the maxillary bones.*

HYPEROODON. Beak of skull straight; crest of beak short, edged, only as high as occiput. *H. butzkopf*.

LAGENOCETUS. Beak of skull ascending; crest of beak flat, tipped, higher than the occiput. *L. latifrons*.

2. EPIODONTINA. *Teeth in front of lower jaw cylindrical or conical. Beak conical; the intermaxillary enlarged behind, forming a more or less large cavity round the blowers.*

ALIAMA. Vomer simple; intermaxillary only slightly elevated on the sides of the blower. Teeth large. *A. indica* = *Ziphius indicus*, Van Beneden. Cape of Good Hope.

EPIODON. Vomer forming a sunken groove; intermaxillary forming a moderately high basin round the blower. *E. desmarestii* = *Ziphius cavirostris*, Cuvier. Mediterranean.

PETRORHYNCHUS. Vomer swollen, forming a large elongated tubercle between the callous intermaxillary; intermaxillary forming a high basin round the blower. *P. capensis*. Cape of Good Hope.



3. ZIPHIINA. *Teeth in the side of the lower jaw compressed. Beak subcylindrical, simple; intermaxillary linear, slender, rather swollen on sides of blower.*

BERARDIUS. *Teeth in the front of the side of the lower jaw conical. B. arnouxi.*

ZIPHIUS. *Teeth in the middle of the sides of the lower jaw of the male large, compressed; of the female small, cylindrical, rudimentary. Lower jaw slender, tapering. Z. micropterus; Z. capensis.*

DIOPLODON. *Teeth in the middle of the lower jaw conical, compressed. Lower jaw broad behind, suddenly narrowing in front. D. sechellensis.*

On reconsidering the account of the Short-nosed *Physeter* of the Cape, I have been induced to believe that the *Physeters* should be separated from the *Catodons* into a separate family called *Physeteridae*, characterized by the oblong rounded form of the head with the blowers on the hinder part of the crown, with a small narrow inferior mouth, and by having an elevated compressed dorsal fin and an ovate pectoral one. The skulls of the species known confirm this idea, as they have the concavity on the crown divided by a more or less central bony ridge into two cells or cavities, instead of being simple like that of the *Catodons*.

M. de Blainville has figured and shortly described a skull that is in the Paris Museum, received from the Cape of Good Hope, under the name of *Physeter brevirostris*. On this skull I established the genus *Kogia*.

Mr. William S. Macleay, in his account of the skeleton of the Australian Sperm Whale, described and figured the skeleton of a *Physeter* thrown ashore on the coast of Australia, which is in the Australian Museum at Sydney, under the name of *Euphysetes grayii*.

It has been thought that these two genera are synonymous; but from the study of the figures and of the photograph of the bones of the Australian species, which have been kindly sent to me by Mr. Krefft, I am induced to believe that the genera are distinct, and that both ought to be adopted. They may be characterized thus—

1. **KOGIA.** The septum that divides the cavity on the crown of the skull very sinuous, folded so as to form a central funnel-shaped concavity. Beak as long as broad at the base.

*Kogia brevirostris* (= *Physeter brevirostris*, Blainv. Annals d'Anat. et de Phys. ii. t. 10, 1838). Cape of Good Hope. Skull Mus. Paris.

2. **EUPHYSETES.** The septum that divides the cavity on the crown of the skull simple, longitudinal, only slightly curved. Beak shorter than broad.

*Euphysetes grayii*, Macleay, on a New Sperm Whale, 1851, t. 2. Australia. Skeleton, Australian Museum, Sydney.

## 7. REPORT ON THE TERRESTRIAL AND FLUVIATILE MOLLUSCA OF PALESTINE. BY H. B. TRISTRAM, CORR. MEMB.

The character of the Molluscan fauna of Palestine partakes, as might have been expected, of the same variety which marks the other branches of its fauna and flora. There are, however, fewer exceptions to its general character as a part of the Mediterranean basin, and fewer traces of the admixture of African and Indian forms. Northern types, especially of the genus *Clausilia*, are frequent in the Lebanon and on its southern spurs in Galilee. The Molluscan fauna of the maritime plains and the coast possesses no features distinct from those of Lower Egypt and Asia Minor. The shells of the central region are scarce and not generally interesting; while on the borders of the Jordan valley and in the southern wilderness we meet with very distinct groups of *Helix* and of *Bulinus*, chiefly of species peculiar, or common in some few cases to the Arabian desert.

The fluviatile Mollusca are of a type very much more tropical in its character than that of the terrestrial shells. There are here but few species similar to those of the east of Europe. Most of the species are identical with, or similar to, those of the Nile and of the Euphrates; and some of the genus *Melanopsis* are peculiar to the Jordan or its feeders. It seems probable that the inhabitants of the waters were better able to sustain the cold of the glacial epoch than the mollusks of the land; and from the post-tertiary remains found by the Dead Sea we may infer that the species now existing have been transmitted from a period antecedent to the glacial; while the more boreal forms introduced at that epoch have maintained their existence in the colder districts of Northern Palestine to the exclusion of the southern species, which have not succeeded in re-establishing themselves. The beautiful group *Achatina*, requiring a degree of moisture not generally found in Palestine, is only represented by a few insignificant and almost microscopic species.

The Molluscan fauna of this country has been less neglected than other branches of its natural history. Olivier first published a few species through Férussac in 1821. Ehrenberg added many more, of which eighteen were described as new. Boissier published his list in the 'Zeitschrift für Malakologie' in 1847. Bourguinat published and figured in 1853 the collection made by M. de Saulcy; and Dr. Roth, in his 'Molluscorum Species,' in his 'Spicilegium Molluscorum,' 1855, and 'Coquilles Terrestres et Fluviatiles,' edited by A. Mousson, 1861, has supplied us with a catalogue far more complete and exhaustive than any of his predecessors.

It will be seen that while we have not, as the result of our expedition last year, to report many entirely new species, we succeeded in obtaining very many which had not occurred to Dr. Roth, and several which had escaped the observation of all our predecessors.

As it seems probable that several species have been redescribed by authors who were not acquainted with the works of previous writers, I have thought it advisable to confine my report to the Zoological

Society to such species as were collected by ourselves, simply appending a list of reputed species not found by us.

1. *LIMAX PHENICIACUS*, Bourg.

Very common in the maritime plains from Beyrout to Jaffa, and in the valleys which abut on them. Not observed in the interior. Easily distinguished from *L. agrestis* by its larger size and its crowded black spots. It is very slightly wrinkled, and reaches a length of upwards of 2 inches.

2. *LIMAX BERYTENSIS*, Bourg.

In the same localities as the preceding, but by no means so plentiful. It is of much smaller dimensions, and may be at once distinguished by its deep black colour, and its mantle placed not in front, but almost on the centre of its back.

3. *LIMAX TENELLUS*, Müll.

I found several specimens of a slug in moist valleys south of the Lebanon, which I can in no way distinguish from the European species.

4. *TESTACELLA SAULCYI*, Bourg.

I dug up four fine specimens of this interesting species in the Wady Kurn, near the plain of Acre.

5. *SUCCINEA PFEIFFERI*, Rossm.

Among reeds near Beyrout.

6. *SUCCINEA GLOBOSA*, n. sp.

*T. ovato-globosa, fragilis, tenuis, nitida, delicatissime striata, aurantiaco-rubra; spira acuta, vix elongata; anfrac. 3½, convexi, ultimus subito accrescens, inflatus, basi expansa; apertura rotundo-ovalis, superne rotundata; peristoma simplex, margine columellari superne reflexiusculo.*

Long. 14, diam. 10, alt.  $8\frac{1}{2}$  mill.

This beautiful and most peculiar species was obtained by me on papyrus-stems in the marshes of Huleh (waters of Merom), in the Upper Jordan. In the rotundity of its form and the diaphanous redness of its coloration it is widely removed from any other of the group which I have seen. The animal is very large for the shell.

7. *HELIX SANCTA*, Bourg.

Near Jerusalem. Mousson considers this only a giant variety of *H. cellaria*. The differences, however, appear constant, both in colour and convexity.

8. *HELIX NITELLINA*, Bourg.

Scarce throughout the country.

9. *HELIX CELLARIA*, Müll.

In the north only.

10. *HELIX JEBUSITICA*, Roth.

Near Jerusalem, Sarepta, and Nazareth. Easily distinguishable from *H. sancta* by its less regular and less delicate striation, and by its much larger umbilicus—and from the following species by its rounded umbilicus and the less rapid increase of its whorls.

11. *HELIX ÆQUATA*, MOUSS.

Only in the north, near the coast.

12. *HELIX CAMELINA*, Bourg.

Near Nazareth, Jericho, and Jerusalem.

13. *HELIX HIEROSOLYMITANA*, Bourg.

Not uncommon close to Jerusalem; not met with elsewhere.

14. *HELIX PULCHELLA*, Müll.

We found a single specimen of this worldwide species under a stone in the plain of Acre.

15. *HELIX CONSPURCATA*, Drap.

On the coast near Sidon.

16. *HELIX ERDELI*, Roth. (= *H. flavida*, Rossm.?)

Near Jerusalem.

17. *HELIX SYRIACA*, Ehrenb.

One of the most abundant shells in every part of the country.

18. *HELIX OLIVIERI*, Fér.

Very common everywhere.

19. *HELIX CARMELITA*, n. sp.

*T. imperforata, depressa, flavida, vix pellucida, nitida, regulariter et pulcherrime striata; anfract. 6, convexi, lente accrescentes, sutura profunda, ultimus ad aperturam deflexus; apertura compressa, obliqua, lunaris; perist. reflexo, flavido, intus albescente, densato; basi rotundata.*

Diam. maj. 8, min. 7, alt. 4 mill.

Two adult and several young specimens of this very distinct and pretty little shell were collected by us on Mount Carmel. It seems to bear no affinity to any other species in the country; but is somewhat like *H. partita*, Pfr., from Ceylon, which, however, is umbilicated.

20. *HELIX BERYTENSIS*, Fér.

Generally distributed in small numbers through the country.

21. *HELIX LENTICULA*, Fér.

Near the coast.

22. *HELIX NUMMUS*, Ehrenb. (= *H. hedenborgi*, Pfr.)

Very abundant in the Nahr el Kelb, near Beyrout.

23. *HELIX SOLITUDINIS*, Bourg.

Cœle Syria.

24. *HELIX PISANA*, Müll.

Plentiful along the coast, to which it is strictly confined. Specimens from the north are very richly coloured, while from the district near Gaza they are blanched and colourless in life.

25. *HELIX CÆSPITUM*, Drap.

On the coast and the hills near it, in the north of Palestine.

26. *HELIX VARIABILIS*, Drap.

Very common on Mount Carmel, and with many variations of colours and size. The eastern specimens seem generally to be smaller than those of Europe. Probably several of the species not recognized by us may be referred to varieties of this widely spread and most variable shell. M. de Saulcy does not appear to have met with it, but perhaps distinguished it under some other name.

27. *HELIX MARITIMA*, Drap.

Found on the hills along the coast. From the study of a long series of intermediate varieties, I should feel disposed to diminish very greatly the number of described species of this variable group.

28. *HELIX CAPERATA*, Mont. (= *H. langloisiana*, Bourg.?)

Common near Jerusalem.

29. *HELIX HIEROCHUNTINA*, Roth.

Takes the place of the preceding species in the Jordan valley. It may be at once distinguished by its red peristome and flattened spire.

30. *HELIX TURBINATA*, Jan.

Scarce on the coast.

31. *HELIX APICINA*, Lam.

In the north, on the dry rocks near the coast.

32. *HELIX CAMPESTRIS*, Ziegl.

Found on the high plateau of Moab and Eastern Gilead.

33. *HELIX PROTEA*, Ziegl.

Common and variable from the coast to the southern deserts. I have many specimens corresponding to *H. langloisiana* of Bourguinat, which appears to be only a strongly marked desert and blanched variety of the present species.

34. *HELIX VESTALIS*, Parr.

Abundant in a few localities.

35. *HELIX TUBERCULOSA*, Conrad.

Erroneously identified by Bourguinat with *H. despreauxii* from the Canaries. This is the most peculiar and interesting *Helix* in Palestine, and is found only sparingly in very restricted localities in the highlands west and south-west of the Dead Sea.

36. *HELIX LEDERERI*, Pfr.

In a few places on the coast, on sand-banks.

37. *HELIX SEETZENI*, Koch.

In immense numbers over the southern deserts, where it is the food of Sea-Gulls.

38. *HELIX ARABICA*, Roth.

Very scarce, and only south of the Dead Sea, taking the place of the preceding species.

39. *HELIX CANDIDISSIMA*, Drap.

Very common.

Var. *hierochuntina*, Boiss., granulated at the apex.

Var.  $\beta$ , extremely glossy, and less than one-third the size of African specimens.

40. *HELIX FIMBRIATA*, Bourg.

Found in a few restricted localities north and west of the Dead Sea.

41. *HELIX PROPHETARUM*, Bourg.

Scattered in several localities west and south of the Dead Sea, near Sebbeh and Jebel Usdum.

42. *HELIX BOISSIERI*, Charp.

This fine example of a desert species, with its thick cretaceous shell, its solid contracted mouth and black interior, is widely dispersed in different localities over the Judæan desert, but not so generally as *H. seetzeni*.

43. *HELIX FILIA*, Mouss.

This beautiful desert species has strong affinities both with *H. prophetarum* and *H. boissieri*. It is extremely scarce, and is found only in a few localities near the Dead Sea.

44. *HELIX CARIOSA*, Oliv.

Extremely abundant in the mountain districts of Western Palestine; not observed in the east. The three varieties, (1) *amphicyrta*, (2) *nazarensis*, (3) *crassocarina*, are easily recognizable. The third

is the prevailing type in the north, distinguished by its depressed spire and broad flattened keel. About Nazareth it gives way to the second variety, rounder, with the keel more compressed, but still the spire depressed. Specimens about Jerusalem and Carmel partake of the character of the first variety, with elevated spire; while at Hebron, the southern limit we observed for this shell, the northern form *crassocarina* reappears unchanged in the slightest particulars.

45. *HELIX CÆSAREANA*, Parr.

Abundant in the plain of Sharon and about the Sea of Galilee. The specimens from Gennesaret are much larger and more richly marked than those from Judæa.

46. *HELIX SPIRIPLANA*, Oliv. (*H. guttata*, Bourg.)

Generally distributed, but not numerous—in the higher grounds of Southern Palestine, and not found in the same localities as the preceding.

47. *HELIX MASADÆ*, n. sp.

*T. umbilicata, depressa, solida, albida, transversim regulariter et profunde striata, et superne et infra; zonis evanescentibus fuscis albo interruptis aliquando ornata; anfract. 5 superiores carinati, plani, sutura protracta, ultimus antice valde deflexus; apertura obliqua, rotundata; perist. reflexo, expanso, sæpe umbilicum celante.*

Diam. maj. 30, min. 25, alt. 14 mill.

Apert. diam. maj. 13, min. 11 mill.

*Hab.* Sebbeh (ant. Masada), and the most barren and sterile mountains from there to Jebel Usdum, the salt-mountain. The deep and regular striation of this shell distinguishes it at once from *H. spiriplana*, for a small variety of which (such as that which Conrad has described under the name *H. lithophaga*) it might otherwise be mistaken.

48. *HELIX ASPERSA*, Müll.

Very common in the gardens of Tyre, Sidon, Beyrout, Jaffa, and all places on the coast. We did not meet with it inland. It reaches a very large size—quite equal to the specimens from Algeria, and far surpassing those of the Greek islands. This as well as all the following species and *H. cæsareana* are collected and sold in the markets for food.

49. *HELIX CAVATA*, Mouss.

Common in the interior; not plentiful near the coast.

50. *HELIX PRASINATA*, Roth.

We did not find this species ourselves; but I possess three specimens given me at Jerusalem by my lamented friend, its discoverer, Dr. Roth.

51. *HELIX LIGATA*, Müll.

In the Lebanon.

52. *HELIX SOLIDA*, Ziegl.

Between Nablous and the Jordan.

53. *HELIX PACHYA*, Bourg.

Near the Lake of Gennesaret, and north of Beyrout.

54. *HELIX ENGADDENSIS*, Bourg.

In the wilderness of Judæa.

These six species appear to me to be very closely allied, the most important differences being in the aperture, which is almost circular in *H. cavata* (a species closely allied to *H. figulina*), and is oval and elongated in *H. prasinata* and *H. engaddensis*. The differences in size and colour are certainly very great; yet I am inclined to believe that they are attributable rather to climate and locality, and that further research will embrace all in two or at most three species. In the immense series we collected, it is difficult anywhere to draw a satisfactory line.

55. *HELIX VERMICULATA*, Müll.

A dwarf form of this widely spread and variable shell occurs between Beyrout and Tripoli. In Northern Syria it is as large as in North Africa.

56. *BULIMUS ACUTUS*, Drap.

Common on the sandy banks near the shore between Beyrout and Sidon; scarcer to the southward.

57. *BULIMUS DECOLLATUS*, Brug.

Found by us sparingly in the plain of Sharon. This is, so far as I am aware, the most eastern locality hitherto noticed for this shell. I cannot altogether agree with the remark of Bourguinat, that *B. decollatus* does not vary in the east and west, excepting in size, those from the east being considerably larger than from the west. I possess an extensive series collected by myself in every country bordering on the Mediterranean, from Spain and Morocco to Asia Minor, Cyprus, and Syria. The specimens from Algeria and Tunis are very much larger than any on the northern side, reaching the length of  $2\frac{1}{4}$  inches without the rejected portion of the apex. The Spanish specimens are much more obtuse, and with fewer whorls, than those from countries further east; and the further we proceed eastward, the longer and the more attenuated do we find the shell, till in Cyprus and Palestine it reaches its extreme attenuation, though not approaching African specimens in size. It does not appear to occur in Egypt.

58. *BULIMUS FASCIOLATUS*, Oliv. (var. *eburnea*).

Scarce, in the neighbourhood of the Wady Kelt, near Jericho.



59. *BULIMUS LABROSUS*, Oliv.

The finest and most characteristic shell of Palestine. It is found, generally concealed in small fissures of the limestone rocks, sometimes under stones, throughout the whole of Western Palestine, as far as the edge of the Ghor or Jordan valley, but not beyond. It is most abundant near the coast, where it attains its greatest size. A very small variety is found in the southern wilderness.

60. *BULIMUS CARNEUS*, Pfr.

This beautiful shell takes the place of the preceding species in the basin of the Dead Sea towards the south; but we never found it north of Engedi, nor on the east side. It is most plentiful about the famed rock of Masada, the modern Sebbeh. We brought a considerable number home alive, which are now depositing their eggs, and feeding on succulent plants. It is impossible, after observing a large series, to have any hesitation in separating *B. carneus* specifically from *B. labrosus*. The elongated form, the mouth proportionally less than half the size of the other species, and circular instead of being extended towards the right, the solidity of the peristome, and the callosity largely extended over the last whorl at once distinguish every specimen; nor have I ever detected any intermediate forms.

The typical *B. carneus* of Dr. Pfeiffer is from Lycia. I have not been able to compare my specimens with the type, though they appear to coincide exactly with the diagnosis and the figure. It is possible that our Dead Sea species may be distinct.

61. *BULIMUS HALEPENSIS*, Pfr.

Generally diffused, but scarce in number of individuals. Collected near Jerusalem and by the Dead Sea.

62. *BULIMUS SYRIACUS*, Pfr.

Extremely abundant in certain localities of the Lebanon.

63. *BULIMUS SIDONIENSIS*, Charp.

In the plain of Phœnicia and the neighbouring hills.

64. *BULIMUS ATTENUATUS*, Mouss.

Erroneously identified by Bourguinat with *B. obesatus*, Webb and Berthelot, from the Canaries. Frequent throughout the wooded hills and under brushwood in Western Palestine. The rich olive-green epidermis of the living shell seems to have escaped the notice of its describers.

65. *BULIMUS URIÆ*, n. sp.

*T. cylindracea, ventricosa, oblique arguteque striolata, nitidiuscula, corneo-olivacea vel cornea; anfract. 7, plano-convexis, ultimo anfractu dimidium longitudinis vix æquante; apertura obliqua, rotundata, contracta; peristomate albo, intus labiato, reflexo; margine columellari vix dilatato.*

Long. tota 15, lat. 7; apert. long.  $5\frac{1}{2}$ , lat.  $4\frac{1}{2}$  mill.

*Hab.* The Wady of Amman (Rabbath Ammon).

This *Bulimus*, the Transjordanic representative of *B. attenuatus*, is intermediate in character between it and *B. pupa* of Greece and Algeria. From the latter it may be distinguished at once by its olive-green colour and by its suddenly expanding fifth whorl, which gives it a peculiar obese appearance. From the former it is distinguished by the sixth and seventh whorls increasing instead of contracting.

66. *BULIMUS (CHONDRUS) TRICUSPIS*, Pfr.

Not uncommon near Beyrout.

67. *BULIMUS (CHONDRUS) SEPTEMDENTATUS*, Roth.

Common throughout the whole country, and subject to great variations in size. The mouth is frequently six-toothed, and sometimes only five-toothed.

68. *BULIMUS (CHONDRUS) OVULARIS*, Oliv.

Common. For the distinctions between this and the last species, see Mousson, Coq. p. 46.

69. *BULIMUS (CHONDRUS) SAULCYI*, Bourg.

About the plain of Gennesaret and the Dead Sea. Confined, apparently, to the Jordan valley. Like *B. ovularis*, but invariably sinistral, and found in distinct localities.

70. *BULIMUS (CHONDRUS) NUCIFRAGUS*, Parr.

Scarce; found at Jaffa and near Jerusalem.

71. *PUPA DELESSERTI*, Bourg.

Scarce, in the Anti-Lebanon.

72. *PUPA SAULCYI*, Bourg.

Two specimens found near Tyre, in the hills.

73. *PUPA RHODIA*, Roth.

Scarce near Jerusalem. Very abundant on a rock near the Lake of Gennesaret, but extremely local.

74. *PUPA GRANUM*, Drap.

Near Sidon, in the plain of Phœnicia.

75. *PUPA SCYPHUS*, Friv. (?).

A single dead specimen in the Lebanon.

76. *PUPA LIBANOTICA*, n. sp.

*T. cylindrico-oblonga, cornea vel albidula, sub lente irregulariter striata, apice obtusissimo; anfract. 10, convexiusculi, sutura impressa, anfractus quinque primi obtusissimi, et rapide crescentes, anfractus sextus septimum subæquans, ultimus et penultimus valde coarctati, ultimus basi carinatus, et prope aper-*

*turam coarctatus; apertura semiovali unidentata, dente in callo sito; peristomate albido, reflexo, in callum continuo.*

Long. tota 11, lat.  $4\frac{1}{2}$  mill.

Found at Ainat, in the Lebanon.

77. PUPA MICHONII, Bourg.

One dead specimen found near Nazareth.

78. PUPA HEBRAICA, n. sp.

*T. minutissima, oblonga, regulariter et pulcherrime sulcis striata, apice abbreviato et obtusissimo, nitida, cornea, pellucida; anfract. 6, tertio ultimum in turgiditate superante, sutura profunda, ultimo ad aperturam forte coarctato; apertura pæne rotunda, sed infra contracta, peristomate continuo, supra callo simplici vix reflexo, tridentata, uno in callo, duobus ad marginem sinistram sitis.*

Long.  $2\frac{3}{4}$ , lat.  $1\frac{1}{2}$  mill.

Found in a tomb near Jericho. The beautiful and regular transverse ridges on the whorls, as seen through a magnifying-glass, at once distinguish this from every other species of *Pupa*.

79. CLAUSILIA MÆSTA, Fér.

Near Jaffa, near Beyrout, and occasionally in the hills behind the plain of Phœnicia.

80. CLAUSILIA STRANGULATA, Fér.

Plentiful in the ravine of the Nahr-el-Kelb, Lebanon.

81. CLAUSILIA SAULCYI, Bourg.

Only found by us at the Ladder of Tyre. Collected by M. de Saulcy near Jerusalem.

82. CLAUSILIA DELESSERTI, Bourg.

In the Nahr-el-Kelb, in damp caves; scarce.

83. CLAUSILIA ALBERSI, Bourg.

In the valley of the Kadisha, Lebanon.

84. CLAUSILIA BOISSIERI, Charp.

Excessively abundant near the Nahr-el-Kelb and on the rocks near Beyrout. Found abundantly on rocks, a few yards from the spray of the sea. It reaches a larger size here, and the peristome is more expanded, than in specimens from Crete and other parts of Greece.

85. CLAUSILIA GENEZERETHANA, n. sp.

*T. rimata, fusiformis, elongata, gracillima, confertim et acute lamellata, fusciscenti-albida; spira regulariter attenuata, apice cornea, acutiuscula; sutura profunda, lamellis prominentibus; anfractibus 15, minime convexis, ultimo infra suturam compresso, antice rugoso-costulato, breviter vix obsolete bicristato;*

*crista rimali obsoleta; apertura parva, pyriformi; lamellis exiguis approximatis; lamella inconspicua; plica palatali 1, subcolumellari, emersu; peristomate continuo, tenui, soluto, vix expanso.*

Long.  $20\frac{1}{2}$ , diam. 3 mill.

Found only on rocks near the plain of Gennesaret.

86. *CLAUSILIA MEDLYCOTTI*, n. sp.

*T. rimata, fusiformis, elongata, gracilis, acute et fortissime nec semper regulariter lamellata, fuscescenti-albida; spira regulariter attenuata; apice corneo, acutissimo; sutura profunda, lamellis interdum alternatis; anfract. 13-14, vix convexiusculis, ultimo latere impresso, basi bicristato; crista rimali, profunda, antice rugoso-costulata; apertura contracta, pyriformi; lamella inconspicua; plica palatali 1, subcolumellari, inconspicua; peristomate continuo, expanso, soluto.*

Long. mill. 19, diam.  $3\frac{1}{2}$ ; apert. long. 3, lat.  $2\frac{1}{2}$  mill.

This most beautiful *Clausilia*, which I have great pleasure in dedicating to my friend and fellow-traveller Mr. W. C. P. Medlycott, was found by us only in one place, but in considerable plenty, in the hills behind Surafend (Sarepta). It may at once be distinguished from all others by the boldness of its sculpture, and by its very deep and distinct, though sometimes irregular, ridges.

87. *TORNATELLINA* (Beck) *HIEROSOLYMARUM*, Roth.

Scarce, in tombs in various parts of the country.

88. *GLANDINA* (*CÆCILIANELLA*) *TUMULORUM*, var. *judaica*, Bourg.

In tombs at Jerusalem.

89. *PLANORBIS HEBRAICUS*, Bourg.

Ain Mellaheh, near Lake Huleh.

90. *PLANORBIS PISCINARUM*, Bourg.

Near Zebdany, in Cœle Syria.

91. *LIMNÆUS TENER*, Parr.

Near the Lake Huleh.

92. *LIMNÆUS SYRIACUS?*, Mouss.

Near Baalbec.

93. *CYCLOSTOMA OLIVIERI*, Pfr.

Very common in the neighbourhood of the plains of Phœnicia and Acre, but not met with further south or east.

94. *BITHINIA HEBRÆORUM*, Bourg.

Ain Fijeh, and other fountains in the Bukáa; very common.

## 95. BITHINIA (PALUDINA) PHIALENSIS, Conrad.

Birket-er-Ram (Lake Phiala).

## 96. BITHINIA RUBENS, Menke.

Lake Huleh.

There are several other species of minute *Paludinidæ*, which I have not been able to determine.

## 97. MELANIA TUBERCULATA, Müll.

Occurs living in various streams, and semifossil in great numbers on the marl-deposits by the Dead Sea. By the shores of the Lake of Galilee dead and bleached specimens are very common.

## 98. MELANIA ROTHIANA, Mouss.

We obtained several dead specimens of this shell by the Sea of Galilee; but I am more than doubtful of its specific value, believing it to be merely an elongated form of *M. tuberculata*.

## 99. MELANIA PYRAMIS, Bursch.

In the Nahr-el-Kelb. Always a deep brown-black, and differing from *M. tuberculata* in the absence of the longitudinal ridges and tubercles on the spire.

## 100. MELANIA RUBRO-PUNCTATA, n. sp.

*T. elongata, fusiformis, tenuis, pellucidior, corneo-albida, puncturis rubris in lineis longitudinalibus dispositis ornata, costulis numerosis spiralibus exarata; anfract. 12, sed apice sæpe eroso; anfract. convexiusculis, summis solis costulis longitudinalibus (sicut in M. tuberculata) sculptis; apertura subelliptica, coarctata, effusa; columella alba.*

Long. 21, diam. 5 mill.; altera 17 long.,  $3\frac{1}{2}$  diam.

*Hab.* Buried in the sand, in fountains near the Dead Sea.

Had I not consulted more experienced naturalists than myself, I should have felt disposed to have included this as a delicate and very beautiful variety of the variable *M. tuberculata*. The distinctive characters are the extreme smallness of the aperture and the sudden termination of the longitudinal sculpture, which does not extend to the lower whorls.

## 101. MELANOPSIS PRÆROSA (L.).

Very abundant in almost all the streams of Palestine, and found subfossil in the old marl-deposits by the shores of the Dead Sea. There is a distinct variety peculiar to almost every district.

Var. A, from the Nahr-el-Kelb, near Beyrout, is horn-colour, with three dark brown bands.

Var. B, from streams near Engedi and other streams flowing into the Dead Sea, is much larger than any other specimens I have seen, and may be at once recognized by a compression on the right side of the peristome, near the columella. It is rarely black, but of a rich

brown colour, and the inside of the mouth a pale purple. It may be hereafter separated as a distinct species.

Var. C, from the waters of Merom and the Lake of Galilee, is very large, almost approaching the specimens of Engedi in size, but black, more inflated and obtuse, and with a rich deep purple colour inside the mouth. Those from the Kishon are similar, but smaller.

102. *MELANOPSIS AMMONIS*, n. sp.

*T. oblonga, nitida, nigrescens vel fusco-cornea, apice acuto, raro eroso; anfract. 7-9, planis, regulariter crescentibus, non gradatis, laevibus; costis vel striis indistinctis et interdum obsolete sculpta; apertura ovali; perist. simplici, acuto; callo albo, effuso; columella albida et inflexa.*

Long. 25, diam. 10; apert. long. 7, larg. 5 mill.

I was at first inclined to place this shell as a variety of *M. prærosa*; but its more elegant and elongated shape, the smallness of its mouth, and the traces of longitudinal ridges appear to me sufficient to justify its separation. Found only in streams at Heshbon and Ammon, east of Jordan, where the other species does not occur.

103. *MELANOPSIS SAULCYI*, Bourg.

In a few restricted localities; chiefly at Ain Sultan, Jericho.

104. *MELANOPSIS COSTELLATA*, Fér.

In the Kishon. The differences between this and the preceding are clearly pointed out by Bourguinat. This species is less fusiform, more inflated, does not increase regularly, and its last whorl is three times the size of the others united; while that of *M. saulcyi* is not more than once and a half as large.

105. *MELANOPSIS COSTATA*, Oliv.

Very abundant in the Huleh (waters of Merom), the Lake of Galilee, and the Upper Jordan. In immense quantities in a subfossil state round the Dead Sea.

106. *MELANOPSIS JORDANICA*, Roth.

Peculiar, so far as we could ascertain, to the Lake of Galilee and the Jordan below it.

Rossmässler, as well as Roth at an earlier period, considered this to be a variety of the preceding species. There is, however, a striking difference, not only in the shape and coloration, but in the habit of the living animal. *M. costata* is always found adhering to the stems and the under surface of the leaves of aquatic plants; while the obtuse and striped form, *M. jordanica*, adheres only to rocks and stones. *M. costata* we never met with south of the entrance to the Lake of Galilee in a living state, nor *M. jordanica* to the north of it.

107. *MELANOPSIS EREMITA*, n. sp.

*T. fusiformis, semipellucida, elongato-pyramidalis, nitida, resplendens, vitreo-cornea, longitudinaliter irregulariter sed delica-*

*tissime striolata; apice acuto, nunquam eroso; anfractibus 6-8, planis, regulariter crescentibus; sutura parum impressa; apertura ovalis; peristomate, simplici, acuto; callo albescente; columella albida et inflexa.*

Long. 16, diam.  $6\frac{1}{2}$  mill.; apert. long. 5, lat.  $3\frac{1}{2}$  mill.

Collected only in the little stream of the Wady Um Bagkek, between Sebbeh and Jebel Usdum, at the south-west corner of the Dead Sea, where it was very abundant.

This beautiful and very small species of *Melanopsis* may be at once recognized by its peculiarly brilliant gloss. It may be remarked, that in the same region which supplies the smallest of its group, the common *Melanopsis prærosa* attains its greatest magnitude.

108. NERITINA JORDANI, Buttl.

Found only in the Jordan and its two lakes, Huleh and Galilee; but chiefly under the leaves of water-lilies in the Huleh. We never discovered it living in the lower course of the Jordan.

109. NERITINA MICHONII, Bourg.

Abundant in almost every stream and spring throughout the whole of Palestine, east and west, except in the Jordan and its lakes. It attains its greatest size in the thermal springs of the Ghor.

110. NERITINA BELLARDI, Mouss.

I have not had the opportunity of examining a type specimen; but, from the diagnosis, I believe this species to be that which is found in the Jabbok and its affluents. It is certainly different from *N. michonii*, as may be at once recognized by an examination of its operculum.

111. CYRENA COR, Lam.

Abundant in the Jordan and the Lakes of Huleh and Tiberias. In the latter it attains a very large size.

112. CYRENA FLUVIATILIS, Müll.

This species, if it be really distinct, is not uncommon in the Jordan. What is the *Cyrena crassula* of Mousson, found near Jaffa?

113. UNIO TERMINALIS, Bourg.

This is the common *Unio* of the Lake of Galilee, and I found it also in the Litany (Leontes) River. The *Unio jordanicus*, Bourg., seems to be only a thinner and shorter variety of *U. terminalis*. I have obtained so many intermediate specimens that it appears to me impossible to separate the two. *U. terminalis* also seems to be identical with the *U. dignatus*, Lea, from the Tigris, as I find on comparison of type specimens in Mr. Cuming's collection.

114. UNIO DELESSERTI, Bourg.

In the Zerka or Crocodile River, in the plain of Sharon. Found by M. de Sauley near Jaffa, in the same plain.

115. *UNIO MICHONII*, Bourg.

In the Zerka or Crocodile River. Figured by Bourguinat from the neighbouring streams of Jaffa. Appears to be but a variety of the *U. marginalis*, Lamarek, a variable species found in India, Mauritius, and China.

116. *UNIO SAULCYI*, Bourg.

From the Kishon. Found by M. de Sauley in the streams near Jaffa. This species is very like *U. mosalensis*, Lea, from the Tigris, if indeed it be not the same species.

117. *UNIO SIMONIS*, n. sp.

*T. ovato-rotundata, supra arcuata, infra subrecte arcuata, antice posticeque rotundata, ventricosa, crassissima, concentricè striata, epidermide nigra vel nigrescente, vel in juvenibus fusco-virescente; umbonibus valde prominentibus, recurvis, extremitate anteriore approximatis, striis undulantibus sculptis; dente cardinali crasso, altissimo, denticulato, sulcis rigidis impresso; dente laterali crasso, producto; sinu palliali profunde impresso; t. infra nacreo-roseo pulcherrime resplendente.*

Long. 66, lat. 44, diam. 32 mill.

This shell is found in the Jordan, the Sea of Galilee (where it reaches its greatest dimensions), the Orontes, and the Leontes (Lithy). Its rotundity, thickness, solidity, and the brilliant rosy tint of its nacreous interior distinguish it at once from every other species. The massive solidity of the young shells is very remarkable. The rosy tint is equally brilliant in all the specimens I have seen.

118. *UNIO EPISCOPALIS*, n. sp.

*T. elongato-ovalis, valde inæquilateralis, subcomplanata, crassa, supra recta, infra compressa, postice rotundata, antice elongata, concentricè striata; epidermide nigerrima; umbonibus prominulis; dente cardinali alto, crasso, subacuto, fortissimo, laterali forti, elongato, nacreo, purpureo-episcopali pulcherrimo; sinu palliali profundissime impresso.*

Long. 98, lat. 56, diam. 35 mill.

This, the prince of Oriental *Unionidæ*, is not uncommon in the Orontes. I found a dead valve by the Leontes, but did not meet with it in the Lake of Galilee. From its brilliant purple hue, which is preserved in the most worn valves, from its size, its jet-black epidermis, and the peculiar compression, it is a remarkable and isolated species. I can find no *Unio* in the collection of Mr. Cuming which at all resembles it.

119. *UNIO TRIPOLITANUS*, Bourg.

Near Tripoli.

The following is a list of species mentioned by previous writers, but not found or identified by us; many of them are doubtful:—



- Limax variegatus*, Ehrenb.  
*Daudebardia syriaca*, Roth.  
*Helix pratensis*, Fér.  
 — *obstructa*, Fér.  
 — *arenosa*, Ziegl.  
 — *simulata*, Fér.  
 — *genezerethana*, Mouss.  
 — *improbata*, Mouss.  
 — *crispulata*, Mouss.  
 — *joppensis*, Roth.  
 — *neglecta*, Drap.  
*Bulimus benjamiticus*, Benson.  
 — (*Chondrus*) *lamelliferus*, Rossm.  
*Pupa chondriformis*, Mouss.  
*Clausilia ehrenbergii*, Roth.  
*Glandina liesvillei*, Bourg.  
*Limnæus truncatulus*, Gm.  
*Cyclostoma elegans*, Drap.  
*Bithinia saulcyi*, Bourg.  
 — *gaillardoti*, Bourg.  
 — *hawadieriana*, Bourg.  
 — *moquiniana*, Bourg.  
*Melania judaica*, Roth.  
*Neritina syriaca*, Bourg.  
*Cyrena crassula*, Mouss.  
*Unio requieni*, Mich.  
 — *litoralis*, Lam.

I may state that I have seen type specimens of *Helix joppensis*, *Bulimus benjamiticus*, and *Melania judaica*, the two former of which are unquestionably good species. *Helix genezerethana* is perhaps only a large variety of *H. nummus*, Ehrenb.

8. CONTRIBUTIONS TOWARDS A MORE COMPLETE KNOWLEDGE OF THE AXIAL SKELETON IN THE PRIMATES. BY ST. GEORGE MIVART, F.Z.S. & L.S., LECTURER ON COMPARATIVE ANATOMY AT ST. MARY'S HOSPITAL.

The great interest which has been felt of late as to the value and extent of the anatomical resemblances and differences between Man and the rest of the Primates has led to many researches, which have, however, been mainly directed to a consideration of the head and extremities, and especially of the bony framework of those parts.

To the various details given by Cuvier and others, respecting the cranial structure of the highest Apes as compared with each other and with Man, such careful and minute comparisons have from time to time been added by Professor Owen, in his well-known and justly esteemed memoirs on the subject, published in the 'Transactions' of this Society, and last of all by Professor Huxley, in his elaborate

comparison of their immature condition (soon to appear in the Society's Transactions), that little remains to be added to our knowledge on the subject; while the differences between the skulls of the highest Apes and those of the lower forms of the order have been investigated by Professor Vrolik, M. de Blainville, and other writers.

As regards the bones of the limbs, there is again but little to add to the comparisons already instituted between Man and the highest Apes in this respect, though perhaps some additional points of interest may yet result from a further investigation of the details of these structures in the lower groups.

The spinal column of the Primates has also been more or less noticed by Cuvier\* and by Meckel†; and the structure of the lower Apes, in this respect, compared with that of the higher, by Professor Vrolik‡ and by M. de Blainville§. Also Professor Huxley, in his Hunterian Lectures for 1864, has given many further details|| on the subject.

But the most complete and detailed description and comparison of the spinal column, as it exists in Man and in the highest Apes, is to be found in Professor Owen's memoir on the skeleton of the Gorilla¶; and it has appeared to me probable that the results of an extension of similar minute observations carried through every family of the order, comparing the various forms with each other and with Man, may not be without a certain interest as exhibiting the manner in which the human vertebral column becomes modified (so to speak) into that of the ordinary mammal, as adding a further clue to the affinities of the different groups composing the order, and, finally, as another contribution (however small a one) to a more correct appreciation of the anatomical and zoological value of the structural differences between Man and the highest of the Apes.

In the following summary of such results, many facts are stated which are already well known, or have been previously noticed, but the mention of which, nevertheless, could not be omitted.

Rich as are the collections of the British Museum and the Royal College of Surgeons, there are nevertheless several genera of the order of which no skeleton exists in either, and others of which there is no skeleton *unmounted*—deficiencies necessarily rendering the following account still more imperfect than it would otherwise be.

As a preliminary, it is necessary to state the arrangement here adopted, with respect to the families, subfamilies, and genera of the order, though this is not the place to give the characters on which this classification reposes. The Primates seem to me to be most naturally divisible as follows:—

\* Leçons d'Anat. Comp., 2nd edition, 1835.

† Traité Général d'Anat. Comp., traduit de l'Allemand par MM. Riester et Alph. Sanson, 1828.

‡ Recherches d'Anat. Comp. sur le Chimpanzé. Amsterdam, 1841.

§ Ostéographie—Mammifères, Primates, Pithecus, Cebus, Lemur.

|| Reported in the 'Medical Times' for 1864.

¶ Trans. Zool. Soc. vol. iv. p. 89, pls. 33, 34, 35, 36.

		Suborder I. ANTHROPOIDEA*.		
Fam. I. HOMINIDÆ .....				Homo.
				Troglodytes.
				Simia.
				Hylobates.
II. SIMIIDÆ .....	Subfam. †	1. <i>Simiinae</i> .....	}	Semnopithecus.
		2. <i>Semnopithecinae</i> ...		Colobus.
		3. <i>Cynopithecinae</i> ...		Cercopithecus.
				Macacus.
				Inuus.
				Cynocephalus.
				Ateles.
III. CEBIDÆ .....	Subfam. .	1. <i>Cebinae</i> .....	}	Lagothrix.
		2. <i>Mycetinae</i> .....		Cebus.
		3. <i>Pitheciinae</i> .....		Mycetes.
		4. <i>Nyctipithecinae</i> ...		Pithecia.
				Brachyurus.
				Callithrix.
				Chrysothrix.
IV. HAPALIDÆ .....				Nyctipithecus.
				Hapale.
		Suborder II. LEMUROIDEA ‡.		
				Indris, &c.
V. LEMURIDÆ .....	Subfam. .	1. <i>Indrisinae</i> .....	}	Lemur, &c.
		2. <i>Lemurinae</i> .....		Nycticebus.
		3. <i>Nycticebinae</i> .....		Loris.
		4. <i>Galagininæ</i> .....		Perodicticus.
				Arctocebus.
				Galago.
VI. TARSIIDÆ .....				Tarsius.
VII. CHEIROMYIDÆ .....				Cheiromys.

Throughout the Primates the spinal column consists of the same regions as it does in Man, the most obvious difference being the very considerable increase of the coccygeal vertebræ, both as regards number and size, in the great majority of species.

With the exception of this coccygeal or caudal region, the other parts of the spine bear more or less the same proportions one to another as in Man.

#### CERVICAL VERTEBRÆ.

The length of the cervical region, as compared to that of the dorsal region, is throughout the *Anthropoidea* pretty uniform, the first being from rather more than a third to about half the length of the second. In the *Lemuroidea* we find a greater variation, the proportion of the cervical region to the dorsal ranging from considerably less than a third, e. g. *Loris*, to as much as two-thirds, as in *Indris*.

The proportion of length to breadth of the cervical region is generally as about two to one in the *Anthropoidea*; but in *Hylobates* it

\* See P. Z. S. 1864, p. 635.

† This subdivision was, I believe, first proposed by my late lamented friend, Mr. Martin, in his unfinished work on Mammals, entitled 'A Natural History of Man and Monkeys,' p. 361. I am doubtful whether the *Simiinae* should not be raised to the rank of a family.

‡ For complete list of the genera of this suborder, see P. Z. S. 1864, p. 637.

is sometimes as three to one. In the *Lemuroidea* we again find a much greater range of variation; for in *Loris* and *Nycticebus* the length is not nearly twice the breadth (shorter relatively than in Man), while in *Indris* the cervical region of the spine is almost five times as long as broad.

In most of the Primates this region bears about the same proportion to the rest of the spinal column, exclusive of the tail or coccygeal vertebræ.

In *Hylobates*, *Cynocephalus*, and *Ateles* it is rather more elongated relatively than it is in Man. It attains its maximum of relative length, however, in *Indris*, where it exceeds one-fifth of the total length of the spine as above limited. On the other hand, in *Loris* it attains its minimum, the cervical region scarcely constituting more than one-tenth of the total length of the spine. Thus in the proportion of the cervical region to the whole trunk, as in its proportion to the dorsal region only, we find both extremes to exist in the sub-order *Lemuroidea*, which contains the relatively longest, as also the relatively and absolutely shortest, neck to be found in the whole order.

*Atlas*.—This bone has a very similar form throughout the *Anthropoidea*.

In the *Lemuroidea* there is a greater range of variation.

In the highest Apes, *Troglodytes* and *Simia*, the atlas is exceedingly like that of Man, only the transverse process is relatively rather smaller and shorter, and its extremity more upcurved\*.

This dorsal curvature of the extremity of the transverse process continues throughout the *Anthropoidea*; but in the *Lemuroidea* the ends of the transverse processes are generally bent more or less downwards.

The length of the transverse process, as compared to the total transverse diameter of the atlas, varies even in the same species; but in some of the *Semnopithecinae*, *Cynopithecinae*, and *Cebidæ* it is relatively less than in the *Simiinae*, being in *Ateles*, *Mycetes*, and some *Macaci* but little, if any, more than one-fifth of the latter.

In the *Lemuroidea* this process attains its greatest relative size, being almost as long as one-third the total transverse diameter in *Indris*. In *Loris* and *Nycticebus*, on the other hand, it is less than one-fourth.

In all the *Anthropoidea* the transverse processes are more or less conical; but in the *Lemuroidea* they have often a flattened, plate-like form, being antero-posteriorly expanded at the distal end.

In the *Simiinae* and in *Ateles*, as in Man, the neural arch is sometimes perforated, sometimes only grooved, by the vertebral artery; but in all the other genera† it is always perforated by it, and often two short bony canals exist on each side.

In the lower *Simiida* (e. g. *Cynocephalus*) the vertebra is thick and massive, the relative size of the canals being much reduced by the extent of ossification.

\* I. e. bent dorsally, the spine in all cases being supposed to be horizontal, as it is in quadrupeds.

† I have only found one exception, *S. nasalis*, in the British Museum.

*Ateles* presents the opposite extreme, the canals being always of large size, if not, as has been mentioned, replaced by a mere groove.

A spinous process is very rarely present; but in a skeleton of *Cynocephalus mormon*\*, in the Royal College of Surgeons' Museum, there is a distinct and pointed, though small, spinous process to the atlas; and Professor Owen† speaks of a distinct tubercular rudiment of such a process on the atlas of an old male Orang at Paris.

A hypapophysial tubercle or ridge, however, is very generally present, sometimes, as in *Mycetes* and *Lagothrix*, attaining a very large size, being produced backwards, beneath the axis, in a very remarkable manner‡.

In all the *Anthropoidea* the two articular surfaces for the axis are quite distinct and separate from each other. In many of the *Lemuroidea*, however, they are confluent and united together in the middle line, so as to form but one articular surface for the axis; this is the case in *Lemur*, *Indris*, *Galago*, *Perodicticus*, and *Arctocebus*. In *Cheiromys*, *Nycticebus*, and *Loris*, however, we again find two separate articular surfaces.

*Axis*.—This vertebra, though in all Primates essentially similar to the axis of Man, has, in most species, but a simple unbifurcated spinous process; but in this, as in so many other details of vertebral structure, there is considerable individual variation. The process is strongly bifurcated in Man, and more or less so in the Orang, *Ateles*, *Hapale*, *Nycticebus*, and *Galago*§. In *Mycetes* (fig. 1, page 553) it is distinctly trifid; and it is sometimes more or less so in the Potto||, Chimpanzee, and Gorilla, and sometimes even in the Orang¶.

This process is produced forwards, curving over anteriorly in some, especially in *Ateles* (fig. 6) and *Mycetes*, *Lemur*, and *Indris*. It is more or less backwardly produced in the lower *Simiidae*, very much so in *Lemur*, but not at all in *Indris*.

Throughout the *Anthropoidea* the neural laminae of this vertebra have very similar proportions; but in some *Lemuroidea* we find a great increase in their antero-posterior as compared with their transverse diameter, e. g. in *Lemur* and *Indris*.

The transverse process curves more or less upwards at its extremity throughout the *Anthropoidea*; but scarcely so in *Lemur* and *Indris*, in which, moreover, the two transverse processes are so sharply bent backwards as to form an acute angle with each other, instead of nearly a rectangle as in the higher forms. The extremity of this process is scarcely ever bifurcated\*\*.

\* No. 4720 in the Osteological Collection.

† Owen, Trans. Zool. Soc. vol. iv. p. 96.

‡ It is nearly as much developed in two skeletons in the British Museum—one of *Colobus satanas* (no. 1180 a), and the other of *Colobus temminckii* (no. 778 b).

§ Besides the above forms, it is decidedly bifurcated in *Cercopithecus ruber* (no. 15 b) in the British Museum.

|| In skeleton no. 743 c in the British Museum.

¶ As in skeletons of Orangs (nos. 3 i and 43, 10, 2, 1) in the British Museum.

\*\* In a Mandril's skeleton in the Museum of the Royal College of Surgeons (no. 4719) there is such a bifurcation, though only on one side. A trace of bifurcation exists also in *Perodicticus* and *Arctocebus*.

The odontoid process in some forms, *e. g.* *Ateles*, *Lemur*, and *Indris*, is much shorter relatively to the length of the axis than in *Man*; it is generally continued forwards nearly or quite in the same plane with the centrum, but rises anteriorly, forming a marked angle with the centrum, in *Lemur*, *Arctocebus*, and *Perodicticus*, but not so in *Nycticebus*.

The axis has, of course, two anterior zygapophysial articular surfaces in those forms in which the atlas has two posterior articular surfaces, and but one in those in which the latter are confluent. The body is very much prolonged backwards in many forms, so that its posterior articular surface looks more or less upwards. This is well seen in *Ateles*; but there is much individual variation in this respect.

*The third Cervical Vertebra.*—The spinous process of this vertebra presents great variations in different forms. In most races of *Men*\* it is strongly bifurcated; but in none is it much elongated. In *Simia* and *Troglodytes*, however, it is very greatly elongated, and shows no trace of bifurcation. In all the other *Anthropoidea* it is the shortest of all the cervical spines, is sometimes directed forwards, and sometimes backwards, but is always quite simple, except in *Mycetes* (fig. 1), where it is more or less trifid, and therefore formed on the same type as is the spine of the axis in that genus.

In the *Lemuroidea* we again meet with a distinctly bifurcated spinous process in *Nycticebus*; and it is curious, that, while we find in this form a return in this respect to the human structure of the process, we find in other genera of the same subfamily (*e. g.* *Perodicticus* and *Arctocebus*) a lofty very elongated spine, similar to that existing in the Anthropoid genera *Troglodytes* and *Simia*. In *Lemur* and *Indris* the process is short and simple, as in most *Anthropoidea*; but in *Loris*, *Tarsius*, and *Cheiromys* it is very rudimentary. In *Galago*† it is absent; but two minute projections appear to repeat in this vertebra, and be serially homologous with, the lateral parts of the spine of the axis.

The neural laminae have much the same proportion as in *Man* till we come to *Ateles*, where the antero-posterior as compared with the transverse diameter is first notably increased; but this elongation does not exist in the lower *Cebidæ*.

In *Lemur* the relative antero-posterior diameter is greatly augmented, reaching to nearly half the total breadth; and in *Indris* this proportion is still further increased to two-thirds. In the *Nycticebinæ* it again decreases. In *Indris* the neural laminae are separated behind by an antero-posteriorly directed cleft or fissure‡, the neural spine arising from the anterior end of the vertebra only, and not from its middle or posterior end as in *Lemur* and *Ateles*.

The transverse process generally ends simply, without any bifurca-

\* In the skeleton of a male Boschisman, preserved in the Museum of the Royal College of Surgeons, the spinous process is simple (Osteological Catalogue, vol. ii. p. 832, no. 5357). The same is the case in the skeleton of a female individual of the same race which is also in that museum.

† See skeleton of *Galago allenii* (no. 68 d) in British Museum.

‡ Noticed by Prof. Owen, 'Osteological Catalogue,' vol. ii. p. 717, no. 4631.

tion; but in Man it appears constantly to bifurcate; it does so also almost constantly in the *Nycticebinæ*, often in *Hapale*, and sometimes in *Simia*, *Colobus*, and *Cynocephalus*.

In *Lemur*, the transverse process being developed concomitantly with the antero-posteriorly extended neurapophyses, the vertebral artery may be said rather to traverse a bony canal than merely to pass through a foramen. This condition is still more marked in *Indris*.

The lowest part of the neurapophysis is, on each side, produced so as to embrace the posterior part of the body of the axis. In all the *Anthropoidea*, in *Lemur*, and in the *Nycticebinæ* these produced parts extend about as far forwards as do the anterior zygapophyses, sometimes a little beyond them (*e. g.* Chimpanzee, Orang, and *Ateles*), sometimes not quite so far forwards (*e. g.* *Lemur*); but in *Indris* we for the first time meet with anterior zygapophyses which extend much more forwards than do the roots of the neurapophyses.

*The fourth Cervical Vertebra.*—In none but Man, and not constantly in him, has this vertebra a decidedly bifurcated spinous process, though a trace of bifurcation is sometimes found in that of the Chimpanzee. In the Gorilla this process is exceedingly produced, being the absolutely longest neural spine attached to any vertebra of that or of any other species of the whole order.

In *Simia*, *Perodicticus*, and *Arctocebus* it is also very much prolonged. In *Hylobates* and all the lower *Simiidae* it is shorter than that of the axis. In some of the *Cebidæ*, especially *Ateles* (fig. 6) and *Chrysothrix*, it is, like the spine of the third cervical vertebra, somewhat curved forwards.

In *Mycetes* (fig. 1) it is rather longer than in the other *Cebidæ*, and still shows an indication of that trifid character presented by the axis and third cervical vertebrae.

In the *Lemuroidea*, except *Perodicticus* and *Arctocebus*, it is, as already mentioned, short, and in *Loris*, *Tarsius*, *Galago*, and *Cheiromys* almost or quite obsolete.

The transverse process is always bifurcated at its extremity, except in *Lemur* and *Indris*. Even in *Lemur* there is a slight incipient bifurcation; but this is never the case in *Indris*.

*The fifth Cervical Vertebra.*—In Man alone is the spinous process of this vertebra ever distinctly bifurcated.

In none but *Indris* is its transverse process constantly without even a trace of bifurcation.

On the whole, this vertebra repeats the characters of the fourth cervical. Its spine\* is generally as long as, or rather longer, rarely (*e. g.* sometimes in the Gorilla and Orang) it is somewhat shorter, than that of the fourth vertebra.

The transverse process has its upper and lower extremities rather more produced and separated than in the preceding vertebra, the bifurcation becoming thus deeper and more marked.

Occasionally in *Ateles* (fig. 6) and *Mycetes* the upper portion of

\* In the skeleton of a young Chimpanzee in the British Museum (marked 27) the spinous processes of this and the following vertebra are quite ankylosed together, the neural laminae remaining distinct.

the bifurcated transverse process itself more or less bifurcates, developing a small backwardly projecting secondary process, which is perhaps a nascent *anapophysis*.

*The sixth Cervical Vertebra.*—This very characteristic vertebra is in none but Man ever provided with a bifurcated spinous process, and it is often simple in him. It is very long in *Troglodytes* and *Simia*, also in *Perodicticus* and *Arctocebus*. In *Tarsius* it is rudimentary, and in *Galago* (fig. 8) and *Cheiromys* obsolete. In the other forms it is moderate, sometimes exceeding and sometimes falling short of the length of the spine of the axis.

The transverse process is subject to much individual variation as to the extent of development and the form of its pleurapophysial portion. It is mostly more extended than in Man, either transversely or antero-posteriorly, or both. Thus even in the Gorilla it is rather more antero-posteriorly, and much more transversely, produced than in him; it also diverges much more from the upper part (diapophysis of Professor Owen); but in the adult Chimpanzee it is very human in its proportions. In none above *Hylobates* does the antero-posterior extent of the costal element equal the antero-posterior length of the under surface of the centrum. In the *Simiidae*, other than the *Simiinae*, however, this element generally becomes much antero-posteriorly extended, exceeding the centrum in length. But sometimes it is only its outer border which is so expanded, the hinder margin being more or less deeply excavated, so that the costal parts take the form of two long processes, one springing from beneath each vertebral foramen, and the two running back parallel to each other, beneath the transverse processes of the seventh cervical vertebra. Amongst the *Cebidae* there is considerable variation. Sometimes in *Ateles* (fig. 6), as also in *Nyctipithecus* and *Pithecia*, the costal part of this vertebra is scarcely larger than the corresponding part of the fifth vertebra; and the same is the case in *Loris*, *Perodicticus*, and *Arctocebus*. In *Lemur*, on the other hand, it is large, and exceeds the centrum in length.

In *Ateles* (fig. 6) and *Mycetes* the upper part of the transverse process, or diapophysis of Owen, often presents a distinct anapophysis.

In *Indris* the diapophysial process, which projects from above quite the anterior end of the costal element, so much resembles the entire transverse process of the more anterior vertebræ that the pleurapophysial part seems, in this genus, to make its appearance for the first time in this sixth vertebra. It depends from the outer side of the back part of the under surface of the centrum, and is very conspicuous.

In the Orang the transverse process is sometimes only grooved, instead of being perforated, by the vertebral artery.

*The seventh Cervical Vertebra.*—The neural spine of this vertebra never bifurcates. Except in the Gorilla, the Orang, and the Aye-Aye, it is the longest, or equal to the longest, of the cervical spines posterior to the axis. It generally exceeds, but sometimes falls short of, the spine of the axis in length. In *Perodicticus* and *Arctocebus* it very considerably exceeds it; but in *Tarsius*, *Galago*, and *Cheiromys* it very greatly falls short of it, in the last-named the spine



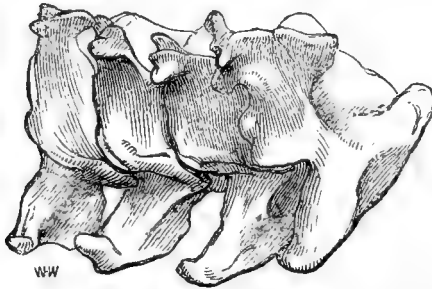
being here more completely absent than even in the third and fourth cervical vertebræ.

The neural laminæ repeat the characters of those of the preceding vertebræ, except in *Loris* and *Indris*. In the first of these genera this vertebra\* has the neural laminæ more antero-posteriorly extended than have the other cervical vertebræ. In the second genus, *Indris*, the opposite condition obtains, the antero-posterior extent of the neural laminæ of this vertebra being distinctly less than that of the other and more anterior ones.

The transverse process varies much, as to its perforate or imperforate condition; but I have never seen it perforated in *Hylobates*, *Mycetes*, *Brachyurus*, *Nyctipithecus*, *Chrysothrix*, *Hapale*, *Lemur*, *Galago*, *Arctocebus*, and *Cheiromys*.

Thus we find that in the cervical vertebræ the spinous processes present their maximum of bifurcation in European Man, where that condition generally obtains from the second to the sixth vertebra inclusive. In no other genus besides, except *Nycticebus*, do we meet with a distinctly bifurcated spine to the third cervical vertebra; but a more or less trifid axis exists in *Troglodytes*, and a similar structure is distinctly marked in *Mycetes*, and repeated in the third and fourth vertebræ also (fig. 1). In most species of the order, as also

Fig. 1.



Axis and three following cervical vertebræ of *Mycetes*, from the Museum of the Royal College of Surgeons. Nat. size.

at least sometimes in certain races of Man, the cervical spines are simple and rather short, generally increasing gradually in length from the third to the seventh. Some of the *Cebidæ* (fig. 6) present us with a remarkable bending-over in a forward direction of the summits of their cervical spines. In *Indris* they are of a subequal height, and somewhat enlarged at the distal end. Some genera, e. g. *Tarsius*, *Cheiromys*, and *Galago* (fig. 8), are remarkable for the atrophy of these parts; while others, e. g. *Troglodytes*†, *Simia*, *Pe-*

\* In no. 67 *a*, in the British Museum, the neural laminæ of the sixth and seventh cervical vertebræ are ankylosed together.

† In the skeleton of a young *T. niger* (no. 2 *i*), in the Osteological Collection of the British Museum, the spines of the fifth and sixth cervical vertebræ are completely ankylosed together, though the neurapophyses of the two vertebræ are distinct and separate.

*rodicticus*, and *Arctocebus*, are distinguished by their excess of development, the Gorilla exceeding all other mammals, even *Didelphys*, in the great preponderance of the cervical spines over those of the rest of the vertebral column.

The neural laminæ have in most *Anthropoidea* nearly the same proportions; but they are thickened in those forms which possess immense spinous processes; and in *Hylobates* and *Ateles* they are relatively more extended in the antero-posterior direction. This extension is yet greater in *Lemur*, where, at least sometimes, the length is more than half the breadth; and greatest in *Indris*, where it equals or exceeds two-thirds of the breadth, the elongated neurapophyses being medianly split behind in all the vertebræ from the second to the seventh.

In *Indris* also the anterior zygapophyses are much in advance of the most anterior part of the bases of the neurapophyses.

The whole series of neural laminæ in each individual are pretty equal, except in *Loris* and *Indris*, the seventh vertebra having its neural laminæ in the first of these two forms mostly larger, in the second smaller, than those of the preceding cervical vertebræ.

Beneath the anterior zygapophysis a more or less marked prominence often exists; it is to be seen in many forms, but is particularly conspicuous in the genera *Ateles* (fig. 6), *Perodicticus*, and *Arctocebus*. This prominence is the metapophysis.

The transverse processes have their extremities bifurcated in a varying number of the cervical vertebræ, and in a varying degree.

In none do they bifurcate so evenly and uniformly from the third to the sixth vertebræ as in Man, thus forming an even and equable groove on each side of the neck.

In all the *Anthropoidea*, except *Cynocephalus* and *Hapale*, this groove does not commence until the fourth vertebra; but in those two genera and in the *Nycticebinæ* it often begins at the third, sometimes in *Cynocephalus* even at the second. In *Lemur* this groove does not begin till the fifth vertebra; and in *Indris* it exists in the sixth vertebra only.

The ends of the diapophysial parts of the transverse processes are upcurved in the *Anthropoidea*. In the *Lemuroidea* the transverse process is bent more downwards and more directly backwards, and, being more extended antero-posteriorly, forms a longer bony canal for the vertebral artery.

The diapophysis, in the more posterior cervical vertebræ, often gives off a secondary backwardly directed process, which is perhaps a rudimentary anapophysis. This is particularly well seen in *Ateles*\* (fig. 6) and *Mycetes*.

The costal plate of the sixth cervical vertebra is almost always larger than the homologous part in the other cervicals; but it predominates least in Man, the Chimpanzee, *Nyctipithecus*, and the *Nycticebinæ*. In *Indris* it predominates more than in any other genus of the order.

The bodies of the vertebræ have their articulating surfaces more

\* See no. 4695 in the Osteological Collection of the Royal College of Surgeons (Osteological Catalogue, vol. ii. p. 729).

or less oblique; but there is great, apparently even individual, variation in this respect. This character appears least marked in Man.

In *Lemur* the under surfaces of the second, third, and fourth vertebræ have often a marked median ridge, such as is found in no *Anthropoidea*. This is wanting in the Slow Lemurs, but is greatly developed in *Indris*, the posterior part of each centrum being produced so as to underlap the centrum next behind in a remarkable manner.

The breadth of each centrum (taking the third cervical vertebra as the standard of comparison) rarely exceeds its antero-posterior dimension so much as it does in Man. Yet it does so in *Nycticebus*, where the breadth is twice and a half the length.

In *Troglodytes* and *Simia* the length is already greater in proportion to the breadth than in Man; in *Hylobates* the two dimensions are nearly equal, as also in the other genera, if the length does not slightly exceed the breadth as it does in *Cynocephalus*, *Ateles*, and *Mycetes*. In *Lemur* and *Indris* the length exceeds once and a half the breadth.

#### DORSAL VERTEBRÆ.

The number of dorsal or rib-bearing vertebræ varies from a minimum of 11 to a maximum of 16.

In Man and the *Simiada* there are generally 12 or 13, and rarely 14 or only 11 dorsal vertebræ.

In Man the number is normally 12, very rarely 13.

In the Gorilla it is, apparently, always 13.

In the Chimpanzee there are normally 13 dorsal vertebræ; but occasionally there are 14\*, or only 12†.

In the Orang there are 12.

In *Hylobates* 12, 13, or rarely 14‡.

In *Semnopithecus* and *Colobus* 12.

In *Cercopithecus* 11, 12, or 13.

In *Macacus* 11 or 12, very rarely 13§.

In *Cynocephalus* 12 or 13.

In the *Cebidæ* the range is different, namely from 12|| to 15, thus:—

In *Ateles* 13 or 14.

In *Lagothrix* 14.

In *Cebus* 13, 14, or rarely 12.

In *Mycetes* 13 or 14.

In *Pithecia*, *Brachyurus*, and *Chrysothrix* 13.

In *Nyctipithecus* from 13 to 15.

\* Cuv. Leçons d'Anat. Comp. vol. i. p. 177.

† In a skeleton recently added to the Hunterian Collection (and to which Mr. W. H. Flower kindly directed my attention) there are but twelve dorsal vertebræ, and only the usual number of lumbar vertebræ, that answering to the fifth lumbar of Man forming part of its sacrum.

‡ No. 5029 in the Museum of the Royal College of Surgeons (Osteological Catalogue, vol. ii. p. 756).

§ Nos. 4860 and 4942 in the Collection of the Royal College of Surgeons (Osteological Catalogue, vol. ii. pp. 744 & 749).

|| In one instance I have found only eleven—namely, in *Callithrix personatus* (no. 51d in the Osteological Collection of the British Museum).

In the *Hapalidæ* there are 12 or 13 dorsal vertebræ.

In the *Lemuridæ* the range is greater, namely, from 12 to 16.

Thus in *Lemur* the number is either 12 or 13.

in *Indris* it is 12, rarely 13.

in *Galago* and *Microcebus* 13.

in *Loris* and *Perodicticus* 14 or 15.

in *Arctocebus* 15.

in *Nycticebus* 16.

in the *Tarsiidæ* it is 13 or 14.

in the *Cheiromyidæ* 13.

The proportion of the dorsal to the other regions of the spinal column (exclusive of the caudal) does not increase regularly with the number of dorsal vertebræ, not being quite so great even in *Loris* as it is in Man. This region attains its greatest relative length in *Ateles*, where it is over nine-twentieths of the total length of the spine, without the tail; and it is least in *Indris*, where it scarcely exceeds six-twentieths of such total length. *Nyctipithecus*, even when possessing fifteen dorsal vertebræ, has a relatively shorter dorsal region than exists in *Homo*, *Troglodytes*, or *Simia*.

*Neural Spines.*—The more anterior are always the narrowest (*i. e.* least antero-posteriorly extended), and are generally more perpendicular and less overlapping than in Man.

The increase in antero-posterior extent, as we proceed from before backwards along the dorsal series of vertebræ, is already greater in the *Simiinae* than in the *Hominidæ*, and becomes still more so in the lower forms.

The summits of the dorsal spines are sometimes expanded and flattened, as in *Cynocephalus*, *Macacus*, *Simia*, and *Troglodytes*, especially the Gorilla, the last four in which sometimes almost bifurcate; on the other hand, they are sometimes very antero-posteriorly extended near the apex, almost bifurcating in that direction in some\*.

The inclination of the majority of the dorsal spines is always backwards. They are all so inclined in some of the lower races of Man, in the *Simiinae* and *Nycticebinae*, as also almost invariably in *Ateles*.

In the higher races of Man the spines of the eleventh and twelfth dorsal vertebræ are nearly at right angles to the long axis of the spine.

In *Indris* the spines are very little inclined, but the twelfth sometimes bends slightly forwards. In all the other forms the last dorsal spines are decidedly inclined anteriorly, the twelfth being always so, and sometimes in *Hapale* even the tenth.

The neural laminæ possess very similar proportions throughout the *Anthropoidea*. In *Lemur* they very little exceed those of the cervical vertebræ in length (*i. e.* in antero-posterior extent), only as six to five, and in *Indris* are actually (and for the first time) shorter, being as three to four. The opposite extreme is found in *Loris*, where the dorsal neural laminæ are double the length of those of the cervical vertebræ, except the seventh.

\* This character is very marked in a skeleton of *C. albogularis* (no. 17 *b*) in the British Museum; and to a less degree in another individual of the same species (no. 17 *h*), also in the British Museum.

In *Galago* (fig. 8, *h*), *Lagothrix* (fig. 11, *h*), and *Mycetes* (fig. 2, *h*) there are certain extra and backwardly projecting processes, which are more conveniently to be described with the lumbar region, where they are more developed.

The transverse processes do not project so much upwards (*i. e.* dorsally) in any other genus as they do in Man. Therefore the longitudinal groove existing on each side of the series of spinous processes, and bounded externally by the series of ends of the transverse processes, is deepest in Man. The width of this groove continues from before backwards most equal in the *Nycticebinæ*, then in the *Simiinaæ*, and then in Man, where it appears narrowed at its posterior (lower) part, owing to the great difference existing between the length of the transverse processes of the most anterior (upper) and that of those of the most posterior (lower) portions of the dorsal vertebræ.

In *Hylobates* the dorsal vertebral groove is slightly interrupted by an accessory process at the thirteenth vertebra. It is so also in *Nyctipithecus*; but in *Ateles* at the twelfth. In the other forms this interruption takes place at the eleventh, or even, as generally in the lower *Simiadaæ* and *Hapale*, at the tenth vertebra. The distal ends of the dorsal transverse processes are often more or less enlarged antero-posteriorly, though the extent of this enlargement varies much. In the Gorilla it is considerably more marked than in Man; but often very much more so in *Hylobates*, and above all in *Ateles*. This expansion is due to the nascent metapophyses and anapophyses, which will be described later.

The increase in breadth (transverse diameter) of the bodies of the vertebræ, as we proceed from before backwards, is exceptionally great in Man, *Hylobates*, and *Cynocephalus*; it is considerably less in *Simia* and *Troglodytes*, and is at its minimum in the *Nycticebinæ*, as is also the increase in antero-posterior extent.

The spinal nerves pass out by notches in almost all species. In Man, *Nycticebus*, and *Loris* these notches are deeper than in the other forms; but in *Perodicticus* (fig. 12) and *Arctocebus* we meet with quite a peculiar condition, namely the direct perforation of the neuropophyses in all the dorsal vertebræ. This foramen is situated behind the capitular and beneath the tubercular process. In *Arctocebus* another, smaller perforation, running from before backwards, pierces the root of the transverse process in each dorsal vertebra, except the first and the thirteenth.

#### LUMBAR VERTEBRÆ.

The lumbar region varies considerably both as to the number of its component vertebræ and as to its relative extent compared to that of the other regions of the spine.

The greatest number is presented by *Loris* and *Indris*, viz. 9; the least in *Troglodytes*, where there are sometimes only three. In Man, the Orang, and Gibbons\* there are normally 5; in *Ateles* sometimes 5, though more generally 4; in *Lagothrix* 4. In all the other

\* Daubenton records six (see Buffon's Hist. Nat. t. xiv. p. 104).

genera there are 6 or 7 lumbar-vertebræ\*, except *Cebus*, which has sometimes as few as 5, and *Nycticebus* and *Perodicticus*, which have often as many as 8.

The lumbar region attains its greatest length in proportion to the other regions of the spine, exclusive of the tail, in *Nyctipithecus*, *Chrysothrix*, *Colobus*, *Semnopithecus*, *Cynocephalus*, and *Loris*. It is least in the Gibbons, Man, *Ateles*, *Simia*, and *Troglodytes*. The last two genera, with *Perodicticus* and *Arctocebus*, are remarkable for the very slight increase in size of the lumbar series of vertebræ from before backwards.

These vertebræ have their length and breadth about equal in the *Nycticebinæ* and *Tarsius*; in Man, *Troglodytes*, and *Simia*, breadth is in excess, while length is so in most of the other forms. The length of the individual lumbar vertebræ compared to the dorsal (selecting the ninth dorsal and longest lumbar for comparison in each species) is greatest in the lower *Cebidæ* (more than double in *Nyctipithecus*, *Chrysothrix*, and *Brachyurus*), rather less in the lower *Simiidæ* and *Lemurinæ*, still less in the *Simiinæ* and *Nycticebinæ*, and least in Man.

The number of dorsal and lumbar vertebræ, taken together, is greatest in *Loris* and *Nycticebus* (23 or 24); small in Man, *Troglodytes*, and *Simia* (17), and *Ateles* and *Hylobates* (mostly 18). In the other *Simiadæ* there are almost invariably 19 trunk vertebræ†.

The proportion borne by the lumbar to the dorsal region is greatest in *Indris*, then in *Nyctipithecus*, *Chrysothrix*, and some *Simiadæ* (e. g. *Colobus*). In most forms the two regions are about equal; but the lumbar is the shorter in Man, the Gibbons, and Orang, *Ateles*, and *Troglodytes*, in the Gorilla being less than half the dorsal region in length. The beautiful sigmoid curve formed by the dorsal and lumbar vertebræ of Man exists in no other species; but the nearest approximation to it is found not in the highest Apes, but in *Cynocephalus*‡.

The neural spines are all vertical, or project more or less backwards, in Man, the *Simiinæ*, *Ateles*, and in the *Nycticebinæ*; in some of the lowest *Simiidæ* some of them are also more or less vertical. In *Indris* the spine of the first lumbar vertebra is inclined slightly forwards. All the lumbar spines project forwards in the other forms, especially in the lower *Cebidæ*, in *Hapale*, and in *Lemur*, in all of which they are very long, and arch over the vertebra next in front in a very marked way. In *Galago* (fig. 8, *h*) a process projects backwards on each side of each lumbar vertebra, above the posterior zygapophysis, the two of each vertebra closely embracing the forwardly

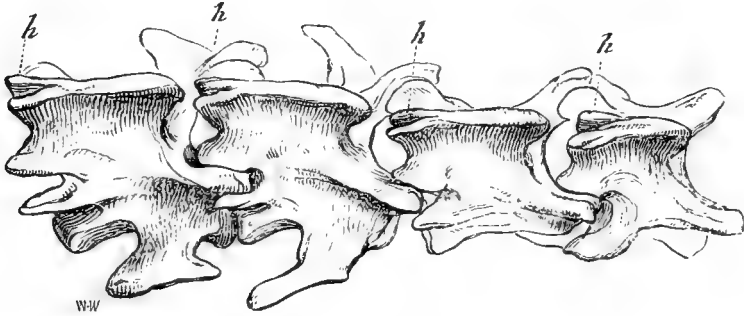
\* De Blainville mentions a Baboon in the Paris collection with eight lumbar and twelve dorsal vertebræ (Ostéog. Primates, *Pithecus*, p. 40).

† In a *Macacus radiatus*, in the British Museum (no. 1103 *e*), the vertebræ are 12 d. + 6 l. = 18; in a *Cynocephalus babouin* (no. 36 *c* in the same collection) the number is 13 d. + 7 l. = 20. De Blainville mentions 12 d. + 8 l. = 20. See Ostéog. Primates, *Pithecus*, p. 40, above referred to.

‡ E. g. *Cynocephalus porcarius* (no. 35 *d* in the Osteological Collection of the British Museum), which is a *natural* skeleton, having all the ligaments, intervertebral cartilages, &c. See also the Mandril, no. 4719 in the Osteological Collection of the Royal College of Surgeons.

projecting spine of the vertebra next behind. Rudiments of these processes exist in the posterior dorsal vertebræ, as has been mentioned. In *Mycetes* (which has some of the cervical spines trifid) these extra

Fig. 2.



Last two dorsal and first two lumbar vertebræ of *Mycetes*, from the Museum of the Royal College of Surgeons. Nat. size. *h.* Hyperapophysis.

processes are also developed in certain of the lumbar vertebræ, as also in *Lagothrix* (fig. 11, *h*), and sometimes in *Hapale*\* and *Chrysothrix*.

The neural laminæ are much less relatively extended, in the antero-posterior direction, in Man, the *Simiina*, and *Ateles* than they are in the other *Anthropoidea*. In *Lemur* their length is not so preponderating, because of the elongation of the cervical neurapophyses. In *Indris* they are exceptional, inasmuch as they are scarcely, if at all, longer than are the neural laminæ of the cervical vertebræ of that genus; as is always the case, however, they are longer than the dorsal neurapophyses.

*The Transverse Processes.*—These processes always project outwards, more or less at right angles to the long axis of the spine, or else forwards†. In Man, the *Simiina*, and *Ateles* they are never inclined ventrally; but in some of the lower *Simiida* they begin to be so; in the lower *Cebidæ*, in *Hapale*, and *Lemur* they are so very decidedly. In the *Nycticebinæ* and *Indris* they are nearly horizontal; but only in Man, *Troglodytes*‡, and *Simia* do they incline somewhat upwards.

They spring from a higher point, with regard to the centrum, in Man than in any other Primate; *Troglodytes* in this respect approaches him the most, and then *Simia*,—*Hylobates*, in spite of the relative length of the legs to the spine, being much less like Man in this respect; and the same must be said of the long-legged *Indris*.

\* As in *H. midas* (no. 1889 *a* in the Osteological Collection of the British Museum) and *H. ædipus* (no. 53 *a* in the same collection).

† In those cases where they project strongly backwards, a rib is ankylosed and included, as in the skeleton of a Chimpanzee in the Museum of the Royal College of Surgeons, obtained from M. du Chaillu, and in skeletons of *Mycetes seniculus* and of *Semnopithecus nasalis* in the British Museum.

‡ In a specimen of *T. niger* (nos. 2 *c*, 4, 6, 10, 33, 11) in the British Museum the first lumbar vertebra has a distinctly double, though very small, transverse process on each side.

The lumbar transverse process has sometimes its distal end antero-posteriorly expanded\* ; and sometimes a process is developed from its posterior margin similar in form and direction to the anapophysis, but external to it, as in *Cheiromys*† and often in *Lemur*. In the last-mentioned genus there is generally a second posterior transverse process to each lumbar vertebra ; it projects from the posterior part of the side of the centrum, and appears to be serially homologous with that part of the centrum of a dorsal vertebra which articulates with the anterior part of the head of the rib. A trace of this process exists in *Indris*.

The metapophyses and anapophyses are always, except in *Tarsius*, most conspicuous in the lumbar region. They are exceptionally rudimentary in Man, *Troglodytes*, and *Simia*. But the condition of these processes will be more fully described later.

#### SACRUM.

This region attains its greatest relative length in the Gorilla ; but in the Chimpanzee, the Orang, and the Gibbons it is longer relatively than in Man, *i. e.* longer compared to the total length of the cervical, dorsal, and lumbar vertebræ. It is shortest in the lower *Simiidae* and true Lemurs. Of all the *Anthropoidea* below *Hylobates*, *Ateles* has considerably the longest sacrum relatively.

The human sacrum is remarkable for the coexistence of certain characters, such as the very marked sacro-vertebral angle formed by it, the transverse and antero-posterior (vertical) concavity of its anterior surface, the concurrence of as many as five or six vertebræ in its formation (three of them generally contributing to form the auricular surface), its great breadth and the gradual way in which it narrows posteriorly (below) without any sudden contraction, the large size of the foramina, and the small development of the spinous and other processes. Each of these characters, taken separately, is shared by some other form or forms of the order. Thus, as to the number of sacral vertebræ (a character which varies more or less with age), all the *Simiinae* have almost always five at the least ; but in *Troglodytes* and *Simia* there are always five, without counting the last lumbar vertebra, which commonly anchyloses with the sacrum ; while in *Hylobates* there are rarely more than five‡ in all, the first of these being probably in all cases the vertebra which answers to the last lumbar of Man. In all the other *Anthropoidea* there are generally only two or three sacral vertebræ—rarely four, as sometimes in *Cynocephalus*, *Ateles*, and *Brachyurus*. In the *Lemuroidea* two or three is still the normal number ; but in *Indris* there are four, and in *Peroedicticus* and *Arctocebus* five. In the *Simiinae* three vertebræ§ articulate with the ilium, as mostly in Man ; but then the upper one of

\* E. g. *Inuus* in British Museum, no. 32 d.

† See Prof. Owen's Memoir on *Cheiromys*, Trans. Zool. Soc. vol. v. pl. xxi. figs. 7, 8.

‡ De Blainville mentions seven sacral vertebræ (*Ostéog. Primates, Pithecus*, p. 24).

§ De Blainville, *l. c.* p. 25.



the three is the homologue of the Human last lumbar vertebra\*. In all the rest of the order, but one or two vertebræ articulate with the ilium, except sometimes in *Ateles* and in *Indris*, when three again share in that office.

*The Sacro-vertebral Angle.*—In most Primates the sacrum and lumbar vertebræ appear (as far as one can judge from skeletons alone) to lie almost, or quite, in one line, so that the promontory is very slightly marked. *Troglodytes* presents in this respect a great contrast to the Human structure. In *Simia* the sacro-vertebral angle is rather more marked; but sometimes in *Cynocephalus* it is so much so as almost to rival that of Man †.

The same may be said of the concavity of the anterior surface of the sacrum, though this is subject to great individual variation. It is most marked in Man and the *Cynocephali* ‡; and is more so in *Simia* § than in *Troglodytes*.

The foramina vary greatly as to their relative size; but they appear to be generally small in *Troglodytes* and *Cynocephalus*, and especially large in Man, *Simia*, *Ateles*, and *Indris*.

The sacrum gradually tapers posteriorly in *Troglodytes* and *Simia*, and more or less in *Hyllobates*, also in the *Nycticebinæ* and in *Indris*, as well as in Man; but in very many forms of the order it is very wide at its anterior end (the transverse processes standing out like a pair of expanded wings), and then suddenly contracts, so that the transverse diameter of the third sacral vertebra is very much smaller than that of the first. This is especially the case in the *Semnopithecinae* and *Cynopithecinae*; in the *Cebidæ* generally, especially in *Ateles*, the contraction is not so marked; and in some, as also in many *Lemuroidea*, the transverse processes of the last sacral expand so as much more nearly to equal those of the first sacral vertebra in breadth.

On account of these wing-like transverse processes, the breadth of the sacrum, in the *Semnopithecinae* and *Cynopithecinae*, generally exceeds its length.

In *Troglodytes*, *Simia*, and *Indris*, and still more in the *Nycticebinæ*, the length exceeds the breadth.

In the other genera these dimensions are generally more or less subequal.

The spinous processes of the sacrum tend generally, with age, to run together and form a ridge. They are relatively least developed in Man, *Simia*, and *Nycticebus*. They are relatively larger in *Loris*, *Tarsius*, and *Indris*, attaining their maximum in *Lagothrix* ||.

\* Prof. Owen remarks that in a young Chimpanzee four vertebræ articulate with the ilia. See Osteological Catalogue, vol. ii. p. 781, no. 5173.

† See the skeleton of a Mandril (no. 4719) in the Museum of the Royal College of Surgeons; also *Cynocephalus porcarius* (no. 35 d) in the British Museum.

‡ It is strongly marked in *Macacus speciosus* (no. 1083 a in the British Museum); and in *Cynocephalus porcarius* (no. 35 d in the same collection) the transverse concavity of the sacrum is quite as great as in Man.

§ Yet in the skeleton (nos. 43, 10, 2, 1) in the Osteological Collection of the British Museum the anterior surface of the sacrum is quite flat. In nos. 45, 10, 2, 2, 3 c, in the same collection the sacrum, on the other hand, is as concave antero-posteriorly and transversely as in Man.

|| See the skeleton (no. A. 4718 a) in Museum of the Royal College of Surgeons.

The metaphyses are generally more developed and more distinct than in Man; but in *Simia*, *Indris*, and most of the *Nycticebinæ* they are very inconspicuous.

Except in Man, the sacrum generally bears at its posterior end the lateral diverging processes (termed diapophyses\* by Prof. Owen): they are very slightly marked in *Hylobates* and the *Nycticebinæ*; but in most of the genera they are strongly so, especially in *Cynocephalus* and *Ateles*. It appears to me not improbable that these processes may include, if they do not even represent, anapophyses.

The neural laminæ of the sacral vertebræ always form complete neural arches, except in the *Hominidæ* and *Simiinae*, in which that of the last sacral is very often incomplete, and sometimes even those of the last two sacral vertebræ.

#### CAUDAL VERTEBRÆ.

In the great majority of species of the order these vertebræ are numerous. Only in *Homo*, *Inuus*, and the *Simiinae* is the number ever reduced to 3† or even to 4. In some of these, however, there are sometimes 5, and very rarely even 6‡, caudal vertebræ.

Then follow the *Nycticebinæ*, *Loris*, and *Nycticebus*, having sometimes as few as 5 or 6 caudal vertebræ, though the latter has sometimes as many as 7 or 8, which is about the number possessed by the very short-tailed *Cynocephali*, although, according to Cuvier§, the Mandril has sometimes only 5. Then comes *Indris*, which has from 9 to 14||, closely followed by the short-tailed Macaques and American *Brachyuri*—*e. g.* in *Macacus rhesus* 15, in *M. nemestrinus* and in *Brachyurus* 17—the shortness of the tail being occasioned rather by a diminution in size of the component vertebræ than by a decrease in their number.

In all the other forms the number ranges between 20 and 33, but sometimes with much variation in the same genus, as in *Hapale* 25 to 31, as also in *Semnopithecus*, this being the highest number in any of the *Simiidæ*; the greatest number in the whole order is found in *Ateles*, namely 33. Amongst the *Lemuroidea* such high numbers are not attained, *Lemur* having 29 at most, while *Galago* and *Cheiromys* have about 22 or 23.

The proportion borne by this region of the spine to all the more anterior part is greatest in *Ateles*, almost 3 to 1; in the other longest-tailed genera it is rarely so large as 2 to 1.

The absolute length of the tail is greatest in *Semnopithecus* and *Colobus*, in which genera the individual vertebræ attain their greatest length, namely, sometimes as much as 1.9 inch.

\* *E. g.* in Trans. Zool. Soc. vol. iv. p. 107.

† De Blainville says of *Inuus*, "*deux coccygiennes*" (Ostéog. Primates, p. 39). The only case in which I have met with but two distinct caudal vertebræ is *Inuus*, no. 32 d in British Museum; and there the second is evidently composed of two anchylosed together.

‡ See skeleton of *Troglodytes niger* in British Museum (nos. 2 h, 48, 11, 20, 5).

§ Leçons d'Anat. Comp. vol. i. p. 178.

|| In the skeleton in the British Museum there are fourteen caudal vertebræ.

The caudal vertebræ generally increase in length as we proceed backwards from the sacrum, till about the 7th, 8th, or 9th, which, with the 10th and 11th, are the longest caudal vertebræ in most long-tailed forms. In *Ateles*, however, it is the 11th, 12th, 13th, and 14th vertebræ which are the longest. But while in the long-tailed *Simiida*\* the increase begins to be decidedly marked at the third caudal; in the *Cebida* and long-tailed *Lemuroidea* the increase is not so rapid, the three first caudals being always short, and the fourth caudal vertebra the first to present a marked elongation. In the *Hapalida* the third caudal vertebra is sometimes decidedly longer than is the second.

In Man, the *Simiina*, the *Nycticebina*, *Inuus* (fig. 10), and *Indris* the caudal vertebræ decrease in length as we proceed backwards, constituting a more or less prolonged coccyx.

In Man and the *Simiina* the neural laminae never or very rarely form a closed canal, nor do those of all the first four caudal vertebræ do so in *Inuus* and *Indris*; but in the other groups the first four caudal vertebræ always possess a complete neural arch. Sometimes in *Semnopithecus*, *Cebus*, &c., six are so formed; but in *Ateles* alone are there as many as eight caudal vertebræ, each provided with such a structure.

Neural spines are often developed on the first two or three caudal vertebræ in the long-tailed *Simiida*, on the first five in *Lagothrix*, and even on six in *Ateles*, but only on the first three or four of the other *Cebida*, and apparently on not more than three in the other genera of the order.

In all the long-tailed *Simiida* and *Cebida*, except *Inuus*, the first four caudals are united together by distinctly articulating zygapophyses. Sometimes in *Inuus* the second caudal vertebra has its posterior zygapophyses so little developed that they fail to attain the anterior zygapophyses of the third caudal vertebra; but in the other *Semnopithecina* and *Cynopithecina* this failure first occurs in the fourth or fifth vertebra; in the *Cebida* generally, and in *Hapale*, not till the fifth or sixth; in *Lemur* and *Tarsius* at about the fifth; in *Mycetes* and *Lagothrix* at the sixth or seventh; but in *Ateles* alone not till the eighth.

In Man and the *Simiina* these processes are absent or quite rudimentary; the same is the case as regards the metapophyses, which are scarcely more distinct in *Inuus*, the short-tailed *Cynocephali*, and *Indris*. In all the long-tailed forms they are more or less prominent, retaining their distinctness from the anterior zygapophyses longest in *Ateles*—namely, till the ninth caudal vertebra.

The transverse processes of the caudal vertebræ are peculiar and interesting. At first they are undivided, and project more or less

\* In a *Macacus nemestrinus* in the British Museum the first four caudal vertebræ are quite short, the fifth longer, and the sixth and seventh about the longest. Also in *Macacus speciosus* (no. 1083 a in British Museum) the third caudal is scarcely, if at all, longer than the second, yet the fourth is longer than the third; so that although there are only ten caudal vertebræ, they do increase in length backwards, thus differing from *Inuus*.

backwardly; but in the middle and posterior parts of the caudal region we find, in nearly all long-tailed forms, two nearly equal-sized transverse processes on each side, one projecting from the anterior part, and the other from the posterior part of each side of each centrum.

It would be well if we could certainly determine to what parts of the dorsal and lumbar vertebræ these caudal processes correspond.

If we were to examine the skeleton of *Lemur* only, we might consider that each posterior caudal transverse process corresponds with the peculiar posterior lumbar transverse process existing in that genus, and therefore also, as already indicated, with that part in each dorsal vertebra which articulates with the anterior part of the head of each rib.

On the other hand, a consideration of such forms as *Pithecia*\* and *Brachyurus*† shows how, in many cases at least, the anapophysis, which is distinct in the penultimate lumbar vertebra, comes in the ultimate one to unite again with the true transverse process, and to form the posterior part of its proximal portion, so that we might regard the anterior part of each divided caudal transverse process as answering to the true normal lumbar transverse process, and the posterior part of each divided caudal transverse process as answering to the lumbar anapophysis, here once more reappearing as a distinct element. Nor would this view be irreconcilable with the interpretation derived from *Lemur*, as in that genus the peculiar extra lumbar transverse process appears to coalesce with the anapophysis, so that we might consider the posterior caudal transverse process equivalent both to the anapophysis and to the Lemurine extra process at one and the same time.

The interpretation of the anterior caudal transverse process as the serial homologue of the true lumbar transverse process, and of the posterior caudal transverse process as an anapophysis is rather strengthened by the examination of the skeleton of *Hydromys chrysogaster*‡, in which the transverse processes of the anterior caudal vertebræ are quite similar in form, size, and direction to the more posterior lumbar transverse processes, with which evidently they are completely homologous (no anapophysis existing in either§); while the middle and posterior caudal vertebræ have the transverse process much enlarged antero-posteriorly, the added and backwardly projecting part apparently representing the anapophysis of the middle trunk vertebræ. Again in the Pangolin||, where anapophyses are entirely absent in the vertebræ of the trunk, the caudal vertebræ are simple and undivided, not projecting backwardly or developing any part answering to the posterior caudal transverse process found in long-tailed Primates. I am disposed therefore to regard the anterior

\* See skeleton in the Museum of the Royal College of Surgeons.

† See skeleton in the British Museum (no. 806 b).

‡ See skeleton (no. 2243) in the Museum of the Royal College of Surgeons.

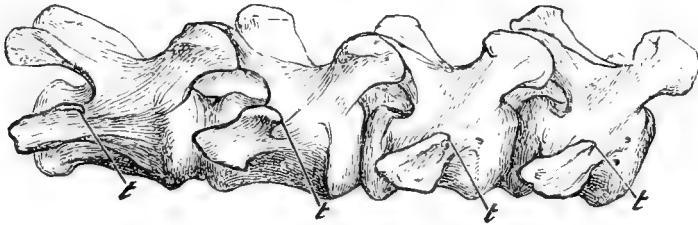
§ Owen remarks, "The anapophysis is obliterated in the last four lumbar vertebræ" (Osteological Catalogue, vol. ii. p. 401).

|| See skeleton (no. 2363 A) in the Museum of the Royal College of Surgeons.

transverse process of each caudal vertebra of a long-tailed Primate as answering to the ordinary transverse process of the lumbar vertebra, and the posterior transverse process of such a vertebra as answering to, and consisting of, a modified anapophysis.

A more or less distinctly marked process is often developed from the anterior part of the transverse process of the anterior caudal vertebræ—from those, in fact, or some of them, in which the bifurcation which we meet with as we proceed backwards has not yet taken place.

Fig. 3.



Four caudal vertebræ of *Ateles*, from the Museum of the Royal College of Surgeons (no. 4698). Nat. size. *t.* "Tubercles analogous to metapophyses."

These are spoken of by Professor Owen\* as "tubercles analogous to metapophyses, and representing a second series of those processes," and are very well seen in the caudal vertebræ of *Ateles paniscus*, preparation no. 4698 in the Museum of the Royal College of Surgeons (fig. 3).

The lumbar true transverse process, as we have seen, sometimes bifurcates more or less at its distal end; and this tendency to division of that part of the caudal transverse process which answers to such true lumbar transverse process is, perhaps, a similar bifurcation.

In Man and the *Simiinae* the whole caudal transverse process is very obscurely represented, and is in a very rudimentary condition. In *Inuus* (fig. 10) it is strongly and largely developed, yet shows no tendency to divide into an anterior and a posterior portion; neither does it do so in the short-tailed *Cynocephali* or in *Macacus nemestrinus*. In all the long-tailed *Simiadae*, however, the transverse process (which, as has been said, is at first simple) is given off from about the middle of the first two vertebræ; but in those behind, which have the transverse process still undivided, it arises from nearer the posterior end of each vertebra. An indication of the division into anterior and posterior caudal transverse processes appears in the transverse process of the fourth or fifth vertebra, and about the sixth the division is complete, the two parts, which may perhaps be spoken of as the true transverse and the anapophysial caudal processes, being about equal in size.

In the *Cebidae* this separation and equality is not so early attained, taking place in *Cebus* at about the seventh caudal vertebra, but in *Ateles* not till the ninth.

In most long-tailed forms the transverse processes of the first

\* Osteological Catalogue, vol. ii. p. 730.

three or four caudal vertebræ stand strongly out, but in *Ateles* those of all the first six do so.

*Chrysothrix* is an exception, and differs from all other long-tailed genera in that the caudal transverse processes do not divide into two separate parts, but, remaining united, form an elongated plate-like process on each side of each vertebra almost throughout the caudal region, giving a quite peculiar aspect to the skeleton of the tail in that genus.

Caudal hæmapophyses and hypapophyses (that is, "chevron" or "Y-shaped" bones, or their rudiments, and processes for the attachment of such) are quite wanting in Man, the *Simiinae*, *Inuus*, the *Nycticebinæ*, and *Indris*. They are more or less developed in all the other forms, attaining, as might be expected, their maximum in *Ateles*, where they present almost every variety of development in one or other part of the caudal region. At the root of the tail they are represented by long and completely detached Y-shaped bones, the two branches of the Y being attached to two scarcely perceptible processes (hypapophyses) developed from the anterior end of each centrum; these processes become more and more developed as we proceed backwards, the Y-shaped bones, however, continuing to be distinct till about the eighth or ninth caudal vertebra, where they are completely anchylosed to the vertebral processes. At about the tenth vertebra, and thence backwards, the processes are still completely anchylosed. They are, however, no longer Y-shaped\*, but bifurcating and open inferiorly. The processes in question are, in this genus, the longest of any which arise from the posterior caudal vertebræ, and they continue to be developed throughout the series.

In the *Semnopithecinae*, *Cynopithecinae*, and *Cebidæ*, except *Ateles* and perhaps *Lagothrix*, these processes are less developed. In the *Simiidæ*, they appear to be most so in the genus *Macacus*. They exist throughout *Cynocephalus*, there being, even in the Mandril, bifurcated inferior processes in the mid-caudal region.

Very often in both *Anthropoidea* and *Lemuroidea* these parts exist in the form of pairs of little bones moveably articulated to the bodies of the vertebræ, and quite disunited in the middle line.

#### STERNUM.

In most genera of the order, the sternum in the adult consists of a more or less enlarged manubrium, followed by a chain of subequal and antero-posteriorly elongated bones from three to six in number.

In Man and some of the *Simiinae* alone do we find a sternum in the adult consisting of a manubrium followed by one bone only, such being the case in the Siamang, the Lar, variegated and perhaps other Gibbons.

In Man and the *Simiinae* the sternum is broader, in proportion to its length, than in any other form; and this relative breadth attains its maximum not in Man, but in the Siamang (*Hylobates syndactylus*).

\* Sometimes, however, Y-shaped bones reappear posterior to open and bifurcating hypapophyses.

The Ape which appears to approach Man most closely in the proportions of its sternum is *Hylobates lar*\*.

In *Troglodytes* the body of the sternum remains, in the adult, more or less divided—sometimes, as in the skeleton of the large Gorilla in the British Museum, the manubrium anchylosing with the first bone of the body of the sternum, while its posterior component bones remain still distinct. The sternum of *T. gorilla* is much broader than that of *T. niger*.

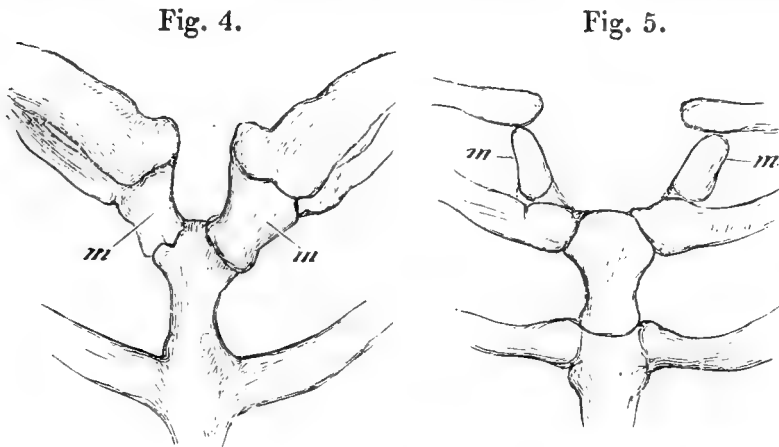
In *Simia* the body of the sternum is at first divided in a singular but varying manner, which is well known, and has been often noticed †.

The manubrium has its anterior margin greatly thickened in *Simia*, Man, *Cynocephalus*, and the Siamang.

In *Indris* its anterior margin is prolonged downwards in a peculiar manner. In *Lemur* this part is sometimes narrow, pointed, and produced ‡.

In *Chrysothrix* the manubrium has a strong process standing out on each side, and serving for the attachment of the first rib.

In a specimen of *Mycetes* preserved in the British Museum (no. 44 a) the manubrium is completely divided in the middle line,



Anterior part of sternum of *Mycetes*. Nat. size. *m*. Divided manubrium.

Fig. 4. Specimen in the British Museum.

5. Specimen in the Museum of the Royal College of Surgeons.

each half supporting a clavicle and first rib §. It is also completely divided in the specimen in the Museum of the College of Surgeons.

\* No. 5027 in the Museum of the Royal College of Surgeons.

† Owen, Trans. Zool. Soc. vol. i. p. 363, and Osteological Catalogue, vol. ii. pp. 763 & 765, nos. 5058 & 5071; Vrolik, Recherches d'Anat. Comp. sur le Chimpanzé, p. 11; De Blainville, Ostéog. Primates, *Pithecus*, i. p. 30.

‡ *E. g.* in no. 5027 in the Museum of the Royal College of Surgeons. Vrolik says (*l. c.* p. 12) that in the Mongous the manubrium quite disappears. I have not observed this.

§ De Blainville says, "Le manubrium paraît plus profondément bifurqué en avant que chez les autres Sapajous" (*l. c.* *Cebus*, p. 16).

In *Galago* the manubrium is somewhat T-shaped, as in the skeleton of *G. allenii* in the British Museum.

The number of distinct bones posterior to the manubrium and anterior to the xiphoid cartilage varies, in the Primates below the *Simiinae*, from four to six, except in *Nycticebus*.

As to the number found in each genus, it is subject to some variation. Thus in *Semnopithecus* and *Colobus* there are generally four in adults\*, but sometimes five; in *Cercopithecus* almost always five, but rarely there are six even in adults†; in *Macacus* and *Cynocephalus* five or six; in *Ateles* six, but in *Cebus* generally five, and in the other *Cebidæ* and in *Hapale* four or five; the same in *Galago*, *Indris*, and *Lemur*, but in *Loris* and *Perodicticus* as many as six. In *Nycticebus* alone have I seen more than this, namely, as many as nine; but this was in an immature specimen.

### RIBS.

Almost all Primates have more true than false ribs. In the highest forms the number of pairs of true ribs is seven, but in *Hylobates* there are sometimes eight pairs. In *Semnopithecus* and *Colobus* there are generally seven, but sometimes eight pairs of true ribs. In the *Cynopithecinae* the normal number is eight. In the *Cebidæ* there are generally seven or eight pairs, but in *Ateles* sometimes nine. In *Hapale* there are sometimes as few as six, sometimes as many as eight; seven or eight in *Galago*, *Lemur*, and *Indris*; nine in *Cheiromys*. The highest number, as might be expected, is found in the *Nycticebinae*, there being as many as ten pairs of true ribs in *Perodicticus*‡ and *Loris*§.

The total number of pairs of ribs is not always constant in the same species, there being in Man sometimes thirteen, sometimes only eleven pairs; in the Chimpanzee sometimes only twelve, and so on.

The ribs of Man are distinguished from those of the other genera of the order by their more marked "angles," and by the greater arching backwards of their proximal parts. In these respects the Gibbons approach most nearly to Man.

The remarkable sigmoid twist in a vertical direction, which exists in the ribs of Man, exists also markedly, though in a less degree, in *Troglodytes*. In *Simia* and the lower Primates it is much less noticeable.

*Pithecia*|| is distinguished from all the rest of the order by the great relative breadth of the ribs. They are also wide, but to a less extent, in *Hapale midas*.

In Man the ribs form a thorax which in its shape and proportions differs from that of all other forms of the order, it being half as broad again as it is vertically (*i. e.* from back to breast) deep.

\* In an adult *Colobus satanas* in the British Museum (no. 1180 *a*) there are five.

† *E. g.* in *C. ruber* (no. 15 *g*) in the British Museum.

‡ No. 743 *c* in the British Museum.

§ No. 4632 in the Museum of the Royal College of Surgeons. Noticed by Prof. Owen, 'Osteological Catalogue,' vol. ii. p. 718.

|| See the skeleton of this genus in the Museum of the Royal College of Surgeons.



In all the *Simiinae* the transverse diameter is still considerably in excess, exceeding the vertical depth by from about one-fourth to a little under one-third of the latter.

In *Indris* the transverse diameter is also decidedly in excess, though to a less degree, and it is so also in *Ateles* and even somewhat in *Mycetes*; but in all the other genera the vertical depth equals, or more or less decidedly exceeds, the transverse diameter of the thorax.

Having now reviewed the different regions of the spine, we may consider certain parts not as confined to those regions, but as extending throughout the vertebral column; and, first, the

#### NEURAL SPINES.

These processes attain both their greatest absolute and relative length in *Troglodytes* and *Simia*, but above all in the Gorilla.

On the other hand, they are wanting in all caudal vertebræ\* but a very few, and also in some of the cervical vertebræ of *Galago* and *Cheiromys*.

Generally it is the seventh cervical and most anterior dorsal vertebræ which bear the most elongated spines; but, besides *Troglodytes* and *Simia*, *Perodicticus* and *Arctocebus* form exceptions, and *Tarsius* also, in which the longest neural spines are sacral, or in the most posterior part of the lumbar region.

The spines of the trunk vertebræ are vertical, or directed backwards, in Man, the *Simiinae*, *Ateles*, and the *Nycticebinæ*; but in all the other genera of the order the spines of the more posterior vertebræ are inclined forwards, the change of inclination taking place sometimes (e. g. *Hapale*) at the tenth, sometimes (e. g. *Cheiromys*) not till the thirteenth vertebra.

The amount of inclination of the spines of the posterior trunk vertebræ reaches its maximum in the lower *Cebidæ*, in *Hapale*, and in *Lemur*.

The summits of the spinous processes are often more or less flattened. This is generally very marked in the lumbar vertebræ of *Troglodytes* and *Simia*, also in *Macacus*, *Inuus*, and *Cynocephalus*, and to a less degree in *Hylobates*, *Ateles*, *Indris*, and others.

In all forms the antero-posterior extent of the spinous processes of the anterior region of the trunk is less than in those of the more posterior portion; but this increase is least in Man and the *Simiinae*: in all the rest (the *Nycticebinæ* in this forming no exception) it is much greater.

Occasionally the antero-posterior extent of the summit considerably exceeds that of the part below, so that the spinous process may almost be said to bifurcate antero-posteriorly†.

\* In *Ateles* the first five caudal vertebræ support spinous processes; and sometimes even the sixth does so.

† This is well seen in the dorsal vertebræ of *Cercopithecus albogularis* (no. 17b) in the Osteological Collection of the British Museum, and to a less degree in another individual (no. 17h) in the same collection, as has already been mentioned.

In the greater number of vertebræ in all species, and in all the vertebræ of the greater number of species, the spinous processes are simple, ending sometimes sharply, sometimes with a blunt termination. In certain vertebræ, however, there are two more or less distinct processes (when the spinous process is said to bifurcate); more rarely (fig. 1) there are three such projections (when the spinous process is spoken of as trifold).

The first condition is very often seen in the axis vertebra, especially in Man, *Simia*, *Hylobates*, *Ateles*, *Hapale*, and the *Nycticebinæ*. It is rarely found in the third cervical vertebra; it is so in European Man and *Nycticebus*, and in the fourth and fifth cervical vertebræ of European Man. An imperfect bifurcation also exists sometimes in the most posterior dorsal or in some of the lumbar vertebræ, as occasionally in Man and in *Troglodytes*.

The second condition, or trifold spinous process, exists in the axis and in one or more of the succeeding cervical vertebræ of *Mycetes* (fig. 1); also to a greater or less extent in the axis of the Chimpanzee.

The peculiar processes which have been mentioned as existing in the lumbar vertebræ of *Galago* (fig. 8, *h*), *Lagothrix* (fig. 11, *h*), and *Mycetes* (fig. 2, *h*) appear to be serially homologous with the two lateral portions of the trifold spinous process.

#### NEURAL LAMINÆ.

The neural laminæ always form a complete arch, except in the greater part (or, as in Man, the whole) of the caudal (coccygeal) region, and sometimes, as in him and mostly in the *Simiinæ*, in the most posterior part of the sacrum.

They always, except in the sacral and most or all caudal vertebræ, present the usual zygapophyses, and in some, especially in *Galago*, *Lagothrix*, and *Mycetes*, support the peculiar additional processes just mentioned (figs. 8, 11, & 2, *h*).

They are invariably more or less notched, for the exit of the spinal nerves, except in some *Nycticebinæ*, where (fig. 12) they are actually perforated by them. The increase in antero-posterior extent of the neurapophyses in the lumbar region varies, of course, with that of the whole vertebræ,—*Ateles* differing from the rest of the *Cebidæ* and from the long-tailed *Simiidæ*, and returning towards the Gibbon type, in the smallness of this increase.

In *Lemur*, and still more in *Indris*, the cervical neurapophyses dispute with the lumbar as to supremacy in antero-posterior development.

Sometimes two contiguous neural laminæ become ankylosed together, as in a skeleton of *Loris gracilis* (no. 67 *a*) in the British Museum.

#### TRANSVERSE PROCESSES.

The true transverse process attains its maximum of development in the lumbar region.

After contributing to form the sacrum, these true transverse processes reappear as separate parts in the caudal vertebræ of all the

long-tailed species, dividing in the more posterior caudal vertebræ in the way that has been described.

In *Lemur* alone, and not always in that genus, a second and more posterior transverse process appears in the hinder part of the lumbar region, as has already been noticed.

Sometimes the transverse process becomes much antero-posteriorly expanded at its distal end; and sometimes (as in *Cheiromys*) a backwardly directed process is developed from its posterior margin, similar in form and direction to the anapophysis, but external to the latter.

The mammillary and accessory supplemental processes (*i. e.* the metapophyses and anapophyses), which are more or less visible in the dorsal transverse processes, must be separately noticed.

#### METAPOPHYSES.

These processes generally attain their maximum of development in the lumbar region, and are sometimes with difficulty distinguishable except in that portion of the vertebral column. This is particularly the case in Man and the *Simiinae*, though there is considerable variation in this respect.

In Man these processes, in rare instances, begin to be well marked as high up as the tenth dorsal vertebra, sometimes at the eleventh, but generally, perhaps, at the twelfth. They are always tolerably distinct on the first and second lumbar vertebræ, but sometimes cease to be distinguishable at the third lumbar; in other instances, however, they may be distinctly traced throughout the lumbar region.

In *Troglodytes* and *Simia* they become distinct at about the twelfth dorsal, remaining visible in all the lumbar vertebræ of the Gorilla, but generally disappearing at the second or third lumbar in the Chimpanzee and Orang, especially in the latter.

In *Hylobates* these processes are sometimes already very marked in the eleventh dorsal vertebra, sometimes only slightly so even in the thirteenth; they are mostly, but not always, distinct in the lumbar region.

In the great bulk of the order—that is to say, in the *Semnopithecinae* and in the *Cynopithecinae* (except *Inuus*), in the *Cebidæ* (except *Ateles*), in the *Hapalidæ*, and all the *Lemuroidea* (except *Indris*, *Tarsius*, and the *Nycticebinæ*)—they are developed to a more or less similar extent, and always to a much greater one than in Man and the *Simiinae*; for they begin to be conspicuous at the eighth or ninth dorsal vertebra, though sometimes much earlier; they mount as it were on the summit of the anterior zygapophysis at from the tenth to the twelfth, or very rarely thirteenth dorsal vertebra. They then continue very marked in the lumbar region, projecting strongly upwards and forwards from the summits of the anterior zygapophyses; they are distinguishable in the sacrum, and are visible, as a process more or less distinct from the anterior zygapophysis, in the first few caudal vertebræ; but further back they coalesce with, or replace, that process.

In *Ateles* the metapophyses are distinguishable throughout the dorsal series, but are very little marked in the lumbar region.

In *Indris* they do not become easily discernible till the last two dorsal vertebræ, but they are marked in the lumbar vertebræ.

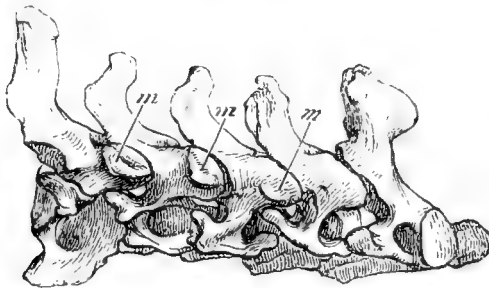
In *Tarsius* these processes attain their maximum, not in the dorsal or lumbar, but in the anterior part of the caudal region.

In the *Nycticebinæ* the metapophyses are not conspicuously\* developed in the trunk vertebræ, most so perhaps in *Perodicticus*.

As to the extent to which the metapophysis can be traced backwards along the spinal column, as might be anticipated, it is in *Ateles* that it can be furthest followed; its amalgamation with the anterior zygapophysis sometimes not taking place, in that genus, till the ninth caudal vertebra. In the other *Cebidæ* this union takes place generally at from the fifth to the seventh, though in *Mycetes* not till the eighth caudal vertebra. In *Lemur* it generally occurs at about the seventh caudal. In almost all the long-tailed *Simiidæ* the metapophyses are distinct in the first three, four, or five vertebræ, the amalgamation with the anterior zygapophysis taking place at the fourth, fifth, or sixth caudal vertebra. In *Inuus* and the very short-tailed *Cynocephali*, as in Man and the *Simiina*, metapophyses are not at all or scarcely to be traced backwards beyond the sacrum; in *Indris* they are scarcely distinct in the second caudal vertebra.

As to the extent to which the metapophysis can be traced forwards along the spinal column, there is considerable variation. As has been already recognized by others†, it can often be easily distinguished even in the first dorsal vertebra; but I am not aware that its existence in the cervical vertebræ of any Primate has yet been observed;

Fig. 6.



Axis and four following cervical vertebræ of *Ateles*, from the Museum of the Royal College of Surgeons (nos. 4694, 4695). Nat. size. *m.* Metapophysis.

nevertheless it is often more or less traceable in the cervical region, but most distinctly so in the genera *Ateles*, *Perodicticus*, and *Arctocebus*, and sometimes in *Simia*.

In *Ateles* this process is plainly distinguishable‡ as far as the third

\* They are really well developed, but extend so little upwards as to be comparatively inconspicuous.

† Prof. Owen on the *Megatherium*, 'Phil. Trans.' part 2 for 1851, p. 727.

‡ Especially in the cervical vertebræ (nos. 4694–4696) preserved in the Museum of the Royal College of Surgeons, and in nos. 808 *d* & 808 *e* in the British Museum, where the first two dorsal vertebræ show the metapophyses advancing inwards and preparing, as it were, to underlap the anterior zygapophyses of the cervical vertebræ.

cervical vertebra, appearing as an obtuse prominence developed from beneath the anterior zygapophysis.

In both *Perodicticus* and *Arctocebus* it is also plainly to be recognized in the corresponding vertebræ, and is similar in form and position to the cervical metapophysis of *Ateles*.

That this prominence is really metapophysial in its nature is made evident by the fact that in the *Edentata*, where these as well as the other vertebral processes are carried to their maximum of development, the metapophyses are continued into the cervical region in the very same situation (viz. dipping beneath the anterior zygapophyses), as may be well seen in the two-toed Sloth (in spite of the poor development of the metapophyses in its trunk vertebræ\*), also in *Orycteropus*†, and especially in the Pangolin‡. The existence of similar tubercles in the cervical vertebræ of *Myrmecophaga tamandua* and *Myrmecophaga jubata* has already been recorded by Professor Owen, who has fully recognized their metapophysial nature§. In this last-mentioned genus the metapophyses are very marked in the cervical region, and are developed with a singular uniformity from the anterior cervical to the posterior caudal vertebræ.

In the other genera of Primates|| this process is not so distinctly to be traced in the cervical vertebræ; yet often the under surface of the anterior zygapophyses of the fourth, fifth, or sixth cervical vertebræ is strongly convex, as is, at least sometimes, the case in the genus *Homo*¶; and doubtless this prominence in all cases is, so to speak, a latent metapophysis.

In the Orang\*\* I have noticed a condition which is common enough in many genera of Mammals, namely, such an extension of the cervical metapophysis, that part of it is continued on to the posterior part of the vertebra next in front, part of a cervical metapophysis occupying its normal position beneath the anterior zygapophysis of one vertebra, the other part being situated outside and partly upon the posterior zygapophysis of the vertebra anterior to it. I have not observed this in any other Primate besides the Orang, except Man, in whom, at least sometimes ††, a more or less similar condition obtains.

\* Noticed by Prof. Owen, 'Memoir on the Megatherium,' p. 740.

† See detached cervical vertebræ (no. 2339) in the Museum of the Royal College of Surgeons.

‡ No. 2363A in the Museum of the Royal College of Surgeons.

§ Memoir on the Megatherium, pp. 745, 746.

|| In the British Museum there is a skeleton of an Orang (nos. 43, 10, 2, 1) in which the seventh cervical vertebra shows distinctly the metapophysis close to and just outside of the anterior zygapophysis, ready to dip beneath it in the sixth. Also, in a skeleton of *Cercopithecus albogularis* (no. 17 b), the metapophyses are distinctly visible throughout the dorsal vertebræ, those of the first two dorsal being more internally situated than are those behind, so that the margin of the anterior zygapophysis of the first dorsal vertebra seems quite in series with them. The same approach of the metapophyses to the anterior zygapophyses takes place in a very marked way in the first dorsal vertebra of a skeleton of *Mycetes* (no. 44 a), and in that of *Ateles subpentadactylus* (no. 38 b).

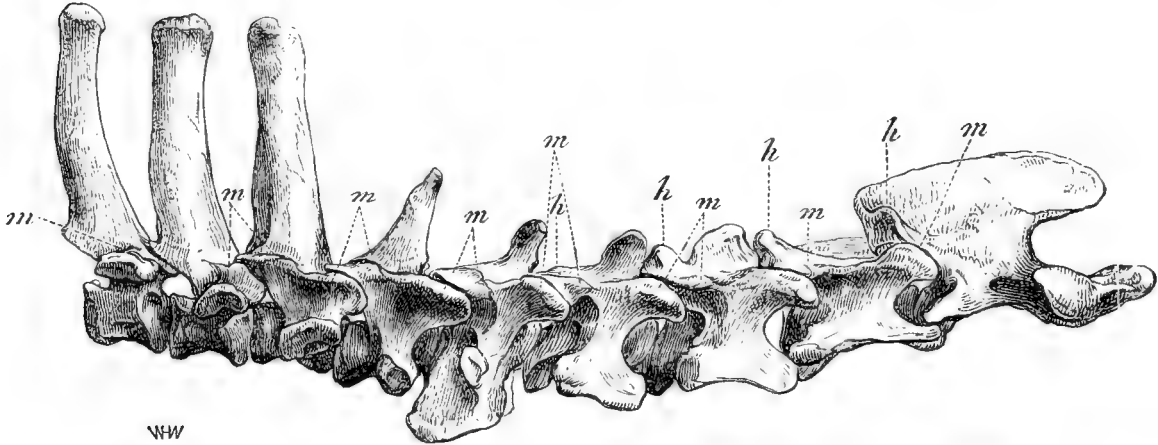
¶ Well seen in the fourth, fifth, and sixth cervical vertebræ of a human spine in the Museum of St. Mary's Hospital.

\*\* See skeleton (nos. 45, 10, 2, 2, 3 c) in the British Museum.

†† E. g. a set of human cervical vertebræ in my own collection.

This peculiar condition of the cervical metapophysis is well seen in large specimens of the genus *Canis*\*, in which (figs. 7 & 9, *m*) the third dorsal vertebra, like all those posterior to it, bears its own metapophysis only, and supports the whole of it. The second dorsal

Fig. 7.



First three dorsal vertebræ and all the cervical vertebræ, except the atlas, of *Canis dingo*. One-half nat. size. *m*. Metapophysis. *h*. Hyperapophysis.

vertebra bears but a portion of its metapophysis, which is continued on to the first dorsal vertebra. This first dorsal supports the other part of the metapophysis of the second dorsal, but scarcely any of its own, which, on the other hand, is almost entirely borne by the seventh cervical vertebra upon its posterior zygapophysis. The sixth cervical vertebra similarly supports the metapophysis of the seventh cervical; but in addition it bears, beneath and outside its anterior zygapophysis, a marked portion of its own true and proper metapophysis. The same is the case in the fifth cervical vertebra; the fourth, however, bears scarcely any of the metapophysis of the fifth cervical, but, on the other hand, has its own metapophysis well developed, and situated in its normal position, beneath the anterior zygapophysis.

In the Malay Tapir† the cervical metapophyses are strongly marked, and are somewhat divided, the greater part of each being in the normal position beneath the anterior zygapophysis, but part also being above the posterior zygapophysis next in front, in the last five cervical vertebræ.

In the Indian Rhinoceros‡ the cervical metapophyses are almost entirely confined to the anterior zygapophyses.

\* See mounted skeleton of *C. occidentalis* in the British Museum. Also no. 4364 (Arctic Wolf) in the Osteological Collection of the Museum of the Royal College of Surgeons.

† No. 2866 of the Osteological Collection in the Museum of the Royal College of Surgeons.

‡ No. <sup>A</sup>2969 in the same collection.

In the Sumatran Rhinoceros\*, however, they are pretty equally divided.

A similar prolongation forwards of the cervical metapophyses takes place in the Ox†.

In *Ursus*‡ I have found the cervical metapophyses very strongly marked, and entirely confined to their normal position beneath the anterior zygapophyses.

In the *Megatherium*§ they are situated rather behind the anterior zygapophyses of the cervical vertebræ.

#### ANAPOPHYSES.

These processes are also, in the main, lumbar processes. In Man they are generally confined to the first two lumbar and last dorsal vertebræ, though they are sometimes distinct at the eleventh dorsal and rarely even on the fifth lumbar. In all cases, however, they are very feebly developed, as is the case also in the *Simiinae*.

In *Troglodytes* and *Simia* they are distinct from the eleventh dorsal to the second lumbar, but less marked in the lumbar than even in the dorsal region, especially in *Simia*.

In *Hylobates* there is much variation; but generally they are pretty distinct from about the tenth to the fifteenth trunk-vertebra, sometimes, however, as early as the third dorsal.

In all the rest of the order (except some of the *Nycticebinæ*) they are much more developed, forming long processes in the lumbar region, each process projecting backwards outside and beneath the anterior zygapophysis of the vertebra next behind.

In the *Semnopithecinae* and *Cynopithecinae* they are generally distinct processes as early as the eighth dorsal vertebra, and continue such to the penultimate lumbar; in the *Cebidæ* they are generally distinct at about the ninth or tenth, but in *Nyctipithecus* not quite so till the fourteenth dorsal vertebra.

In *Ateles* they are shorter than in *Lagothrix* and the other *Cebidæ*, and disappear at the fourth lumbar.

In *Lemur* they become marked at about the eleventh dorsal vertebra; in *Indris* at the twelfth.

In the *Nycticebinæ* they are not distinct till we come quite to the end of the dorsal region, and, except in *Perodicticus*, they are little marked even in the lumbar vertebræ.

In *Tarsius* they are inconspicuous throughout the whole of the trunk-vertebræ.

The anapophyses appear to attain their maximum of relative size in the lower *Cebidæ*.

Generally, in the last lumbar vertebra, the process in question appears to coalesce with the base of the true transverse process; and if we may consider the terminal lateral processes of the sacrum the

\* No. 2933 in the same collection.

† No. 3825 in the same collection.

‡ A skeleton in my own collection.

§ See Professor Owen's memoir on the *Megatherium*, 'Phil. Trans.' 1855, vol. cxlv. p. 375, and pl. 20. fig. 5.

single backwardly projecting transverse processes of the first few caudal vertebræ, and the hinder part of each divided transverse process of the more posterior caudal vertebræ as serially homologous with the lumbar anapophyses, then this process continues to be developed almost to the posterior extremity of the spinal column.

The extent to which the anapophysis may be traced forwards varies much. In some Gibbons it can be plainly distinguished on the transverse process of the third dorsal vertebra. It can often, in the *Simiadae*, be traced to the first dorsal; but in *Cynocephalus*\* it sometimes appears as a minute projection on the dorsum of the outer end of each of the upper or diapophysial transverse processes of the four posterior cervical vertebræ.

I am not aware that the serial homologues of the lumbar anapophyses have before been noticed in the cervical region; but I have no doubt that they do exist in many forms, and that they may even be represented in Man himself by the backwardly projecting extremities of the upper part of each bifurcated transverse process.

In *Ateles*† these processes are distinctly traceable in the cervical region (fig. 6) as tubercles backwardly projecting from the distal ends of the upper (diapophysial) transverse processes of the fifth, sixth, and seventh cervical vertebræ.

In many individuals of different species‡, in which the dorsal anapophyses are well marked; by following these latter forwards it becomes pretty evident that the more or less backwardly projecting extremity of the upper portion of the cervical transverse process is in series with these dorsal anapophyses, and therefore that these processes do in fact sometimes extend almost from one end of the vertebral column nearly to the other—that is, of course, if the interpretation previously suggested for the caudal transverse processes be correct.

#### HYPERAPOPHYSES.

A more or less trifid neural spine, as has been said, exists in the axis vertebra of *Troglodytes* and some others. In *Mycetes* (fig. 1) the same vertebra has a distinctly trifid spine; and this character is repeated in the two or three following vertebræ.

In *Mycetes* also, as has likewise been mentioned, lateral backwardly projecting processes spring from the neural arch in the lumbar ver-

\* *E. g.* in no. 4719 in the Museum of the Royal College of Surgeons.

† No. 4695 in the Museum of the Royal College of Surgeons.

‡ This, I think, is plainly to be observed in the following skeletons preserved in the British Museum:—In an Orang (nos. 3 b, 45, 10, 2, 8), where the backwardly projecting point of the seventh cervical vertebra appears to continue forwards the dorsal anapophyses. The same may be said of two specimens of *Colobus* (no. 1371 b and no. 1180 a). In *Cercopithecus albogularis* (no. 17 b), where the anapophyses of the ninth, tenth, and eleventh dorsal vertebræ bifurcate, these processes are plainly visible throughout the dorsal series; and the points of the cervical transverse processes are, I think, evidently their serial homologues. Perhaps this is even more marked in another individual of the same species (no. 17 h). The same thing is plainly visible in a young *Cynocephalus babouin* (no. 36 c), in *Macacus rhesus* (no. 30 g) to the fifth and sixth cervical vertebræ; and in *Inuus* (no. 32 d) it is distinctly traceable to the seventh.



tebræ, one on each side of the neural spine (fig. 2, *h*). Such processes are also found in other forms, e. g. *Lagothrix*\* (fig. 11, *h*), *Chrysothrix*†, *Nyctipithecus*‡, and *Hapale*§; but they attain their maximum in *Galago*|| (fig. 8, *h*), where they exist both in the posterior dorsal and in the lumbar vertebræ, and are very marked, each pair of such backwardly projecting processes embracing between them the spinous process of the vertebra next behind. These extra processes¶ are somewhat similar to anapophyses, but are placed much higher, being above and within the posterior zygapophyses.

Now these lumbar extra processes, as they exist in *Mycetes*, seem certainly to be the serial homologues of the lateral parts of the cervical trifid spines. In *Galago* there is no cervical spinous process whatever, except that of the axis vertebra, which is more or less bifid; yet the cervical neural laminæ in that genus develop two faintly marked processes on the dorsum of each vertebra, which processes appear to continue backwards (*i. e.* to be serially homologous with) the lateral parts of the spine of the axis, in the same way that the extra processes of the cervical vertebræ of *Mycetes*\*\* are evidently serially homologous with the lateral parts of the spine of the axis in that genus. Now, without doubt, the before-mentioned lumbar processes of *Mycetes* are the serial homologues of the cervical extra processes and of the lateral parts of the axis-spine; and therefore the same lumbar processes in *Galago* are also the serial homologues of the faintly marked processes of the cervical neural laminæ and of the lateral parts of the axis-spine in that genus.

Thus we have processes backwardly directed, and springing from the neurapophyses, which processes attain their maximum in the lumbar and third and fourth cervical vertebræ, and appear to be serially homologous with the lateral portions of a so-called bifid or trifid spine, whether of the axis or of some other vertebra.

Professor Owen remarks††, in speaking of the axis of an Australian Woman, "The neural spine is much less developed; in fact, what is usually described as the bifurcated spine of the axis seems rather

\* See the skeleton of *Lagothrix* (no. A 4718 *a*) in the Museum of the Royal College of Surgeons, and that in the British Museum (numbered 43 *d*, 50, 11, 22, 61).

† See no. 932 *b* in the Osteological Collection of the British Museum. These processes are present in the last dorsal and first four lumbar vertebræ.

‡ See the skeleton of *N. villosus* in the British Museum.

§ They are very distinct in the last dorsal and first five lumbar vertebræ of *H. midas* (no. 1889 *a*). They are also marked in *H. ædipus* (no. 53 *a*) and *H. auritus*, all in the Osteological Collection of the British Museum.

|| See the skeleton of *G. allenii* in the British Museum (no. 68 *d*).

¶ The processes in question are spoken of as "*griffelförmige Fortsätze*" by Creplin, the German translator of Retzius, in describing the spinal column of *Callithrix* (*Chrysothrix*?). See Müller's 'Archiv' for 1849, Heft vi. p. 614.

\*\* In a *Macacus rhesus* (no. 30 *g*) in the same collection, the spines of the four last cervical and first dorsal vertebræ show traces of these processes, although the spine of the axis is in the same individual quite simple. In a skeleton of a Potto (no. 743 *a*) in the British Museum, there are also faint indications of these processes in the fourth, fifth, sixth, and seventh cervical vertebræ.

†† Osteological Catalogue, vol. ii. p. 807, preparation no. 5187.

to be the upper slightly produced extremities of the not completely coalesced neurapophyses of that vertebra in Man.”

I do not for a moment pretend to assert that there is any fundamental distinction between a single, a bifid, and a trifid neural spine; at the same time it may be well to note these varieties of structure, and the fact that, as has been said, it is with the lateral parts of such trifid spines, or with the halves of such bifid spines, that these extra processes appear to be serially homologous.

In the genus *Canis* the axis and three following cervical vertebræ support processes, decreasing in size as we proceed from before backwards, which project posteriorly, and are situated upon, and rather internally to, the posterior zygapophyses. They are quite distinct from the cervical metapophyses, and disappear at the sixth cervical vertebra (figs. 7 & 9, *h*). Similar processes exist in other Carnivora, as the genus *Felis*, and in *Ursus labiatus*\*. On the other hand, they are quite wanting in the large marsupial Carnivore *Thylacinus*†.

Are these processes the homologues of those just described as existing in *Mycetes* and others?

I am disposed, provisionally at least, so to regard them; but, whether they are so or not, the extra processes existing in Primates are so marked in some species, and serve so well to distinguish certain groups one from another, that I cannot but think that it would be convenient and every way proper to bestow on them a distinct appellation; and recognizing fully as I do the great convenience, as Professor Owen has pointed out, of terms capable of being inflected adjectively, and desiring that the new term should harmonize with those already so happily devised, I propose for the process in question the term *hyperapophysis*.

#### CENTRUM.

Speaking broadly, the bodies of the vertebræ of the different regions of the spine have much the same relative proportions throughout the *Anthropoidea*. They are relatively widest transversely in the cervical vertebræ, narrowest and shortest in the dorsal region, and expanded both in length and breadth in the lumbar.

In the *Lemuroidea*, except the *Nycticebinæ*, the elongated cervical centra alter the proportion. The *Nycticebinæ* differ from all the other forms in the small increase in breadth of their lumbar vertebræ, in which respect they are most nearly approached by the Gorilla.

I have not been able to detect in the vertebral column any distinctive characters separating the whole of one of the two primary divisions, or suborders, of the Primates from the whole of the other, parallel to the cranial and dental distinctions which so well characterize those two groups respectively. It is the great variety of structure presented by the second suborder (*Lemuroidea*) which renders it difficult or impossible to give satisfactory spinal distinctive characters; for the typical Lemurs present marked differences enough

\* *E. g.* skeleton (no. 4037) in the collection of the Royal College of Surgeons.

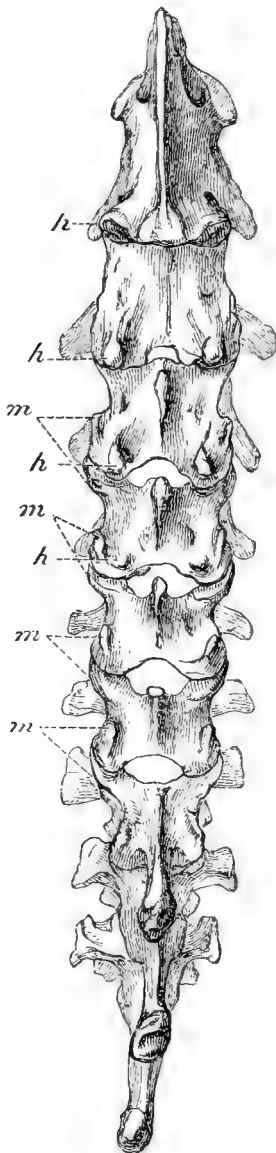
† *E. g.* skeleton (no. 1984) in the same collection.

Fig. 8.



Spine of *Galago alleni*,  
from the British Mu-  
seum. Nat. size.  
z. Posterior zygapo-  
physis.  
h. Hyperapophysis.

Fig. 9.



First three dorsal vertebrae  
and all the cervical vertebrae,  
except the atlas, of  
*Canis dingo*. One-half  
nat. size.  
m. Metapophysis.  
h. Hyperapophysis.

from the whole of the *Anthropoidea*, which last have much uniformity of structure, and may be characterized as follows:—

#### ANTHROPOIDEA.

Cervical vertebræ always short; atlas with the extremities of its transverse processes always bent upwards, and its two posterior articular surfaces always separated by an interval; transverse processes of the fifth cervical vertebra always bifurcating; ribs sometimes as few as eleven pairs, but never more than fourteen; lumbar vertebræ scarcely ever more than seven\*; increase in breadth of the bodies of the posterior as compared to the anterior dorsal vertebræ generally considerable; third, fourth, fifth, and sixth cervical vertebræ always with distinct neural spines; sternum sometimes formed of as few as two bones in the adult; neurapophyses never perforated by the spinal nerves.

The first family, *Hominidæ*, possesses many characters in common with the *Simiinæ*; in fact, were we to consider the spinal structure only, the *Simiinæ* would be united to the *Hominidæ*, or would rank as a family by themselves, so widely do they differ from the rest of the *Simiidæ*.

#### HOMINIDÆ AND SIMIINÆ.

A more or less perceptible sigmoid curve in the spinal column; the vertebral artery sometimes grooves, sometimes perforates the neural arch of the atlas; dorsal vertebræ normally twelve; thirteen, or fourteen; no dorsal or lumbar neural spines forwardly directed; lumbar transverse processes short and never bent ventrally; metapophyses and anapophyses but very little developed†; sacrum large and solid, always consisting of four vertebræ at the least, and tapering gradually backwards; caudal vertebræ never more than seven, and destitute of complete neural arches, metapophyses, anapophyses, and hypapophyses, and always decreasing in length from before backwards; sternum broad and short, often with only one bone between the manubrium and the xiphoid cartilage; spine of axis generally more or less distinctly bifid or trifid; increase in antero-posterior diameter of spinous processes (as we survey the spine from before backwards) at its minimum; last sacral vertebra with its neural arch generally imperfect.

#### HOMINIDÆ.

Spinal column with a strongly marked sigmoid curve; dorsal and lumbar vertebræ together seventeen in number; transverse processes of dorsal and lumbar vertebræ inclined upwards (backwards); lumbar transverse processes arising at a high level, through elongation of the crura of the neural arches‡; metapophyses not distinct before the

\* De Blainville mentions a Baboon with eight lumbar vertebræ.

† Prof. Owen, in his interesting 'Memoir on the Gorilla,' recently published, gives as the most conspicuous osteological characters of his group *Pithecina* (my *Simiinæ*) "the great relative breadth and flatness of the sternum, the reduction of the caudal vertebræ to a non-projecting 'cs coccygis,' and the feeble met- and anapophyses in the lumbar vertebræ." See 'Memoir on the Gorilla,' 1865, p. 46.

‡ Noticed by Prof. Owen, 'Trans. Zool. Soc.' vol. iv. p. 105.

tenth, and anapophyses not before the eleventh, dorsal vertebra; sacrum always consisting of five vertebræ, without counting the last lumbar, which rarely anchyloses with it; three sacral vertebræ generally articulate with the ilium; sacrum concave anteriorly, both antero-posteriorly and transversely; sacro-vertebral angle very marked; no anapophysial process at posterior end of sacrum; ribs twelve pairs, with strongly marked angles, and with their proximal portions arching much backwards, more so than in any other Primate, also with the vertical sigmoid twist at its maximum; breadth of thorax to its depth as about three to two; transverse process of third cervical vertebra always bifurcated; spinous processes of second, third, fourth, and fifth cervical vertebræ generally bifurcated, never very elongated; of the cervical spines, that of the seventh cervical vertebra the longest.

#### SIMIINÆ.

Spinal column with a scarcely perceptible sigmoid curve; sacrum very elongated relatively, and generally flattened anteriorly. If three sacral vertebræ join the ilium, then one answers to the last lumbar of Man. Sacro-vertebral angle very slightly marked; an anapophysial process on each side at posterior end of sacrum; ribs twelve or thirteen (rarely fourteen) pairs, and forming a thorax the transverse diameter of which is still very considerable; spinous processes of third, fourth, fifth, and sixth cervical vertebræ never bifid; transverse process of third cervical vertebra very rarely bifurcating.

The first two genera of this family have much in common, thus:—

#### TROGLODYTES AND SIMIA.

Dorsal and lumbar vertebræ, taken together, seventeen in number; ribs twelve or thirteen pairs; transverse processes of lumbar vertebræ inclined somewhat upwards; spines of most cervical vertebræ very elongated, but not bifurcated; axis-spine more or less bifid or trifid; anapophyses very slightly developed; bodies of dorsal vertebræ increasing but slightly in breadth posteriorly; last lumbar vertebra very often anchylosed to sacrum; lumbar vertebræ never more than five in number.

#### TROGLODYTES.

Ribs normally thirteen pairs; neural foramina of sacrum much smaller than in Man; sacro-vertebral angle exceedingly slight; sacrum very flat anteriorly.

Sternum of *T. gorilla* much wider (below the manubrium) than that of *T. niger*.

#### SIMIA.

Ribs only twelve pairs; neural foramina of sacrum as large or larger than in Man; sacro-vertebral angle more marked than in *Trogodytes*; antero-posterior concavity of anterior surface of sacrum generally very marked; anterior margin of manubrium much thickened; sternum peculiarly composite; anapophyses often scarcely perceptible in lumbar region; transverse process of sixth cervical vertebra sometimes imperforate.

## HYLOBATES.

Dorsal and free lumbar vertebræ, taken together, generally eighteen in number; ribs twelve to fourteen pairs; last lumbar vertebra always anchylosed to sacrum; sometimes as many as six lumbar vertebræ; spines of cervical vertebræ neither elongated nor bifurcating; anapophyses generally more developed than in the higher forms.

This genus presents us, in the Siamang (*H. syndactylus*), with the broadest and relatively shortest sternum to be found in the whole order.

Nearly all the rest of the Primates—that is to say, all the SIMIIDÆ (except the *Simiïnæ*), all the CEBIDÆ, HAPALIDÆ, and LEMUROIDEA, with a few exceptions, present the following common characters:—

Dorsal and lumbar vertebræ, taken together, almost always exceed eighteen in number; the vertebral artery perforates the neural arch of the atlas\*; metapophyses and anapophyses generally very conspicuous; caudal vertebræ generally numerous, and always one at least has a complete neural arch; spines of last dorsal and of lumbar vertebræ forwardly directed (except the *Nycticebinæ* and *Ateles*); lumbar transverse processes often inclined downwards; sacrum not tapering gradually (except *Indris* and the *Nycticebinæ*), and very rarely consisting of as many as four vertebræ. Except in a very few, the caudal vertebræ increase in length after the first two or three. Caudal vertebræ with well-marked transverse processes, generally divided; hypapophyses present in caudal region, except in *Inuus*, *Indris*, and the *Nycticebinæ*; sternum elongated, and always with three or more bones, in the adult, between the manubrium and xiphoid cartilage; thorax deeper and less broad relatively than in the two first families; fourth, fifth, and sixth cervical spines never bifurcating, and (except in *Perodicticus* and *Arctocebus*) never very elongated.

*Characters presented by all the SIMIIDÆ, except the SIMIÏNÆ.*

Dorsal vertebræ from 11 to 13; lumbar vertebræ 6 or 7; together generally 19, rarely 18 or 20 in number; generally 2, rarely 3, very rarely 4 sacral vertebræ; neural spines begin to incline forwards at the eleventh or twelfth dorsal vertebra†; the metapophysis interrupts the dorsal vertebral groove by mounting on the anterior zygapophysis at the tenth or eleventh dorsal vertebra; anapophysis distinct, at the latest, at the ninth, and long at the eleventh dorsal vertebra; only one or two true sacral vertebræ articulate with the ilium; caudal vertebræ begin to increase in length at the second or the third caudal vertebra‡. Neural spine of third cervical vertebra short and simple§;

\* Not so in *Semnopithecus nasalis* (no. 6 c) in the British Museum.

† At the thirteenth in *C. porcarius* (no. 35 d) in the British Museum.

‡ This, of course, is not the case in *Inuus*; and there are exceptions, as the *Macacus nemestrinus* and *M. speciosus* in the British Museum, already mentioned.

§ This process very rarely exhibits an incipient bifurcation, as in *Colobus velerosus* (no. 1391) in the British Museum, and in *Cynocephalus sphinx* (no. 34 c) in the same collection.

that of seventh cervical the longest, or equal to the longest of the cervical spines; transverse process of third cervical vertebra very rarely bifurcating, those of fourth and fifth cervical vertebræ always so; relative extent of lumbar region great, that of sacral region very small.

#### SEMNOPIITHECINÆ.

In the two genera composing this subfamily we find the greatest absolute length of tail existing in the order, also the absolutely longest individual caudal vertebræ; there is also generally one bone less to the sternum than in the *Cynopithecina*\*, there being mostly but four bones interposed between the manubrium and the xiphoid cartilage.

#### CYNOPIITHECINÆ.

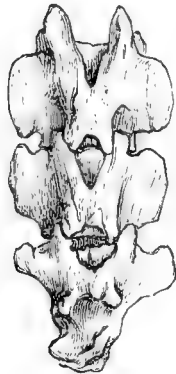
#### MACACUS.

In this genus the hypapophyses and chevron bones are more developed than in any other of the *Simiidae*.

#### INUUS.

This form (which, when considering the structure of the spine alone, it is convenient to rank as a separate genus) is very distinct from the *Semnopithecina* and from all the other *Cynopithecina* as regards the structure of the posterior end of the vertebral column, though

Fig. 10.



Caudal vertebræ of *Inuus* (no. 32 *b*) in the British Museum. Nat. size.

from the atlas to the posterior end of the sacrum it is quite like the other Macaques. Thus the most marked characters are—caudal vertebræ from two† to four in number; caudal transverse processes

\* This has been noticed by De Blainville, 'Ostéog. Primates,' p. 22.

† Vrolik says two (see *l. c.* p. 10). In the skeleton (no. 32 *d*) in the British Museum there are only two caudal vertebræ, but the second is evidently composed of two ankylosed together; it has a very narrow, yet complete, neural arch. In the specimen no. 32 *f*, also in the British Museum, there are four caudal vertebræ, the two first having complete neural arches. In no. 32 *b* there are also four caudals (the two last being ankylosed together), and three have each a complete neural arch.

undivided; no hypapophyses; caudal vertebræ flat and broad, each successive vertebra being less than its predecessor in all dimensions, like those of the coccyx of the *Simiinae*. In the allied Japanese form, *Macacus speciosus*\*, there are ten caudal vertebræ; the third caudal is scarcely, if at all, longer than the second; but the fourth is longer than the third caudal vertebra; there are slight hypapophyses and chevron bones.

#### CYNOCEPHALUS.

Transverse process of axis and that of third cervical vertebra sometimes bifurcating; dorsal and lumbar vertebræ, taken together, sometimes only eighteen in number; sometimes as many as four sacral vertebræ; sacro-vertebral angle often strongly marked, as also the antero-posterior concavity of sacrum; relative breadth of sacrum at its maximum; hypapophyses present; anterior margin of manubrium much thickened; atlas vertebra occasionally developing a short neural spine. In some at least there appears† to be a decided return towards the sigmoid curve of the spinal column existing in Man.

The American *Anthropoidea* have but very few characters in common tending to distinguish them from the Old-World forms.

#### CEBIDÆ.

Three first caudal vertebræ quite short, the increase in length not taking place till the fourth; dorsal vertebræ from twelve‡ to fifteen in number; twelfth dorsal spine turned forwards (except in *Ateles*); spines of the third and fourth cervical vertebræ often curving over in a forward direction; spine and transverse process of third cervical not bifurcating; spine of the seventh cervical§ the longest, or equal to the longest of the cervical spines; lumbar spinous processes (except in *Ateles*) very long, and curving over in a forward direction in a very marked manner; generally two, rarely three, very rarely four, sacral vertebræ; only one or two sacral vertebræ articulate with the ilium (except sometimes in *Ateles*); sacro-vertebral angle almost always obsolete; transverse processes of lumbar vertebræ (except in *Ateles*) inclined strongly downwards and forwards.

#### ATELES.

This genus presents many exceptional characters in its vertebral structure.

Neural laminae rather long; marked cervical metapophyses (fig. 6, *m*); dorsal region at its maximum of relative length in the

\* No. 1083 *a* in the British Museum.

† *I. e.* as far as can be judged from skeletons only.

‡ In *Callithrix personatus* (no. 51 *d*), in the British Museum, there are but eleven dorsal vertebræ.

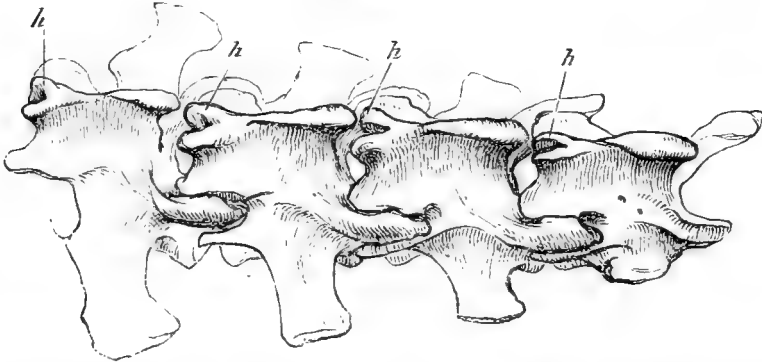
§ Wagner says that the transverse process of the seventh cervical vertebra is never perforated in any of the American Primates, Man of course excepted. See 'Beitr. zur Kennt. der Wirbelthiere Amerika's, osteolog. Beitr. zur Kenntniss der amerikanischen Affen,' p. 457.



family; all the dorsal spines backwardly inclined or vertical\*; mostly four, sometimes five, lumbar vertebræ; dorsal and lumbar vertebræ, taken together, only eighteen, or even only seventeen, in number†; lumbar neural spines scarcely inclined forwards; transverse processes of lumbar vertebræ not bent downwards, and arising from a higher level than in other *Cebidæ*; transverse diameter of thorax exceeds its depth; sacrum generally composed of four vertebræ, three often articulating with the ilium; sacral region longer in proportion to the rest of the spine than in any other of the *Cebidæ*, or any of the *Simiidæ* below *Hylobates*; number of caudal vertebræ at its maximum in the order; proportion of caudal region to other vertebral regions at its maximum; longest individual caudal vertebræ situated further from the root of the tail than in other long-tailed forms; eight caudals with a complete neural arch to each; five or six caudals with a neural spine each; caudal zygapophyses articulate with each other till the eighth caudal vertebra; caudal metapophyses distinct to the same vertebra; anterior and posterior divisions of the caudal transverse processes not attaining equality till the ninth caudal vertebra; transverse processes of the first six caudal vertebræ very long and strong; hypapophyses and chevron bones at their maximum, and in the posterior caudal vertebræ they are the largest of the caudal processes; terminal caudal vertebræ thick.

This genus also differs from all the rest of the *Cebidæ* and from all *Semnopithecinae* and *Cynopithecinae* in the small increase in antero-posterior extent of the lumbar neurapophyses and spines as compared to those of the dorsal region, and in the shortness of the lumbar anapophyses.

Fig. 11.



Last dorsal and three first lumbar vertebræ of *Lagothrix humboldtii*, from the Museum of the Royal College of Surgeons. Nat. size. *h*. Hyperapophysis.

\* De Blainville remarks this (*l. c.* p. 10); but in the skeleton (no. 38 *b*) in the British Museum the thirteenth and fourteenth dorsal spines are turned slightly forwards.

† As in two skeletons in the Museum of the Royal College of Surgeons (nos. 4690 & 4697).

## LAGOTHRIX\*.

In this genus there are fourteen dorsal, four lumbar, and three sacral vertebræ. The hypapophysis of the atlas is very largely developed, as are the hypapophyses and chevron bones of the caudal region. The axis-spine has a trifid tendency. The cervical spines are not curved over in a forward direction, nor are there any cervical metapophyses; but hyperapophyses are largely developed in at least the last three dorsal and first four lumbar vertebræ, and the lumbar anapophyses are very long and strong. There are five caudal vertebræ with spinous processes, and seven with a complete neural arch.

## CEBUS.

Wagner says† of this genus, that the terminal caudal vertebræ are intermediate in form between those of *Ateles* and *Mycetes* and the slender terminal ones of the lax-tailed *Cebidæ* and of *Hapale*.

## MYCETES.

Manubrium (figs. 4 & 5, *m*) remarkably divided in the middle line‡. Axis with a trifid spine; hyperapophyses in the neck and trunk (figs. 1 & 2, *h*); no cervical metapophyses; anterior cervical spines rather elongated; hypapophysis of atlas produced very strongly backwards beneath the axis; terminal caudal vertebræ thick; sometimes only four bones between manubrium and xiphoid cartilage§.

In all the rest of the *Cebidæ* and in *Hapale* the posterior caudal vertebræ are long and slender||.

## PITHECIA¶.

In this genus the ribs attain the greatest relative breadth of the whole order; and the costal element of the sixth cervical vertebra is scarcely larger than that of the fifth.

## BRACHYURUS.

Here there are sometimes four sacral vertebræ\*\*, the sacrum being strongly concave antero-posteriorly, long, narrow, and tapering.

## CALLITHRIX.

Sometimes in this genus there are but eleven dorsal vertebræ††, the

\* I have only seen two skeletons of this genus—one in the British Museum (nos. 43 *d*, 50, 11, 22, 61), the other in the Museum of the Royal College of Surgeons (no. A 4718 *a*).

† *L. c.* p. 461.

‡ As has been before observed, it is completely cleft in the specimen preserved in the Museum of the Royal College of Surgeons, as well as in the one in the British Museum; and De Blainville speaks of it as "*profondément bifurqué*" (*Ostéog. Primates, Cebus*, p. 16).

§ *E. g.* in no. 44 *a* in the Osteological Collection of the British Museum.

|| Wagner, *l. c.*, and in Suppl. to Schreber's Säug. Abtheilung, v. p. 97.

¶ See the skeleton of *P. monachus* in the Museum of the Royal College of Surgeons.

\*\* See *B. calvus* (no. 806 *b*) in the British Museum; it has seventeen caudal vertebræ.

†† As in *C. personatus* (no. 51 *d*) in the British Museum.

spine of the ninth dorsal being turned forwards, and there being but four bones between the manubrium and the xiphoid cartilage.

#### CHRYSOTHRIX.

Transverse processes of the caudal vertebræ undivided, forming a long ridge on each side\*. Manubrium with a process on each side for the first rib; hyperapophyses in last dorsal and first four lumbar vertebræ†.

#### NYCTIPITHECUS.

Here the dorsal vertebræ are from thirteen to fifteen, the dorsal and lumbar vertebræ together being generally as many as twenty-two‡ in number; yet the dorsal region is relatively shorter, as compared with the other precaudal regions, than in Man, *Pithecus*, or *Troglodytes*; on the other hand, the lumbar region is relatively the longest in the whole order, the individual lumbar vertebræ being relatively so much elongated. The spines of the lumbar vertebræ are very much prolonged forwards.

#### HAPALIDÆ.

Spine of axis sometimes bifid, that of third cervical vertebra always short and simple; transverse process of third cervical vertebra generally bifurcating; spines of cervical vertebræ never arching over forwards; dorsal vertebræ twelve or thirteen in number; tenth dorsal spine often turned forwards; sometimes the third caudal vertebra is more elongated than the two preceding§, as in the *Simiidæ*. Hyperapophyses sometimes present in last dorsal and anterior lumbar vertebræ||; transverse processes of lumbar region long, and strongly inclined downwards and forwards; sacro-vertebral angle obsolete; spines of lumbar vertebræ arching over forwards very strongly.

#### LEMUROIDEA.

This suborder, as has already been said, presents a great variety of structure; and I have not detected¶ any universal characters separating it from the *Anthropoidea*, though conditions often exist in it which are not found in the last. The transverse processes of the atlas have almost always their extremities inclined ventrally; and very often

\* Noticed by Wagner, 'Amerik. Affen,' p. 460.

† See skeleton (no. 932*b*) in the British Museum.

‡ De Blainville says, 14 d. + 8 l. = 22 (*l. c.* p. 20). Wagner, in 'Beiträge zur K. der amerik. Affen,' p. 426, gives the same number in his careful description of the osteology of this genus. In the specimen preserved in the Museum of the Royal College of Surgeons there are 15 d. + 7 l. = 22. In *N. villosus* (no. 58*b*) in the British Museum there are only 13 d. + 8 l. = 21; and in *N. felinus* there are 14 d. + 8 l. = 22.

§ E. g. *Hapale aurita* (nos. 62, 3, 19, 17) in the British Museum.

|| As in *H. midas* (no. 1889*a*) in the British Museum, and *H. ædipus* (no. 53*a*).

¶ Unfortunately I have not been able to meet with a skeleton of any of the following genera:—*Propithecus*, *Microrhynchus*, *Hapalemur*, *Microcebus*, *Lepilemur*, and *Cheirogaleus*.

the atlas has but one posterior articular surface, the two posterior zygapophyses uniting in the middle line. The transverse process of the fifth cervical vertebra is sometimes simple, and does not bifurcate. The transverse processes of all the cervical vertebræ project more sharply backwards than in the *Anthropoidea*. The ribs are never so few as eleven pairs, while they are occasionally as many as sixteen pairs. There are sometimes as many as nine lumbar vertebræ. The increase in breadth and length of the posterior as compared with the anterior dorsal vertebræ is very slight. Sometimes the third, fourth, fifth, and sixth cervical vertebræ are quite destitute of neural spines. The cervical vertebræ are often very much extended antero-posteriorly. The sternum is never formed of so few as two or three bones in the adult; and the first three caudal vertebræ are short. Except in the *Nycticebinæ*, the atlas is furnished with wide and long transverse processes; there are, with the same exception, never more than thirteen pairs of ribs, but (except in *Indris*) always hypapophyses and more or less complete chevron bones, and, as in the *Anthropoidea*, the neurapophyses are not perforated by the spinal nerves.

#### INDRIS.

This very remarkable form presents us with spinal characters at least as marked and distinct from those of the other *Lemuroidea* as are the spinal characters of Man from those of the rest of the *Anthropoidea*. Atlas with one posterior articular surface only; spine of axis extending forwards at the summit, but not backwards; spines of third, fourth, and fifth cervical vertebræ rather elongated; neural lamina of third cervical vertebra split behind, so that its spinous process springs from quite its anterior end; anterior zygapophyses advancing much in front of the roots of the neurapophyses; transverse processes of neither the third, fourth, nor fifth cervical vertebra bifurcated; neural lamina of seventh cervical vertebra shorter than that of any of the other cervical vertebræ; cervical region exceeding one-fifth the length of the spine (exclusive of the tail), and nearly five times as long as broad; lumbar vertebræ eight\* or nine† in number; spinous processes of lumbar vertebræ vertical; neural laminae of the dorsal vertebræ shorter, and those of the lumbar vertebræ scarcely, if at all, longer than those of the cervical vertebræ; sacrum often composed of as many as four vertebræ, and tapering posteriorly; spinous processes of sacrum long and flattened at their summits; transverse diameter of thorax considerably exceeding its depth; dorsal region less relatively extended than in all the rest of the order; cartilages of ribs slightly dilate before joining the sternum‡; caudal vertebræ few and more or less decreasing in length posteriorly§; no trace of hyperapophyses; no caudal chevron bones,

\* As in skeleton in the British Museum.

† As in skeleton in the Museum of the Royal College of Surgeons.

‡ Noticed by De Blainville, 'Ostéographie,' *Lemur*, p. 21.

§ In the skeleton in the British Museum there are fourteen caudal vertebræ: the first two are about equal in length; they then decrease in all dimensions to the sixth inclusive.

but the lowest part of each cervical centrum is remarkably prolonged in a backward direction as a hypapophysial ridge\*.

#### LEMUR.

This genus agrees with the last in the very elongated cervical vertebræ and the little relative extent of the dorsal region, also in the cervical neural laminæ exceeding those of the dorsal vertebræ in antero-posterior extent, in the atlas having but one posterior articular surface for the axis, and in the large size of the transverse process of the atlas. The spine of the axis, however, has its upper part produced in a backward as well as in a forward direction; there are many caudal vertebræ, and there are caudal hypapophyses and chevron bones; the spines of the lumbar vertebræ are very long, and produced strongly forwards. Often the transverse processes of both the fourth and fifth cervical vertebræ are bifurcated; sometimes there are extra short transverse processes to the lumbar vertebræ, and the normal ones are produced strongly downwards and forwards.

#### MICROCEBUS.

According to Dr. Peters†, there are seven lumbar vertebræ in this genus.

#### NYCTICEBINÆ.

This family contains forms, the vertebral structure of which is aberrant, and singularly recalls in some of its details the family *Hominidæ* and the subfamily *Simiinæ*.

Atlas with less extended transverse processes than in the other *Lemuridæ*, and sometimes with two articular surfaces for junction with the axis; spine of axis bifid or trifid; transverse process of the third cervical vertebra often, those of the fourth and fifth cervicals always, bifurcated; cervical vertebræ very short, and therefore quite unlike those of *Lemur* and *Indris*; dorsal and lumbar spines all backwards inclined, or sometimes the latter only very slightly forwards; increase in length and breadth of dorsal vertebræ backwards very slight; metapophyses mostly inconspicuous‡, but sometimes developed in the cervical region; anapophyses but little developed; sacrum long and tapering posteriorly; caudal vertebræ few, no caudal hypapophyses; increase in breadth of the lumbar vertebral bodies as compared with the dorsal at its minimum; neurapophyses sometimes directly perforated by the spinal nerves; ribs from fourteen to sixteen pairs; dorsal region much relatively extended, cervical region very little so.

#### NYCTICEBUS.

Spine of third cervical vertebra generally bifurcated; dorsal ver-

\* This, as well as many of the above characters, is noticed by Prof. Owen in his remarks on the skeleton of this species (see Osteological Catalogue, vol. ii. p. 717). He also notices that the Paris specimen has an extra pair of ribs.

† Reise nach Mossambique, p. 17.

‡ *I. e.* not projecting strongly upwards as in the Long-tailed Monkeys and Lemurs.

tebræ sixteen, lumbar vertebræ seven or eight in number; spines of lumbar vertebræ all backwards inclined\*; no distinct lumbar anapophyses†; neurapophyses not perforated; two articular surfaces on the atlas for its union with the axis; cervical spines short.

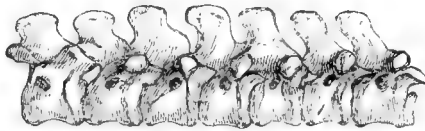
#### LORIS.

Spines of third and fourth cervical vertebræ very minute; neck so short that the breadth of the cervical vertebræ equals two-thirds their total length; spines of lumbar vertebræ nearly vertical; distinct though short lumbar anapophyses†; articular surfaces for the junction of the atlas with the axis not continuous; dorsal vertebræ fourteen or fifteen, lumbar vertebræ nine in number; cervical spines short.

#### PERODICTICUS AND ARCTOCEBUS.

Cervical spines very long, the last the longest; distinct cervical metapophyses; neurapophyses of dorsal vertebræ directly perforated

Fig. 12.



Seven trunk-vertebræ of Potto (*Perodicticus*), from the British Museum. Nat. size.

by spinal nerves; spines of lumbar vertebræ vertical or very slightly inclined forwards; articular surfaces for the junction of the axis with the atlas continuous, as in *Lemur*; dorsal vertebræ fourteen or fifteen, lumbar vertebræ seven or eight in number; sometimes traces of hyperapophyses.

#### GALAGININÆ †.

Atlas with only one articular surface behind; axis with a simple or bifurcated spinous process; spines of all the cervical vertebræ posterior to the axis almost or quite obsolete; thirteen dorsal, and six lumbar vertebræ; twelfth or thirteenth dorsal spine turned forwards; metapophyses and anapophyses distinct; hyperapophyses (fig. 8, *h*) in lumbar region at their maximum; first dorsal spine long.

#### TARSIDÆ.

Cervical spines almost obsolete; first dorsal spine very small;

\* Noticed by De Blainville, 'Ostéographie,' *Lemur*, p. 14.

† Noticed by De Blainville, 'Ostéographie,' *Lemur*, p. 16. The metapophyses are described by Prof. Owen in part 1 of his Memoir on the *Megatherium*, 'Phil. Trans.', part 2 for 1851, p. 728.

‡ Unfortunately I have only been able to observe two skeletons of this sub-family—one of *Galago (Otolincus) allenii*, the other of *Galago (Hemigalago) demidoffii*.

lumbar anapophyses very faintly marked; metapophyses more distinct in the three first caudals than in all the rest of the spine; no hyperapophyses.

#### CHEIROMYIDÆ.

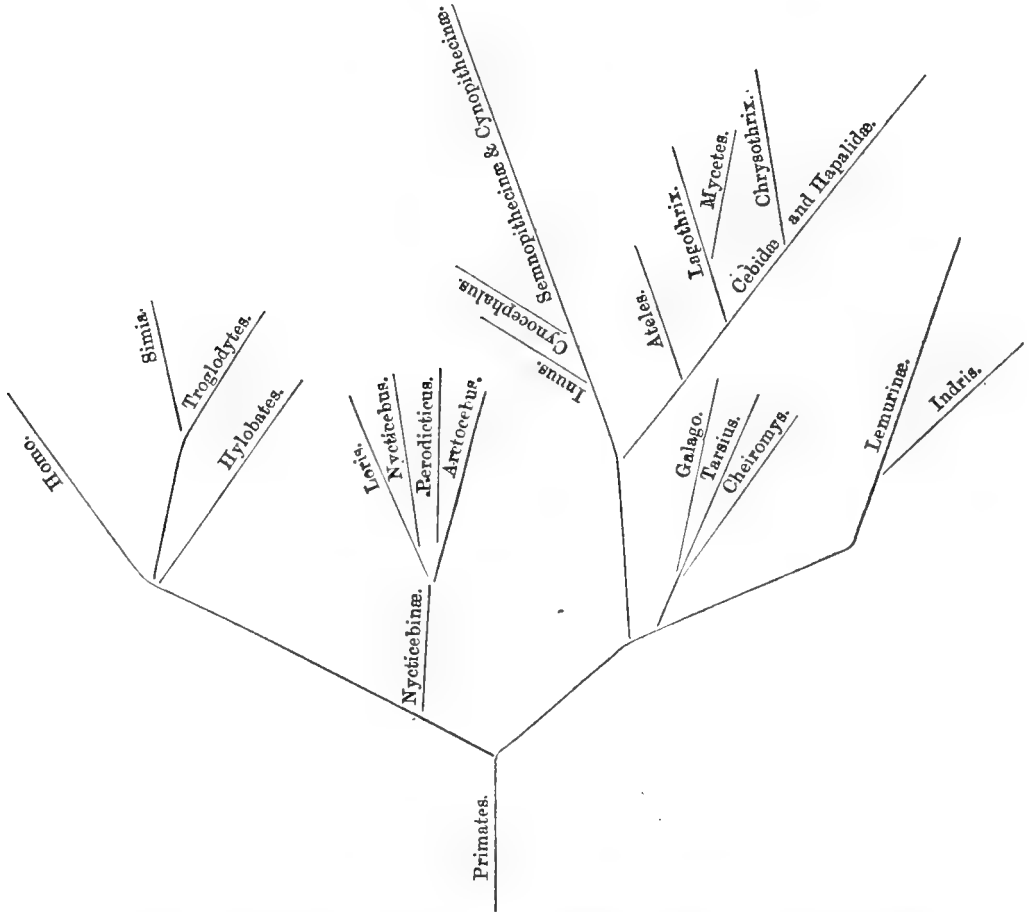
Atlas with two distinct articular surfaces for axis; spines of third, fourth, fifth, sixth, and seventh cervical vertebræ almost obsolete; thirteenth dorsal spine turned forwards; a process like a second anapophysis in some lumbar vertebræ; transverse process of fourth cervical vertebra bifurcating; nine pairs of true ribs; two sacral vertebræ; no hyperapophyses; no distinct metapophyses or anapophyses in the cervical region.

To sum up the results of these observations, the Primates present us (as regards their vertebral column only) with four principal types of structure, well represented, respectively, by (1) *Simia*, (2) *Cerco-pithecus*, (3) *Nycticebus*, and (4) *Lemur*,—the first having, however, many points in common with the third, and the second with the fourth; so that the affinities between the various groups of the order (as regards their spinal characters) may be represented under the symbol of a tree. The trunk of such a tree (fig. 13) divides into two main branches—one of them representing the forms possessing few caudal vertebræ, an elongated tapering sacrum, inconspicuous metapophyses or anapophyses, neural spines of trunk nearly always vertical or backwardly inclined, and that of the axis more or less bifid or trifid, cervical vertebræ short, and cervical spines sometimes very produced—that is to say, the forms included in the family *Hominidæ* and in the subfamilies *Simiinæ* and *Nycticebinæ*; the other main branch representing all the rest of the order, and possessing the characters attributed above to the *Simiidæ* (other than the *Simiinæ*), the *Cebidæ*, the *Hapalidæ*, and the *Lemuroidea* in common.

The first main branch gives off a secondary one to represent the *Nycticebinæ*, and then divides into three others for (1) *Homo*, (2) for *Troglodytes* and *Simia*, and (3) for *Hylobates*. The second main branch bifurcates,—its first division representing the *Simiidæ* other than the *Simiinæ*, together with the *Cebidæ* and *Hapalidæ*; its second denoting the *Lemuroidea* other than the *Nycticebinæ*. From both the *Semnopithecinae* and *Cynopithecinae* *Inuus* and *Cynocephalus* distinguish themselves as separate twigs; and *Ateles* diverges from the *Cebidæ* generally, and very interestingly parallels *Hylobates* in its long cervical neural laminæ, backwards inclined neural spines of trunk-vertebræ, large transverse diameter of thorax, and slightly marked metapophyses and anapophyses. *Mycetes* and *Lagothrix* also, with their marked hyperapophyses, and *Chrysothrix*, with its undivided caudal transverse processes, are also special forms. The genera *Galago*, *Tarsius*, and *Cheiromys*, with their rudimental cervical spines, diverge so much from the typical Lemurs that they might almost be represented as a distinct primary division of the second main branch, instead of a subdivision of that bifurcation which culminates in *Lemur*, and which gives off a twig to represent *Indris*

—a form, as we have seen, almost, if not quite, as distinct amongst the *Lemuroidea* as *Homo* is amongst the *Anthropoidea*.

Fig. 13.



Thus the vertebral column in Primates, though it does not give us such marked and distinct characters as are presented by the cranium and dentition, yet exhibits peculiarities which are far from being destitute of significance. These peculiarities, if considered alone, would lead to an arrangement of groups and an interpretation of affinities somewhat differing from, yet in part agreeing with, the classification founded on cranial and dental characters; so that the study of that part of the axial skeleton in the Primates which is posterior to the skull may fairly be regarded as well adapted to assist us in the determination of the natural affinities of the groups composing the order, while at the same time it conduces to a correct appreciation of the relations existing between the human vertebral column and that of the ordinary four-footed mammals.



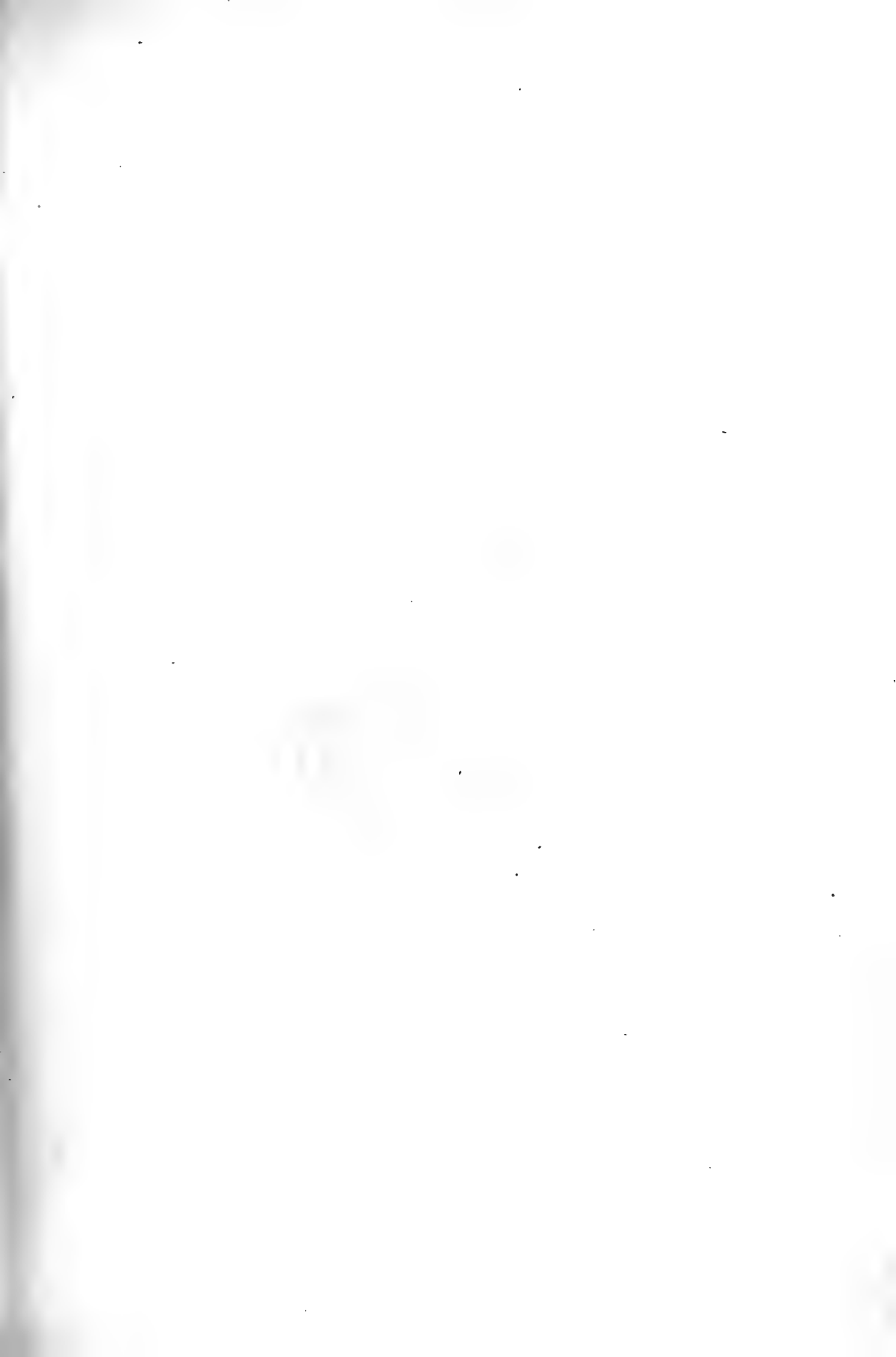




J Wolf & J.W Wood, del. et lith.

M. & N. Hanhart, imp.

CYPSELUS SQUAMATUS.





W. Wood del., sculp.

M. & N. Harhart, imp.

HELENA BISCUTATA.

9. NOTES ON THE GENERA AND SPECIES OF CYPSELIDÆ. BY  
P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE  
SOCIETY.

(Plates XXXIII., XXXIV.)

In offering to the Society some notes on the *Cypselidæ*, which have been put together during the time that I have devoted to this group with the object of working out the American species, I may begin by stating that my views as to the correct position of this family in the Natural System coincide with those of L'Herminier\*, Nitzsch, and Burmeister. There can be no doubt, I think, if osteological and pterylographical characters are to have any weight in our classification, that we must place the three families *Trochilidæ*, *Cypselidæ*, and *Caprimulgidæ* next to one another. It need scarcely be added, therefore, that I consider that the Swifts have no relationship whatever with the Swallows (*Hirundinidæ*), with which, in spite of the frequent protests of scientific ornithologists, they are confounded even to the present day by certain systematists who attend only to the most superficial external characters.

Without going into the general anatomy and osteology of the Swifts, which offer so many peculiarities, I may say a few words concerning two points—the form of the sternum, and the number of the phalanges of the toes—concerning which I have some new facts to communicate.

The general form of the sternum in the genus *Cypselus* has been well described by M. E. Blanchard in his admirable article upon the osteological characters of the sternum of birds in the 'Annales des Sciences Naturelles'†. As a typical form of the group, M. Blanchard describes and figures the sternum of the Common Swift (*Cypselus apus*). We cannot do better than follow his description of the more noticeable points in the structure of this organ, which is represented in the accompanying woodcuts (figs. 1 & 2).

The body of the sternum of *Cypselus apus* is much produced, and gradually widened towards its posterior extremity, the lateral margins curving gradually outwards, and meeting the posterior margin nearly at right angles. The posterior margin (see fig. 1) is convex, forming a segment of a circle; it is continuous throughout, and presents no traces of posterior fissures. The keel (see fig. 2) springs at once from the posterior margin, and rises high and rapidly, attaining an enormous development. It projects far in front over the anterior margin of the body of the sternum, and terminates in a rounded point, descending thence to the anterior margin of the body in a concave curve. There is scarcely a trace of the manubrial process

\* As long ago as the year 1827, in his 'Recherches sur l'appareil sternal des oiseaux,' M. l'Herminier well described the sternal apparatus of the Swifts, and constituted them the seventh family of his "Normal Birds," placing them between the Colibris (*Trochilus*) and the Engoulevents (*Caprimulgus*).

† Recherches sur les caractères ostéologiques des Oiseaux, &c. (Ann. d. Sc. Nat. ser. 4, Zool. vol. xi. p. 11).

which is so well developed in all the true Passeres. The two rami of the *furcula* are completely joined at its apex, which is situated at some distance from the anterior margin of the keel, and at about half the height of the keel from its base.

Fig. 1.

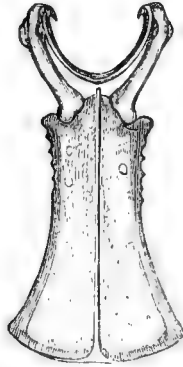
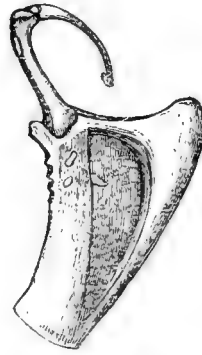


Fig. 2.

Figs. 1 and 2. Sternum of *Cypselus apus*.

Such are some of the more noticeable points in the formation of the sternum of *Cypselus*. They have been so frequently described that I should not have alluded to them unless I had wished to call attention to the fact that all the other genera of the same family present a nearly similar form of sternum. In *Chætura* (figs. 3 & 4)

Fig. 3.

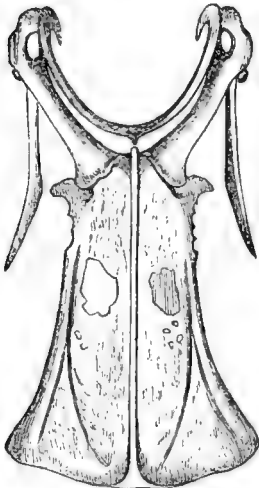
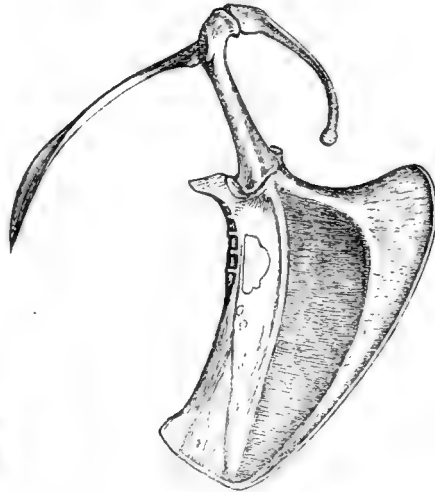


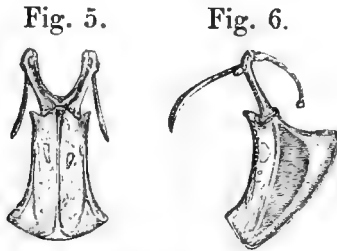
Fig. 4.

Figs. 3 and 4. Sternum of *Chætura zonaris*.

the general characters are nearly the same, although the whole sternum is broader in proportion and less elongated, and the anterior point or apex of the keel is not carried so far forward. The body of the sternum is also incompletely ossified, presenting traces of two

large irregular medial foramina, one on each side. The same foramina are present in some of the weaker forms of *Cypselus*, as already noticed by Mr. Gosse\* in the case of his *Tachornis phœnicobia*.

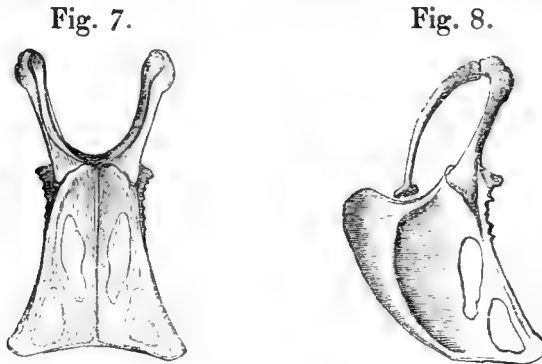
*Collocalia*† presents us with a sternum (figs. 5 & 6), which may be described as a miniature of that of *Chætura*. Besides the irregular



Figs. 5 and 6. Sternum of *Collocalia francica*.

lateral foramina in the face of the sternum noticed in the latter genus, there are likewise two small openings perforating the lower part of the carina, as is mentioned by Gosse in the case of his *Tachornis (l. c.)*. These are not shown in the figure.

*Dendrochelidon*, as already remarked by M. Blanchard, is, as regards its sternum, somewhat divergent from the typical form of



Figs. 7 and 8. Sternum of *Dendrochelidon wallacii*.

*Cypselus*. The whole sternal apparatus is much broader in proportion. The posterior margin of the sternal plate is slightly concave instead of being convex. The two medial foramina are large and well-defined, and two posterior foramina are likewise present, although the posterior margin of the sternal plate is entire and strongly ossified. The general character of the sternum, however, is strongly Cypseloid, and, putting aside the other points of its structure, leaves

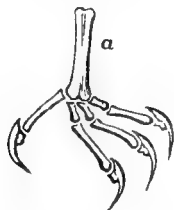
\* Birds of Jamaica, p. 59.

† Of the Osteology of *Collocalia* Dr. Bernstein has written a very complete account in the twenty-sixth volume of the 'Acta Academiæ Leopoldino-Carolinæ (p. 15)'. Dr. Bernstein gives figures of the breast-bones of the two Javan species (*C. esculenta* and *C. nidifica*), and shows conclusively that this genus is in every point of view truly Cypseloid and is most nearly allied to *Dendrochelidon*.

no doubt whatever as to the true position of this interesting form. The figure represents the sternum of *D. wallacii*. That of *D. mystacea*, of which also Mr. Wallace has kindly lent me a specimen, is nearly similar, but larger, and with the medial foramina still broader and more regularly oblong.

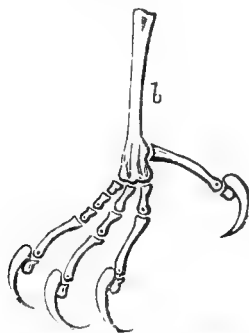
The abnormality of the number of phalanges in the digits of *Cypselus* is well known. The medial and external digits have only three phalanges like the inner digit, as was first pointed out by Nitzsch\* in 1811. This is the case, I believe, with all the species of *Cypselus* and *Panyptila*. Professor Baird, in his 'North-American Birds,' apparently misled by Streubel †, believes that in *Panyptila* the normal number of phalanges is present. But, as will be seen by the accompanying drawing (fig. 9), the same rule prevails in *Panyptila* as in *Cypselus*. The medial and outer digits have only

Fig. 9.

Fig. 9. Left foot of *Panyptila melanoleuca*.

three phalanges each like the inner. In all the other genera of *Cypselidæ*, as far as I have been able to ascertain, the normal rule is followed, the medial digit having four phalanges and the outer digit five. As an illustration of this form of Cypseloid foot I give a figure (fig. 10) of the bones of the foot of *Chætura zonaris*, with the phalanges slightly separated as in the corresponding figure of *Panyptila melanoleuca*.

Fig. 10.

Fig. 10. Right foot of *Chætura zonaris*.

\* Osteogr. Beiträge z. Nat. d. Vögel, p. 104.

† See Streubel's remarks in the 'Isis,' 1848, pp. 359, 360.



This very remarkable peculiarity in the foot of the typical *Cypselidæ*, together with the abnormal position of the hallex or posterior digit, which is either placed anteriorly in a line with the other digits or more or less laterally, serves to divide the family *Cypselidæ* into two distinct subfamilies.

*a.* CYPSELINÆ—tarsis plumosis : digitorum externi et medii phalangibus utriusque tribus : hallice antice vel lateraliter versa.

*b.* CHÆTURINÆ—tarsis nudis : digitorum phalangibus, quoad numerum, normalibus : hallice postice posita, interdum versatili.

The *Cypselinæ* contain two genera, which may be separated by the following diagnoses :—

1. *Cypselus* : tarsis plumosis, digitis nudis : hallice antica.
2. *Panyptila* : tarsis digitisque plumosis : hallice laterali.

The *Chæturinæ* appear to embrace four well-marked genera, which may be shortly diagnosed as follows :—

*a*, tarsis digito medio longioribus.

*a'*, reatricibus spinosis.

*a''*, rachidum apicibus prominentibus, (1) *Chætura*.

*b''*, rach. apicibus non prominentibus, (2) *Cypseloides*.

*b'*, reatricibus non spinosis . . . . . (3) *Collocalia*.

*b*, tarsis digito medio brevioribus . . . . . (4) *Dendrochelidon*.

One of the most remarkable points in the structure of the *Cypselidæ* is the great development of the salivary glands. In all the species of which the nidification is known, the secretion thus produced is used more or less in the construction of the nest. In most cases it forms a glue by which the other materials are joined together, and the whole nest affixed to the rock, wall, or other object against which it is placed. In some species of *Collocalia*, however, the whole nest is made up of inspissated saliva\*, and becomes the edible bird's-nest so well known in the East.

The eggs of the *Cypselidæ* appear to be always regularly oval in shape, and colourless.

### Subfam. I. CYPSELINÆ.

#### Genus I. CYPSELUS.

*Apus*, Scopoli, Intr. Nat. Hist. p. 483 (1777). Type *C. apus*.

*Cypselus*, Ill. Prodr. p. 229 (1811). Type *C. apus*.

*Micropus*, Meyer & Wolf, Taschenb. i. p. 280 (1810). Type *C. apus*.

*Brachypus*, Meyer, Vögel Liv- und Esthlands, p. 142 (1815).

Type *C. apus*.

*Tachornis*, Gosse, B. Jamaica, p. 58 (1847). Type *C. phœnicobius*.

This genus embraces a series of rather varied forms, which it may be perhaps necessary ultimately to subdivide. For the present I

\* The true constituent of the edible nests of the *Collocaliæ* was, I believe, first stated by Mr. Blyth (Journ. As. Soc. Beng. xiv. p. 210, 1845; cf. Ibis, 1860, p. 323).

prefer to use one generic name for the whole, arranging them as follows:—

A. Species orbis antiqui.

a. Cauda furcata.

1. CYPSELUS MELBA.

*Hirundo melba*, Linn.

*H. alpinus*, Scop., Levaill. Afr. pl. 43, undè *Cypselus gutturalis*, Vieill.

*C. alpinus*, Temm.

*C. melba*, Gould, B. Europe, pl. 35. f. 2; Blyth, Cat. p. 85; Jerdon, B. Ind. i. p. 175; Grill, Zool. Ant. p. 41; Tristram, P. Z. S. 1864, p. 431.

*Fuscus: gutture et ventre albis: torque cervicali fusco: long. tota 8·0, alæ 8·7, caudæ 3·5, rectr. ext. 3·5, med. 3·0 poll. Angl.*

*Hab.* Central and Southern Europe, Africa north of the Atlas, and South-western Asia, as a summer visitant; Crimea and eastern coasts of Black Sea (*Demidoff*); Palestine (*Tristram*); Algeria (*Tristram & Loche*); South Africa, Cape Colony (*Victorin & Levaill.*); India, Central and Southern (*Jerdon*); N.W. Himalayas and Cashmere (*Adams*).

2. CYPSELUS ÆQUATORIALIS.

*Cypselus æquatorialis*, Müll. Naum. 1851, iv. p. 25, et Ois. d'Afr. pl. 7.

*C. rueppellii*, Heugl. Journ. f. Orn. 1861, p. 421?

“Magnitudine *C. melbæ*, colore *C. apodis*” (Müller et Heuglin, *l. c.*).

*Hab.* Highlands of Abyssinia (*Müll.*); High plains of Woggara, Central Abyssinia (*Heuglin*).

I have not myself seen examples of this species; but Mr. Otto Finsch, of Bremen, who has examined Heuglin's specimens, has kindly furnished me with the following note upon them.

*Minor quam C. melba, et ventre non albo: supra fumido-brunneus, aliquot metallice resplendens: subtus dilutior, mento pallidior, et plumarum marginibus pallidioribus: long. al. 7·9, caudæ furcatæ rect. ext. 3·3, med. 2·4.*

3. CYPSELUS APUS.

*Hirundo apus*, Linn.

*Cypselus murarius*, Temm.

*C. apus*, Blyth, Cat. p. 35; Jerdon, B. Ind. i. p. 177; Gould, B. Europe, pl. 35. f. 1; Grill, Zool. Ant. p. 41; Radde, Reisen, ii. p. 130; Tristram, P. Z. S. 1864, p. 431.

♂. *Fuliginoso-niger, gula alba: long. tota 6·8, alæ 6·6, caudæ rectr. ext. 3·0, med. 2·0.*

♀. *Paulo minor.*

*Hab.* Europe and Northern and Middle Asia, as summer visitant;

Palestine (*Tristram*); Afghanistan (*Blyth*); Cashmere (*Adams*); Egypt and Nubia (*Rüpp.*); Coasts of Black Sea, nesting in cliffs (*Demidoff*); Eastern Siberia (*Radde*); Madeira (*Harcourt*); Benguela (*Monteiro*); Cape Colony (*Layard*); Natal (*Ayres*).

There are two South-African specimens of a Swift in the Leyden Museum labelled "*Cypselus barbatus*," which differ from European examples principally in their lighter colour above, particularly on the secondaries and scapulars, in the white feathers of the gular patch presenting a narrow black central line, and in the feathers of the lower back, belly, and under wing-coverts being narrowly margined with white. Two examples from Natal, collected by Mr. Ayres\* are similar. It is possible that this form may be entitled to rank as a species, to which Temminck's MS. name may be applied. But it would be desirable to obtain more skins for comparison, particularly examples from other parts of South Africa.

Mr. Layard says *C. apus* arrives at the Cape early in November (Cf. *Ibis*, 1864, p. 134), but does not breed in the colony, as far as he can ascertain.

Specimens collected by Heuglin at Keren, on the White Nile, in the Bremen Museum (probably those referred to in his article *Journal f. Ornithologie*, 1862, p. 422), are stated by Mr. Finsch to belong certainly to *C. apus*, although two of them present slight white marginations on the under surface. Heuglin's *C. aterrimus* (*l. c.*) is probably not different.

#### 4. CYPSELUS PACIFICUS.

*Hirundo apus*, var.  $\beta$ , Pallas, Zoogr. Rosso-Asiat. i. p. 540.

*Cypselus pacificus*, Lath.

*C. australis*, Gould, B. Austr. ii. pl. 11.

*C. vittatus*, Jard. & Selby, Ill. Orn. n. s. t. 39; Swinhoe, P. Z. S. 1863, p. 263; Moore, Cat. E. I. Mus. p. 385; Blyth, Cat. p. 86.

*C. apus* (partim), Radde, Reisen, ii. p. 130.

♂. *Niger*: *uropygio albo*: *subtus fusco-niger, plumis late albo marginatis*: *gutturæ medio albo, lateraliter grisescente*: *subalaribus fusco-nigris albo marginatis*: *long. tota 7.5, alæ 7.5, caudæ rectr. ext. 3.3, med. 2.2.*

♀. *Paulo minor.*

*Hab.* Eastern Siberia, Baikal (Pallas & Radde); China, summer visitant from Amoy to Talién Bay (*Swinhoe*); Formosa (*Swinhoe*); Pinang (*Cantor*); Malay peninsula (*Blyth*); Eastern Australia (*Gould*); Cape York (*MacGillivray*).

I cannot distinguish Australian and Asiatic examples of this species. It would be desirable to know whether it occurs in the great Indian islands and the Moluccas. There are no specimens from these localities in the Leyden Museum, nor did Mr. Wallace obtain it.

Mr. Swinhoe says of the species (*l. c.*):—"Sexes of similar plumage; wings and tail of variable length in both, in the former seldom more than  $\frac{1}{2}$  inch difference between two specimens."

\* Cf. Gurney in *Ibis*, 1863, p. 321, et 1865, p. 264.

Mr. Swinhoe's specimens, which I have examined, measure as follows:—

	L. t.	alæ.	caudæ.
(1) ♂, Amoy, May 1859 . . . . .	7·5	7·5	3·3
(2) ♀, Amoy, April 1859 . . . . .	6·5	7·0	3·0
(3) ♂, Amoy, May 1859. . . . .	6·5	7·2	3·1
(4) ♂, Talien Bay, July 1860. . . . .	7·2	7·2	3·2

I can by no means agree with Radde in considering this species merely a variety of *C. apus*, although they may both occur together in Dauria.

#### 5. CYPSELUS LEUCONYX.

*Cypselus*, sp.?, Blyth, J. A. S. B. xi. p. 886.

*C. leuconyx*, Blyth, J. A. S. B. xiv. 212; Cat. p. 85; Jerdon, B. Ind. i. p. 180.

*Hab.* India: Malabar (*Jerdon*); N.W. Himalayas, Simla (*Blyth*).

The only examples of this species I have met with are in Mr. Gould's collection. They are not in good condition. They appear to be smaller than *C. pacificus*, and blacker above; the white bar on the rump is narrower, and there is much less white on the throat. I admit this species with doubt, and should wish to see further examples before deciding definitely as to its validity.

#### 6. CYPSELUS UNICOLOR.

*Cypselus unicolor*, Jard. Journ. Nat. & Geogr. Sc. i. p. 242; Jard. & Selby, Ill. Orn. ii. pl. 83; Vernon Harcourt, P. Z. S. 1851, p. 144; Ann. N. H. ser. ii. vol. xv. p. 434; A. Newton, Ibis, 1863, pp. 186, 192.

*Nigro-fuliginosus unicolor*: *cauda valde furcata*: *long. tota* 6·5, *alæ* 5·5, *caudæ rectr. ext.* 2·8, *med.* 1·9.

*Hab.* Madeira, permanent resident (*Harcourt*).

*Mus.* Brit.

"Smaller than *C. apus*, and tail more deeply forked; chin sometimes almost as white as in the Common Swift."—*Harcourt*.

#### 7. CYPSELUS CAFFER.

*Cypselus caffer*, Licht. Doubl. p. 58; Cab. Mus. Hein. ii. p. 85; Grill, Zool. Ant. p. 41.

*C. pygargus*, Temm. Pl. Col. 460. f. 1.

*Niger*: *gutturæ et vitta uropygiali albis*: *pileo et alis murino-fuscis*: *cauda profunde furcata*: *long. tota* 6·2, *alæ* 5·8, *caudæ rectr. ext.* 2·1, *med.* 1·8.

*Hab.* Nubia (*Licht.*); Abyssinia (*Heuglin*); Natal (*Ayres*); Cape Colony, generally distributed (*Layard*); Damara-land (*Andersson*).

A very distinct species, easily recognizable by its deeply forked tail and sharply pointed outer rectrices. Dr. Cabanis informs me that *Cypselus caffer*, Licht. (type), is certainly the same as *Cypselus pygargus*, Temm. Bonaparte (Consp. p. 65) and Radde (Reisen, ii. p. 130) have referred Lichtenstein's name to *C. pacificus*.

There are four stuffed examples of this species in the Leyden Museum from the Cape, and one from Abyssinia, the latter collected by Heuglin at Dembea in May 1862, and labelled *C. abyssinicus*. Under this name it is referred to in 'Journ. f. Orn.' 1862, p. 422.

Levaillant's *Martinet à croupion blanc* (Ois. d'Afr. pl. 244. f. 1; unde *Hirundo nigra*, Vieill. Enc. p. 528, et *H. leucorhoa*, Shaw, Gen. Zool. x. p. 98; et *Cypselus leucorrhous*, Stephens, Gen. Zool. xiii. pt. 2. p. 81) is, as Sundevall suggests (Krit. Framst. p. 51), in all probability *C. caffer*. Levaillant's figure wants the white throat, &c., and is not recognizable.

Mr. E. L. Layard, who has kindly sent me a skin of this species collected in Damara-land by Mr. Andersson, informs me that it is a very abundant species at the Cape, and that he has received it from all parts of the colony. "It takes possession of the long-necked nests of the Cape Swallow (*Hirundo capensis*), and lays four or five pure-white eggs of a truncated shape. It breeds about houses when in town, and about rocks in the country. Its flight precisely resembles that of *C. apus*, and the two are generally seen together. I can only distinguish them by the white rump of the former, seen when going away from me."

### 3. CYPSELUS PARVUS.

*Cypselus parvus*, Licht. Doubl. p. 58; Streubel, Isis, 1848, p. 351; Brehm in Cab. Journ. f. Orn. 1854, Extrah. p. 95.

*C. ambrosiacus*, Temm. Pl. Col. 460. f. 2; Hartlaub, West. Afr. p. 24; Antinori, Cat. p. 24.

*Murino-fuscus, gutture albido fusco striolato: alis et cauda æneo tinctis: cauda profundissime furcata: long. tota 7.0, alæ 5.4, caudæ 1.4, rectr. ext. 4.0, med. 1.4.*

*Hab.* Nubia (Licht.); vicinity of Chartoum, very common (*Antinori*); "Nesting in companies, in the Tompalm (*Crucifera thebaica*), Sept 1850, at Elefahn, on the Blue Nile" (*Brehm*, l. c.); Western Africa, Gold-coast (*Nagtglas*); Fernando Po (*Fraser*); Gaboon (*Du Chaillu*); Mayotte, Comoro Islands (*Pollen*); Madagascar (*E. Newton*).

*Hirundo ambrosiaca*, Gm. (S. N. i. p. 1021), is founded on Brisson's *Hirundo riparia senegalensis* (Orn. ii. p. 508), which has twelve rectrices, according to that accurate describer, and therefore cannot be a Cypseline bird. We must consequently adopt Lichtenstein's name for this species, founded on Nubian specimens.

The skin from which the characters are taken is from Gaboon (*Du Chaillu*). Two other examples in the British Museum (from Fernando Po) are smaller, and have the throat whitish, minutely streaked with black. A fourth from the Niger Expedition is nearly similar, but has the throat dark, nearly uniform with the body below, and scarcely any indications of striations. A Madagascar skin in Mr. Newton's collection measures: "long. tota 6.4, alæ 5.3, caudæ rect. ext. 3.7, med. 1.7."

I cannot make out this species without a larger series of speci-

mens, particularly examples from Eastern Africa, of which I have none accessible. But I think it probable there are two species con-founded under this name, as Cassin (List of *Cypselidæ* in Philad. Acad. Collection) keeps *C. ambrosiacus* distinct from *C. parvus*.

In the Leyden Museum are three specimens from Western Africa (Gold-coast, from Governor Nagtglas, 1861-2), all of the smaller variety, and nearly uniform in colour, with the throat obscurely punctured with whitish. A fourth rather larger (probably Tem-minck's type) from Nubia is much faded. It has the throat white, obscurely punctulated with fuscous. A skin in the same museum from Mayotte, lately sent by Mr. Pollen, agrees with Mr. Newton's bird from Madagascar.

#### 9. CYPSELUS BATASSIENSIS.

*Cypselus batassiensis*, Gray, Griff. An. Kingd. ii. p. 60; Blyth, Cat. p. 86; Moore & Horsf. Cat. i. p. 108; Jerdon, B. Ind. i. p. 180.

*C. palmarum*, Gray, Ind. Zool. pl. 35. f. 1.

*Nitenti-cineraceo-fuscus*; *subtus dilutior*: *alis et cauda saturatioribus*: *cauda profunde furcata*: *long. tota 5.0, alæ 4.5, caudæ rectr. ext. 2.5, med. 1.25.*

*Hab.* Peninsula of India, and Ceylon, generally distributed (*Jerdon*); Assam (*MacClelland*); Arracan (*Blyth*); Tenasserim (*Brit. Mus.*).

The nest of this Swift is always placed in the fronds of the *Tal* or Palmyra palm (*Borassus flabelliformis*). See the notes collected in Moore and Horsfield's 'Catalogue' and Jerdon's 'Birds of India.'

#### 10. CYPSELUS INFUMATUS, sp. nov.

*Fumoso-nigricans, alis et cauda æneo parum nitentibus*: *subtus dilutior*: *cauda furcata*: *long. tota 4.7, alæ 4.5, caudæ rectr. ext. 1.11, med. 1.3.*

*Hab.* in ins. Borneo, Banjermassing (*Mottley*).

*Mus.* A. R. Wallace.

*Obs.* Aff. *C. batassiensis* ex India, sed colore saturatiore et cauda brevior et minus furcata distinguendus.

I have as yet seen but a single example of this species, now in Mr. Wallace's possession. It formed part of the collection made by the late Mr. Mottley at Banjermassing, Borneo, for Mr. L. L. Dillwyn, M.P., of which I have given a list (P. Z. S. 1863, p. 206). It stands there incorrectly determined as a *Collocalia*, sp.?, but is decidedly a *Cypselus*, allied to *C. batassiensis* of India.

I have searched in vain for this species among the treasures of the Leyden Museum.

#### b. Cauda fere æquali.

#### 11. CYPSELUS SUBFURCATUS.

*Cypselus affinis*, Strickl. P. Z. S. 1846, p. 99; Swinhoe, Ibis, 1860, p. 48, et 1861, p. 30.

*C. subfurcatus*, Blyth, J. A. S. B. xviii. p. 807, et Cat. p. 85; Moore & Horsf. Cat. i. p. 386; Burgess, P. Z. S. 1854, p. 265; Swinhoe, P. Z. S. 1863, p. 264.

*C. leucopygialis*, Cassin, Pr. Acad. Phil. v. p. 58, pl. 13. f. 1.

*Niger: gutture et vitta uropygiali albis: fronte murina: cauda vix furcata, omnino nigra: long. tota 5·2, alæ 5·3, caudæ rectr. ext. 2·0, med. 1·8.*

*Hab.* Southern China and Formosa (*Swinhoe*); Malay peninsula; Penang (*Cantor*); Malacca (*Wallace*); Sumatra (*Cassin*); Java (*Müller*).

Of this species Mr. Swinhoe writes (P. Z. S. 1863, p. 264)—“Larger than *C. affinis*, and of a much blacker and glossier colour, with much more white on the throat; tail longer and subfurcate. Sexes alike. Wings varying somewhat in length. Resident on the Chinese coast not much higher than Amoy, whence it ranges southwards to Malacca. Found also in Southern Formosa.”

I do not find much difference *in size* between Mr. Swinhoe's examples of this species and others of *C. affinis*. But I think the two species are distinct. In this bird the plumage is altogether darker, the head, wings, and tail being glossy black like the back. In *C. affinis* these parts are brown. The furcation of the tail also presents a constant and well-marked difference, and the tail itself is decidedly longer.

In Southern China *C. subfurcatus* builds its nest “under the eaves and rafters of the houses, much in the form of the House Martin (*Chelidon urbica*), but the exterior coating of it differs in being composed of thin layers of wool, hair, and dried grass, glued one above the other with the saliva of the bird, and lined internally with feathers.” (Swinhoe, Ibis, 1863, p. 254.)

In Penang, according to Blyth, quoting Col. Low, several pairs of this Swift inhabit a “continuous common nest” placed under the eaves of the verandahs (J. A. S. B. xviii. p. 807).

There are three specimens of this species in the Leyden Museum from Java (Samarang), collected by S. Müller in 1828, and labelled “*Cypselus leucorrhous*, S. Müller, n. sp.” In the same collection are two examples labelled “Nepal (*Hodgson*).” If this latter locality be correct, it would appear that *C. subfurcatus* ranges up the Malayan peninsula to the frontiers of Nepal, as is the case with many other of the Malayan representatives of Indian species. But *C. nipalensis*, Hodgson (J. A. S. B. x. 1836, p. 780), is usually referred to *C. affinis*.

## 12. CYPSELUS AFFINIS.

*Cypselus affinis*, Gray, Ill. Ind. Zool. pl. 35. f. 2; Jerdon, B. Ind. i. p. 178; Blyth, Cat. p. 86; Horsf. Cat. i. p. 106; Jard. Contr. Orn. 1849, p. 5, et 1851, p. 157.

*C. montanus*, Jerdon.

*C. abyssinicus*, Streubel, Isis, 1848, p. 354; Hartl. Orn. West. Afr. p. 24.

*C. galilæensis*, Ant. Naumann. v. p. 307, et Cat. p. 24; Tristram, P. Z. S. 1864, p. 431.

*Supra fusco-niger*: dorso nigro, æneo tincto: pileo fuscescente, fronte dilatior: subtus fuscescenti-niger, gula alba: long. tota 4·5, alæ 5·0, caudæ 1·8.

*Hab.* India, generally distributed, and Ceylon (*Jerdon*); Kurra-chee (*Mus. Brit.*); Palestine, Jordan valley (*Ant. & Tristram*); Abyssinia (*H. & Ehr.*); Sennaar, on the Blue Nile (*Antinori*); Western Africa, St. Thomas (*Hartl.*); Cape (*Mus. Brit.*).

This Swift, as I have pointed out (*Ibis*, 1865, p. 234), appears to be a very widely distributed species, and one in which the plumage varies greatly in intensity of colouring, without presenting any constant differences.

Indian skins differ amongst themselves in depth of tint, some being of a much more brownish black than others. A specimen in Mr. Gould's collection, obtained by Captain Burgess in the Deccan, is quite undistinguishable from Mr. Tristram's Palestine skins, which are of the darker type. Dr. Cabanis has kindly compared one of the Palestine birds with the type of *C. abessynicus* in the Berlin Museum, and pronounces them identical. I have examined the specimen from St. Thomas, mentioned by Hartlaub (*West. Afr.* p. 24), and can see little distinction, except that the Palestine bird presents a whitish front and superciliaries, which, however, are quite apparent in other African specimens.

In India this Swift builds in colonies "wherever there are large towns, large pagodas, tombs, or other old buildings. Their nests are composed of feathers, grass, straw, &c., agglutinated together by the secreted mucus of their salivary glands" (*Jerdon*). It also occasionally breeds in rocks, in India, and in the Jordan valley appears to follow this practice exclusively, sometimes appropriating the nest of *Hirundo rufula* and completing it after its own fashion. See Mr. Tristram's interesting notes in these 'Proceedings' (1864, p. 131) and in 'The Ibis' (1865, p. 76 *et seq.*).

### B. Species Americanæ (*Tachornis*, Gosse).

Mr. Gosse has proposed the name *Tachornis* for his *Tachornis phœnicobia*. But I do not see how this bird differs from the weaker species of the genus *Cypselus* of the Old World, and for the present I am inclined to keep the Neotropical members of the group under the same generic designation.

#### 13. CYPSELUS PHÆNICOBIUS.

*Tachornis phœnicobia*, Gosse, B. Jamaica, p. 58; ejusd. Ill. B. Jam. pl. 9; Gundlach, Journ. f. Orn. 1856, p. 5.

*Cypselus iradii*, Lembeye, Av. de Cuba, t. 7. f. 4.

*Niger, alis fuscescentioribus*: uropygii fascia lata cum gutture toto et ventre medio albis: cauda paulum furcata: long. tota 4·0, alæ 4·0, caudæ rectr. ext. 1·7, med. 1·4.

*Hab.* Jamaica and Cuba.



“Builds in the hollows of the dried spathes of the Cocoa-nut Palm (*Cocos nucifera*), also on the plaited surface of the fronds of the Palmetto (*Chamerops*, sp.). Nest made of silk-cotton (*Bombax*) and feathers” (Gosse, *l. c.*). Mr. Marsh gives an interesting note on the recent change of habits in nesting in this species, in the ‘Proc. Acad. Sc. Philad.’ 1863, p. 283.

I have two Jamaican skins of this species, kindly presented to me by the Rev. J. M. Philippo of Spanish Town, but I have never compared them with Cuban skins, which are stated to be identical.

#### 14. CYPSELUS SQUAMATUS. (Pl. XXXIII.)

*Cypselus squamatus*, Cassin, Pr. Ac. Phil. vi. p. 369 (1853).

*C. marginipennis*, Natt. MS. sp. no. 372.

*Supra aeneo-niger, plumis subtiliter albo marginatis: subtus obscure albus, lateraliter nigricans, subalaribus fusco-nigris: cauda longa, profunde furcata: long. tota 5·4, alæ 4·0, caudæ rectr. ext. 2·8, med. 1·2.*

*Hab.* Cayenne (*Mus. Brit.*); British Guiana (*Dr. Dalton*); Brazil, Nas Furnas, and Riacho (June), Borba (winter months) (*Natt.*).

This species was first described by Mr. Cassin (*l. c.*), from specimens obtained by Dr. Dalton in British Guiana, although long previously discovered by the late J. Natterer in Brazil.

Natterer’s MS. notes concerning it, most obligingly communicated to me by Herr v. Pelzeln, are as follows:—

“Nas Furnas, 13 June, 1823, four ex. obtained out of a flock of seven flying over a pool. Their flight is the same as that of other Swifts. Male, just completed moulting, iris dark brown; tarsus and toes reddish grey, covered sparingly with little feathers; claws reddish grey, with the tips darker; the deeply cleft tail consists of ten feathers, the outermost 2" 10" in length, the middle 1½" shorter; length 6" 1", expanse 10" 1", the tail reaches 2" beyond the end of the wings. Apertures of the nostrils elongated, small, with elevated edges, placed close to the edge of the culmen, the apertures turned vertically upwards and forming a horizontal line.

“A second ex. in moult, bill black; length 5" 9", expanse 9" 11", end of wings reaching 2" beyond the outer tail-feathers; outer tail-feathers 2½", the medial ditto 14" shorter.

“This bird builds its nest in the beautiful hanging withered fronds of the *Puriti* Palm\*. It is made of Pigeons’ feathers stuck together with gum†. The young must hold fast or they would fall out, since there is only a very small place hollowed out for them near the entrance. The nest is stuck on to the under side of the leaf near the stalk, and so protected from the rain. The eggs are white, two or three in number.”

\* In answer to an inquiry respecting this Palm, Dr. R. Spruce writes:—“The Palm you ask about is doubtless *Mauritia venifera*, L., called *Mauriti* on the Amazon, but *Buriti* elsewhere in Brazil, if I may trust to Martius, although a German is apt to hear *b* or *p* for *m* in foreign languages.”

† No doubt the saliva of the bird itself, as in the case of other *Cypselidæ*.—P. L. S.

Herr v. Pelzeln adds—"The two nests brought back by Natterer are of the following dimensions: breadth rather more than 2", diameter of entrance-hole about 1". The feathers used in construction are greyish brown with white shafts, with some green feathers mixed in. The cement is doubtless the saliva of the bird, as is the case with other *Cypselidæ*."

Mr. Wolf's plate (Pl. XXXIII.) includes a figure of the nest from a drawing kindly sent me by Herr von Pelzeln.

#### 15. CYPSELUS ANDICOLA.

*Cypselus andicolus*, Lafr. et d'Orb. Syn. p. 70; d'Orb. Voy. p. 358, pl. 42. f. 2.

*Fumoso-fuscus, uropygio collo undique et corpore subtus albidis: crisso fusco: cauda elongata, furcata, fusco-nigra: long. tota 5.5, alæ 5.5, caudæ rectr. ext. 2.6, med. 1.7.*

*Obs.* Of this species I have only seen the single specimen in the British Museum.

*Hab.* Bolivia; La Paz, Cavari, and Inquisivi, alt. 9000 feet (*D'Orb.*).

*Mus.* Brit. ex Bridges.

#### 15. CYPSELUS MONTIVAGUS.

*Cypselus montivagus*, Lafr. et d'Orb. Syn. Av. p. 70; d'Orb. Voy. p. 357, pl. 42. f. 1.

*Supra fusco-niger, tectricum alarium majorum quatuor aut quinque dorso proximis apice et margine albis, reatricibus (prima laterali excepta) apice pogonio externo pallide rufescentibus, duabus mediis apice albescentibus: macula parva ante et supra oculos alba: subtus fusco-niger: gutture colloque antico usque ad pectus fasciaque anali albis: tectricibus caudæ inferis, pectore ventreque nigris: alis plicatis lineas octo cauda longioribus: rostrum minutum, breve, supra valde curvatum: long. tota 150, alæ 125, caudæ 40 mill. Gall. (d'Orb.).*

*Hab.* Bolivian Andes, between Samaypata and Santa Cruz de la Sierra (*D'Orb.*).

I have never seen examples of this species. The figure represents the tarsi naked and the hallux placed posteriorly, so that it may belong to the next subfamily. But very little dependence can be placed on *D'Orbigny's* figures; and *Bonaparte* says (*Consp.* p. 66) "*minime ACANTHYLIS.*"

### Genus 2. PANYPTILA.

*Panyptila*, Cassin, *Wieg.* Arch. xiii. p. 345 (1847). Type *P. cayennensis*.

*Pseudoprocne*, Streubel, *Isis*, 1848, p. 358. Type *P. cayennensis*.

#### 1. PANYPTILA CAYANENSIS.

*Le Martinet à collier de Cayenne*, Buff. Pl. Enl. 725. f. 2.

*Hirundo cayanensis*, Gm. S. N. i. p. 1024.

*Panyptila cayanensis*, Cab. Wieg. Arch. xiii. p. 345 (1847).

*Cypselus cayanensis*, Bp. Consp. p. 66.

*Pseudoprocne cayennensis*, Streubel, Isis, 1848, p. 358.

*Splendenti-nigra*, macula anteculari utrinque, gutture toto et torque angusto postico cum plaga hypochondriali utrinque albis : cauda profunde furcata : long. tota 4·7, alæ 4·8, caudæ rectr. med. 1·2, ext. 2·3.

*Hab.* Cayenne and Brazil ; Bahia (*Mus. Brit.*).

## 2. PANYPTILA SANCTI-HIERONYMI.

*Panyptila sancti-hieronymi*, Salvin, P. Z. S. 1863, p. 190, pl. xxii.

*Sericeo-nigra* ; linea ante oculos, gutture toto ad medium pectus et torque postico cum plaga hypochondriali utrinque albis : cauda profunde furcata : long. tota 7·5, alæ 7·3, caudæ rectr. ext. 3·6, ext. 1·9.

*Hab.* Guatemala, prov. Vera Paz near San Geronimo.

*Obs.* Similis *P. cayanensi* et ejusdem formæ sed fere duplo major. See Mr. Salvin's description of the singular nest of this bird, *l. c.*

## 3. PANYPTILA MELANOLEUCA.

*Cypselus melanoleucus*, Baird, Pr. Acad. Phil. 1854, p. 118 ; B. N. Am. p. 141.

*Panyptila melanoleuca*, Sclat. et Salv. Ibis, 1859, p. 125.

*Nigra* : secundariorum apicibus, gutture toto et pectore medio cum macula laterali utrinque albis : cauda furcata : long. tota 6·0, alæ 5·7, caudæ rectr. med. 1·8, ext. 2·3.

*Hab.* Colorado basin, New Mexico (*Baird*) ; Guatemala, near Dueñas (*Salvin*).

## Subfam. II. CHÆTURINÆ.

### Genus 1. CHÆTURA.

*Chætura*, Stephens, Gen. Zool. xiii. pt. 2. p. 76. Type *C. pelasgia*.

*Acanthylis*, Boie, Isis, 1826, 971. Type *C. spinicauda*.

*Hemiprocne*, Nitzsch, Pterylogr. p. 123, 1840. Type *C. zonaris*.

*Pallene*, Lesson, Compl. Buffon, viii. p. 493. Type ?.

*Hirundapus*, Hodgson, J. A. S. B. v. p. 780 (1836). Type *C. caudacuta*.

### A. Species majores.

#### a. Species Asiaticæ (*Hirundinapus*).

#### 1. CHÆTURA CAUDACUTA.

*Hirundo caudacuta*, Lath. Ind. Orn. Suppl. p. 57.

*Hirundo fusca* et *Chætura australis*, Steph. Gen. Zool. xiii. p. 76.

*Chætura macroptera*, Sw. Zool. Ill. n. s. pl. 42.

*Acanthylis caudacuta*, Gould, B. Austr. ii. pl. 10 ; v. Schrenck,

Reise, i. p. 250; Radde, Reisen, ii. p. 129; Swinhoe, P. Z. S. 1863, p. 263; Jerd. B. Ind. i. p. 175.

*Chætura nudipes*, Hodgs. J. A. S. B. v. p. 779 (1836).

*Cypselus leuconotus*, Deless. Mag. de Zool. 1840, Ois. t. 20; Souv. Voy. dans l'Inde, Ois. t. 9.

*Acanthylis caudacuta*, Jerd. B. Ind. i. p. 173.

*Acanthylis fusca*, Blyth, Cat. p. 84.

*Hirundo ciris*, Pallas, Zoogr. R.-A. p. 541(?).

*Fusca, pileo alis et cauda obscurioribus, æneo perfusis: gutture et crisso pure albis: fronte interdum albida: long. tota 7·5, alæ 8·0, caudæ 2·2.*

*Hab.* Eastern Australia and Tasmania (*Gould*); China, Amoy (*Swinhoe*); South-Eastern Himalayas, Nepal, Sikim, Bootan (*Jerdon*); Amoorland (*v. Schrenck and Radde*).

Mr. Gould figures this fine species in the 'Birds of Australia' with a conspicuous white front. This is so in some Australian examples, but in others (as in a Tasmanian skin in Mr. Gould's collection) the front is nearly black. This is likewise the case in one of Mr. Hodgson's skins typical of his *Acanthylis nudipes*. The Himalayan skin is also rather darker below than the Chinese bird, but I can see no other difference.

It would be interesting, however, to know whether this bird is found anywhere between Asia and North-Eastern Australia, as in Celebes a very distinct form occurs.

## 2. CHÆTURA GIGANTEA.

*Cypselus giganteus*, Temm. Pl. Col. 364.

*Acanthylis gigantea*, Jerd. B. Ind. i. p. 172.

*A. caudacuta*, Blyth, Cat. p. 84.

*Nigricanti-fusca, pileo alis et cauda æneo perfusis: crisso et hypochondriis pure albis: long. tota 8·4, alæ 8·0, caudæ rectr. med. 2·6, ext. 2·2.*

*Hab.* Java (*Van Hasselt*); Sumatra (*Mus. Lugd.*); Malay peninsula up to Arakan (*Blyth*); Nilgherries (*Jerdon*); Ceylon (*Layard*); Pinang (*Cantor*); Singapore (*Wallace*); Celebes (*Mus. Lugd.*).

One example of this Swift is in Mr. Wallace's collection, shot by himself at Singapore; but the species is not in the British Museum. In form it is identical with the preceding, but is easily distinguishable by its smoky-black throat being uniform with its breast. The spines of the tail-feathers are rather stronger, particularly in the medial pair.

There are four examples of this species in the Leyden Museum. Two from Java and Sumatra belong to the typical form; but two others, from Celebes (*Menado*), almost merit specific separation. In these the whole body, above and below, is dark brownish black glossed with purple, like the wings, and there is a well-marked narrow white patch on the front on each side of the nostrils. This appears to constitute a local variety, which may be called *Chætura gigantea*, var. *celebensis*.

b. Species Americanæ (*Hemiprocne*).

## 3. CHÆTURA SEMICOLLARIS.

*Acanthylis semicollaris*, De Saussure; Rev. Zool. 1859, p. 118.

*Chætura semicollaris*, Sclater, Cat. Am. B. p. 282, et P. Z. S. 1863, p. 99.

*Nigra; semitorque postico angusto, albo: long. tota 10·0, alæ 10·0, caudæ 3·0.*

*Hab.* Mexico.

*Mus.* P. L. S.

This fine Swift is easily distinguishable from *C. zonaris* by its larger size, and the entire absence of any traces of a white collar below.

## 4. CHÆTURA BISCUTATA, sp. nov. (Pl. XXXIV.)

*Cypselus biscutata*, Natt. in Mus. Vindob., no. 1139.

*Fumoso-nigra, fronte et gutture dilutioribus; nucha et plaga lata pectorali albis; cervice laterali corpore concolore: long. tota 8·1, alæ 8·3, caudæ 3·2.*

*Hab.* Brazil, Rio Janeiro, and Ypanema (*Natt.*).

*Mus.* Vindob. et P. L. S.

*Obs.* Similis *C. zonari*, sed facie albicante et cervicis lateribus dorso concoloribus.

I have only seen Natterer's examples of this species, which were collected in the vicinity of Rio, in the month of June, and at Ypanema, in the months of June and September. I have some hesitation in considering it more than a variety of *C. zonaris*; but, on the whole, I think we may safely rely on Natterer, who separates it in his MS. as distinct.

## 5. CHÆTURA ZONARIS.

*Hirundo zonaris*, Shaw, in Mill. Cim. Phys. pl. 55.

*Hirundo albicollis*, Vieill. Nouv. Dict. xiv. p. 524, et Gal. Ois. pl. 120.

*Acanthylis albicollis*, Sclater, P. Z. S. 1854, p. 10, et 1858, p. 59.

*Cypselus collaris*, Max. Beitr. iii. p. 344; Temm. Pl. Col. 195.

*Hemiprocne collaris*, Nitzsch, Pterylogr. p. 123.

*Pallene collaris*, Boie, Isis, 1844, p. 168.

*Hemiprocne zonaris*, Sclat. et Salv. Ibis, 1860, p. 37; Cab. et Heine, Mus. Hein. iii. p. 84.

*Acanthylis collaris*, Gray, List Spec. Fiss. p. 15; Bp. Consp. p. 64, Burm. Syst. Ueb. ii. p. 364.

*Chætura zonaris*, Sclater, P. Z. S. 1861, p. 79, 1863, p. 99, et Cat. Am. B. p. 282.

*Hemiprocne torquata*, Streubel, Isis, 1848, p. 362.

*Fusco-nigra; torque undique lato, albo: long. tota 9·0, alæ 9·0, caudæ 2·5.*

*Hab.* Western portion of South America, from the La Plata northwards, and through Central America to Guatemala; Jamaica (*Osburn*); St. Domingo (*Sallé*).

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In 'Journ. f. Orn.' (1862, p. 164), Dr. Cabanis has separated the northern form of this bird (extending from Guiana to Mexico) as *Hemiprocne albicincta*. The differences appear to me too slight to be insisted upon: they are the smaller dimensions and narrower white neck-band behind of the northern form. I have Guatemalan and Jamaican skins fully as large as those from Brazil; and in one Brazilian skin the neck-band is narrower behind than in several northern examples.

Natterer's specimens of this species (sp. no. 95) were obtained at Rio Janeiro (December), Ypanema (June, July, September), and Sapotioa (February).

B. Species minores, Americanæ, Africanæ et Asiaticæ (*Chætura*).

α. Species Americanæ.

6. CHÆTURA PELASGIA.

*Hirundo pelasgia*, Linn. S. N. i. p. 345; Wils. Am. Orn. v. p. 48, pl. 39. f. 1.

*Chætura pelasgia*, Steph. Gen. Zool. Birds, xiii. p. 76; Baird, B. N. Am. p. 144; Sclat. Cat. Am. B. p. 282, P. Z. S. 1863, p. 100.

*Acanthylis pelasgia*, Bp. Consp. p. 64; Cass. Ill. B. Cal. i. p. 241.

*Hemiprocne pelasgia*, Streubel, Isis, 1848, p. 362.

*Fuliginosa, gutture pallidiore; supra æneo tincta, uropygio paulo dilutiore: long. tota 4·7, alæ 5·0, caudæ 1·8.*

*Hab.* Eastern United States of North America.

*Mus.* P. L. S.

Dr. Brewer gives the following account of the nidification of this bird:—"The nest of the Chimney Swallow is one of the most remarkable structures of the kind to be found among the handiworks of even this interesting family, nearly all of whom are far from being undistinguished for their architectural accomplishments. It is composed of small twigs of nearly uniform size, which are interwoven into a neat semicircular basket.

"In selecting the twigs with which to construct the nest, the Swift seems to prefer to break from the tree such as are best adapted to its wants, rather than to gather those already scattered upon the ground. This is done, with great skill and adroitness, while on the wing. Swooping on the coveted twig, somewhat as a Hawk rushes on its prey, it parts it at the desired place, and bears it off to its nest. This fact is familiar to all who have attentively observed their habits. Each of these twigs is strongly fastened to its fellows by an adhesive saliva secreted by the bird; and the whole structure is as strongly cemented to the side of the chimney in which it is built, by means of the same secretion. When dry this saliva hardens into a glue-like substance, apparently firmer even than the twigs themselves. In separating a nest from the side of the chimney, I have known

portions of the brick to which it was fastened to give way sooner than the cement with which it had been secured."—*N. Am. Ool.* i. p. 109.

#### 7. CHÆTURA VAUXII.

*Cypselus vauxii*, Towns. Journ. Acad. Philad. viii. p. 148.

*Acanthylis vauxii*, Bp. Compt. Rend. xxxviii. p. 660, Notes s. les coll. de Delattre, p. 90, et Consp. p. 64; Cass. Ill. B. Cal. i. p. 250.

*Chætura vauxii*, Baird, B. N. Am. p. 145; Sclat. Cat. Am. B. p. 282, et P. Z. S. 1863, p. 100.

*Chætura* — ?, Sclat. et Salv. Ibis, 1860, p. 37.

*Fuliginosa*; dorso et capite æneo tinctis; uropygio pallidiorè; gutture albo; ventre obscure fuliginoso, gulam versus sensim dilutiorè: long. tota 4·3, alæ 4·7, caudæ 1·5.

*Hab.* Western North America, from British Columbia south through Mexico to Guatemala.

*Mus.* P. L. S.

Readily distinguishable from *C. pelasgia* by its smaller size, paler rump, nearly white throat, and lighter underparts. *C. poliura*, which somewhat resembles it, is blacker on the back and head, and much darker below.

#### 8. CHÆTURA POLIURA.

*Cypselus poliourus*, Temm. Tabl. Méth. p. 78 (ex Buff. Pl. Enl. 726. f. 2).

*Acanthylis cinereicauda*, Cass. Proc. Acad. Philad. 1850, p. 58.

*Cypselus pelasgius*, Max. Beitr. iii. p. 347.

*Acanthylis oxyura*, Burm. Syst. Ueb. ii. p. 366.

*Acanthylis polioura*, Bp. Consp. p. 64.

*Chætura poliura*, Sclater, Cat. Am. B. p. 283, et P. Z. S. 1863, p. 101.

*Acanthylis brachyura*, Jard. Ann. N. H. ser. 1. xviii. p. 120 (1846)?

*Supra* æneo-nigra; uropygio et tectr. caudæ sup. fuliginosis; subtus fuliginosa, gutture albicantiore: long. tota 4·2, alæ 4·8, caudæ 1·8.

*Hab.* Cayenne (*Buff.*); Tobago (*Kirk*).

*Mus.* P. L. S.

One of the specimens of this species in my collection is said to be from Brazil; but the other is certainly from Cayenne, and Buffon describes the species as from that country. I have compared my examples with the type of Mr. Cassin's *A. cinereicauda* in the Philadelphia collection, and with type specimens of M. Temminck's *C. poliurus* in the Leyden Museum, and find them all identical. A specimen of Mr. Kirk's from Tobago, obligingly presented to me by Sir William Jardine, and typical of his *A. brachyura*, does not seem to be decidedly different, although the tail is rather shorter and the upper coverts are much produced, so as to reach nearly to the end of the rectrices. It is, however, possible that this form may prove distinct on comparison of a suite of specimens.

Natterer obtained specimens of this Swift (sp. no. 96) at Rio Janeiro (December and July), Engenho do Cap Gama (September), Resacca (November), Ypanema (February), Yturaré (February), Borda do Matto (November), and Trisauga (February).

9. CHÆTURA CINEREIVENTRIS.

*Cypselus acutus*, Max. Beitr. iii. p. 351 (nec auct.).

*Acanthylis spinicauda*, Burm. Syst. Ueb. ii. p. 366.

*Chætura cinereiventris*, Sclater, Cat. Am. B. p. 283, et P. Z. S. 1863, p. 101, pl. xiv. f. 1.

*Æneo-nigra*; *uropygio et corpore subtus cinereis*; *crisso nigricante*: long. tota 4·3, alæ 4·2, caudæ 2·8.

*Hab.* South-eastern Brazil.

*Mus.* P. L. S.

The cinereous uropygium and body beneath render this Brazilian bird very easily recognizable on comparison with its congeners, though it has been hitherto always confounded with one or other of them.

Two examples of this species in the Leyden Museum are marked *C. spinicauda*, while the same name is more correctly applied to a third specimen belonging to the next species.

Natterer obtained examples of this species (his no. 97) at Rio Janeiro (December), Marambaya (March), Registre do Sai (April), and Borba (July).

Natterer's remarks (as kindly communicated to me by Herr v. Pelzeln) concerning this species are as follows:—

“Borba, July 8th, 1830.—Just before sunset almost every day a pretty large flock of this Swift sweeps with extraordinary rapidity over the village. In the winter months (from December to March) the Puriti Swifts\* sweep over the village in the afternoon, but they do not fly so swiftly as the present bird, which comes in later in the evening, and flies at a higher elevation. There have been now no Puriti Swifts to be seen here for several months.”

10. CHÆTURA SPINICAUDA.

*Cypselus spinicaudus*, Temm. Tabl. Méth. p. 78 (ex Buff. Pl. Enl. 726. f. 1).

*Hirundo pelasgia*, var., Lath. Ind. Orn. ii. p. 581.

*Acanthylis spinicauda*, Boie, Isis, 1826, p. 971; Bp. Consp. p. 64.

*Chætura spinicauda*, Sclater, Cat. Am. B. p. 283, et P. Z. S. 1863, p. 101.

*Nigra*; *fascia uropygiali alba*; *subtus albicanti-fuliginosa*, *pectore indistincte nigro vittato*: long. 3·7, alæ 3·9, caudæ 1·6.

*Hab.* Cayenne.

*Mus.* P. L. S.

I have little doubt that this bird is the true “*Hirondelle à queue pointue de Cayenne*” of Buffon. It is easily distinguishable from all the others by the white band across the rump. I have two examples, both from Cayenne. Such being the case, it is entitled

\* *Cypselus squamatus*, Cassin, *antea* p. 605.



to bear Temminck's appellation *spinicauda*, although only one of the specimens so marked in the Leyden Museum is of this species, and others so marked belong to *Chæt. cinereiventris*, mihi.

### 11. CHÆTURA RUTILA.

*Hirundo rutila*, Vieill. Nouv. Dict. xiv. p. 528, et Enc. Méth. p. 534.

*Acanthylis rutila*, Sclater, P. Z. S. 1855, p. 135.

*Chætura rutila*, Sclat. et Salv. Ibis, 1860, p. 37, pl. 3. f. 1 (♂), 2 (♀); Sclat. Cat. Am. B. p. 283; et P. Z. S. 1863, p. 101.

*Hirundo robini*, Less. Tr. d'Orn. i. p. 270.

*Chætura brunneitorques*, Lafr. Rev. Zool. 1844, p. 81; Bp. Consp. p. 64.

*Nigranti-fuliginosa, subtus dilutior; torque maris undique rubro, feminae nullo: long. tota 4·5, alæ 5·0, caudæ 2·0.*

*Hab.* Guatemala (*Salvin*).

*Mus.* P. L. S.

Said to have been procured by M. Robin in Trinidad, and by Lafresnaye described as from New Granada, but more certainly from Guatemala, where Mr. Salvin obtained his specimens personally.

### β. Species Africanæ.

### 12. CHÆTURA SABINI.

*Chætura sabini*, Gray, Griff. An. K. ii. p. 70; Hartl. Orn. W. Afr. p. 25; Sclater, P. Z. S. 1863, p. 205.

*C. bicolor*, Gray, Zool. Misc. p. 7.

*Acanthylis bicolor*, Strickl. P. Z. S. 1844, p. 99.

*Nigra; uropygio, caudæ tectricibus superioribus et inferioribus et ventre cum crisso albis; tectricum caudalium sup. et inf. plumarum rachidibus nigris: long. tota 4·0, alæ 5·0, caudæ 1·5.*

*Hab.* Sierra Leone (*Sabine*); Fernando Po (*Fraser*).

In this smaller species the tail is wholly black; and the whole of the upper and under tail-coverts are pure white, with black shafts to the feathers.

### 13. CHÆTURA CASSINI.

"*Chætura sabinei*," Cassin, Proc. Acad. Sc. Phil. 1859, p. 33.

*C. cassini*, Sclater, P. Z. S. 1863, p. 205, pl. xiv. f. 2 (May 26th).

*C. hartlaubi*, Jard. Edinb. N. Ph. Journ. 1863, p. 147 (July 1st).

*Nigra; uropygii fascia angusta et corpore subtus albis; pectore fuliginoso; pectoris et gulæ plumarum rachidibus nigris: long. tota 4·8, alæ 6·3, caudæ 1·2.*

*Hab.* Gaboon (*Du Chailly*).

In this species the upper tail-coverts are black, crossed by a narrow white bar, which extends through and is partially observable on the rectrices. The size is much larger than that of *Chætura sabini*.

## γ. Species Asiaticæ.

## 14. CHÆTURA SYLVATICA.

*Acanthylis sylvatica*, Tickell, J. A. S. B. xv. 284; Jerdon, B. Ind. i. p. 170.

*Supra nigra æneo nitens; uropygio albo; gula, genis et pect. pallide griseis, lateraliter in nigrum transeuntibus: ventre et crisso pure albis: long. tota 4·25, alæ 5·0, caudæ 1·5* (Jerdon).

*Hab.* Central India (*Tickell*); Darjeeling (*Tickell*); Nagpore (*Jerdon*).

I have never met with examples of this species. Strange to say, I do not believe any museum in Europe contains it. Dr. Jerdon says, "An allied species is *A. leucopygialis*, Blyth, from Penang, differing from our bird in having the shafts of the tail-feathers much stronger, more resembling those of *A. gigantea*, whilst in our species the tail-feathers more resemble those of *A. caudacuta*. The Penang bird is black beneath, and is thus more normally coloured for a Swift."—*Jerdon, l. c.*

## 15. CHÆTURA CORACINA.

*Cypselus coracinus*, Müll. Mus. Lugd.

*Acanthylis coracina*, Bp. Consp. p. 64 (1858).

*A. leucopygialis*, Blyth, J. A. S. B. xviii. p. 809 (1858).

*Nigra; corpore æneo-nitente; tetricibus caudæ protractis, griseo-lacteis, rachide nigricante: long. tota 4·6, alæ 5·2, caudæ 1·9.*

*Hab.* Borneo and Sumatra (*Mus. Lugd.*); Labuan (*Motley*); Penang, common (*Blyth*).

I have seen examples of this species in the Leyden Museum, and in Mr. Dillwyn's collection from Labuan. Mr. Blyth's species is, no doubt, the same.

## Genus 2. CYPSELOIDES.

*Cypseloides*, Streubel, Isis, 1848, p. 366. Type *C. fumigatus*.

*Nephæcetes*, Baird, B. N. Am. p. 142 (1860). Type *C. niger*.

I think, although it is not a very easy question to decide, that the name *Cypseloides*, given by Streubel as an alternative to *Hemiprocne*, in his article in the 'Isis,' before referred to, has claims to be used as a generic appellation for *Cypselus fumigatus*, from which *Nephæcetes* (Baird) is hardly sufficiently different for separation. The form in fact is simply *Chætura* without the tail-spines.

a. *Cypseloides*.

## 1. CYPSELOIDES SENEX.

*Cypselus senex*, Temm. Pl. Col. 397.

*Hemiprocne temminckii*, Streubel, Isis, 1848, p. 368.

*Fusco-niger, capitis plumis anguste cinereo lineolatis, et rachidibus obsolete nigris; cauda vix rotundata: long. tota 7·0, alæ 7·0, caudæ 2·5, tarsi 0·7.*

*Hab.* S.E. Brazil (*Natt.*).

*Mus.* P. L. S.

Natterer's examples of this fine Swift (sp. 509 of his series) were obtained at Ypanema in June and November, and at Trisanga in December.

## 2. CYPSELOIDES FUMIGATUS.

*Cypselus fumigatus*, *Natt.* MS.

*Hemiprocne fumigata*, *Streubel*, *Isis*, 1848, p. 366.

*Fumoso-brunneus, unicolor; cauda quadrata: long. tota 5.0, alæ 5.6, caudæ 2.0, tarsi 0.6.*

*Hab.* S.E. Brazil (*Natt.*).

*Mus.* P. L. S.

Of this species, numbered 424 in Natterer's collection, specimens were obtained by that excellent naturalist at Ypanema in September, November, and December, at Curytiba in November, and in Ytararé in March.

## b. *Nephæcetes*.

### 3. CYPSELOIDES NIGER.

*Hirundo nigra*, *Gm.* S. N. i. p. 1025.

*Cypselus niger*, *Gosse*, *B. Jam.* p. 63; *ejud.* Ill. pl. 10; *Gundl. & Lawr. Ann. L. N. Y.* vi. 268.

*Niger unicolor, gutture dilutiore; frontis plumis cinerascente marginatis; cauda paulum furcata: long. tota 5.5, alæ 6.2, caudæ rectr. ext. 2.4, med. 2.1.*

*Hab.* Jamaica (*Gosse*); Cuba (*Gundlach*).

*Mus.* P. L. S.

### 4. CYPSELOIDES BOREALIS.

*Cypselus borealis*, *Kennerly*, *Pr. Acad. Phil.* 1857, p. 202.

*Nephæcetes niger*, *Baird*, *B. N. Am.* p. 142.

*Niger unicolor, fronte canescente; cauda quadrata: long. tota 5.8, alæ 6.5, caudæ 2.1, tarsi 0.5.*

*Hab.* Puget Sound, British Columbia.

On the whole I am disposed to think this species will probably turn out different from the West-Indian *C. niger*, though my materials are not at present sufficient to give accurate diagnoses of the two.

## Genus 3. COLLOCALIA.

*Collocalia*, *G. R. Gray*, *List of Gen.* 1840, p. 8.

*Salangana*, *Streubel*, *Isis*, 1848, p. 368.

I have paid no special attention to this group. Mr. Wallace, who has lately contributed an interesting article to these 'Proceedings'\* on the subject, recognizes six species, namely:—

1. *C. esculenta*, from Celebes, Timor, Moluccas, and Aru Islands.

\* See *P. Z. S.* 1863, p. 382.

2. *C. leucopygia*, from New Caledonia.
3. *C. linchi*, from Java, Malacca, and the Nicobars.
4. *C. spodiopygia*, from the Samoan and Fiji Islands.
5. *C. troglodytes*, probably from the Philippines.
6. *C. fuciphaga*, from "Bourbon and Mauritius (var. *francica*, Gm.); India and Ceylon; the whole of the Malay Islands; Louisiade Archipelago; New Caledonia; Tahiti (var. *leucophæa*, Peale; *cinerea*, Gm.); Marianne Islands."

Mr. Wallace states that the British Museum contains a seventh species, from the New Hebrides, as yet undescribed.

#### Genus 4. DENDROCHELIDON.

*Macropteryx*, Sw. Zool. Ill. (1832).

*Pallestre*, Lesson, Compl. Buff. viii. p. 490 (1837).

*Dendrochelidon*, Boie, Isis, 1844, p. 165.

*Chelidonia*, Streubel, Isis, 1848, p. 370.

This is likewise a purely Palæogean form to the species of which I have paid little attention. Those I am acquainted with are the following:—

##### 1. DENDROCHELIDON MYSTACEA.

*Cypselus mystaceus*, Less. Ois. t. 22.

*Macropteryx mystaceus*, Sw.

*Dendrochelidon mystaceus*, Gould, B. Asia, pt. xi. pl. 5.

Mr. Gould states that the habitat of this bird is the Aru Islands and New Guinea; but the truth is, its range is more extensive. The Leyden Museum contains specimens from Amboina, Cerain, Bouru, Morotai, Guebé, Batchian, Halmadeira, and Waigiou.

##### 2. DENDROCHELIDON WALLACEI.

*Dendrochelidon wallacei*, Gould, P. Z. S. 1859, p. 100, et B. Asia, pt. xi. pl. 4.

*Hab.* Celebes and Sula Islands (*Mus. Lugd.*).

##### 3. DENDROCHELIDON KLECHO.

*Hirundo klecho*, Horsf.

*Dendrochelidon klecho*, Gould, B. Asia, pt. xi. pl. 3.

*Hab.* Java, Sumatra, and Malay peninsula; Banca (*Mus. Lugd.*).

The very remarkable mode of nidification of this Swift is described by Dr. Bernstein in the 'Journal für Ornithologie' for 1859 (p. 183). Dr. Bernstein says that the nest resembles in form and materials that of *Collocalia*, but is still smaller and flatter! It is a semicircular structure, and is affixed to a small naked horizontal branch high up in a tree, the branch forming the flat side of the nest. The walls, scarcely thicker than parchment, are made of feathers, tree-mosses, and bits of bark, cemented together by the viscous saliva of the bird. The nest, which contains a single, perfectly oval, white egg, is so small that the bird (as repeatedly observed by Dr. Bernstein) sits upon the branch, and covers it with only the end of her belly.

## 4. DENDROCHELIDON CORONATA.

*Hirundo coronata*, Tickell.*Macropteryx longipennis*, Jerdon.*Dendrochelidon schisticolor*, Bp. Consp. p. 66.*D. coronata*, Gould, B. Asia, pt. xi. pl. 2.*Hab.* Continental India and Ceylon.

## 5. DENDROCHELIDON COMATA.

*Cypselus comatus*, Temm.*Dendrochelidon comata*, Gould, B. Asia, pt. xi. pl. 6.*Hab.* Borneo, Sumatra, and Philippines (*Mus. Lugd.*); Siam (*Finlayson*).

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November 14, 1865.

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

Mr. S. Stevens exhibited a nearly perfect egg of a *Dinornis*, supposed to be that of *D. ingens*, Owen, which had been placed in his hands for sale, and read the following extract from a newspaper published at Wellington, New Zealand, on the subject:—

“There is at the present time being exhibited at Messrs. Bethune and Hunter’s stores, for the benefit of the curious, an object of no less interest than the egg of a Moa. It appears, from what we learn from Captain Davidson, of the schooner ‘Ruby,’ which trades between this port and the Kai Koras, that a man in Mr. Fyffe’s employment at the latter place was digging the foundation of a house, when on the side of a small mound he suddenly came upon the egg in question, and the skeleton of a man, supposed of course to be a Maori. The body had evidently been buried in a sitting posture, and the egg must have been placed in the hands, as when found the arms were extended in such a manner as to bring it immediately opposite the mouth of the deceased. This, it is assumed, was in accordance with the Maori custom, and was done for the purpose of giving the individual who was buried an opportunity of sustaining himself if he thought proper, or if, in the course of things, he required sustenance. Between the legs of the skeleton were found numerous tools, cut from greenstone, including a spear, axe, and several implements, which would lead to the belief that the man to whom the bones belonged must have been, in some way or other, connected with the wood trade—that is to say, if carpenters, cabinetmakers, &c., flourished in his time. All the bones were in excellent preservation, one arm and hand being entirely without blemish. The skull bore evidence of its proprietor having, at some time or the other, received some hard knocks, probably in the battle-field while taking his part in some of those terrific en-

counters which are supposed to have taken place in ancient times. Unfortunately, before the man who was digging discovered the natural treasure, the implement he was using came in contact with the shell and broke a small piece out of the side of it; but the fragments have been carefully preserved, and might readily be fitted into the aperture. The egg itself is about 10 inches in length, and 7 inches in breadth, the shell being of a dirty brownish colour, and rather better than the thickness of a shilling coin. The inside is perfectly clear and free from all traces of decayed matter. From what Captain Davidson tells us, we should suppose that the ground where this relic was discovered must have been used as a cemetery at some distant period of the past, as Mr. Fyffe had previously found some interesting Maori emblems about the same place; but none of the natives about there—and some of them, we are informed, have arrived at very mature ages—have the slightest recollection of even having heard, as a matter of history, that any of their ancestors had found a final resting-place in that particular locality.”

Mr. Blyth exhibited some remarkably large horns of the Wapiti Deer (*Cervus canadensis*), and made some remarks on the different varieties of this Deer, two of which (*Cervus canadensis verus* and *C. canadensis occidentalis*) were represented by fine examples in the Society's Menagerie.

A paper was read by Mr. J. H. Gurney, F.Z.S., on a new and very singular Raptorial Bird, of general Buteonine aspect, but remarkable for its extremely wide gape, small bill destitute of a tooth, and the rudimentary pectination of the middle claw. For this curious form, a single specimen of which had been obtained by Mr. C. J. Andersson at Objimbinque, Damaraland, Mr. Gurney proposed the new generic and specific name *Stringonyx anderssoni*.

This paper will be published in the Society's 'Transactions.'

Mr. P. L. Sclater exhibited a collection of bird-skins formed by Mr. Henry Whitely in the vicinity of Hakodadi, Japan, during the winter of 1864-65. Mr. Sclater called particular attention to the following species, which were additional to those given in Captain Blakiston's papers on the birds of Hakodadi, published in the 'Ibis,' 1862-63:—

*Caprimulgus jotaka.*

*Certhia*, sp.

*Troglodytes*, sp.

*Parus minor.*

*Anthus japonicus.*

*Turdus chrysolaus.*

*Fringilla montifringilla.*

*Montifringilla brunneinucha.*

*Emberiza variabilis.*

— *personata.*

*Totanus glareola.*

*Gallinago*, sp.

*Podiceps*, sp.

*Spatula clypeata.*

*Fuligula clangula.*

— *histrionica.*

*Harelda glacialis.*

*Phalacrocorax*, sp.

*Larus niveus*, Pall.

*Phaleris cristatella.*

The following letter was read from Mr. E. L. Layard, Corr. Memb. :—

“ Cape Town, July 11, 1865.

“ *To the Secretary of the Zoological Society.*

“ SIR,—I perceive, by one of the printed notices, that on the 9th of May last a communication was read from Dr. G. Hartlaub, describing a new *Saxicola*, forwarded by me, and procured at Windvogelberg, in this Colony, by Capt. Bulger, of H.M. 10th Regiment, 2nd Battalion.

“ I have much pleasure in acquainting you that I can now supply a pretty full account of the habits, nest, and eggs of this species, through the kindness of my talented friend Mrs. Barber of Graham Town, an enthusiastic lover of natural history and botany.

“ My fair friend writes under date June 22nd, 1865—‘ These birds [*Saxicola spectabilis*, of which she sends specimens] are dwellers amongst the rocks, and frequent rocky mountains and hills, old stone kraals, &c., &c. They build their nests under shelving rocks, near or upon the ground, and sheltered by spreading ferns or long grass; and their eggs are usually three in number. The male is fond of placing himself on some high projecting rock, and of making himself conspicuous by chirping away in a cheerful voice, either to annoy a rival or amuse his mate; he is also fond of opening and shutting his wings, bowing and scraping, &c., and, I have no doubt, thinks a great deal of himself.

“ ‘ The female is a very quiet retiring little body. The males possess the power of mocking other birds and animals. When we were living in the district of Graaf Reinet I had a beautiful spotted Mere Cat [*Suricata capensis*, Desm., the Meer Kat of the Dutch colonist, lit. Pismire Cat, or Ant Cat, from their feeding on ants.—E. L. L.], a tame one; it was very fond of me, and my companion in all my walks. These little animals have a peculiar bark, and produce a great variety of sounds with their pretty little voices; and these mocking-birds would imitate all the sounds that my pet made naturally. I have also heard them mocking our Robins (*Petrocincla superciliosa*, E. L. L.) and Sugar-birds (*Cinnyris*), but they seldom use this power. I send you a nest and eggs.’

“ The nest forwarded by Mrs. Barber is cup-shaped, 6" across and 3" deep, the cup  $2\frac{1}{2}$ " across by  $1\frac{1}{2}$ " deep, composed almost entirely of the fine roots of grasses (?), with here and there a strengthening twig; the lining is entirely of roots. Clinging round the outside, and worked into the structure so as not to be disturbed by the wind, are two fronds of the common fern (*Pteris aquilina*), effectually concealing the fabric from a casual observer. The eggs, three in number, are cream-coloured, with reddish blotches, more or less minute, thickly sprinkled throughout the surface, but coalescing into a ring at the obtuse end, on which some bluish tints may be observed. Each egg differs from the other in shape, the medium measurement is, axis 11"', diam.  $7\frac{1}{2}$ ".

“Capt. Bulger, in his letters and conversation with me, always called this bird ‘the mocking-bird,’ and corroborated Mrs. Barber’s description of its vocal powers; in fact nothing was safe from its mimicking-powers. I have myself heard our common *Saxicola pileata* imitate the yelping of the farm-curs, the crowing and cackling of fowls, the calls of pheasants and partridges, the harsh notes of the fiscal (*Lanius collaris*), and the clear pipe of the robin.

“Trusting this little history of a new species may not prove uninteresting.

“I am, Sir,

“Yours very faithfully,

“EDGAR L. LAYARD, F.Z.S.”

The following papers were read:—

1. ON A NEW PARROT OF THE GENUS NASITERNA.  
BY P. L. SCLATER, M.A., PH.D., F.R.S.

(Plate XXXV.)

Our Corresponding Member, Mr. Gerard Krefft of Sydney, has lately sent me two specimens of a small Parrot in spirits, stated to be from the Salomon Islands, which turn out upon examination to belong to a new and very beautiful species of the genus *Nasiterna*. The little bird is of very great interest, as being a second known representative of this very peculiar genus of *Psittacidae*—hitherto supposed to be restricted to New Guinea and the Papuan Islands—and as affording an additional proof, if any such were needed, that the Salomon Islands belong strictly to the Austro-Malayan as distinguishable from the Pacific subdivision of the Australian Region.

I propose to call the new species

NASITERNA PUSIO. (Pl. XXXV.)

*Supra viridis, pileo summo obscure cyaneo: fronte et capitis lateribus cum mento fulvis: subtus dilutior, medialiter flavicans: rectricibus duabus mediis cyaneis, macula ovali ad apicem nigra; ceteris nigris, pogonii interni parte apicali cum caudæ tectricibus inferioribus aureo-flavis: cauda rotundata, rectricum sex mediarum rachidibus protractis rigidis, acuminatis, ceterarum rigidiusculis.*

Long. tota 3·3 poll. Angl., alæ 2·5, caudæ 1·1, tarsi 0·3.

*Hab.* Ins. Salomonenses.

*Obs.* Major quam *N. pygmæa*, et colore pilei et faciei, necnon forma et colore caudæ, facile distinguenda.

Of the two specimens received from Mr. Krefft, one which I now exhibit has been made into an excellent stuffed specimen by the artistic hands of Mr. Bartlett, and is the subject of the accompanying plate by Mr. Wolf. An examination of the second specimen left in spirits has enabled me to supply the following particulars concerning







the anatomy and osteology of this form of Parrot, of which nothing has been hitherto recorded.

The oil-gland in *Nasiterna* is very distinct, though small; it is feathered at the apex, as is usual in the *Psittacidæ*, except in cases where it is altogether absent.

The wings are rather long, reaching to within 0·4 inch of the end of the tail, and consist of ten primaries and eight secondaries. The three first primaries are nearly equal in length and longest, the fourth, fifth, and sixth rapidly decreasing in length.

The tail is rounded, the lateral rectrices being about 0·3 inch shorter than the medial. The three outer are but slightly rigid, and only the third from the outside has the spinous apex of the rachis slightly projecting. The six middle feathers are more rigid, and have the rachis sharply pointed and projecting 0·5 inch beyond the barb.

The nostrils of *Nasiterna* are placed high in the cere, and form a prominent fleshy ring which surrounds the circular aperture. In this respect they resemble those of the *Platycerci* rather than those of *Cacatua*, in which there is no such apparent elevation, and the opening is more or less elliptical.

Of the two medial digits, which are united to the end of the first phalanx and placed in front, the third or outer one is the longer. Of the two reversed digits, the first and fourth, the latter is the longest of all the four digits, the former being the shortest of all the four.

The tongue is thick and fleshy, as is usual in the Parrots. It is nearly cylindrical in shape, and somewhat truncated at the apex. Upon its upper surface there is a rather deep median sulcus running from the apex to the base, which I have not observed in other *Psittacidæ*. At the posterior part of the tongue there are indications of transverse rugæ. The upper portion of the œsophagus measures half an inch in length, and terminates in a large and very distinct ovoid crop (0·4 inch in length), having a pouch below the commencement of the lower œsophagus. The lower œsophagus is narrower than the upper, measuring 0·5 inch in length to where the proventriculus commences. The latter is moderately developed, and fully 0·3 inch in length. The gizzard is small and strongly muscular, nearly round, about 0·3 inch in diameter; the contents were only minute fragments of stones and mucous matter. The intestinal canal is nearly uniform in diameter throughout, 7·5 inches in length. No cæca were discernible, and they are, I believe, always absent in *Psittacidæ*.

These particulars were noted upon the specimen preserved in spirits. Dr. Murie, who examined the bird set up by Mr. Bartlett, kindly gives me the following notes:—

“ Sex uncertain.

“ *Muscles: Pectoralis major*.—Very strong and well developed. *Origin*, whole front of sternum, overlapping the outer edge and clavicular interspace. *Insertion*, by tendon into forearm.

“ *Pectoralis minor*.—Smaller and narrower. *Origin*, anterior edge of sternum tapering to a point at the clavicle.

*Subclavius muscle*.—Narrow below the bone; anterior muscles of neck long and strong.

“*Contents of Stomach*.—Only a number of minute dark-coloured stony particles, but no other food.”

The sternum of *Nasiterna*, which is the only part of its osseous structure to which I have paid any attention, has the usual characteristic form of that of the *Psittacidae*. It is, however, rather shorter in proportion to its length than in most species of the group. There is no trace of a furcula. The two posterior foramina, which are present in most of the sterna of the *Psittacidae*, except in the *Cacatuinae*, are well marked.

As regards the best position for *Nasiterna* in the series of *Psittacidae* I am not able to give a decided opinion without further examination of the structure of the whole group. In its spinous tail it is conspicuously different from every other Psittacine form. I cannot agree with those authorities who have placed it with the Cockatoos, to which, in my opinion, it presents no sort of resemblance. The Cockatoos have mostly the top of the head bare of feathers, and covered by a crest of elongated plumes, which rise from the front of the head. There is nothing of this sort in *Nasiterna*. The *Cacatuinae* have also a well-developed furcula, and no foramina in the posterior end of the sternum. In *Nasiterna* the furcula is absent, and the foramina are present. Nor can we associate *Nasiterna* with the Lories, as its tongue does not present the characteristic formation of that division of the *Psittacidae*. There remain only the true Parrots (*Psittacinae*) and the Broad-tails (*Platycercinae*). In the latter group the furcula is usually absent, which is also the case with *Nasiterna*. But in other respects *Nasiterna* presents but little resemblance, either in form or in habits, to the *Platycercinae*, which are mostly ground-loving birds; whereas *Nasiterna* is stated to be exclusively arboreal. I should therefore be rather inclined to place it as an aberrant form of the *Psittacinae*, amongst the weaker members of which the furcula is also deficient, unless it can be allowed to stand as the type of a distinct subfamily, which would probably be more correct.

I trust that Mr. Otto Finsch of Bremen, who is now engaged on the preparation of a Monograph of the *Psittacidae*, and to whom I propose to send my specimens of this curious bird for examination, will be able to give a more satisfactory account of its affinities.

## 2. MONOGRAPH OF THE SPECIES OF CHARAXES, A GENUS OF DIURNAL LEPIDOPTERA. BY ARTHUR G. BUTLER, F.Z.S., ASSISTANT, ZOOLOGICAL DEPARTMENT, BRITISH MUSEUM.

(Plates XXXVI., XXXVII.)

This monograph contains an account of all the species in the National Collection, together with others described in recent publications.



A.G. Butler, del et lith.

1. CHARAXES SATURNUS

2. CHARAXES PHŒBUS ♂

5. CHARAXES SMARAGDALIS.

3. CHARAXES GYNTHIA.

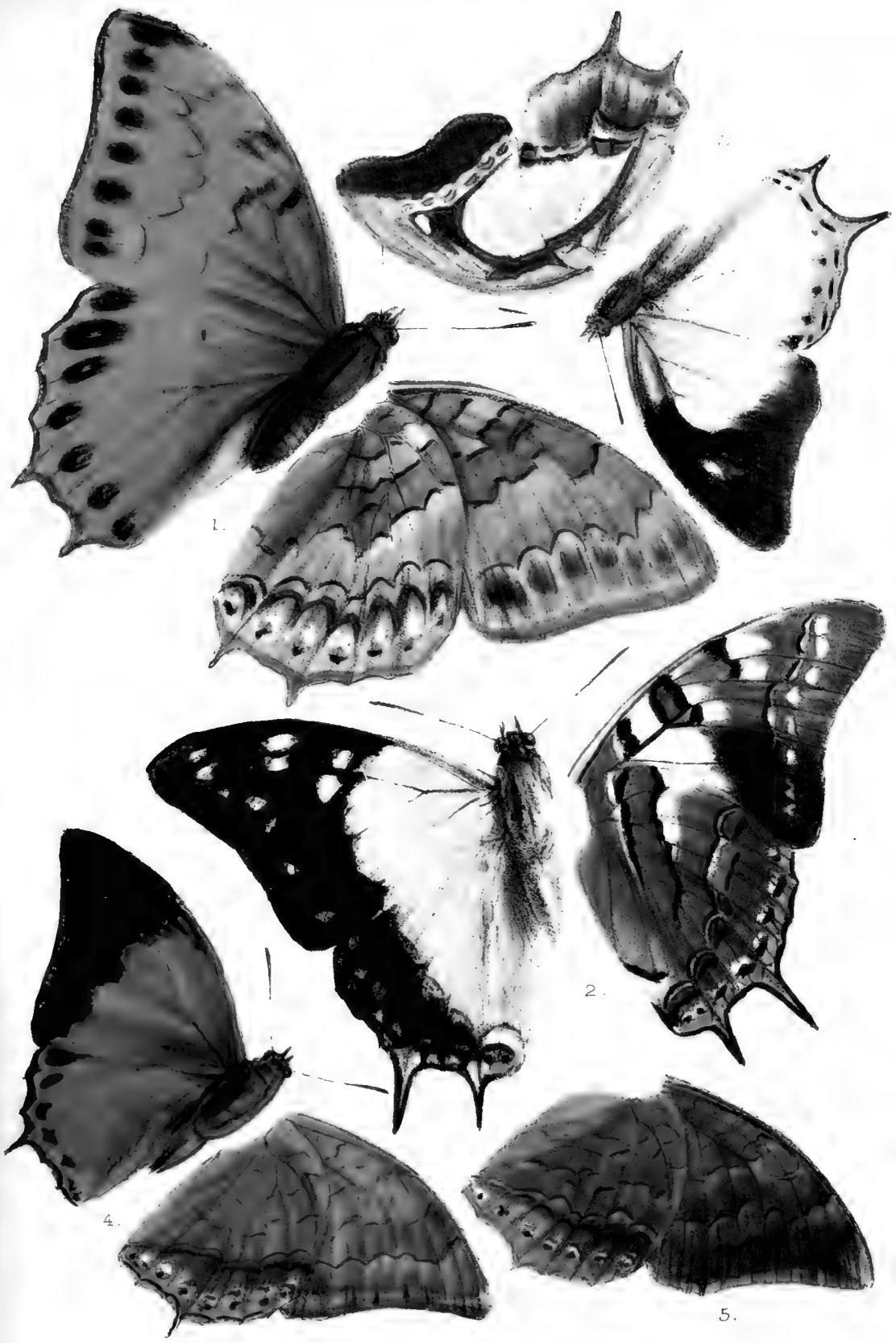
4. CHARAXES VIOLA.

W. H. Edwards, sculp.

GYNTHIA.

VIOLA.





A.G. Butler, del et lith.

M & N Hanhart, Imp<sup>r</sup>

1. CHARAXES LATONA.      3 CHARAXES HERBE  
 2. CHARAXES GALAXIA.    4 CHARAXES AFFINIS  
 5. CHARAXES BAYA. Moore.





## Genus CHARAXES, Ochseneheimer.

Div. 1. Alæ subtus variis characteribus albis difformibus basi scriptæ, maculas griseas includentibus.

*Alæ supra fuscæ; margo posticus ferrugineus, nervis nigris interruptus; posticæ margine caudisque nigris: subtus fascia media nivea; basi ferrugineæ, variis characteribus scriptæ; margo posticus maculis cæruleis submarginatus, superior maculis tricoloratis, hastatis: corpus fuscum; antennæ nigræ, filiformi-clavatæ; palpi extus albi; caput magnum, lanare, supra incirratum, oculis exstantibus, nudis.*

## 1. CHARAXES JASON.

*Papilio jason*, Linn. Syst. Nat. ii. p. 749. n. 26; Cramer, Pap. t. 329. f. A, B; Westw. in Drury, Ill. 2nd edit. i. p. 2.

*Papilio jasius*, Fabricius, Ent. Syst. iii. pt. 1. p. 61, pt. 2. p. 191; Drury, Ill. i. t. 1. f. 1; Ochs. Schmett. von Eur. i. 151, iv. 18; Godart, Enc. M. ix. p. 350. n. 1.

*Nymph. jason*, Boisd. Ind. Meth. p. 24. n. 180.

*Charaxes jason*, Boisd. Spéc. Gén. Léop. pl. 7. f. 12, pl. 3 A. f. 9.

*Papilio eques*, Drury, Abbild. und Beschreib. exotisch. Insekt. t. 1. f. 1.

*P. rhea*, Hübner, Europ. Schmett. Pap. figs. 111, 112, 580, 581.

*Eribæa unedonis*, Hübner, Verz. bek. Schmett. n. 423.

*Nymph. jason*, Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 308. n. 1.

*Hab.* Southern Europe; Asia Minor; Barbary. B.M.

## 2. CHARAXES EPIJASIVS.

*Charaxes epijasivus*, Boisd. MS.; E. Doubl. List Lep. Brit. Mus. App. p. 28; Feisth. in Annal. Soc. Ent. France, 1850, p. 257.

*Nymph. epijasivus*, Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 308. n. 2.

*Hab.* Senegal; Cazamanca. B.M.

*Alæ supra fuscæ, fascia media ad marginem interiorem coarctata; anticæ elongatæ, aliquando margine ferrugineo; posticarum margo posticus maculis cæruleis submarginatus.*

## 3. CHARAXES POLLUX.

*Papilio pollux*, Fabricius, Ent. Syst. iii. pt. 1. p. 63. n. 197; Godart, Enc. M. ix. pt. 1. p. 352. n. 5; Lucas, Hist. Nat. Léop. Exot. pl. 62. f. 1.

*Nymph. pollux*, Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 308. n. 4.

*Papilio castor*, Cramer, Pap. 37. f. E, F.

*Hab.* Ashanti; Guinea.

*Alæ basi pallidæ; corpus pallidum.*

## 4. CHARAXES PELIAS.

*Papilio pelias*, Cramer, Pap. p. 3. f. C, D; Godart, Enc. M. ix. p. 351. n. 2.

*Nymph. pelias*, Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 309. n. 20; Trimen, Rhop. Afric. Austr. i. p. 175. n. 101.

*Eribea pelopia*, Hübner, Verz. bek. Schmett. n. 424.

*Hab.* Cape of Good Hope.

## 5. CHARAXES SATURNUS, sp. n. (Pl. XXXVI. fig. 1.)

Upperside—front wings, basal half ferruginous, apical half black; crossed beyond the middle by a broad deeply dentated orange band, broader above than below, running nearly parallel to the hind margin; three orange spots along the front margin near the middle; outer margin orange, intersected with black at the nervules. Hind wings, basal half ferruginous, apical half black; crossed in the middle by an orange band tapering towards the middle of the inner margin, which is brown; outer margin with a submarginal row of six lunular orange spots, the three lower ones white at the sides and angular; a dull green marginal streak at the anal angle; three blue spots between the nervures towards the anal angle, the lowest one elongate. Body ferruginous.

Underside—basal half dull red, curiously marked, as in *C. epijasius*, with white streaks and spots with dusky centres; a white irregular central band. Front wings, outer margin broadly violaceous grey, enclosing a row of eight orange spots between the nervules, the two lower ones contiguous, all of them margined by black spots on their outer edge, and the six upper ones on their inner edge; outer margin with a marginal row of nine orange spots between the nervules; central band faintly roseate, enclosing an orange spot near the front margin. Hind wings, outer margin broadly olivaceous, separated from the central band by a row of six elongate dull red spots; marginal edge black, broadly bordered inwardly by white varied with orange; a submarginal row of seven elongate violaceous spots margined outwardly with black; a short curved elongate ochreous band at the anal angle, above the last violaceous spot. Body creamy white.

*Hab.* Interior of South Africa.

B.M.

*Note.*—This species is closely allied to *C. pelias*; it hardly differs in the front wings of the upperside; in the hind wings the spots of the submarginal band are more lunulate and become nearly white towards the anal angle, and the central band is much narrower and tapers towards the inner margin.

Below, the submarginal orange spots of the front wings are bounded by black spots on both sides, the band of the hind wing has no central spot, an inner submarginal row of large dull red spots takes the place of the small black ones in *C. pelias*, a submarginal row of purple lunular spots takes the place of the blue line, and the basal markings are quite different from those in the figure by Cramer.

*Alæ supra ferruginæ; posticæ sine maculis cæruleis; subtus maculis submarginalibus obscurissimis.*

6. CHARAXES PHRAORTES.

*Charaxes phraortes*, E. Doubleday in Ann. Nat. Hist. xx. p. 65; Doubl., Westw. & Hewits. Gen. Diurn. Lep. p. 309. n. 22.

*Hab.* Madagascar.

B.M.

7. CHARAXES CASTOR.

*Papilio castor*, Fabricius, Gen. Ins. Mant. p. 251; Ent. Syst. iii. pt. 1. p. 63. n. 196; Godart, Enc. M. ix. p. 351. n. 4.

*Nymph. castor*, Donovan, Nat. Repos. iv. pl. 16; Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 308. n. 3.

*Papilio pollux*, Cramer, Pap. t. 37. f. C, D.

*Charaxes pollux*, Feisthamel in Ann. Soc. Ent. France, 1850, p. 255. pl. 9. f. 1.

*Papilio camulus*, Drury, Ill. iii. t. 30. f. 2.

*Hab.* Sierra Leone; Congo.

B.M.

8. CHARAXES PHŒBUS, sp. n. (Pl. XXXVI. fig. 2.)

Upperside—front wings ferruginous, paler just beyond the middle, with a broad submarginal black band along the outer margin; apical part of submarginal edge intersected with black at the nervures; a triangular black spot, its base resting upon the first subcostal nervule near the apex; a black elongate spot closing the cell; two spots, one above the cell, the other halfway between the subapical spot and the end of the cell; two black spots placed obliquely just below the end of the cell. Hind wings as above, but without any spots, and with black marginal edge. Body ferruginous.

Underside reddish olivaceous, basal half curiously marked with silvery spots and streaks with dark centres; central band silvery, very narrow, tapering from the inner margin of hind wing near the anal angle to the front margin of anterior wing near the apex. Front wings with a submarginal row of eight dusky black spots between the nervules along the outer margin; a row of six dusky spots on the central band. Hind wings with a submarginal olivaceous band varied with silver; anal angle ochreous, enclosing a violaceous spot.

*Hab.* Abyssinia.

B.M.

*Alæ supra atræ, fascia media nivea ad apicem anticarum coarctata; corpus fuscum.*

9. CHARAXES BRUTUS.

*Papilio brutus*, Cramer, Pap. t. 241. f. E, F; Godart, Enc. M. ix. p. 351. n. 3.

*Nymph. brutus*, Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 308. n. 5; Trimen, Rhop. Afric. Austr. i. p. 173. n. 100.

*Eribæa brutus*, Hübner, Verz. bek. Schmett. p. 47. n. 422.

*Hab.* Sierra Leone; Coast of Guinea.

B.M.

*C. brutus*, var. Port Natal. B.M.

*Alæ supra atræ, margine postico ferrugineo; fascia media ferruginea, marginem posticum approximante; anticæ basi ferrugineæ: subtus ferrugineæ, anticæ variis maculis nigris; posticæ fascia pallida submarginatæ.*

10. CHARAXES EUDOXUS.

*Papilio eudoxus*, Fabricius, Ent. Syst. iii. pt. 1. p. 65. n. 203; Jones, Icon. v. t. 53; Drury, Ill. iii. pl. 33. f. 1, 2; Godart, Enc. M. ix. p. 352. n. 6; Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 309. n. 12.

*Hab.* Sierra Leone.

Div. 2. *Alæ subtus basi lineis nigris scriptæ.*

*Note.*—*C. eudoxus* is closely allied to the following species, but has the same marking underneath at the base of the wings as in the former species.

11. CHARAXES LUCRETIVUS.

*Papilio lucretius*, Cramer, Pap. t. 82. f. E, F; Fabricius, Ent. Syst. iii. pt. 1. p. 84. n. 261; Godart, Enc. M. ix. p. 352. n. 7. *Nymphalis lucretius*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 308. n. 6.

*Eribæa lucretia*, Hübner, Verz. bek. Schmett. n. 425.

*Hab.* Coast of Guinea.

B.M.

12. CHARAXES CYNTHIA, sp. n. (Pl. XXXVI. fig. 3.)

Upperside black-brown, crossed by a central ferruginous band, as in *C. lucretius*, divided into spots by the nervures towards the apex of the front wings, and incurved towards the anterior margin; outer margin deeper ferruginous, divided into marginal spots by the nervures in the front wings; base reddish brown; inner margin of hind wings covered with long brown hairs; front marginal edge of anterior wings reddish brown, with four spots of the same colour in couples just below it, two at the end of the cell, and two just beyond. Body golden brown; abdomen pale; head and prothorax reddish; palpi white externally.

Underside—front wings reddish grey, crossed beyond the middle by a band of large pale oval ferruginous spots, tapering towards the apex, and curving at the top towards the anterior margin, enclosing ochreous lunules, and bordered outwardly by faint silvery lunules; the last three spots bordered inwardly, the lowest one with green-grey deeply margined with black, the other two with ochreous bordered outwardly with ferruginous; a large irregular black patch marked with three silvery streaks near the anal angle; a reddish elongate spot at the anal angle; front marginal edge silver from the base to the end of the cell; cell ochreous, enclosing four irregular reddish spots; two similar spots at the end of the cell, margined outwardly with ochreous, and three similar lunular spots placed obliquely just beyond; a black and ferruginous spot just below the

middle of the median nervure. Hind wings ferruginous; basal half crossed by three wavy bands of grey, the central one distinct, silvery; apical half with irregular reddish grey submarginal bands, bordered outwardly by a lunulate line of violaceous; wings crossed by a central irregular silver band from the middle of the front margin to the inner margin just above the anal angle; an irregular row of eight spots between the nervures, outside the central band, the seven upper ones ochreous, lunular, the eighth silver, linear; a yellowish green spot at the anal angle, bounded inwardly by a fine pale blue line and two black dots; inner margin streaked with grey. Body whitish ochreous.

*Hab.* Ashanti.

B.M.

*Alæ maris sine fascia media, basi non ferrugineæ.*

### 13. CHARAXES PROTOCLEA.

*Charaxes protoclea*, Feisthamel in Ann. Soc. Ent. France, 1850, p. 260; Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 309. n. 14.

*Hab.* Cazamanca, Western Tropical Africa.

B.M.

### 14. CHARAXES ANTICLEA.

*Papilio anticlea*, Drury, Ill. iii. t. 27. f. 5, 6; Godart, Enc. M. ix. p. 353. n. 9.

*Nymph. anticlea*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 13.

*Papilio horatius*, Fabricius, Ent. Syst. iii. pt. 1. p. 64. n. 202; Jones, Icon. v. t. 16. f. 3, 4.

*Nymph. horatius*, Godart, Enc. M. ix. p. 354. n. 13.

*Charaxes horatius*, Feisthamel in Ann. Soc. Ent. France, 1850, p. 259.

*Hab.* Sierra Leone.

B.M.

### 15. CHARAXES ETHALION.

*Charaxes ethalion*, Boisduval in Delegorgue, Voy. Afriq. ii. p. 593.

*Nymph. erithalion*, Boisduval, MS.

*N. ethalion*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 21, pl. 48. f. 1; Trimen, Rhop. Afric. Austr. i. p. 170. n. 98.

*Hab.* Zooloo, Port Natal, &c.

B.M.

### 16. CHARAXES VIOLA, sp. n. (Pl. XXXVI. fig. 4.)

*Female.* Upperside—front wings brown; outer margin reddish; a broad ferruginous band near the hind margin, interrupted above by a brown patch and by the nervures. Hind wings, basal half brown, apical half white tinted with blue-green; outer margin brown, with orange upper edging, green below the outer tail; a submarginal row of violaceous lunules; two black spots at the anal angle.

Underside only differs from *C. ethalion* in the brighter red of the submarginal lunules, in the central white band being only indicated by a paler shade of brown, and the less distinct black markings.

*Hab.* West Africa.

B.M.

*Alæ maris fulvæ, fasciis nigris maculatis.*

17. CHARAXES BOUETI.

*Charaxes boueti*, Feisthamel in Ann. Soc. Ent. France, 1850, p. 261.

*Nymph. boueti*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 15.

*Hab.* Gambia.

18. CHARAXES CANDIOPE.

*Nymphalis candiope*, Godart, Enc. M. ix. p. 353; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 16.

*Hab.* Congo.

B.M.

*Alæ fuscæ, maculis pallidis submarginatæ; fascia media fulva, apice anticarum interrupta: posticæ margine angusto pallido: subtus lunulis viridi-flavis fasciatæ.*

19. CHARAXES FABIUS.

*Papilio fabius*, Fabricius, Ent. Syst. iii. pt. 1. p. 69. n. 201; Godart, Enc. M. ix. pt. 1. p. 353. n. 8.

*Nymph. fabius*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 28.

*Hab.* India; Indian-Islands.

B.M.

20. CHARAXES LAMPEDO.

*Eribœa lampedo*, Hübner, Samml. exot. Schmett. Band ii. pl. f. 3, 4.

*Nymph. lampedo*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 31.

*Hab.* — ?

*Note.*—This species is closely allied to *C. fabius*, but does not agree with it in the subapical portion of the band of the fore wing, or the submarginal spotting on the underside.

21. CHARAXES IOCASTE.

*Charaxes iocaste*, Boisduval, MS.; E. Doubl. List Lep. Brit. Mus. App. p. 28.

*Nymph. iocaste*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 17.

*Hab.* Senegal.

B.M.

22. CHARAXES SOLON.

*Papilio solon*, Fabricius, Ent. Syst. iii. pt. 1. p. 69. n. 216; Jones, Icones, v. t. 63. f. 2; Godart, Enc. M. ix. p. 357. n. 24; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 26.

*Hab.* — ?

*Alæ fuscae, fascia media alba, cæruleo-viridiscente.*

23. CHARAXES ETHEOCLES.

*Papilio etheocles*, Fabricius, Ent. Syst. iii. pt. 1. p. 64. n. 200; Cramer, Pap. pl. 119. f. D, E; Godart, Enc. M. ix. p. 355. n. 17.

*Nymphalis etheocles*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 308. n. 7.

*Eribæa etheoclessa*, Hübner, Verz. bek. Schmett. n. 431.

*Hab.* Coast of Guinea; Sierra Leone.

24. CHARAXES EPHYRA.

*Nymphalis ephyra*, Godart, Enc. M. ix. p. 355. n. 18.

*Charaxes ephyra*, Feisthamel in Ann. Soc. Ent. France, 1850, p. 258.

*Nymph. ephyra*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 308. n. 8.

*Hab.* Cazamansa, West Coast of Africa.

25. CHARAXES ETESIPE.

*Nymphalis etesipe*, Godart, Enc. M. ix. p. 355. n. 19.

*Papilio etheocles*, Drury, Ill. iii. pl. 10.

*Nymph. etesipe*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 308. n. 9.

*Hab.* Sierra Leone.

*Alæ maris fuscae, maculis cæruleis viridibusve submarginatae: feminae anticae plerumque fascia obliqua media alba, raro ferruginea.*

26. CHARAXES CACUTHIS.

*Charaxes cacuthis*, Hewitson, Exot. Butterf. v. 3, pl. 48. f. 12, 13.

*Hab.* Madagascar (*Coll. Mr. Hewitson*).

27. CHARAXES ETHETA.

*Nymphalis etheta*, Godart, Enc. M. ix. p. 356. n. 20; Guérin, Icon. R. An. Ins. p. 477, pl. 78. f. 4; Griffith's An. Kingd. Ins. Lep. pl. 2. f. 4; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 308. n. 10.

*Hab.* West Coast of Africa.

28. CHARAXES TIRIDATES.

*Papilio tiridates*, Fabricius, Spec. Ins. ii. p. 11. n. 43; Ent. Syst. iii. pt. 1. p. 26. n. 195; Cramer, Pap. t. 161. f. A, B; Drury, Ill. iii. t. 23. f. 1, 2; Donovan, Ins. of India, pl. 23. f. 3; Godart, Enc. M. ix. p. 354. n. 14.

*Nymphalis tiridates*, Lucas, Hist. Nat. Léop. Exot. t. 62. f. 2; Boisduval in Delegorgue, Voy. Afriq. ii. p. 593; Trimen, Rhop. Afric. Austr. i. p. 172. n. 99.

*Charaxes tiridates*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 508. n. 11.

♀. *Papilio marica*, Fabricius, Ent. Syst. iii. pt. 1. p. 113. n. 346; Donovan, Naturalist's Repos. 11, pl. 37. f. 1; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 310. n. 31.

*Nymphalis marica*, Mus. Banks.

*Hab.* Sierra Leone; Ashanti.

B.M.

29. CHARAXES NUMENES.

*Nymphalis numenes*, Hewitson, Exot. Butterf. ii. pl. 38. f. 9, 10, 11.

*Hab.* Sierra Leone.

B.M.

30. CHARAXES AMELIÆ.

*Charaxes ameliæ*, Guérin Méneville, sér. 2. t. 13. (1861) p. 171, pl. 5. f. 1.

*Hab.* Gaboon; Sierra Leone.

B.M.

31. CHARAXES BOHEMANI.

*Charaxes bohemani*, Felder, Wien. Entom. Monatschr. (1859) p. 321, pl. 6. f. 3.

*Hab.* South Africa?

32. CHARAXES SMARAGDALIS, sp. n. (Pl. XXXVI. fig. 5.)

*Male.* Upperside—front wings deep brown, inner margin glossed with greenish blue; a submarginal row of six pale blue-green spots along the outer margin, the two nearest the apex very pale, placed obliquely from the costal nervure. Wings crossed in the middle by a broad oblique blue-green band, very broad below, becoming abruptly narrower above the third median nervule. Hind wings, basal half deep brown, glossed with greenish blue; apical half pale green; outer margin deep brown, with a pale green sinuate lunulate edge and a submarginal row of seven pale green spots with white centres between the nervures. Tails very short; inner margin densely clothed with pale brown hairs. Body deep brown.

Underside olivaceous; front wings, basal portion ochreous; cell crossed by three small irregular angulated black bands, margined with grey; three similar markings below the cell; a similar line margined outwardly with ochreous at the end of the cell, and a lunulate black band, also margined with ochreous, placed obliquely from just below the end of the cell to the submedian nervure, the outer edge of the lowest lunule bluish below; outer margin ochreous, with a submarginal row of spots, the two uppermost ones white, the two lowest ocellate, tricoloured (grey, ochreous, and black), the rest ochreous. Hind wings olivaceous, marked with various lines and spots as in *C. tiridates*; but the lines are a little more angular, and the inner submarginal ochreous lunules are better defined.

*Hab.* Congo.

B.M.

This species is allied to *C. tiridates*, from which it scarcely differs underneath.



## 33. CHARAXES CITHERON.

*Charaxes citheron*, Felder, Wien. Entom. Monatsschr. p. 308, pl. 8. f. 2, 3.

*Hab.* Port Natal.

B.M.

## 34. CHARAXES THIESTE.

*Papilio thieste*, Stoll, Suppl. Cramer, pl. 32. f. 2, 2 B.

*Eribæa thiestessa*, Hübner, Verz. bek. Schmett. n. 432.

*Nymphalis thieste*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 307. n. 18.

*N. thurias*, Godart, Enc. M. ix. pt. 1. p. 354. n. 15.

*Hab.* Caffraria.

## 35. CHARAXES XIPHARES.

*Papilio xiphares*, Fabricius, Ent. Syst. iii. pt. 1. p. 71. n. 221 ; Cramer, Pap. t. 377. f. A, B ; Godart, Enc. M. ix. pt. 1. p. 357. n. 25.

*Nymphalis xiphares*, Westw., Doubl. & Hewits. Gen. Diurn. Lep. p. 309. n. 19 ; Trimen, Rhop. Afric. Austr. i. p. 167. n. 97.

*Hab.* Cape of Good Hope.

B.M.

*Note.*—This species will probably prove to be the female of *thieste*.

*Alæ maris nigræ ; posticæ margine albo-viridiscente, ocellis nigris albo-pupillatis : subtus omnes fusco cæruleoque variegatæ, fascia flava distincta.*

## 36. CHARAXES EURYALUS.

♂. *Papilio euryalus*, Fabricius, Ent. Syst. iii. pt. 1. p. 70. n. 218 ; Cramer, Pap. t. 74. f. A, B.

*Eribæa euryale*, Hübner, Voy. bek. Schmett. n. 435.

♀. *Papilio nisus*, Fabricius, Ent. Syst. iii. pt. 1. p. 70. n. 219 ; Cramer, Pap. pl. 150. f. A, B ; Godart, Enc. M. ix. p. 357. n. 23 ; Lucas, Hist. Nat. Léop. Exot. pl. 63. f. 1 ; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 25.

*Hab.* Amboyna.

B.M.

*Alæ ferruginæ ; posticæ ocellis nigris albo pupillatis : subtus ochræ, basi lineis nigris variegatæ, posticæ ocellis violaceis submarginatæ, lunulisque ferrugineis.*

## 37. CHARAXES LATONA, sp. n. (Pl. XXXVII. fig. 1.)

Upperside ferruginous, paler towards the outer margin ; a submarginal row of black spots with white centres along the outer margin in the hind wings ; outer marginal edge brown ; a zigzag pale brown submarginal line extending from the front margin of the front wings to the middle of the hind wings, in the hind wings scarcely perceptible. Front wings elongate ; a black spot at the end of the cell ; three lunular spots placed vertically just beyond it, and extending to the third median branch ; two contiguous hastate spots a

little way beyond the cell; apex brown. Body ferruginous; antennæ black.

Underside ochreous; basal half with two irregular, oblique, dull ochreous bands outlined with black, much the same form as in *C. euryalus*; a lunulate line, extending from the anterior margin near the apex of the front wing to the anal angle of the hind wing, margined inwardly with dull ochreous. Front wings, outer margin dull ochreous, with a paler marginal line and a row of indistinct ferruginous submarginal spots, getting smaller and less distinct towards the front margin. Hind wings, marginal edge dull ochreous; a submarginal row of violaceous ocelli; the pupil black, surrounded with greenish on the outer edge of each ocellus; a submarginal row of ferruginous lunules below the common lunulate line; between the lunules and ocelli dull ochreous.

*Hab.* Timor.

B.M.

Div. 3. *Alæ subtus albo, fusco, rubro atroque variæ striga cærulea; margo posticus posticarum plerumque lunulis flavis.*

*Alæ supra fuscæ, maculis ochreis submarginatæ, fascia media ochrea ad anteriorem interrupta; margo posticus posticarum maculis rubris ochreisque submarginatus, lunulis flavis marginatus.*

### 38. CHARAXES CAPHONTIS.

*Charaxes caphontis*, Hewitson, Exot. Butterf. iii. pt. 48. f. 14, 15.

*Hab.* Fiji Islands (*Coll. Mr. Hewitson*).

*Alæ supra albæ; margine atro, albo-punctato; corpus album, antennis nigris.*

### 39. CHARAXES PYRRHUS.

*Papilio pyrrhus*, Linnæus, Syst. Nat. ii. p. 749. n. 25; Clerck, Icones, t. 25. f. 2; Fabricius, Ent. Syst. iii. pt. 1. p. 61. n. 192; Cramer, Pap. pl. 220. f. A, B; Godart, Enc. M. ix. p. 356. n. 22; Lucas, Hist. Nat. Lép. Exot. pl. 63. f. 2.

*Nymphalis pyrrhus*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 24.

*Eribæa pyrrhichia*, Hübner, Verz. bek. Schmett. n. 433.

*Hab.* Amboyna.

*Note.*—The specimen in the Banksian Collection has no connexion whatever with this species, it certainly has the old label attached to it with the name "*pyrrhus*" inscribed upon it; but it is only a variety of *C. athamas*. The specimen described and figured by Lucas as *C. pyrrus* (sic) is so different in aspect to all the other figures of this species that I am almost inclined to think it distinct; the anal tail is almost gone, the submarginal spots and bands all seem to meet at the anal angle, and the whole of the outer marginal portion of the hind wing is suffused with purple; these differences may be occasioned by a desire of the artist to improve upon nature; but if not, there is no doubt as to its being a new species.

## 40. CHARAXES GALAXIA, sp. n. (Pl. XXXVII. fig. 2.)

Upperside—front wings, basal half cream-coloured, apical half black-brown; four cream-coloured spots in couples placed beyond the cell; a submarginal row of eight similar spots along the outer margin. Hind wings, basal half broadly cream-coloured, becoming greenish along its outer edge; apical half brown-black; a marginal row of green lunular spots from above the third subcostal nervule to the anal angle; an orange spot at the anal angle. Tails long. Body, head brown, spotted with cream-colour; thorax greenish grey; abdomen cream-coloured.

Underside—front wings olivaceous, with irregular central white band and greyish anal angle. The markings are the same as in *C. sempronius*, excepting that the submarginal spots are smaller and further from the edge of the wing, and the black spot at the end of the cell is much larger and continued below the cell. Hind wings olivaceous, with a small central white patch tapering from the front margin to the end of the cell. The markings the same as in *N. sempronius*, excepting that the hind marginal yellow lunules are very small, the narrow black band at the end of the cell is more irregular and terminates a little below the cell, and the three subapical blue spots are wanting.

*Hab.* Timor.

B.M.

## 41. CHARAXES KADUNII.

*Charaxes kadunii*, Felder, Wien. Entom. Monatschr. (1860) pl. 3. f. 2.

*Hab.* Caraccas.

## 42. CHARAXES SEMPRONIUS.

*Papilio sempronius*, Fabricius, Ent. Syst. iii. pt. 1. p. 62. n. 194; Jones, Icones, v. t. 67; Donovan's Drawings in Bibl. Hope, Oxford; Godart, Enc. M. ix. pt. 1. p. 354.

*Nymphalis sempronius*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 27.

*Jasia australis*, Swainson, Zool. Ind. 2nd ser. t. 114.

*Charaxes tyrtæus*, Felder, Wien. Entom. Monatschr. (1859) p. 399, pl. 9. f. 3.

*Hab.* Australia.

B.M.

*Alæ nigræ, basi fuscæ, fascia communi alba cæruleo marginata; posticæ, et sæpe anticæ, maculis albis submarginatæ; caudis cæruleis: corpus fuscum.*

## 43. CHARAXES SCHREIBERI.

*Nymphalis schreiberi*, Godart, Enc. M. ix. App. p. 825. n. 11, 12; Horsfield, Descr. Cat. Lep. East India Comp. pl. 6. f. 3, 3 a; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 30.

*Hab.* Java.

B.M.

## 44. CHARAXES COGNATUS.

*Charaxes cognatus*, Van der Hoeven, Tijdsch. voor Entom. pt. 1-4 (1859-61), pl. 9. f. 1, 2.

*Hab.* Moluccas.

*Alæ supra fuscæ, fascia communi sulphurea; posticæ aliquando omnino sulphureæ, margine fusco, maculis albis submarginatæ.*

## 45. CHARAXES ATHAMAS.

*Papilio athamas*, Drury, Ill. i. t. 2. f. 3, 4; Cramer, Pap. t. 89. f. C, D; Godart, Enc. M. ix. pt. 1. p. 353. n. 11; Swainson, Zool. Ill. 2nd ser. t. 90.

*Jasia athamas.*

*Nymphalis athamas*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 29.

*Papilio athamas*, Drury, Abbild. und Beschreib. exotisch. Insek. t. 2. f. 4.

*P. pyrrhus*, Donovan, Ins. India, pl. 29. f. 3.

*Eribœa athamis*, Hübner, Verz. bek. Schmett. n. 430.

*P. pyrrhus*, Mus. Banks.

*Hab.* India; China; Java.

B.M.

## 46. CHARAXES HEBE, sp. n. (Pl. XXXVII. fig. 3.)

Upperside—front wings, basal half, except the cell, pale greenish; base and inner margin ochreous; cell grey, brownish in front; apical half dark brown, with a green oval spot halfway between the end of the cell and the apex. Hind wings pale greenish, base grey; inner margin brownish ochreous; outer margin grey, with brown marginal edge and two submarginal rows of black spots with white spots between them; a narrow blue line down each of the tails. Body fuscous; thorax grey; head spotted with ochreous; antennæ brown, tipped with red.

Underside pale reddish brown; outer margin deeper-coloured; a broad central greenish silky patch, rounded in front, widest at the inner margin of front wings, in the hind wings angulated at the median nervure and abruptly tapering to a point at the third median nervule, margined with rich brown, and outwardly by a row of reddish spots extending from near the apex of the front to the anal angle of the hind wings, lunulate from the middle of the front, to the anal angle of the hind wings, the lunule at the angle of the central patch margined inwardly with white and outwardly with blue, those below it margined with blue inwardly; a greenish oval spot on the front wings, as above; a black line near the base, crossing the cells obliquely; two black lunules on the lower part of the abdominal fold; a submarginal row of small black spots and a blue and yellow line along the outer margin of the hind wings. Tail brown. Body brownish ochreous.

*Hab.* Sumatra.

B.M.

This insect is closely allied to *C. athamas*, but is much more ro-

bust; the upper wings are much more rounded and longer, the sinuation of the outer margin is not so deep, and the wing is more obliquely slanted inwards at the anal angle; the apex is very much rounded; the hind wings are longer, and the outer tail half as long again as the inner one; underneath, the central band is very much further from the outer margin, only extending to the end of the cell.

Div. 4. *Alæ supra albæ, margine fusco, albo-maculato; subtus niveæ, fulvo rubrove virgatæ, raro variis coloribus maculatæ.*

*Alæ subtus niveæ, fulvo rubrove virgatæ.*

47. CHARAXES EUDAMIPPUS.

*Charaxes eudamippus*, E. Doubleday in Ann. Soc. Ent. France, 1843, p. 217, pl. 7; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 32.

*Hab.* Silhet; Assam.

B.M.

48. CHARAXES NARCÆUS.

*Nymphalis narcæus*, Hewitson, Exot. Butterf. i. p. 87, pl. 44. f. 1, 4.

*Hab.* North China.

B.M.

49. CHARAXES DOLON.

*Charaxes dolon*, Westwood, Cabinet, Orient. Entom. p. 55. pl. 27. f. 2, 3; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 34.

*Hab.* East Indies.

B.M.

*Alæ supra albæ, apice late fusco, unimaculato: subtus variis coloribus maculatæ.*

50. CHARAXES DELPHIS.

*Charaxes delphis*, E. Doubleday in Ann. Soc. Ent. France, 1843, p. 217, pl. 7; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 33.

*C. concha*, Van der Hoeven, Tijdsch. voor Ent. (1859-61), pts. 1-4. pl. 10. f. 1-3.

*Hab.* Silhet; Assam.

B.M.

Div. 5. *Alæ basi ferruginæ, raro fulvæ, apice atræ, subtus lineis, punctis strigae pallida variegatæ.*

*Alæ basi fulvæ; apice atræ, maculis fulvis submarginatæ; corpus fuscum.*

51. CHARAXES NITEBIS.

*Nymphalis nitebis*, Hewitson, Exot. Butterf. ii. p. 75, pl. 38. f. 7, 8.

*Hab.* Celebes.

B.M.

*Alæ ferrugineæ, anticæ apice atræ; posticæ ocellis nigris albo punctatis submarginatæ: corpus ferrugineum.*

## 52. CHARAXES PSAPHON.

*Charaxes psaphon*, Westwood, Cabinet Orient. Entom. p. 43, pl. 21.

*Nymphalis psaphon*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 36.

*Hab.* Ceylon. B.M.

## 53. CHARAXES BAYA. (Pl. XXXVII. fig. 5.)

*Nymphalis baya*, Moore, Cat. Lepid. East India Comp. p. 207, sp. 424, Horsf. Coll.

*Hab.* Java; India; Borneo. B.M.

## 54. CHARAXES BERNARDUS.

*Papilio bernardus*, Fabricius, Ent. Syst. iii. pt. 1. p. 71, n. 223; Jones, Icones, iv. t. 65. f. 2; Donovan, Ins. of China, pl. 34.

*Nymphalis bernardus*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 35.

*Satyrus bernardus*, Godart, Ent. M. ix. p. 477. n. 2.

*Papilio polixena*, Cramer, Pap. t. 54. f. A, B.

*Nymphalis polixo*, Godart, Enc. M. ix. p. 399. n. 169.

*Doxocopa epilais*, Hübner, Verz. bek. Schmett. p. 464.

*Hab.* Northern India; China. B.M.

## 55. CHARAXES AMYCUS.

*Charaxes amycus*, Boisd. in litt.; Felder in Wien. Entom. Monatschr. (1861) p. 303. n. 21.

*Hab.* Philippine Islands.

## 56. CHARAXES ÆSON.

*Charaxes æson*, Herrich-Sch. Samml. Aeussereurop. Schmett. iii.? f. 9, 10.

*Hab.* Gold Coast.

## 57. CHARAXES MARMAX.

*Charaxes marmax*, Westwood, Cabinet Orient. Entom. p. 43, pl. 21; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 37.

*Hab.* Silhet; Assam. B.M.

## 58. CHARAXES AFFINIS, sp. n. (Pl. XXXVII. fig. 4.)

Upperside—front wings, basal half ferruginous, apical half black. Hind wings ferruginous; hind marginal edge black, with a submarginal row of black spots. Body ferruginous.

Underside pale ferruginous, varied with ochreous; hind margin glossy, bounded inwardly by a lunulate ferruginous line; basal half varied with angulated black lines; a submarginal ferruginous band, interrupted with ochreous at the nervures, tapering to the anterior

margin of the front wings, where it becomes very indistinct; on the hind wings distinct, close to the common lunulate line. Front wings, apex with a silver dash; a silver streak at the anal angle. Hind wings, a marginal ferruginous line and a submarginal row of greenish ocelli, the pupils black, at the outer edge of each ocellus.

*Hab.* Celebes.

B.M.

Closely allied to *C. baya*, and only differs from it above in the absence of a ferruginous spot on the black near the anal angle of the front wing: on the underside the black lines are very differently placed, the continuous submarginal lunulate line is more regular and very close to the outer margin, and none of the lines are so angular. We have two specimens in the Museum Collection; and I have carefully compared them with all the other allied species, and find none that agree with them; and all these species resemble one another so closely in the coloration of the underside that, if the linear markings, which are locally constant (as far as I have been able to judge), are not taken into account, nothing is left to distinguish the species but the depth of the black margin of the upperside.

*Note.*—*C. psaphon* and *C. baya* exactly agree in the marking of the underside. We have a variety of *C. baya* that resembles *C. marmax* on the upperside. I think it very doubtful whether any of the species included in the present subdivision are more than varieties of one form; and Mr. William Atkinson, who has studied these insects in their native country and has compared numbers of specimens, assures me that they are all of one species.

Div. 6. Alæ ferruginæ, nigro maculatæ; posticæ bicaudatæ :  
subtus maculis argenteis.

59. CHARAXES JAHLUSA.

*Nymphalis jahluca*, Boisd. MS.; Trimen, Rhop. Afric. Austr. p. 177. n. 102.

*Charaxes argynnides*, Westwood, Proc. Ent. Soc. London, 1864, p. 10.

*Hab.* Zambesi; Cape of Good Hope.

Div. 7. Alæ subtus plurimis maculis strigisque variegatæ; posticæ dentatæ, obtuse caudatæ.

*Alæ nigræ, fascia communi rubra: posticæ subtus nigro, albo, ferrugineo flavoque maculatæ.*

60. CHARAXES BERENICE.

*Nymphalis berenice*, Drury, Ill. iii. t. 11. f. 1, 2; Fabricius, Ent. Syst. iii. pt. 1. p. 114. n. 350; Donovan, Nat. Repos. iii. pl. 107; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 310. n. 39.

*Papilio zingha*, Cramer, Pap. pl. 315, f. B, C.

*Tigridia zingha*, Hübner, Verz. bek. Schmett. n. 355.

*Hab.* West Coast of Africa; Sierra Leone.

B.M.

*Alæ nigræ, fascia communi alba : posticæ subtus nigro, albo, cæruleo rubroque maculatæ, et viridi rubroque fasciatæ.*

61. CHARAXES CALYDONIA.

*Nymphalis calydonia*, Hewits. Exot. Butterf. p. 86, pl. 43. f. 3, 4.

*Hab.* Malacca (*Coll. Mr. Wallace*).

Div. 8. *Alæ anticæ sub apice angulatæ ; posticæ caudis dilatatis.*

*Alæ albæ viridiscentes, nigro variæ.*

62. CHARAXES ZOLINA.

*Nymphalis zolina*, Westwood, MS. ; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 309. n. 23, pl. 53. f. 1 ; Angas, Illustr. Port Natal Ins. pl. 1. f. 7 ; Trimen, Rhop. Afric. Austr. i. p. 178. n. 103.

*Hab.* Amazoulu ; Port Natal.

B.M.

*Alæ ferrugineæ, nigro variæ.*

63. CHARAXES NEANTHES.

*Nymphalis neanthes*, Hewits. Exot. Butterf. p. 88, pl. 44. f. 2, 3 ; Trimen, Rhop. Afric. Austr. i. p. 179. n. 104.

*Hab.* Port Natal.

B.M.

Div. 9. *Alæ non caudatæ, virides ; supra basi nitentes, apice anticarum tenebrosæ.*

64. CHARAXES EUPALE.

*Papilio eupale*, Drury, Ill. iii. t. 6. f. 3 (1783).

*Nymphalis eupale*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 310. n. 41.

*Papilio amasia*, Fabricius, Ent. Syst. iii. pt. 1. p. 136. n. 419 (1793) ; Jones, Icones, v. t. 15. f. 2 ; Godart, Enc. M. ix. p. 389. n. 137 ; Lucas, Lép. Exot. t. 69.

*Hab.* Sierra Leone ; Ashanti.

B.M.

Div. 10. *Alæ non caudatæ ; supra nigræ, anticæ maculis cæruleis submarginatæ ; corpus fuscum ; subtus cinereæ, fasciis fuscis.*

*Alæ anticæ cella cærulea maculisque duabus cæruleis ; margo posticus maculis quatuor cæruleis : posticæ fascia cærulea.*

65. CHARAXES MYCERINA.

*Nymphalis mycerina*, Godart, Enc. M. ix. p. 369. n. 65 ; Lucas, Hist. Nat. Lép. Exot. pl. 65. f. 2 ; Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 310. n. 40, pl. 53. f. 2.

*Hab.* Sierra Leone.

B.M.



*Alæ supra nigræ, maculis cæruleis submarginatæ; posticæ dentatæ.*

66. CHARAXES NESIOPE.

*Nymphalis nesiope*, Hewitson, Exot. Butterf. p. 88, pl. 44. f. 5, 6.  
*Hab.* Sierra Leone (*Coll. Mr. Hewitson*).

The two following species are doubtful:—

67. CHARAXES? THERSANDER.

*Papilio thersander*, Donovan, Nat. Repos. iii. t. 75.

*Nymphalis? thersander*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 310. n. 42.

*N. lampedo?*, id.

*Hab.* Sierra Leone.

68. CHARAXES? MILTIADES.

*Papilio miltiades*, Fabricius, Ent. Syst. iii. pt. 1. p. 66. n. 205; Jones, Icones, v. t. 80. f. 2; Donovan, Drawings in Bibl. Hope. Oxford; Godart, Enc. M. ix. p. 358. n. 26.

*Nymphalis? miltiades*, Westw., Doubl. & Hewits. Gen. Diurn. Lepid. p. 310. n. 43.

*Hab.* —?

*Note.*—*Charaxes rayi* of Van der Hoeven (*Tijdschft voor Entomologie*, pts. 1–4, 1859–61, pls. 9, 10) is identical with *Megistanus bæotus* of Boisduval (South America); there must be some mistake as to the specimen described by him having come from Amboyna. This species is rather variable: specimens from Ega have a greenish tint on the underside; whilst those from New Granada are tinted with violaceous; there is also a difference in the number of black spots on the front margin of the anterior wings below. New Granadian specimens have eleven to twelve, Ega specimens eight to nine; they are also shorter in the wing; the central band of the upper wings is more regular, the submarginal lunules of the hind wings vary from two to three in number, and the submarginal spots are sometimes entirely wanting. The specimen figured as *C. rayi* is probably from Bolivia.

DESCRIPTION OF PLATES XXXVI., XXXVII.

PLATE XXXVI.

- Fig. 1. *Charaxes saturnus*, p. 624.  
 2. — *phæbus*, p. 625.  
 3. — *cynthia*, p. 626.  
 4. — *viola*, p. 627.  
 5. — *smaragdalis*, p. 630.

PLATE XXXVII.

- Fig. 1. *Charaxes latona*, p. 631.  
 2. — *galaxia*, p. 633.  
 3. — *hebe*, p. 634.  
 4. — *affinis*, p. 636.  
 5. — *baya*, p. 636.

3. DESCRIPTIONS OF TWO NEW GENERA OF LIZARDS FROM DAMARALAND. BY DR. J. E. GRAY, F.R.S., F.L.S., V.P.Z.S., ETC.

(Plate XXXVIII.)

The British Museum has lately received from Mr. Andersson some Lizards from Damaraland, among which there are two which appear to have hitherto escaped being described in the Catalogues. As they are both remarkable forms, I proceed to lay the descriptions and figures of them before the Society.

The first Lizard belongs to the family *Agamidæ*, and to the terrestrial group of that family, with a depressed body, covered with minute granular scales, and destitute of any anal and femoral pores, which has been called *Phrynocephalinæ* (see Cat. Lizards B. M. p. 259). It differs from *Phrynocephalus*, and all the other genera of that group, in having distinct, though small, sunken ears, with a distinct linear erect opening.

The animal is very like the nocturnal Lizards, or *Geckotidæ*, in the form of the body, the kind of scales, and the large size of the eyes. But the eyes are covered with distinct valvular lids; and the toes are not dilated, but edged on the outer side with a series of projecting slender scales.

PTENOPUS.

The head and body depressed; head, body, and limbs covered with uniform, minute, smooth granular scales. The tail conical, with rings of rather larger, smooth, squarish scales. The head rather large. Lips with a single series of very small shields. Eyes large, with distinct valvular lids; pupil roundish. Ears small, linear, open in front of the rather swollen parotoids. Body depressed, covered with minute, small, uniform granules, like scales; scales of the chin and belly rather larger, flatter. Limbs moderate. Toes  $5/5$ ; the front subequal, rather broad and depressed, with three series of scales on the upper surface, with a single series of rather convex band-like scales beneath; the hinder unequal, the second the longest, rather depressed, with three or four series of smooth scales above, and three or four series of keeled scales beneath, and with a series of elongated subulate scales forming a fringe on each side of the toes on the sides. The soles of the hind feet covered with minute, small, acute scales. Claws conical, elongate, acute, brown.

PTENOPUS MACULATUS. (Pl. XXXVIII. fig. 1.)

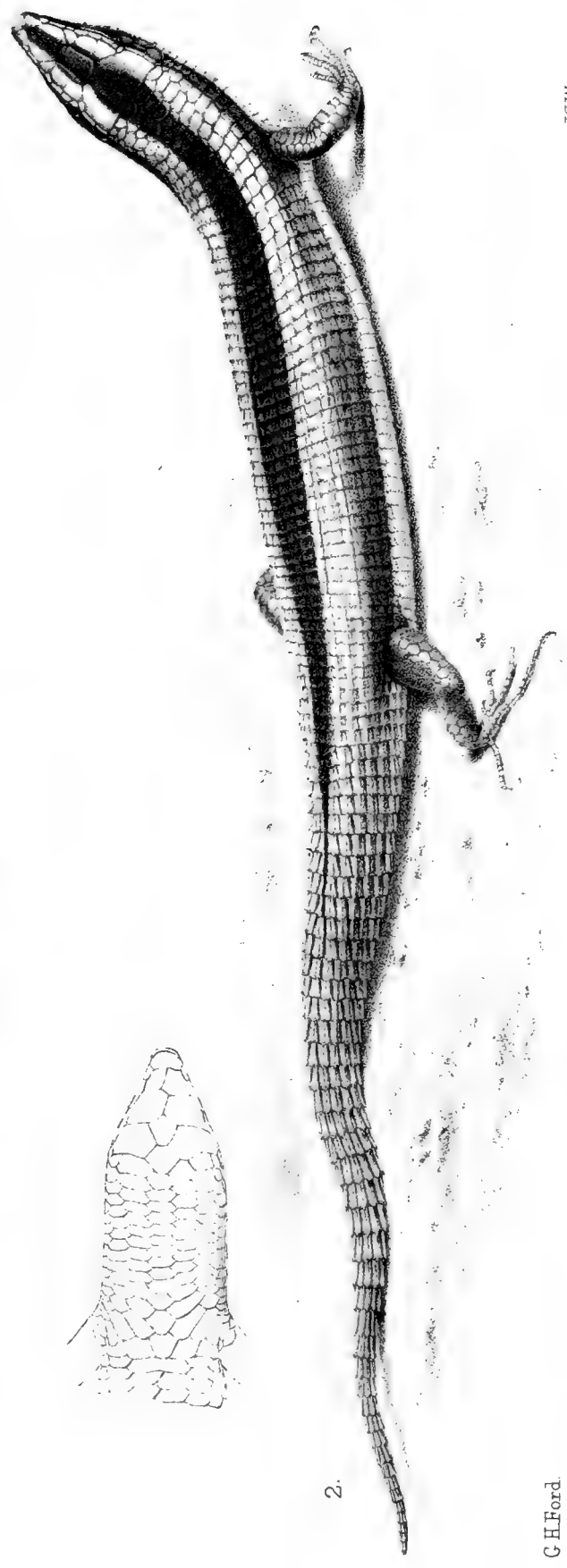
Grey brown (in spirits), with irregular-shaped groups of small black spots, the spot on the back being subsymmetrical on the two sides; underside of the tail with irregular blackish cross bars; the underside of head, body, and tail uniform brown-white.

*Hab.* South Africa, Damaraland (*Mr. Andersson*).

The second Lizard belongs to the family *Zonuridæ*, with distinct femoral pores, and unarmed caudal scales, which I have called *Ci-*



1.



2.

1 *Ptenopus maculatus*.  
2 *Cordylosaurus trivirgatus*



*cignina* in my 'Catalogue of the Lizards in the British Museum' (see p. 49), and to the group of the genera of that family which have large flat dorsal scales, and five toes to each foot.

#### CORDYLOSaurus.

Head depressed, elongate. Occiput covered with a pair of elongated occipital shields, sometimes united into one; interparietal shields absent. Temple covered with several unequal-sized small scales. Body depressed, with a very narrow impressed fold occupying two-thirds of the hinder part of the sides. Back covered with rings of close, square, very obscurely keeled uniform shields, placed in longitudinal series. The tail elongate, conical, tapering, with rings of strongly keeled, rather elongate scales. The limbs covered above with obscurely keeled scales. The belly with four series of thin square shields. Toes  $5/5$ , elongate, slender, linear, sharply clawed; femoral pores  $4/4$  or  $5/5$ , large; subanal pores none. The chin and throat covered with hexagonal, thin, smooth scales. The underside of the tail with larger, smoother scales.

#### CORDYLOSaurus TRIVIRGATUS. (Pl. XXXVIII. fig. 2.)

Whitish (in spirits), with a central broad and a narrow black streak on each side, commencing from the end of the nose, and continued rather beyond the base of the tail; limbs brown above; underside silvery white (in spirits); the frontal nasal shield elongate, nearly as long as the frontal.

*Hab.* South Africa, Damaraland (*Mr. Andersson*).

This Lizard has somewhat the appearance of *Platysaurus* of Sir Andrew Smith; but the back of that Lizard is covered with small granular scales. It is also like the *Gerrhosaurus subtessellatus* of Sir Andrew Smith, but differs in the system of coloration and in the form of the frontal nasal shield.

The Lizards of this group may be thus divided:—

- I. *The back covered with small granular scales; head depressed, elongate; interparietal and occipital plates similar, square.*

PLATYSAURUS CAPENSIS, A. Smith, Ill. Z. S. A. t. 40.

PLATYSAURUS GUTTATUS, A. Smith, App. Ill. Z. S. A. t. 8.

- II. *Back covered with smooth, or only slightly keeled, square scales; head elongate, depressed; interparietal shield none; occipital shields elongate, rarely united.*

#### CORDYLOSaurus.

CORDYLOSaurus TRIVIRGATUS, n. s.

Frontal nasal elongate.

CORDYLOSaurus SUBTESSELLATUS.

Frontal nasal transverse.

*Gerrhosaurus subtessellatus*, A. Smith, Ill. Z. S. A. t. 41. f. 1.

*G. tessellatus*, A. Smith, Ill. Z. S. A. t. 42. f. 17-20.

*Pleurostrichus subtessellatus*, Gray, Cat. Lizards B. M. p. 51.

III. *Back covered with keeled, square scales; head short, high; occipital plates broad, short.*

#### PLEUROSTRICHUS.

Interparietal shield none.

#### PLEUROSTRICHUS BIFASCIATUS.

*Gerrhosaurus bifasciatus*, A. Smith, Ill. Z. S. A. t. 42. f. 25-27 (head).

#### GERRHOSAURUS.

Interparietal shield moderate, polygonal; occipital short, broad, subtrigonal.

GERRHOSAURUS FLAVIGULARIS, A. Smith, Ill. Z. S. A. t. 37, t. 42. f. 1-4 (head).

GERRHOSAURUS TYPICUS, A. Smith, Ill. Z. S. A. t. 38. f. 2, t. 42. f. 5-8 (head).

GERRHOSAURUS BIBRONII, A. Smith, Ill. Z. S. A. t. 38. f. 1 ♂, t. 42. f. 9-12 (head).

GERRHOSAURUS SEPIFORMIS, A. Smith, Ill. Z. S. A. t. 41. f. 2, t. 42. f. 13-16.

GERRHOSAURUS LINEATUS, A. Smith, Ill. Z. S. A. t. 42. f. 21-24.

GERRHOSAURUS PALLIDUS, Sundevall; A. Smith, Ill. Z. S. A. App. 9.

I may here observe that the Lizard which I described as *Homodactylus turneri* (Proc. Zool. Soc. 1864, p. 59, t. 9. f. 2) is the same as *Pachydactylus (Tarentola) bibronii* of Sir A. Smith (Illustrations of the Zoology of South Africa, Reptiles, t. 50. f. 1). I cannot conceive how I overlooked this plate when describing the animal. Sir Andrew Smith observes it is not a typical *Tarentola*; this explains why I did not look in that genus for the species. It must now be called *Homodactylus bibronii*.

The *Lygodactylus strigatus* of the same paper (Proc. Zool. Soc. 1864, p. 59) is the *Hemidactylus capensis* of Sir A. Smith, described and figured in the same work.

Dr. Peters, who pointed out these synonyma from the examination of Sir Andrew Smith's typical specimens, which have been sent to the British Museum since the species were described, informs me that he has "found the latter animal in 'a fossil state' in copal received from the coast of Zanzibar, showing that it has a very extensive geographical range."

The figures of both the Lizards given in Plate XXXVIII. are double the natural size.

4. ON THE MARINE MOLLUSCAN FAUNA OF THE PROVINCE OF SOUTH AUSTRALIA: WITH A LIST OF ALL THE SPECIES KNOWN UP TO THE PRESENT TIME; TOGETHER WITH REMARKS ON THEIR HABITATS AND DISTRIBUTION, ETC. BY GEORGE FRENCH ANGAS, C.M.Z.S., ETC.

(Part II.\*)

CONCHIFERA.

Fam. PHOLADIDÆ.

1. BARNEA AUSTRALASIÆ.

*Pholas australasiæ*, Gray, MS. Brit. Mus.; Thesaurus Conchyliorum, pl. 107. f. 73.

*Station.* Burrowing in soft rock beyond tide-marks.

*Hab.* Spencer's Gulf.

2. BARNEA SIMILIS.

*Pholas similis*, Gray, MS. Brit. Mus.; Thesaurus Conchyliorum, pl. 103. f. 12, 13, 14.

*Station.* In soft rock.

*Hab.* St. Vincent's Gulf, Port Adelaide Bar.

Abundant also near Auckland, New Zealand.

Fam. SOLENIDÆ.

3. SOLEN VAGINOIDES.

*Solen vaginoides*, Lam. Anim. sans Vert. vi. p. 54.

*Station.* Burrowing in sandy flats in sheltered places.

*Hab.* Port Adelaide Creek; Nepean Bay, Kangaroo Island; also Tasmania.

A pretty species, slightly curved, and mottled with flesh-purple.

Fam. SAXICAVIDÆ.

4. SAXICAVA AUSTRALIS.

*Saxicava australis*, Lam. Anim. sans Vert. vi. p. 153.

*Mactra crassa*, Péron.

*Station.* Imbedded in sponges.

*Hab.* Rapid Bay, St. Vincent's Gulf.

5. \*SAXICAVA ANGASI.

*Saxicava angasi*, A. Adams, MS. Col. Cuming.

*Station.* On oyster-banks, living in sandy mud at from 5 to 8 fathoms.

*Hab.* Port Lincoln.

This species resembles a gigantic *S. australis*, some specimens being  $2\frac{1}{2}$  inches in length. Its difference of station would, however,

\* For Part I. see P. Z. S. 1865, p. 155.

independently of its large size, induce me to regard it as a distinct species.

Fam. ANATINIDÆ.

6. \*ANATINA ANGASI.

*Periploma angasi*, Crosse et Fischer, Journal de Conchyliologie, 1864, tome iv. no. 4, p. 349.

*Station.* In sandy mud in sheltered bays.

*Hab.* Hardwick Bay; Spencer's Gulf.

It has been also found at Oyster Bay, on the east coast of Tasmania.

This fine species, which has been described by Messrs. Crosse and Fischer as a *Periploma*, to which genus, on account of the inequality of its valves, it bears some resemblance, must nevertheless, from its gaping and beaked posterior extremity, be placed in the genus *Anatina* of Lamarck.

7. ANATINA CRECCINA.

*Anatina creccina*, Valenciennes.

*Station.* In sandy mud.

*Hab.* Hardwick Bay; Spencer's Gulf; Port Phillip; Illawarra Lake and Port Jackson, New South Wales.

8. ANATINA GRACILIS.

*Anatina gracilis*, Reeve, Conchologia Icon.

*Station.* In estuary mud.

*Hab.* Port Adelaide Creek.

9. MYODORA OVATA.

*Myodora ovata*, Reeve, Proc. Zool. Soc. 1844; Couch. Icon. pl. 1. f. 4.

*Station.* Dredged on sandy bottom at 2 fathoms.

*Hab.* Port Adelaide Creek, north arm; middle harbour, Port Jackson, New South Wales.

10. CHAMOSTREA ALBIDA.

*Chama albida*, Lam.

*Cleidothærus chamoïdes*, Stutchbury, Zool. Journal; Sowerby, Genera of Shells, f. 1-3.

*Station.* On oyster-banks.

*Hab.* Port Lincoln; Rapid Bay; Port Jackson, New South Wales.

Hitherto the locality of this peculiar shell was supposed to be exclusively Port Jackson. Fine large specimens have been obtained by the dredge from the oyster-banks near Port Lincoln.

Fam. MACTRIDÆ.

11. TRIGONELLA RUFESCENS.

*Mactra rufescens*, Lam. Anim. sans Vert. (Deshayes's edit.) vi. p. 102.



*Station.* Burrowing in sand, on shores exposed to the surf.

*Hab.* Encounter Bay, near the sea-mouth of the Murray; also Tasmania.

A solid, flexuously-wrinkled species.

12. TRIGONELLA POLITA.

*Mactra polita*, Chemnitz, Conch. Cab. vi. p. 222, f. 216, 217.

*M. glabrata*, Schröter.

*M. australis*, Lam.

*Station.* Burrowing on sandy shores, beyond tide-marks.

*Hab.* Spencer's Gulf and Encounter Bay.

This species is more or less banded with light ashy and violet.

13. TRIGONELLA PURA.

*Mactra pura*, Deshayes, Proc. Zool. Soc. 1853, p. 15.

*Station.* The same as the preceding.

*Hab.* Spencer's Gulf; Hardwick Bay.

A solid, ivory-white species, which ranges westward to Swan River.

14. \*TRIGONELLA AMYGDALA.

*Mactra amygdala*, Crosse et Fischer, Journ. de Conch. 1864, p. 349.

*Station.* In sand, near tide-marks.

*Hab.* Head of Spencer's Gulf.

A small, white, oval species.

15. \*SPISULA ADELAIDÆ.

*Spisula adelaidæ*, Angas, MS.

*Station.* In estuary mud, amongst mangrove-swamps.

*Hab.* Port Adelaide Creek.

16. \*MULINIA PINGUIS.

*Mactra (Mulinia) pinguis*, Crosse et Fisch. Journ. de Conch. 1864, p. 349.

*Station.* Unknown.

*Hab.* Port Lincoln.

17. LUTRARIA RHYNCHÆNA.

*Lutraria rhynchæna*, Jonas, MS. (Mus. Cuming.); Reeve, Conch. Icon. (*Lutraria*) pl. 4. f. 16.

*Station.* Dredged on oyster-banks.

*Hab.* Port Lincoln.

A fine species, obliquely arched, with the anterior end beaked and openly gaping.

18. LUTRARIA PHILIPPINARUM.

*Lutraria philippinarum*, Deshayes, P. Z. S. 1854, p. 71.

*Station.* Same as the preceding.

*Hab.* Port Lincoln.

## Fam. TELLINIDÆ.

## 19. HIATULA BIRADIATA.

*Solen biradiatus*, Wood, Gen. Conch. pl. 33. f. 1; Index Test. pl. 3. f. 26.

*Station.* In the sands at low-water mark.

*Hab.* St. Vincent's Gulf.

## 20. HIATULA EPIDERMIA.

*Soletellina epidermia*, Desh. MS. (Mus. Cuming.); Reeve, Conch. Icon. pl. 1. f. 3.

*Station.* Buried in sand at low water.

*Hab.* Port Lincoln; St. Vincent's Gulf; Swan River; Port Phillip; Tasmania and Port Jackson.

## 21. HIATULA NYMPHALIS.

*Soletellina nymphalis*, Deshayes, MS. (Mus. Cuming.); Reeve, Conch. Icon. (*Soletellina*) pl. 1. f. 2.

*Station.* Same as the preceding species.

*Hab.* Hardwick Bay and St. Vincent's Gulf.

This may perhaps prove to be only an orange-coloured variety of *H. biradiata*.

## 22. HIATULA VITREA.

*Sanguinolaria vitrea*, Desh. P. Z. S. 1854, p. 326.

*Station.* In deeper water than the other *Hiatula*.

*Hab.* Port Lincoln; Spencer's Gulf; also Tasmania.

## 23. TELLINELLA DELTOIDALIS.

*Tellina deltoidalis*, Lam. Anim. sans Vert. vi. p. 206.

*T. lactea*, Quoy, Voyage de l'Astrol.

*Station.* In sandy mud, in estuaries.

*Hab.* Port Adelaide Creek.

This species has a wide range. It occurs not only in South Australia, Port Phillip, and Tasmania, but in Illawarra Lake and Botany Bay in New South Wales—and also in New Zealand, where it attains a larger size than in the other localities.

## 24. PERONÆODERMA ALBINELLA.

*Tellina albinella*, Lam. Anim. sans Vert. vi. p. 194.

*Station.* Buried in the sands at low water on shores exposed to the ocean surf.

*Hab.* Encounter Bay, along the beach towards the sea mouth of the Murray.

There are several varieties in colour of this beautiful shell,—the white variety (Lamarck's type) being the one most seldom met with, whilst those of a deep rose-colour and an orange flesh tint are comparatively abundant.

25. *MACOMA UMBONELLA.*

*Tellina umbonella*, Lam. no. 48 ; Hanley, Desc. Cat. p. 70 ; Sow. Thes. Conch. pl. 56. f. 13.

*Station.* In sandy bays.

*Hab.* Port Lincoln.

26. *ARCOPAGIA DECUSSATA.*

*Tellina decussata*, Lam. Anim. sans Vert. vi. p. 205.

*Station.* Amongst rocks and stones at low tides.

*Hab.* Rapid and Aldinga Bays ; Tasmania and Port Phillip.

27. *LATONA EPIDERMIA.*

*Donax epidermia*, Lam. Anim. sans Vert. vi. p. 243.

*D. deltoides*, Lam. ; Sow. Genera of Shells, no. 10.

*D. lævigata*, Dillwyn.

*Station.* In sand at low water.

*Hab.* Encounter Bay ; the Coorong.

This species is abundant on most of the sandy shores of the southern portion of Australia. On the coasts of New South Wales and along the Coorong it is eaten by the natives ; and large heaps of the shells may be seen about their old fires and camping-places.

28. *SEMELE EXIGUA.*

*Semele exigua*, H. Adams, P. Z. S. 1861, p. 385.

*Station.* In sand near tide-marks.

*Hab.* Spencer's Gulf.

This beautiful little species is an aberrant form of the genus, and has much the aspect of a *Tellina*.

29. \**SEMELE ADA.*

*Semele ada*, Adams & Angas, P. Z. S. 1863, p. 426.

*Station.* Dredged in 3 fathoms water.

*Hab.* Port Adelaide Creek, north arm.

30. *DONACILLA PRÆCISA.*

*Mesodesma præcisum*, Desh. MS. (Mus. Cuming.) ; Reeve, Conch. Icon. pl. 4. f. 31.

*Station.* Sands at low water.

*Hab.* Salt Creek ; St. Vincent's Gulf ; Tasmania.

31. *DONACILLA ELONGATA.*

*Mesodesma elongatum*, Desh. MS. (Mus. Cuming.) ; Reeve, Conch. Icon. pl. 1. f. 5.

*Station.* Sands at low water.

*Hab.* On most sandy shores in both gulfs ; New South Wales ; Tasmania ; Bass's Straits ; Swan River.

## 32. \*DONACILLA OBTUSA.

*Mesodesma obtusum*, Crosse et Fischer, Journ. de Conch. 1864, p. 350.

*Station.* Sands at low water.

*Hab.* Port Lincoln and St. Vincent's Gulf.

## 33. ANAPA TRIQUETRA.

*Mesodesma triquetrum*, Hanley, P. Z. S. 1843, p. 101.

*Anapa triquetra*, Gray.

*Station.* In sand at low water.

*Hab.* Head of Spencer's Gulf; Tasmania.

## 34. ANAPA CUNEATA.

*Mesodesma cuneatum*, Desh. Anim. sans Vert. vi. p. 133.

*Crassatella cuneata*, Lam.

*Station.* In sand at low water.

*Hab.* St. Vincent's Gulf; New Zealand.

## Fam. VENERIDÆ.

## 35. CHIONE (CIRCOMPHALUS) LAMELLATA.

*Venus lamellata*, Lam.; Reeve, Conch. Syst. pl. 68. f. 3.

*Station.* Deep water, on oyster-banks.

*Hab.* Port Lincoln.

This magnificent species, with its broad flesh-coloured lamellæ, is, when in good condition, one of the most beautiful of bivalve shells. It occurs likewise in Bass's Straits and on the coast of Tasmania.

## 36. CHIONE (CIRCOMPHALUS) TIARA.

*Venus tiara*, Dillwyn; Reeve, Conch. Syst. pl. 67. f. 3.

*Station.* Deep water; dredged from oyster-beds.

*Hab.* Port Lincoln.

This species occurs at Moreton Bay, on sandbanks.

## 37. CHIONE (CIRCOMPHALUS) ALTA.

*Venus alta*, Sow.

*Station.* Dredged from oyster-beds.

*Hab.* Port Lincoln.

Large specimens of this species are found at Shark's Bay, North-west Australia.

## 38. CHIONE (TIMOCLEA) AUSTRALIS.

*Venus australis*, Sow. Proc. Zool. Soc. 1835, p. 22.

*Station.* Deep water.

*Hab.* Port Lincoln and Kangaroo Island; Swan River; Tasmania; Port Jackson, New South Wales.

## 39. CHIONE (CHAMELEA) APHRODINA.

*Venus aphrodina*, Lam.; Delessert, Recueil, pl. 11. f. 1.

*Station.* In sand beyond tide-marks.

*Hab.* Port Lincoln ; Tasmania.

A chalky-white species, purple inside, with the valves transversely ridged or striated.

40. CHIONE (CHAMELEA) CONULARIS.

*Venus conularis*, Lam.

*Station.* On sandy beaches at low tide.

*Hab.* St. Vincent's Gulf ; Salt Creek ; York's Peninsula.

Similar in form and sculpture to the preceding, but with the valves stained with bluish purple and chestnut.

41. CHIONE (CHAMELEA) PERONI.

*Venus peroni*, Lam. Anim. sans Vert. vi. p. 369.

*Station.* In sandy bays at low tide.

*Hab.* Rapid Bay ; Aldinga Bay ; Salt Creek ; Tasmania and Port Philip ; also King George's Sound (large specimens).

Like the preceding, but larger and more inflated, and frequently ornamented with zigzag brown lines and spots.

42. CHIONE (CHAMELEA) STRIGOSA.

*Venus strigosa*, Lam. Anim. sans Vert. vi. p. 368.

*Station.* Sandy bays at low tide.

*Hab.* York's Peninsula ; St. Vincent's Gulf ; Port Lincoln ; King George's Sound (very large) ; Port Phillip.

More elongated, with the ridges waved and crenated. The specimens from Port Phillip are beautifully ornamented with a network of dark lines and spots, especially near the ventral margin.

43. CHIONE (CHAMELEA) SCALARINA.

*Venus scalarina*, Lam. ; Deless. Recueil, pl. 10. f. 12.

*Station.* In sand at low-water mark.

*Hab.* Very abundant near the semaphore jetty outside Port Adelaide. It ranges westward to Swan River.

At the head of Spencer's Gulf a solid white variety occurs, beautifully tinged more or less with violet, and wanting the wavy spots which are so characteristic of the ordinary type of this species.

Another variety is remarkable in having the ridges wide apart, thin, and erect at the sides.

44. CHIONE (MARCIA) FABÆ.

*Tapes faba*, Reeve, Conch. Icon.

*Station.* In estuary mud.

*Hab.* Port Onkaparinga, St. Vincent's Gulf.

Somewhat resembling *V. lavigata*, Sow., but more gibbous and rounded at the sides.

45. \*SUNETTA ALICIÆ.

*Sunetta aliciæ*, A. Adams & Angas, Proc. Zool. Soc. 1863, p. 425, pl. xxxvii. f. 18.

*Station.* Deep water.

*Hab.* Encounter Bay.

A very beautiful species, painted with blotches and rays of rose or purple on a flesh-coloured ground.

46. CIRCE RIVULARIS.

*Cytherea rivularis*, Born ; Menke, Moll. Nov. Holl. p. 42.

*Station.* Deep water ; dredged on oyster-banks.

*Hab.* Port Lincoln.

Found also at Moreton Bay, on the north-east coast of Australia.

47. \*DOSINIA DIANA.

*Dosinia diana*, A. Adams & Angas, Proc. Zool. Soc. 1863, p. 424.

*Station.* Deep water.

*Hab.* Hardwick Bay ; Spencer's Gulf.

A fine species, of a pure white colour, gibbous, and very smooth towards the beaks.

48. TAPES (CUNEUS) GALACTITES.

*Venus galactites*, Lam. Anim. sans Vert. vi. p. 359.

*Station.* In deep water.

*Hab.* St. Vincent's and Spencer's Gulfs.

Of a uniform white colour, with the surface of the valves longitudinally striated.

49. RUPELLARIA CRENATA.

*Venerupis crenata*, Lam. Anim. sans Vert. vi. p. 164.

*Station.* In holes and crevices of rocks, and at the roots of mangrove trees.

*Hab.* Port Adelaide Creek ; Port Jackson, New South Wales.

50. RUPELLARIA CUMINGI.

*Rupellaria cumingi*, Deshayes.

*Station.* In crevices of rocks and hollow stones.

*Hab.* St. Vincent's Gulf, Rapid Bay, and Encounter Bay.

A reddish violet-coloured species, with the transverse ridges elegantly frilled.

51. RUPELLARIA OBESA.

*Venerupis obesa*, Desh. P. Z. S. 1853, p. 5.

*Station.* In rocks beyond low water.

*Hab.* Port Elliott ; Encounter Bay ; also Port Phillip and Tasmania.

Fam. PETRICOLIDÆ.

52. \*NARANIO DIVARICATA.

*Naranio divaricata*, Chemnitz.

*Station.* Deep water.

*Hab.* Aldinga Bay, St. Vincent's Gulf.

## Fam. CARDIADÆ.

## 53. CARDIUM (TRACHYCARDIUM) CYGNORUM.

*Cardium cygnorum*, Desh.

Station. Deep water.

*Hab.* Rapid Bay; Holdfast Bay, dredged in 5 fathoms; Swan River.

## 54. PAPYRIDEA TENUICOSTATA.

*Cardium tenuicostatum*, Lam. Anim. sans Vert. (Desh. edit.) vi. p. 372.

Station. Deep water.

*Hab.* Hardwick Bay; Spencer's Gulf; Kangaroo Island; Port Phillip; Port Jackson.

## Fam. CHAMIDÆ.

## 55. CHAMA FRAGUM?

*Chama fragum*, Reeve, Conch. Icon. pl. 9. f. 48.Station. Adhering to dead *Pinnæ* and *Malleus*.*Hab.* Head of Spencer's Gulf.

## 56. CHAMA CRISTELLA?

*Chama cristella*, Lam. Anim. sans Vert. (Deshayes's edit.) vi. p. 585.

Station. On mussel-beds, adhering to one another.

*Hab.* Head of Spencer's Gulf.

## Fam. LUCINIDÆ.

## 57. \*LUCINA CONCENTRICA.

*Lucina concentrica*, A. Adams & Angas, Proc. Zool. Soc. 1863, p. 426, pl. XXXVII. f. 19.

Station. Deep water.

*Hab.* St. Vincent's Gulf.

## 58. \*LUCINA (CYCLAS) CUMINGI.

*Lucina (Cyclas) cumingi*, A. Ad. & Angas, P. Z. S. 1863, p. 426, pl. XXXVII. f. 20.

Station. Deep water.

*Hab.* St. Vincent's Gulf.

A large handsome species, in which the divaricating ridges are acute and imbricate upwards, and are wider apart than in most of this group, which is the *Cyclas* of Klein.

## 59. LORIPES ICTERICA.

*Lucina icterica*, Reeve, Conch. Icon.

Station. In sandy bays.

*Hab.* St. Vincent's Gulf; Hobson's Bay, Victoria.

A small white shell, having the ligament in an oblique internal pit, as in the British *L. leucoma*.

## Fam. LASEIDÆ.

## 60. PYTHINA DESHAYESI.

*Lucina deshayesi*, D'Orb.

*Station.* Deep water.

*Hab.* Rapid Bay, St. Vincent's Gulf.

A very beautiful little shell, in which the ribs divaricate from the centre of the valves, and form erect vaulted scales at the sides, leaving the umbones smooth.

## Fam. SOLEMYIDÆ.

## 61. SOLEMYA AUSTRALIS.

*Solemya australis*, Lam. Anim. sans Vert. vi. p. 124.

*Station.* In sandy mud, 2 to 4 fathoms.

*Hab.* St. Vincent's Gulf.

This is the largest species of the genus. Its delicate shells, containing the animal, are frequently cast ashore at Holdfast Bay and on the semaphore beach after heavy gales.

## Fam. ASTARTIDÆ.

## 62. CRASSATELLA CASTANEA.

*Crassatella castanea*, Reeve, Proc. Zool. Soc. 1842, p. 42.

*Station.* Deep water.

*Hab.* Port Lincoln.

This magnificent species is the largest *Crassatella* known. One of my specimens measures  $4\frac{1}{2}$  inches in length.

## 63. MYTILICARDIA CRASSICOSTATA.

*Cardita crassicostata*, Lam. Anim. sans Vert. (Desh. edit.) p. 430.

*Cardita tridacnoïdes*, Menke.

*Station.* Amongst rocks and stones beyond tide-mark.

*Hab.* Rapid and Aldinga Bays; St. Vincent's Gulf.

This beautiful shell, which varies considerably in growth and distribution of colour, is also met with in the Philippines. Occasionally specimens occur of a bright rose-colour, or saffron-yellow.

## 64. \*MYTILICARDIA (THECALIA) MACROTHECA.

*Thecalia macrotheca*, A. Ad. & Angas, P. Z. S. 1864, p. 39.

*Station.* Under stones at low tide.

*Hab.* Rapid Bay.

## Fam. MYTILIDÆ.

## 65. MYTILUS (AULACOMYA) HIRSUTUS.

*Mytilus hirsutus*, Lam. Anim. sans Vert. vii. p. 38.

*Station.* Adhering to rocks and stones at low water.

*Hab.* Head of Spencer's Gulf.

This hairy species is also found in New South Wales and New Zealand.



## 66. MYTILUS (AULACOMYA) MENKEANUS.

*Mytilus menkeanus*, Phil. ; Dunker, MS. in Mus. Cuming.

*Station.* Adhering to stones in clusters.

*Hab.* St. Vincent's and Spencer's Gulfs.

## 67. MYTILUS (AULACOMYA) ROSTRATUS.

*Mytilus rostratus*, Dunker, MS. Mus. Cuming.

*Station.* In clusters on rocks.

*Hab.* Encounter and Guichen Bays.

## 68. \*CRENELLA PAULUCCIÆ.

*Crenella paulucciæ*, Crosse, Journ. de Conch. 1863, p. 89, pl. 1. f. 8.

*Station.* Nestling amongst *Zostera* on sandy flats.

*Hab.* Head of Spencer's Gulf and St. Vincent's Gulf.

Varying in colour from bright green to orange.

## 69. CRENELLA (MODIOLARIA) CUMINGIANA.

*Modiola cumingiana*, Dunker, MS. Mus. Cuming.

*Station.* 1 to 3 fathoms, amongst *Zostera*.

*Hab.* St. Vincent's Gulf.

## 70. PERNA AUSTRALIS.

*Modiola australis*, Gray, Appendix to King's Voyage.

*Station.* Abundant at the roots of seaweed, and on *Zostera* flats in moderately shallow water.

*Hab.* St. Vincent's Gulf.

A large species somewhat resembling in colour *M. tulipa*, Lam., from the West Indies ; but of a more contracted growth on the posterior side, and convexly dilated anteriorly.

## 71. PERNA FLAVIDA.

*Volsella flavida*, Dunker, P. Z. S. 1856, p. 364.

*Modiola flavida*, Reeve, Conch. Icon. (*Modiola*) pl. 10. f. 77.

*Station.* With *P. australis*.

*Hab.* St. Vincent's Gulf ; Bay of Manilla (*Cuming*).

## Fam. VULSELLIDÆ.

## 72. VULSELLA LIMÆFORMIS.

*Vulsella limæformis*, Reeve, Conch. Icon. (*Vulsella*) pl. 2. f. 10 a & b.

*Station.* Imbedded in sponges.

*Hab.* St. Vincent's Gulf.

## 73. VULSELLA RUDIS.

*Vulsella rudis*, Reeve, Conch. Icon. (*Vulsella*) pl. 2. f. 12.

*Station.* In sponge.

*Hab.* Port Lincoln.

## Fam. AVICULIDÆ.

## 74. AVICULA SCALPTA.

*Avicula scalpta*, Reeve, Conch. Icon. pl. 11. f. 38.

*Station.* Attached to bunches of Zoophytes and Algæ.

*Hab.* St. Vincent's Gulf; Guichen Bay; Tasmania.

## 75. AVICULA PULCHELLA.

*Avicula pulchella*, Reeve, Conch. Icon. pl. 8. f. 22.

*Station.* Same as preceding.

*Hab.* St. Vincent's Gulf; Port Phillip.

## 76. AVICULA RUTILA.

*Avicula rutila*, Reeve, Conch. Icon. pl. 8. f. 19.

*Station.* Same as preceding.

*Hab.* St. Vincent's Gulf.

## 77. AVICULA PUNCTULATA.

*Avicula punctulata*, Reeve, Conch. Icon. pl. 12. f. 42.

*Station.* Same as preceding.

*Hab.* Port Lincoln and St. Vincent's Gulf.

All the foregoing are delicate, subtransparent species, varying considerably in colour and markings.

## 78. MARGARITIFERA MARGARITIFERA.

*Mytilus margaritiferus*, Linn. Syst. Nat. p. 1153.

*Margarita sinensis*, Leach.

*Avicula meleagrina*, De Blainv.

*A. radiata*, Leach.

*Station.* Deep water.

*Hab.* Spencer's Gulf; Coffin's Bay; and the Great Australian Bight.

This is the "Pearl Oyster," a species generally distributed throughout the Indo-Pacific marine molluscan province.

## 79. MALLEUS ALBUS.

*Malleus albus*, Lam. Anim. sans Vert. vii. p. 91.

*Ostrea malleus-albus*, Chemn.

Var. *Malleus normalis*, Lam.

*Station.* On oyster-banks, buried in the sand, in from 2 to 5 fathoms water.

*Hab.* Port Lincoln.

This species occurs also at Moreton Bay and the Philippines.

## 80. MALLEUS REGULUS.

*Ostrea regula*, Forsk. Desc. Anim. p. 124.

*O. ocrea*, Martini.

*Vexillum moluccanum*, Chemn.

*Ostrea vulsellæ*, Gmel.

*Malleus vulsellatus*, Lam.

*Station.* Same as preceding.

*Hab.* Head of Spencer's Gulf.

81. PINNA ZEYLANICA.

*Pinna zeylanica*, Gray, Appendix to Dieffenbach's Travels.

*Station.* Buried in sandy mud on flats in shallow water.

*Hab.* St. Vincent's Gulf; Kangaroo Island; New Zealand; Moreton Bay; Shark's Bay.

Fam. ARCADEÆ.

82. BARBATIA LIMA.

*Arca lima*, Reeve, Proc. Zool. Soc. 1844.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf; Philippines (*Cuming*).

83. BARBATIA RADULA.

*Barbatia radula*, A. Ad.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

Common in Port Phillip.

84. \*BARBATIA (ACAR) LAMINATA.

*Barbatia (Acar) laminata*, Angas, MS.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

In this species (which belongs to the same group as *A. divaricata*, Sow., and *A. gradata*, Brod. & Sow.) the sculpture consists of regular layers of frilled laminæ, overlapping each other like tiles on a roof.

85. AXINIA RADIANS.

*Pectunculus radians*, Lam. Anim. sans Vert. (Desh. edit.) vi. p. 495.

*Station.* Deep water.

*Hab.* Port Lincoln; Bass's Straits.

86. AXINIA OBLIQUA.

*Pectunculus obliquus*, Reeve, P. Z. S. 1843.

*Station.* Deep water.

*Hab.* St. Vincent's and Spencer's Gulfs; Swan River and King George's Sound.

Fam. LEDIDÆ.

87. LEDA CRASSA.

*Nucula crassa*, Hinds, P. Z. S. 1843, p. 99.

*Station.* Deep water.

*Hab.* St. Vincent's Gulf.

A very fine species, of great rarity.

## Fam. PECTINIDÆ.

## 88. PECTEN AUSTRALIS.

*Pecten australis*, Sow. Thesaurus Conch. i. p. 76, pl. 19. f. 210 & 220.

? *P. asperrimus*, Lam.

*Station.* On sandy banks amongst ooze, and in sponge, 2 to 5 fathoms.

*Hab.* St. Vincent's and Spencer's Gulfs; at Hardwick Bay, large; also King George's Sound and Swan River, Western Australia.

Like many of the species of this genus, *P. australis* is very variable in colour: dark violet-brown or orange-rose are its prevailing tints, but occasionally specimens are found of a bright scarlet, and also of a peculiar vivid lemon-yellow. The large specimens from Hardwick Bay are curiously like *P. asperrimus*, Lam.; but after comparing a series I should hardly like to separate them, the tripartite character of the ribs being visible in all.

## 89. PECTEN (CHLAMYS) BIFRONS.

*Pecten bifrons*, Lam. Anim. sans Vert. (Desh. edit.) vii. p. 131.

*Station.* Deep water, on oyster-banks.

*Hab.* Port Lincoln, Port Adelaide, and Kangaroo Island.

This fine species is more or less of a lilac-bloom colour, ribbed with dark purple or rose, whilst the interior is universally of an intense purple throughout. The granular shagreen character of the valves is peculiar.

## 90. VOLA LATICOSTATA.

*Pecten laticostatus*, Gray, Yates's 'New Zealand,' Appendix.

*Station.* In deep sheltered bays.

*Hab.* Port Lincoln.

This species is without doubt the *P. laticostatus* of Gray, from New Zealand. The ribs of the right valve are broad, flatly convex, and smooth, as in *P. medius*, Lam., to which it is closely allied.

## Fam. RADULIDÆ.

## 91. RADULA LIMA.

*Ostrea lima*, Linn.

*Lima squamosa*, Lam.; Sow. Thes. Conch. pl. 21. f. 17, 18.

*Station.* In sponges and clefts of rocks, deep water.

*Hab.* Rapid Bay.

## 92. RADULA (MANTELLUM) ANGULATA.

*Lima angulata*, Sow. Thesaurus Conch. p. 86, pl. 22. f. 39, 40.

*Station.* Deep water.

*Hab.* Port Lincoln.

## 93. RADULA (LIMATULA) BULLATA.

*Lima bullata*, Sow. Genera of Shells, f. 3.

*Ostrea bullata*, Born.

*Lima fragilis* (var. *b*), Lam.

*Station.* Deep water, and under rocks and stones at low spring tides.

*Hab.* St. Vincent's Gulf; Port Jackson, New South Wales.

Fam. SPONDYLIDÆ.

94. SPONDYLUS TENELLUS?

*Spondylus tenellus*, Reeve, Conch. Icon. pl. 18. sp. 67.

*Station.* Adhering to dead shells and stones in deep water.

*Hab.* Rapid Bay, South Australia.

This pretty red-tinted *Spnodylus* comes so near to the *S. tenellus* of Reeve, from the Pacific, that I am inclined to regard it as belonging to that species.

Fam. OSTREIDÆ.

95. OSTREA EDULIS?

*Ostrea edulis*, Linn. Syst. Nat. p. 1148.

*Station.* On mud-banks in moderately deep water.

*Hab.* St. Vincent's and Spencer's Gulfs.

This species, which is procured in abundance for the Adelaide market, approaches so closely to the European *O. edulis* as scarcely to be distinguished from it.

96. OSTREA CUCULLATA.

*Ostrea cucullata*, Born, Mus. Cæs. Vindob.

*O. mordax*, Gould's 'Otia.'

*Station.* On rocks between tide-marks.

*Hab.* Common everywhere on rocky shores, from King George's Sound to New South Wales. It is excellent eating and of a delicious flavour.

BRACHIOPODA.

Fam. TEREBRATULIDÆ.

97. WALDHEIMIA FLAVESCENS.

*Terebratula flavescens*, Lam. Anim. sans Vert. vii. p. 330.

*T. dentata*, Lam.

*T. australis*, Quoy.

*T. recurva*, Quoy.

*Station.* Attached to the under surface of shelving rocks partly exposed at low spring-tides.

*Hab.* St. Vincent's Gulf; South Australia.

This species is also found in comparative abundance in some parts of Sydney Harbour, New South Wales.

5. DESCRIPTIONS OF SEVEN NEW SPECIES OF THE GENUS VIVIPARA, LINK. BY GEORGE, RITTER V. FRAUENFELD.

When passing some time at London in the summer of 1865, I found among the last acquisitions from Africa and Eastern India, made by the late Mr. Hugh Cuming for his splendid collection, some new species of *Paludina*, which, with wonted kindness, the most regretted possessor entrusted to me for description and publication. These are—

1. *VIVIPARA SCLATERI*. *Testa obtuso-conica, olivacea, imperforata, anfractibus quinque, modice convexis; costis duabus paribus intervallis distantibus instructis, costa tertia suturali; anfractibus ultimis supra angulum aperturæ superiorem obtusioribus; apertura altitudine testæ dimidio brevior, ovali, parum producta, intus cærulescente.*

*Obs.* From Japan, of a shape intermediate between *V. ingallsiana*, Lea, and *V. oxytropis*, Bus. I have named this species in honour of Mr. P. L. Sclater, to whose kindness I owe so many obligations.

2. *VIVIPARA SIAMENSIS*. *Testa depressa, solida, acute conica, late umbilicata, pallide olivacea, margine anfractuum superiore subalbescente, inferiore anfractus tertii et quarti purpureo-fusco, parum nitente; anfractibus quinque, valide convexis, subdivaricatis, sutura profunda; apertura valide dextrorsum directa, magna, ampla, margine valide incrassato, intus alba; anfractibus obscure et interrupte spiraliter striatis: operculo tenui, pallide fusco, nucleo excentrico.*

*Obs.* The only species with equally thickened peristoma is, as far as I know, *V. columna*, a fossil form lately described by Von Martens.

3. *VIVIPARA HELICIFORMIS*. *Testa subglobosa, umbilico angusto profundo, saturate olivacea, parum nitente; anfractibus quinque (?), parum convexis, sutura impressa; anfractu ultimo extra angulum aperturæ superiorem declinato, ceteris lineis punctatis subtilissime spiraliter striatis; apertura mediocri, pyriformi, intus sordide cærulea, margine nigro nitido.*

*Obs.* From Central Africa; most nearly related to *V. æthiops*, Reeve.

4. *VIVIPARA PUNCTATA*. *Testa conica, tenui, umbilico magno amplo, olivacea, subtilissime flavo punctata; anfractibus quinque, subconvexis, supra subcostatis, lineis creberrimis undulatis obscure striatis, sutura impressa; apertura modice ovali, intus fusciscente, diaphana, maculis flavis extraneis intus opacis, margine, subtili, acuto, nigro marginato.*

*Hab.* Western Africa.

5. *VIVIPARA JEFFREYSII*. *Testa turbinata, subsolida, olivacea subnitente, anfractibus superis purpureo-pruinosis; umbilico profundo, amplo; anfractibus quinque et dimidio, ad suturam*

*profundam impressam convexis divaricatis, deinde plane declivibus, ultimo medio subimpresso sicuti in V. sudleri, infra subangulato; apertura ovali, cærulescente, margine acuto: operculo concavo, castaneo.*

*Obs.* Through Dr. Kirk, from Lake Nyassa. I have named it as a mark of respect to the author of the newest publication concerning British conchology. I do not know any recent species of *Paludina* with which it could be parallelized.

6. *VIVIPARA CAPILLATA.* *Testa conica, tenui, ampliter umbilicata, olivacea, parum nitente; anfractibus quinque et dimidio, supra obliquis, angulariter subplane declivibus, sutura parum impressa, anfractu ultimo infra geniculato, costis seriebus tribus intermediis paribus intervallis distantibus pilis brevissimis ornatis; apertura mediocri, orbiculari, intus albescente, margine acuto, nigro.*

*Obs.* Through Dr. Kirk, from Lake Nyassa.

7. *VIVIPARA ROBERTSONI.* *Testa acuta, conica, solidiuscula, umbilico amplo, callo circumducto, olivacea vel eburnea; anfractibus sex, supra modice convexis, obliquis, sutura haud impressa, anfractu ultimo infra geniculato; apertura magna, rotundo-ovali, intus albescente, plerumque maculis dilutis fuscis picta, margine acuto, præcipue ad labium internum nigro.*

*Obs.* Through Dr. Kirk, from Lake Nyassa. I have given to this species the name of Mr. David Robertson of Glasgow, in acknowledgment of the very effectual assistance which he was pleased to lend me in my deep-sea dredging-operations at Great Cumbray.

6. ON A LEECH (TROCHETA SUBVIRIDIS, DUTROCH.) FOUND IN THE VISCERA OF A MOLUCCAN DEER (CERVUS MOLUCCENSIS, MÜLLER). BY JAMES MURIE, M.D., PROSECTOR TO THE ZOOLOGICAL SOCIETY.

In the month of July of this year, while a post mortem examination was being made of a Moluccan Deer at the Society's Gardens, there was found among the viscera a Leech of such dimensions as to excite the astonishment of the various parties present at the operation. Unfortunately the viscera were somewhat disturbed and confused when the Leech was first observed, so that it might be rash to say whether it was attached to the stomach, the intestines, or to the organs of the chest.

At the time this specimen of Leech was obtained I myself was out of town; but as to the credibility of those present I need only mention Mr. A. D. Bartlett's name as an authoritative witness, to allay suspicion of error or deception.

When first shown me I was surprised at its large dimensions, but for the moment was inclined to believe it an unusually large specimen of the Horse-leech (*Hæmopsis sanguisuga*, Sav.), which might have

been accidentally swallowed by the Deer while drinking water. My attention was further called more fully to ascertain its specific identity by its recalling to my mind a notice of a large Leech found in the neighbourhood of the Regent's Park by Mr. Hoffmann, and described by Dr. Gray as being entirely new to the British fauna (see Proc. Zool. Soc. 1850, p. 52).

With the assistance of Dr. Baird at the British Museum, I was enabled by comparison to ascertain that this Leech which had been found in the Deer was no other than the species commented on by Dr. Gray, namely the *Trocheta subviridis* (Dutroch.) referred to by Lamarck in An. sans Vert. vol. v. 2nd edit. p. 523, and also described and figured by De Blainville in the Dict. de Scien. Nat. xvii. 246, lviii. 559, Atlas pl. *Hirud.* fig. 6. Besides, in the monograph of the family by M. Moquin-Tandon (p. 309, pl. 4), there is a detailed account and excellent figures of the external appearance and internal anatomy of this species of Leech, where 8 to 12 or 13 centimètres is given as the size it occasionally reaches, and it is said not to be terrestrial, as the author kept one fifteen days in water in good health.

The specimen first found by Mr. Hoffmann near or in the Regent's Park now forms part of the National Collection, and is referred to in the 'Catalogue of British Non-parasitical Worms,' 1865, p. 45. It is there stated to have been 7 inches long when in the fresh condition, and now, after being preserved in spirits, as much as 6 inches in length with a breadth of half an inch.

The distinctive features of *Trocheta subviridis* are its great size, its large shield-like sucker, the uniformity and narrowness of the rings, and the tail-sucker being upon the ventral aspect—with all of which our present specimen agrees. It also differs from *Hirudo medicinalis* and *Hæmopsis sanguisuga* in the form of its jaws, and in having but eight eyes, whereas these have ten. The eyes I could not detect; but, according to M. Tandon, they are occasionally absent or with difficulty made out.

Obtaining this second specimen of a large and rare Leech in the same vicinity as the last, it might be looked upon as conclusive that it was an animal indigenous to Britain, as Dr. Gray has surmised, had I not other facts to detract from this supposition.

It may either be said that the specimen obtained from the Deer found its way thither by being swallowed among the food or water, as the animal partook of these in the Gardens; and this fact would strengthen the belief of its British habitat; or, in opposition to this, it may be suggested that the ova, or Leech while young, may have been taken into the viscera of the Deer in its own native country previously to being shipped for England.

Dr. Baird holds that this last opinion is not tenable, upon the grounds that in a voyage of several months it would be sure to die itself or pass through the Deer. But in contradiction to his judgment, Mr. Bartlett relates to me the case of a similar large Leech having been obtained from a Yak (*Bos grunniens*, Linn.) on board ship, and before the animal had set foot on these shores. This oc-



curred in a female Yak that afterwards formed part of the Collection at Knowsley of the late Earl of Derby. The man in charge of the Yak, and who brought it to England, told Mr. Bartlett that for several weeks in the first part of the voyage the animal seemed to lose flesh fast, and altogether have the appearance of a wasting and decline. One afternoon while watching it, he was surprised to see a large Leech descend one of the nostrils and, curling itself round, proceed to ascend the other, when he seized it and withdrew it from the Yak's nose. He brought the Leech with him to England, and showed it to Mr. Bartlett, who supposes it to have been not much less than 9 inches long; but, not suspecting it to be an animal of special interest, he did not preserve the specimen. After the Leech had been abstracted from the Yak's nose, the latter animal seemed to thrive well, and it was afterwards landed in England in excellent condition.

Since then, namely in June last, and soon after three Yaks had arrived at the Society's Gardens belonging to Mr. Stone, there was found in the water-trough where the newly imported Yaks drank, another large Leech, the same which I now exhibit, and which appears also to be a specimen of *Trocheta subviridis*. Mr. Bartlett immediately suspected this must have come from one of the new animals; and his thoughts were so far verified, that Mr. Stone informed him that Leeches of a similar character had been discharged or obtained from the Yaks during the voyage.

Although from what I have said it cannot be affirmed with certainty that this Leech *does not* belong to the British fauna, yet, with this somewhat contradictory testimony before us, it may be as well to suspend judgment until at least more accurate evidence is given, whether it has not thus casually been imported to these islands.

My own belief, from the statements made, inclines me to the idea of its importation by the medium of some large animal—especially as I myself on one occasion took several small Leeches from the posterior nares of a large Hippopotamus killed by our party in the river Aye, an upper tributary of the White Nile—and also as several authorities have mentioned the occasional occurrence of Leeches in the nasal passages of other large animals.

Apart from the decision of this point, it still remains undecided whether *Trocheta subviridis* is to be regarded as belonging to Britain, or whether it has an Asiatic habitat\*. M. Moquin-Tandon, p. 309, records it as being found in several places in France, as the district of the Loire, Toulouse, Dordogne, &c., also in the environs of Algiers, but he does not mention its geographical distribution to the East Indies.

Respecting the name of this genus, in an article in the October number of the 'Natural History Review,' 1865, reviewing Dr. John-

\* In the discussion following the reading of this paper, Dr. Sclater stated that the Moluccan Deer had not been imported direct from the East, but had been received from the Zoological Society of Amsterdam. If so, it more readily accounts for this Continental species of Leech being now found in England, and, moreover, adds to the probability of a similar Eastern importation.

son's 'Catalogue of Worms in the British Museum,' already referred to, fault is found that *Trocheta* is given therein as the generic term, whereas the writer considers that *Trochetia* is proper. But the critic himself is in reality at fault, as I find that Dutrochet named the genus *Trocheta* in his paper, Bull. Phil. 1817, while Lamarck a year later alters this to *Trochetia*, An. sans Vert. 1818.

7. SUR L'HABITAT DU HYALONEMA LUSITANICUM.  
PAR J. V. BARBOZA DU BOCAGE, F. M. Z. S.

A l'époque où j'annonçais la découverte dans nos mers d'une espèce nouvelle du genre Hyalonema, *H. lusitanicum* (P. Z. S. 1864, p. 265), je ne possédais qu'un seul spécimen de cette curieuse espèce. J'étais bien sûr que cet individu avait été réellement trouvé dans les mers du Portugal, mais je ne me dissimulais pas que pour faire partager complètement ma conviction à cet égard, il me faudrait obtenir d'autres spécimens.

J'ai donc redoublé d'instances auprès de mes correspondants à Setubal pour qu'on fît de nouvelles recherches, et mes efforts ont été couronnés d'un heureux résultat.

Aujourd'hui le Muséum de Lisbonne possède deux autres spécimens complets de *H. lusitanicum*, outre un grand nombre de filaments isolés, appartenant à 3 ou 4 individus. Tous ces objets m'ont été envoyés de Setubal dans des conditions telles qu'elles ne permettent pas le moindre doute quant à l'authenticité de leur provenance.

Des deux individus complets, l'un est à peine long de 47 centimètres, mais l'autre est un exemplaire magnifique, parfaitement conservé, et d'à peu près 80 centimètres. Le *corium polypigerum* de celui-ci recouvre complètement l'axis, sans aucune solution de continuité, depuis l'une de ses extrémités jusqu'aux  $\frac{2}{5}$  de sa longueur.

J'ai reçu le premier individu en mai de 1864 de M. Gamitto, à qui je devais déjà le spécimen type de ma description; l'autre m'est parvenu, ainsi qu'un gros paquet de filaments isolés, en Septembre de 1864 par un autre de mes correspondants de Setubal, M. Brito.

Maintenant j'espère que la nouvelle espèce de *Hyalonema* restera définitivement acquise à la faune du Portugal.

Elle ne me paraît pas d'une grande rareté dans nos mers. S'il n'est pas facile d'en obtenir autant d'exemplaires qu'on puisse désirer, c'est que nos pêcheurs, très-superstitieux comme ceux de tous les pays, croient d'un mauvais présage pour leurs pêches la prise de ces produits singuliers, qu'ils connaissent fort bien et qu'ils appellent avec beaucoup de propriété *cravaches de la mer* (en portugais, *chicotes do mar*). Quand ils les trouvent dans les appareils dont ils se servent pour la pêche des squales, ils s'empressent à les rejeter à la mer, après les avoir mis en pièces.

Les zoologistes ne sont pas d'accord sur les véritables producteurs des filaments hyalins dont se compose l'axis des Hyalonemas. Quelques uns regardent comme tels les polypes, tandis que pour d'autres, en plus grand nombre, les polypes ne sont que des parasites,

et certaines éponges, dont l'axis de quelques spécimens du Japon se présente couvert par places, les modestes fabricants de ces admirables produits.

Quoique l'hypothèse du parasitisme des polypes soit aujourd'hui en faveur, soutenue qu'elle est par de grandes autorités scientifiques, les résultats de mes observations sur les spécimens du Portugal me semblent plus favorables à l'hypothèse contraire.

Sans vouloir m'engager pour le moment dans une discussion qui exige de grands développements, je demande la permission d'énoncer quelques faits bien constatés, et qui me semblent de quelque valeur.

1°. La cohabitation ou l'existence simultanée sur le même axis de polypes et d'éponges, qu'on a remarquée sur quelques spécimens du Japon, n'a pas lieu sur aucun des exemplaires du Portugal.

2°. Chez ces derniers le *corium polypigerum* enveloppe l'axis d'une manière uniforme; il recouvre parfaitement l'une des extrémités de l'axis, la plus étroite, et de là il s'étend sans aucune interruption jusqu'aux  $\frac{2}{5}$  ou les  $\frac{3}{5}$  de la longueur totale. Les polypes placés sur l'extrémité de l'axis sont les plus petits de tous.

3°. Le *corium polypigerum* et les polypes sont formés de plusieurs tissus en couches superposées, dans lesquels on trouve une quantité très-considérable de spicules silicieux, dont les caractères morphologiques varient pour chaque couche.

4°. L'aspect granuleux, chagriné, que présente la surface extérieure du *corium* et des polypes n'est pas le résultat d'une simple incrustation de débris de sable (comme on l'affirme pour les individus du Japon), mais il est dû à la présence d'un nombre infini de spicules réguliers, en forme de massue et hérissés de pointes. Ces spicules font partie intégrante de la couche la plus extérieure ou tégumentaire.

5°. Chaque polype est soutenu par une charpente silicieuse de spicules filiformes, disposés longitudinalement et à intervalles égaux sur la paroi interne de la cavité du corps.

## 8. DESCRIPTIONS OF FOUR NEW SPECIES OF BIRDS FROM EASTERN ASIA. By JOHN GOULD, F.R.S., ETC.

### NECTARINIA (ARACHNECHTHRA) INSIGNIS, Gould.

Crown of the head deep shining green; shoulders, wing-coverts, rump, and upper tail-coverts shining green, tinged with purple; a narrow line down each side of the throat, breast, and abdomen rich glossy blue, tinged with purple; chin and centre of the throat rich purplish red; on each side of the breast a tuft of rich gamboge-yellow feathers; nape and back deep velvety black; primaries and secondaries glossy brownish black; tail rounded at the end, of a deep bluish black, some of the outer feathers narrowly margined externally with shining green; lower part of the abdomen, thighs, and under tail-coverts deep black; flanks smoke-grey; bill and feet black.

Total length  $14\frac{3}{4}$  inches, bill  $1\frac{3}{16}$ , wing  $2\frac{3}{8}$ , tail  $2\frac{1}{8}$ , tarsi  $\frac{5}{8}$ .

*Hab.* Penang.

*Remark.* The fine adult male of this beautiful species now in my possession formed part of a collection of birds made at Penang. In size it is intermediate between *Nectarinia (Arachnechthra) lotenia* and *N. (A.) asiatica*, from both of which it differs in the green colouring of its crown and in the beautiful purple tint of the breast and abdomen.

#### OTOCOMPSA FUSCICAUDATA, Gould.

Forehead, crown, crest, occiput, and sides of the head brownish black; below the posterior portion of the eye a small tuft of bright blood-red feathers, and below this a large oval-shaped spot of white bordered with black; upper surface of the body and wings light olivaceous brown; tail uniform fuscous; on each side of the neck an irregular crescentic mark of blackish brown, the two nearly meeting on the centre of the chest; chin and throat white; abdomen and under surface of the shoulder creamy-white, washed with light olivaceous brown on the flanks; under tail-coverts scarlet; bill and feet brownish black.

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

*Hab.* The southern portion of the peninsula of India.

*Remark.* This species, which is very common in many parts of the Madras Presidency, appears to have been hitherto undescribed. It differs from the *O. emeria* of Bengal, the *O. jocosa* of China, and all the other species of the genus with which I am acquainted in the uniform colouring of the tail.

I had been led to believe that it might be identical with the bird of this form described and figured in Sonnerat's 'Voyage to China;' but I find that this is not the case, the bird there represented and described having the tail-feathers conspicuously tipped with white.

#### ENICURUS GUTTATUS, Gould.

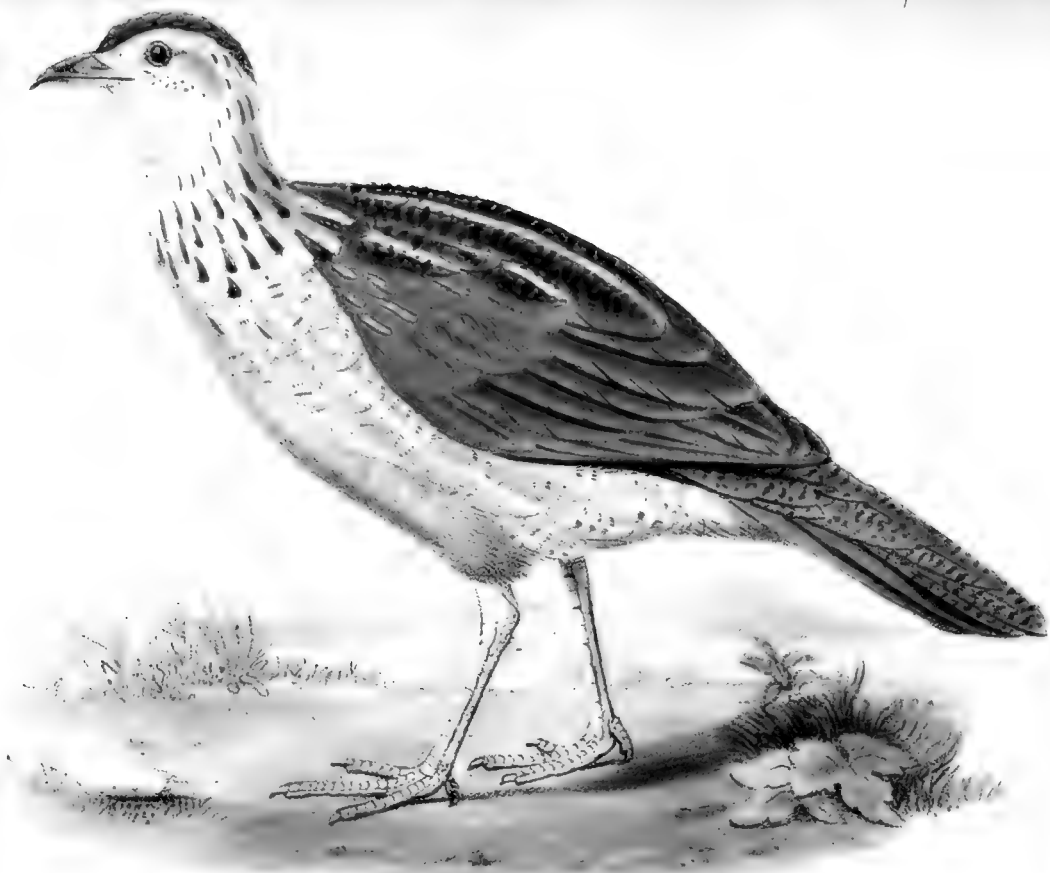
On the forehead a large spot of white; head, neck, throat, and breast deep black; at the nape and down the sides of the neck a series of silky white feathers, narrowly bordered with black; upper half of the back black, with a small round spot of white at the tip of each feather; lower half of the back and upper tail-coverts white; wings black, the tips of the greater coverts and the bases of the secondaries white, forming a band across the wing, innermost secondaries also tipped with white; primaries dark brown; two lateral tail-feathers white, the remainder black, tipped with white; lower half of the abdomen and under tail-coverts white; bill black; tarsi and toes fleshy-white.

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

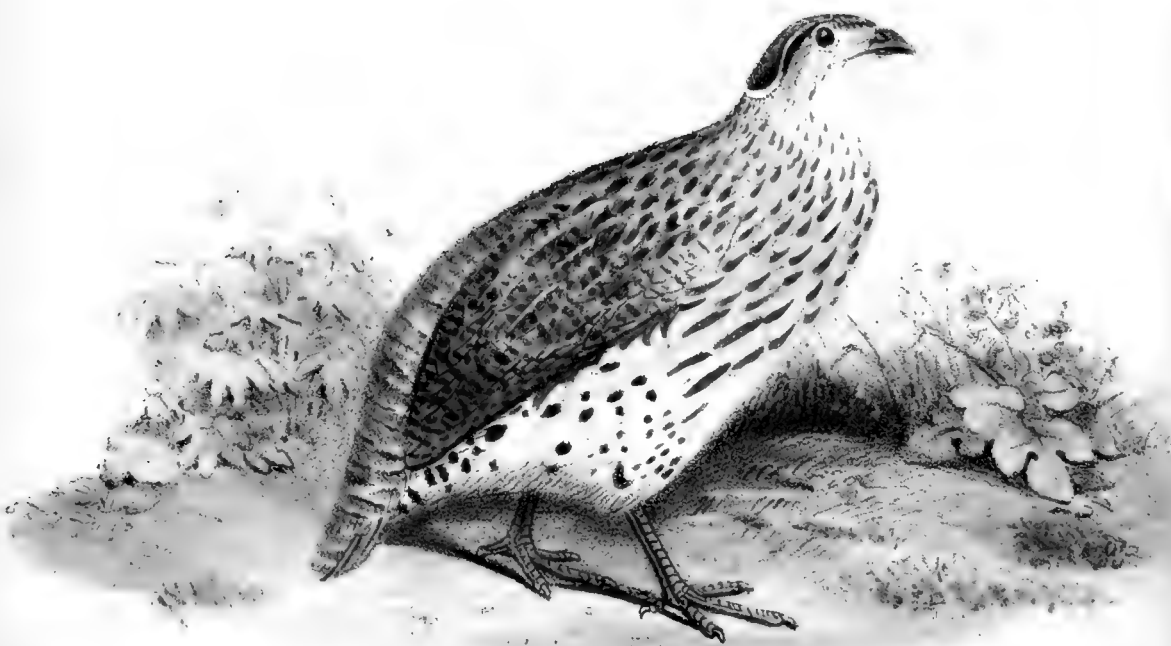
*Hab.* Sikim?

This species must not be confounded with the *Enicurus maculatus*, to which it is very nearly allied; for it differs from that bird in having a much shorter and smaller tail, in having a round spot instead of a crescentic mark of white at the tip of each of the feathers of the mantle, and in the spot on the forehead being of less size.





$\frac{1}{2}$



$\frac{1}{3}$

J. Jemms. del.

M. & N. Hanhart. sculp.

1 FRANCOLINUS GRANTII: 2. F. ICTEROPUS.

The *E. guttatus* may be regarded as the Eastern representative of the *E. maculatus* of the great Himalayan range.

ENICURUS SINENSIS, Gould.

Forehead to the middle of the crown, lower part of the back, rump, upper tail-coverts, tips of the greater wing-coverts, bases of the secondaries, two outer tail-feathers, the tips of all the others, the under coverts of the shoulder, the abdomen, and under tail-coverts pure white; primaries blackish brown; the remainder of the plumage deep black; bill black; feet fleshy-white.

Total length 11 inches, bill 1, wing  $4\frac{1}{4}$ , tail  $6\frac{1}{4}$ , tarsi  $1\frac{1}{4}$ .

*Hab.* China.

*Remark.* By some ornithologists this species may perhaps be considered too similar to the *E. leschenaulti* of Java to admit of its being recognized as distinct from that bird; and, while I admit that there are grounds for such a supposition, I may state that only half the crown is white in the China bird, while the entire crown is white in the Javan species.

9. ON A NEW SPECIES OF FRANCOLIN DISCOVERED BY MESSRS. SPEKE AND GRANT IN CENTRAL AFRICA. BY DR. G. HARTLAUB.

(Plate XXXIX.)

FRANCOLINUS GRANTII, sp. nov. (Plate XXXIX. fig. 1.)

*Pileo fusco; regione parotica rufescente; gutture et superciliis late albis; collo albido, maculis subtriquetris fusco-rufis pulchre torquato; dorsi plumis pallide rufescentibus, nigro transversim notatis vel subfasciatis, scapis conspicue albis; pectore et abdomine albidis subconcoloribus, plumis lateralibus intensius tinctis, obsolete subfasciolatis, scapis albidis; remigibus fusco-rufescentibus, pogoniis externis pallide rufis; rectricibus fuscis, pogoniis externis basin versus rufescentibus, mediis in fundo pallide fulvo nigricante vermiculatis et irregulariter subfasciatis; subcaudalibus isabellinis; pedibus pallidis; rostro corneo, apice et tomis pallidioribus.*

Long. circa  $12\frac{1}{2}$ " , rostr. a fr. 7" , al.  $5\frac{1}{2}$ " , caud.  $3\frac{1}{2}$ " , tars. 16" , dig. med. 14" .

*Hab.* Unyamuezi (Speke).

This new species, the unique specimen of which is now in the Bremen Museum, was collected by the much lamented traveller Capt. J. H. Speke in Unyamuezi. It comes very near to *F. pileatus* of Smith, but is much smaller and is besides differently coloured. In *F. pileatus* the dark brown-red spots of the neck are much more widely distributed, the whole upper part of the breast being covered by them; in *F. grantii* they only form a broad collar. The transverse black irregular markings of the dorsal feathers, so conspicuously visible in *F. grantii*, are entirely wanting in *F. pileatus*.

Mr. Selater, from whom we received the specimen, has included this species in his list of Capt. Speke's birds given in the Society's 'Proceedings' (1864, p. 113), without giving it a name.

I add a list of the known species of African Francolins.

1. *Francolinus rubricollis*, Rüpp. . . . . Mus. Brem.
2. — *nudicollis*, Gm. . . . . Mus. Brem.
3. — *swainsoni*, Sm. . . . . Mus. Brem.
4. — *cranchi*, Leach . . . . . Mus. Brem.
5. — *humboldtii*, Pet.
6. — *erkelii*, Rüpp. . . . . Mus. Brem.
7. — *clappertoni*, Childr. . . . . Mus. Brem.
8. — *rueppelli*, G. R. Gray (= *clappertoni*, Rüpp.).
9. — *levaillantii*, Val.
10. — *albigularis*, Gr.
11. — *bicalcaratus*, L. (= *adansoni*, Temm. = *albiscapus*, Reichb.) . . . . . Mus. Brem.
12. — *gariensis*, Sm. . . . . Mus. Brem.
13. — *natalensis*, A. Sm. . . . . Mus. Brem.
14. — *ahantensis*, Temm. . . . . Mus. Brem.
15. — *afer*, Temm. . . . . Mus. Brem.
16. — *capensis*, Gm. (= *clamator*, Tem.) Mus. Brem.
17. — *adpersus*, Waterh.
18. — *subtorquatus*, Sm.
19. — *pileatus*, Sm. . . . . Mus. Brem.
20. — *grantii*, Hartl. . . . . Mus. Brem.
21. — *icterorhynchus*, Heugl. . . . . Mus. Brem.
22. — *schlegelii*, Heugl. . . . . Mus. Brem.
23. — *gutturalis*, Rüpp.
24. — *lathamii*, Hartl. (*peii*, Temm.) . . Mus. Brem.
25. — *vulgaris*, St. . . . . Mus. Brem.

Of *F. icteropus*, Heugl. (described Journ. f. Orn. 1862, p. 412), only one female specimen was obtained. This specimen was unfortunately lost, but I am enabled to give a figure of it from Herr von Heuglin's original drawing. The following are von Heuglin's notes upon this species.

FRANCOLINUS ICTEROPUS, Heugl. (Pl. XXXIX. fig. 2.)

♀. *Similis F. erkelii, sed diversus; statura minore, cauda pro mole longiore; pedibus flavis; pileo nigricanti-fusco, subcristato, postice ferrugineo-limbato; stria supratemporalis utrinque nigra; colli postici plumis conspicue ferrugineis, striis duabus longitudinalibus albis; abdominis et hypochondriorum plumis utrinque fascia lata longitudinali castanea notatis, subcaudalibus fasciolatis; rectricibus fasciis alternantibus 12-16 isabellinis fuscisque; rostro fusco.*

Long. tot. 11", rostr. ab ang. or. 10", rostr. a fr. 9", al. 4" 9", caud. 3" 5", tars. 1" 4".

Lives in flocks of three to six on the southern slope of the moun-



tains of Semién, in Abyssinia, in an absolute altitude of from 10,000 to 11,000 feet. The only individual I ever shot was an adult female. It was in the month of February in 1863. I did not succeed in obtaining a male, these birds living exclusively near the margins of colossal precipices, into which, when once alarmed, they dive with a bewildering velocity. The drawing was made from the freshly killed bird, several specimens of *F. erhelii* and *F. gutturalis* being near me at the time.

10. DESCRIPTIONS OF SIX BUTTERFLIES NEW TO SCIENCE, BELONGING TO THE GENERA HETEROCHROA AND ROMALEOSOMA. BY ARTHUR G. BUTLER, F.Z.S., ASSISTANT, ZOOLOGICAL DEPARTMENT, BRITISH MUSEUM.

1. HETEROCHROA SALMONEUS. (Fig. 1, p. 668.)

Upperside—front wings, basal half rich brown, varied with black lines; apical portion deeper-coloured, with a black submarginal line along the outer margins; crossed beyond the middle by an irregular bright orange belt. Hind wings rich brown, crossed by five broad black bands converging towards the anal angle, the two nearest the base divided in the middle; a narrow submarginal black line along the outer margin.

Underside—front wings golden reddish brown, anterior margin and anal angle paler; crossed beyond the middle, from the anterior margin to the anal angle, by a broad, oblique, irregular silver band, broader above than below, interrupted by the nervures, which are fuscous, and by a faint ochreous streak crossing the space between the first and second median nervules; three bluish-silver spots, placed obliquely between the nervules and extending from near the apex to the central silver band; a submarginal row of silver spots between the nervules, close to the outer margin, the two lowest ones lunular; a large wedge-shaped bluish-silver patch margined with rufous at the base, interrupted by the median nervure and an oblique orange streak; a smaller curved elongate patch, intersected by a rufous lunular line, and margined with rufous, closing the cell; a small bluish-silver spot below the base of the third median nervule, a second oblong spot of the same colour below the middle of the same nervule, and a small silver lunule just above it margined on its inner edge with rufous. Posterior wings golden reddish brown, basal half and anterior margin paler; crossed by four irregular violaceous silvery bands, bordered with rufous, converging towards the anal angle and interior margin; the second from the base short, bounded by the median nervure, its upper half contiguous to the third band; the fourth somewhat dusky, broadest in the middle; a submarginal row of silver lunules intersected by a rufous line along the outer margin, between the nervures.

*Hab.* Venezuela.

Allied to *H. irmina*, Doubl. & Hewits. (from the Amazons), but

very distinct; we have, however, a variety of *H. irmina* that is almost identical with it in the colour and markings of the upperside, although very different beneath.

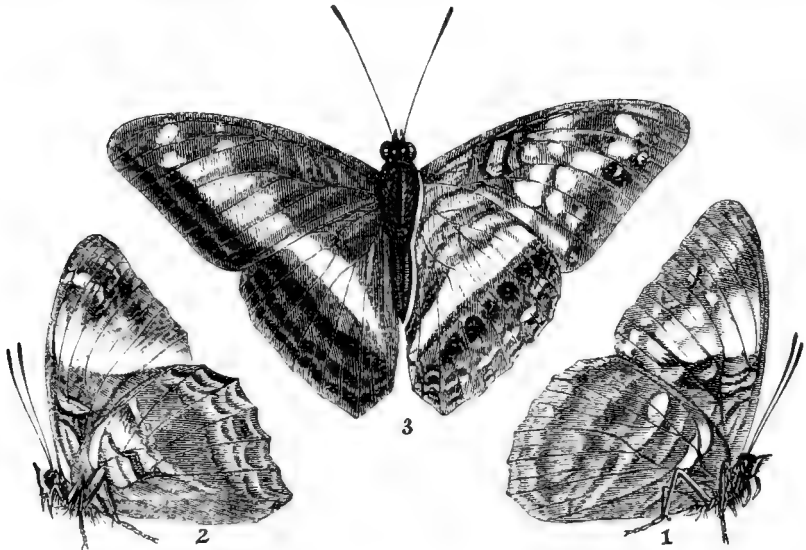


Fig. 1. *Heterochroa salmonæus*.  
 2. *H. boreas*.  
 3. *H. sichæus*.

## 2. HETEROCHROA BOREAS. (Fig. 2.)

Upperside—front wings rich brown, crossed beyond the middle by a broad oblique dull orange band; the two extremities curved, the upper end, which touches the anterior margin, outwardly, the lower and smaller end, at the anal angle, inwardly; the outer edge produced just before the middle, forming two irregular sinuations; a row of three orange spots between the nervures connecting this projection with the anterior margin near the apex, the lowest spots very minute; cell crossed by five oblique black lines, the two central ones continued below the median nervure and meeting each other; two indistinct, converging, submarginal black lines along the outer margin near the apex. Posterior wings rich brown, crossed by a paler brown band just beyond the middle, broad at the anterior margin, and gradually tapering towards the anal angle; outer margin pale, intersected by two submarginal darker bands.

Underside—front wings deep reddish brown, paler towards the outer margin; central band similar to that of the upperside, but roseate white, and interrupted by the nervures, which are red-brown, and by a faint brown streak intersecting the band between the upper disco-cellular and the second median nervules; a row of three white spots, the two upper ones tinged with roseate, the lower one with blue, meeting the projection of the central band, and connecting it with the anterior margin near the apex; the second spot divided into two, the third into three, by central brown lines; two dark

quadrate spots parallel to the outer margin, one between the disco-cellular, and the other between the first and second median nervules; a large triangular violaceous spot edged with brown at the base, intersected by the median nervure and an oblique brown line; a smaller curved elongate patch, enclosing a brown spot and margined with brown, at the end of the cell, and a third similar small indistinct spot beyond it; a small violaceous spot just below the middle of the median nervure. Posterior wings, basal half white glossed with violaceous, apical half pale reddish brown; crossed beyond the middle by a broad irregular oblique dark reddish brown band, broadest just above the middle, its outer edge following the direction of the outer margin; a submarginal row of white lunules edged with rufous between the nervules along the outer margin; cell crossed by three rufous lines, extending from the anterior margin to the median nervure, and closed by an oblong pale brown spot edged with rufous; interior margin pale rosy brown.

*Hab.* Bolivia.

Allied to *H. leucophthalma*, Latr. (Bogota).

### 3. *HETEROCHROA SICHÆUS*. (Fig. 3, p. 668.)

Upperside—front wings rich black-brown, the cell crossed by two oblique black lines, and closed by two similar lines; a submarginal black line near the outer margin; a broad bright orange band extending from the upper disco-cellular to the interior margin near the anal angle, wider above than below, dentated on its inner edge at the nervures, connected with the anterior margin by three orange spots extending from its outer upper angle to near the apex, and with the costal nervure by two orange spots from its inner upper angle. Posterior wings rich black-brown, crossed in the middle by a white band tapering from the anterior margin beyond the middle to near the anal angle; two submarginal pale brown lines parallel to the outer margin.

Underside—front wings red-brown, crossed beyond the middle by a broad irregular white band tinged with violaceous, broader above than below, divided through the centre by a fuscous line extending from the upper disco-cellular to the third median nervule, connected with the anterior margin by three white spots on either side between the nervules, and bordered on its outer edge by a row of pale blue-white spots edged outwardly with brown, extending from the apex to the anal angle; a white spot at the anal angle; a large triangular blue-white patch at the base, bordered with brown, and interrupted by the median nervure and by an oblique brown line; cell closed by an oblong blue-white patch margined with brown; two similar spots just beyond it and touching the central band; a small spot of the same colour below the cell. Posterior wings red-brown, crossed in the middle by a white band as above; basal half crossed by two violaceous bands bordered with brown, the outer one bounded by the median nervure; a marginal row of violaceous lunules between the nervures on the outer margin, and a similar row of larger lunules just above them; a deep-brown band, tapering to the anal angle and

intersected by the nervures, between the submarginal row of lunules and the central band.

*Hab.* Bogota.

Allied to *H. cocala*, Cramer (Brazil, &c.), but very distinct.

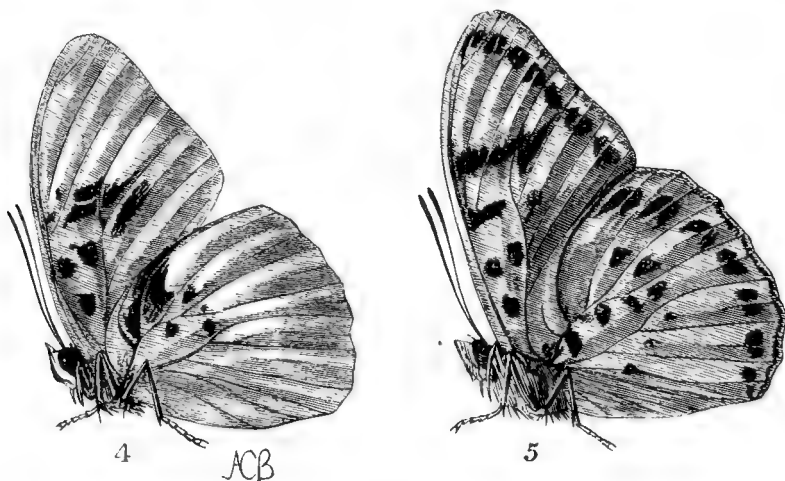


Fig. 4. *Romaleosoma phaethusa*.  
5. *R. gausape*.

#### 4. ROMALEOSOMA PHAËTHUSA. (Fig. 4.)

*Male.* Upperside—front wings blue-black, with anterior and interior margins of metallic golden green, crossed beyond the middle by a broad oblique pale orange band, which extends from just beyond the middle of the anterior to near the middle of the outer margin. Hind wings golden green, bluish at the base and hind margin; an indistinct blue-black band along the hind margin, and a small spot of the same colour at the end of the cell; inner margin fringed with long chocolate-brown hairs. Body brown, palpi orange.

Underside—front wings golden-green, crossed beyond the middle by a pale ochreous band; edge of front margin, cilia, and nervures orange; apex faintly tipped with white; three large black spots within the cell, one near the base, the other two placed obliquely just beyond it; cell closed by four obliquely placed black spots, the two upper ones small, circular, the lower ones oblong, irregular, the outer couple touching the ochreous band; a subtriangular black dash below these spots, also touching the band, with another blackish brown dash below it and between the second and third median nervures; hind margin somewhat grey. Hind wings golden-green, basal half deeper-coloured; an oblique, irregular, pale ochreous band crossing the middle of the wing from the middle of the anterior margin to near the anal angle, its outer edge gradually shading off towards the outer margin, bordered on its inner edge by three black dashes between the nervures; the first large, oblong, oblique, crossing the space between the costal nervure and first subcostal ner-

vule; the second small, nearly triangular, oblique, between the first and second subcostals; the third indistinct, very small, between the second and third subcostals; costal nervure margined outwardly with black, broadest near the base; two small oval black spots within the cell, one in the middle just below the subcostal nervure, the other at the end of the cell; inner margin rich golden-green. Body—thorax orange; legs pale ochreous.

*Hab.* Ashantee.

Near *R. ceres*, Fabr. (Ashantee); differs from it above in the more produced fore wings, and the absence of the submarginal band of spots near the outer margin; beneath, in its paler colouring, the absence of the submarginal spots of the outer margins, the indistinct black dash near the interior margin, the white dots at the outer terminations of the folds between the nervules, and the two black spots, one at the base and the other just above the median nervure within the cell.

##### 5. ROMALEOSOMA GAUSAPE. (Fig. 5, p. 670.)

*Male.* Upperside—front wings, apical half, front and hind margins broadly black, the nervures tinted with greenish; lower basal half and inner margin broadly golden green; an irregular orange band, faintly bordered on its inner side with greenish, crosses the wing obliquely from near the anterior margin, at two-thirds of the distance from the base, to near the outer margin just before the middle. Posterior wings golden green, apical portion inclining to cupreous, anal portion bluish green; outer margin broadly blue-black, getting paler towards the anal angle, and discovering black submarginal spots between the nervules; interior margin fringed with rich-chocolate hairs. Body brown; palpi orange.

Underside—front wings golden green, apical portion greenish ochreous; interior margin dusky, violaceous near the anal angle; three large spots within the cell; cell closed by an oblique oblong black dash; an oblique row of four black spots crossing the wing from the anterior margin, at nearly two-thirds the distance from the base, to near the outer margin just below the middle, the lowest spot somewhat hastate; a marginal row of eight black spots near the outer margin; a small indistinct black spot just below the end of the cell; cilia of outer margin brown. Posterior wings ochreous, basal half and outer margin greenish; anterior margin to near the apex broadly peach-red; inner margin broadly orange; three black spots within the cell, placed close to the subcostal nervure, one at the base, one in the middle, and one at the end of the cell; a minute circular black spot also within the cell and just below the central larger spot; a row of three large spots placed obliquely just beyond the cell and beneath the subcostal nervules, meeting a row of three minute circular black spots placed obliquely beneath the submedian nervules; a submarginal row of eight black spots near the outer margin. Body orange; legs ochreous.

*Hab.* West Africa.

Allied to *R. cyparissa*, Cramer (Ashantee); but differs from it

considerably beneath in the arrangement of the black spots on all the wings, in the further extension of the red patch of the lower wings, and the more brilliant colouring; above in the presence of a subapical orange band and different disposition of the green patches in the fore wing and the narrower black bordering to the hind wing.

#### 6. ROMALEOSOMA AGNES.

Upperside—front wings rich chocolate-brown, crossed beyond the middle by an irregular orange or white band; apex white; a violet patch on the inner margin beyond the middle. Hind wings chocolate-brown, with a central curved band of violet; inner margin pale brown.

Underside—front wings greenish or brownish olivaceous, crossed beyond the middle by an irregular white band; a submarginal row of seven very ill-defined greyish spots near the hind margin; apex white; nervures and extreme edges of wings ochreous; three small black spots within the cell. Hind wings the same as the front wings, but with a much narrower central white band, bounded below by the first median nervule.

*Hab.* Ashantee.

This species, from the similarity of the underside-markings, has been confused with *R. medon* of Linnæus, but I feel certain that it is distinct. It differs from *R. medon* in being shorter in the wings, less robust, the ground-colour of the underside uniform greenish or brownish olivaceous, the black spots much larger, and the bands longer. The upperside is quite different. It is figured in Drury's 'Illustrations of Natural History,' ii. pl. 15.

The description given by Linnæus of *R. medon* is so insufficient that, without Clerck's figure, it would suit about two-thirds of the insects in the genus; and as there have been several mistakes made concerning it, I give a fuller description of it below. Cramer has figured a variety of *R. ceres* as *R. medon* (pl. 205. f. C, D).

#### 7. ROMALEOSOMA MEDON, Linn. (Fig. 6, p. 673.)

*Female.* Upperside—front wings rich chocolate-brown, glossed with steel-blue; crossed beyond the middle by an irregular chrome-yellow band, narrower above than below, extending from just beyond the middle of the anterior to just beyond the middle of the outer margin; apex white; interior margin silvery blue-green; front marginal edge irrorated with orange. Hind wings steel-blue, changing to silvery blue-green beyond the cell; outer and inner margins chocolate-brown glossed with purple. Body brown; antennæ with orange club; palpi orange.

Underside—front wings pale greenish, varied with dull chocolate-brown, crossed beyond the middle by an irregular white band, narrower above than below, extending from just beyond the middle of the anterior margin to near the outer margin just beyond the middle, and interrupting a submarginal band of ill-defined brown spots extending from the anterior margin near the apex to the interior margin near the anal angle; apex white, cilia and basal half of front

marginal edge brownish ochreous; three large black spots within the cell. Hind wings pale green varied with brown; an irregular white band just beyond the middle, sinuated on its inner edge and gradually shaded off on its outer edge, extending from the front margin, towards the anal angle, to the second median nervule; a submarginal row of seven large, ill-defined brown spots a little way from and following the direction of the outer margin; three large black spots within the cell, one near the base, the other two placed obliquely just beyond the middle of the cell; cilia, anterior and interior marginal edges brownish ochreous. Body orange ochreous; legs pale ochreous; palpi and club of antennæ orange.

*Hab.* Congo.

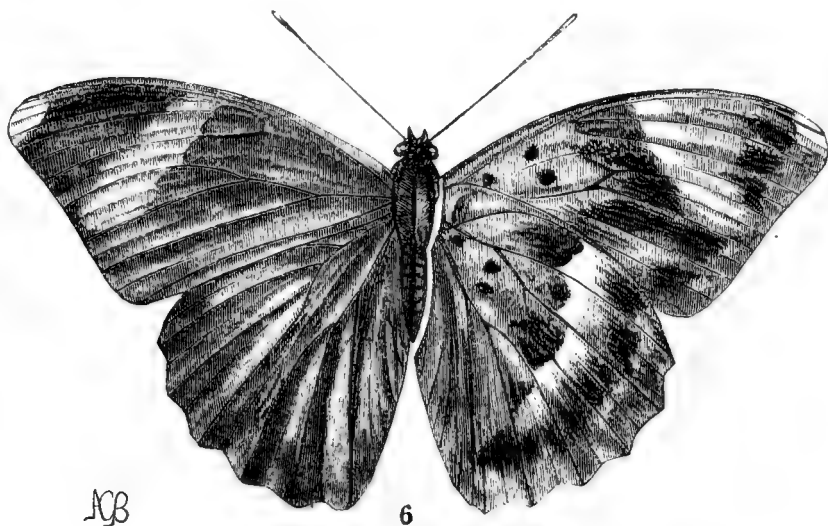


Fig. 6. *Romaleosoma medon*, Linn.

11. NOTE ON THE PRESENCE OF TEETH ON THE MAXILLÆ OF SPIDERS. BY MISS STAVELEY. COMMUNICATED BY DR. J. E. GRAY\*.

I do not find in Dr. Blackwall's 'Monograph of the British Spiders,' nor in M. Simon's 'Histoire Naturelle des Aranéides,' nor in any other work which I have had an opportunity of consulting, that the occurrence of teeth on the maxillæ of Spiders has been noticed.

On the maxillæ of six out of seven Spiders which I have examined, belonging to various genera, there is a row of very regular and perfectly-formed teeth on the outer edge of the extremity of the maxilla. These teeth vary slightly in form in the different species, and the

\* Since this paper was read, Miss Staveley has examined several other species of Spiders, and found these teeth developed in all of them.—J. E. G.

first of the row is sometimes unlike the succeeding teeth. The species examined were:—

<i>Agelena labyrinthica</i> , ♀.	<i>Theridion quadripunctatum</i> , ♀.
<i>Salticus scenicus</i> , ♀.	<i>Epeira callophylla</i> , ♀.
<i>Theridion nervosum</i> , ♀.	<i>Tetragnatha extensa</i> , ♀.
— <i>lineatum</i> , ♀.	

Of these only one of the *Theridions* showed no teeth; but the specimen was not satisfactory, being ill prepared and mounted. The jaw of one (*Agelena labyrinthica*) presented an appearance of a second row of teeth, forming a waved line running down the surface of the maxillæ, and quite distinct from the marginal row; but as this occurred in no other species examined, nor even in another individual of the same species, as it seemed much less substantial than the marginal row, and presented other suspicious appearances, and as the specimen was prepared and mounted before the teeth were observed, I cannot be sure, without the examination of other specimens, that this is a genuine row of teeth. Unfortunately the fellow jaw was thrown away without being looked at.

In one or more specimens the teeth appear to have been worn or broken by use. All the specimens referred to are mounted in Canada balsam, and are now in the collection of the British Museum.

Fig. 1.

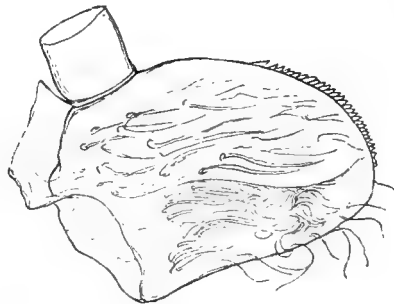


Fig. 2.



Fig. 1. The jaw of *Agelena labyrinthica* magnified.  
2. The beginning of the row more highly magnified.



November 28, 1865.

Dr. J. E. Gray, F.R.S., V.P. in the Chair.

Mr. P. L. Sclater called the attention of the Meeting to the additions made to the Society's Menagerie since the last Session. Amongst the more noticeable of these were

1. Two Pondicherry Vultures (*Vultur calvus*) and a Neophron (*Neophron percnopterus*) from Calcutta, purchased July 3rd. The acquisition of these specimens rendered the series of Vulturidæ in the Society's collection very complete, as it now embraced examples of not less than 14 species, namely,

*Cathartes atratus.*

— *aura.*

*Sarcorhamphus gryphus.*

*Gyparchus papa.*

*Vultur monachus.*

— *occipitalis.*

— *calvus.*

*Vultur auricularis.*

*Gyps fulvus.*

— *rueppellii.*

*Neophron percnopterus.*

— *occipitalis.*

*Gypohierax angolensis.*

*Gypaëtus barbatus.*

Mr. Sclater called attention to the differences noticeable between the two specimens of *Vultur auricularis* in the Society's collection. In the example acquired from Eastern Africa along with the Hippopotamus in 1850 (specimen *a* of the Catalogue of Vertebrata, ed. 3. p. 45), there was barely any appearance of ear-wattles, and the occiput was slightly feathered. In the larger specimen lately purchased, and believed to be from Natal, the ear-wattles were well developed, and the head and face were alike naked and red in colour. These differences had already been commented upon in Mr. Gurney's Catalogue of the Raptorial Birds in the Norwich Museum (p. 58).

Mr. Sclater also called attention to the two specimens of *Neophron percnopterus* in the Society's collection. In the smaller specimen, lately received from Calcutta, the whole bill and claws were white; in that acquired from the Cape Colony in 1863 (spec. 8 *a* of the Cat. of Vert. p. 45) the point of the bill and claws were black.

2. A male Chimpanzee (*Troglodytes niger*), purchased of a dealer in Liverpool on the 15th of August last, making up a pair of this animal, which, together with the female Orang (acquired in May 1864), were all living in good health in the new Monkey-house.

3. A pair of Dama Antelopes (*Antilope dama*, Licht.), purchased of the Zoological Gardens, Antwerp; new to the Society's collection, though probably specifically identical with the *Antilope mhorri*, Bennett.

4. A collection of birds from Djeddah, Arabia, presented to the Society by Henry H. Calvert, Esq., of H. M. Consular Service, on September 5th. The collection embraced 19 specimens of the following species:—*Pterocles lichtensteini*, Temm., *Caccabis heyi* (Temm.), and *Æna capensis* (Linn.). The two former of these species had not been previously exhibited in the Society's collection.

5. A young female African Elephant (*Elephas africanus*), making a pair of these animals now in the Menagerie. Two examples of this Elephant had come into the London market for sale, having been remitted here from Vienna, where they had been brought from the Soudan, along with other animals, by the well-known traveller Casanova. The best of these two had been purchased for the Society's collection for the sum of £500. It was a female, now standing about 3 feet 6 inches high, and measuring 6 feet 3 inches in girth round the middle of the body. The male of the same species (acquired in June last) measured 5 feet 6 inches in height, and 9 feet 6 inches in girth.

6. An Abyssinian Hornbill (*Bucorax abyssinicus*), purchased along with the African Elephant. Specimens of this fine bird, on two former occasions, had reached the Society's Gardens alive; but in each case in bad condition, and only to die shortly afterwards. The present example was in excellent health, and made the fifth species of this peculiar family of birds now exhibited in the Society's Aviaries, the series being composed as follows:—

*Buceros cavatus*.  
 — *rhinoceros*.  
 — *albirostris*.

*Toccos erythrorhynchus*.  
*Bucorax abyssinicus*.

7. A Tree-Kangaroo (*Dendrolagus inustus*, Müll.) from New Guinea, received in exchange from the Zoological Gardens, Rotterdam.

8. A Black-necked Screamer (*Chauna nigricollis*, Sclater), received November 16th, having been purchased in New Granada for the Society by Mr. Edward Greey, Corr. Memb., to whom the Society had likewise been indebted for their original specimens of this bird. Mr. Sclater stated that since he had described the species, he had noticed another fine example of it in the Museum at Bremen. He was also of opinion that the *Chauna derbiana* of the Leyden Museum (if the locality assigned to it, New Granada, were correct) would probably turn out to belong to this species.

9. A young female Jew-Monkey (*Pithecia satanas*) (also acquired through Mr. Greey), exhibited the well-marked dorsal patch and other peculiarities of the adult, and had induced Mr. Sclater to believe that he had been in error in referring the specimen figured in the Society's Proceedings for 1864 (pl. xli. p. 712) to the same species.

Mr. Sclater promised a further communication on these two *Pitheciæ* as soon as he had made the necessary investigations into their somewhat confused synonymy.

Mr. P. L. Sclater made some remarks on the animals he had noticed in several of the continental zoological gardens which he had visited during the summer.

The Gardens of the Zoological Society of Hamburg, established only about two years since, were stated to be in a very flourishing state, and to contain several very noticeable varieties. Among them

might be mentioned a fine Indian Tapir (*Tapirus indicus*), a pair of scarce American Deer (*Cervus gymnotis*) received from Venezuela, examples of two rare *Spizaëti* (*S. isidori*, Des Murs, from Bogota, and *S. bellicosus* (Vieill.) from Zanzibar), and a fine specimen of the rare Guinea-fowl (*Numida vulturina*, Hardw.) from the eastern coast of Africa (about 4° S. lat.), received likewise from Zanzibar.

At Rotterdam the Zoological Gardens, under the care of Mr. P. H. Martin, were stated to contain a pair of the rare Bovine animal of Celebes, *Bubalus depressicornis* (*Antilope depressicornis*, Temm.).

At Amsterdam Mr. Sclater had had the pleasure of inspecting a fine young male Hippopotamus, born in the Gardens of the Royal Zoological Society "Natura artis Magistra" on the 9th of July last. Under the special care of the excellent director, Mr. G. F. Westerman, this little animal (of which several photographic portraits were exhibited) was stated to be rapidly increasing in size and strength. Although several previous instances of the birth of a Hippopotamus in captivity had occurred, both in Antwerp and Paris, this was the first instance of one having been successfully reared.

The following abstract of a letter of Capt. J. M. Dow, C.M.Z.S., addressed to Dr. Albert Günther, was read:—

"New York, Oct. 30, 1865.

"You will be gratified to see amongst the collection two fine examples of *Thalassophryne* which I obtained at Panama. One of the specimens was picked up on the sand beach of one of the small islands in Panama Bay, on which our American seamen have their dépôts; the second example I purchased in the native fish-market in the City of Panama. I took advantage of the occasion of the purchase of the fish to inquire of the native fishermen as to the effect produced in a human subject on being wounded by one of the spines of *Thalassophryne*. The natives seemed quite familiar with the existence of the spines, and of the emission from them of a poison which, when introduced into a wound, caused fever, an effect somewhat similar to that produced by the sting of a Scorpion; but in no case was a wound caused by one of them known to result seriously.

"I had no opportunity, myself, to try the effect of the poison on another fish or small animal. The slightest pressure of the finger at the base of the spine caused the poison to jet a foot or more from the opening of the spine."

The following extracts were read from letters received from Mr. R. Swinhoe, F.Z.S., H.M. Consul for Formosa:—

"Takow, Formosa, May 18, 1865.

"I have lately been very energetic on the Society's behalf, and have forwarded two Deer for shipment home. They are two females of the *Cervus taëvanus*. I have also on hand eleven Swinhoe's Pheasants (*Euplocamus swinhoii*), which I am preparing to ship away. They are cocks and hens, in nearly equal numbers. The cocks are

magnificent birds, and I am sanguine about getting them home. As soon as they are shipped I will advise you, and enclose you the captain's receipt, so that you will be able to cover the risk. Most of the Pheasants come here from a distance of 200 miles, from the mountain-range near Tamsuy. I have spared no labour in getting them; and as they appear pretty hardy birds, there is no reason why they should not reach home. I am also trying to get a couple of females of *Cervus swinhoii*, and live specimens of the *Capricornis*, the Bear, and the Leopard."

"Takow, July 25, 1865.

"From some Chinese notes which I have lately been reading on the Zoology of Formosa, I learn of the existence here of some animals to me hitherto unknown,—among others a Porcupine and a wild *Bos* which occurs in herds of hundreds and thousands. I think in this last I shall discover the wild stock of the small Yellow Cow of South China. I shall spare no pains, you may be sure, to investigate this interesting fact."

"Takow, Formosa, 8th August, 1865.

"Chinese books tell of a Porcupine that occurs in this island. I have not yet seen it, but I suspect it will be the same as that found throughout India and in South China. In Mammals all that I have lately secured are several specimens of the pretty *Kerivoula* Bat, and a nearly unicolor variety of the Red-bellied Squirrel, *Sciurus erythræus*, from the southern mountains. In birds I have lately got several examples of the Green Dove (male and female), my *Sphenocercus formosæ*, and a skin of the *Pitta oreas*. The latter I got before from the northern mountains; my latest acquisition shows the species to extend also to the south."

The following papers were read:—

1. A REVISION OF THE SPECIES OF GOLDEN MOLES (CHRYSOCHLORIS). BY DR. JOHN EDW. GRAY, F.R.S., V.P.Z.S.

Several species of Golden Moles have been described by various zoologists on specimens procured from different parts of Africa—the size and form of the muffle, the size and form of the claws, and slight differences in the colour of the fur being regarded as sufficient to separate the species. I have examined the large series of specimens which is contained in the British Museum, received from various parts of Africa, and I find that the form of the muffle greatly depends on the art, or amount of care on the part of the persons who skinned and stuffed the specimens, and that its form can be altered at pleasure. The form of the claws of the front feet seems to vary according to the age, and probably also according to the sex of the specimens; but unfortunately the sex is seldom marked on the specimens in Museums.

The general colour and, especially, the distinctness of the white and dark marks on the head seem to vary greatly in specimens from the same locality. Moreover this animal is often put into spirits on

account of the brilliant colours which it exhibits when so preserved, and animals so preserved are sometimes taken out and stuffed. Specimens which have been so treated have a very different appearance from those which have been skinned fresh and the skins preserved dry, the colour being more or less changed according to the strength of the spirits or the length of the time that the animal may have been kept in the fluid.

I have carefully compared the series of skulls in the Museum, which have in most cases been extracted from the specimens which are preserved in the collection; so that the results of this paper are founded on the comparison of the skulls as well as the skins in the Museum collection.

The specimens and skulls in the British Museum appear to be all referable to the two following species, and most easily separated by the character of the fur.

### 1. CHRYSOCHLORIS AURATA.

Fur short, very dense, erect, with more or less metallic reflections, brown; sides of the face whitish; the front claws subcylindrical.

*Hab.* South Africa.

This species varies in the extent and pureness of the white colour on the sides of the face and crown, and in the presence or absence of the intensity of the blackness on the forehead. The fur is much more iridescent when the specimens are preserved in spirits.

This species includes the *Ch. aurata* and *Ch. rubra* of Fischer, and the synonyma he attaches to these species; and I am also inclined to refer to it *Ch. hottentotta*, A. Smith, *Ch. holosericea*, Licht., *Ch. albirostris*, *Ch. rutilans*, Wagner, and *Ch. damariensis*, Ogilby, which appear to have been bleached by exposure; nor do I see any distinction to induce me to separate from it *Ch. obtusirostris*, Peters.

### 2. CHRYSOCHLORIS VILLOSA, A. Smith, South African Journal, ii. 33.

The fur elongate, very thick, coarse, villose, brown, with an abundant under-fur; lips, chin, and streak from the angle of the mouth white; the outer front claw rather large, broad, high; the hind claws large.

*Hab.* South Africa: Natal.

This is considerably larger than the former species.

The examination of the skulls has helped me to this determination. I find that it has been supposed by some zoologists that I undervalue the study of fossil bones, or *Palæontology* as it is called; as if the study of fossil bones were distinct from the study of osteology in general. Nothing can be more contrary to my feelings; indeed I have been doing all I can for years to facilitate the study of fossils, as well as recent osteology, by forming a large collection of *well-determined* skeletons of vertebrated animals for the purpose. What I do object to is, that persons who pretend to be scientific men

should proceed to describe species of fossil animals without having properly studied the osteology of the recent species and the variations that the bones, teeth, horn, and other parts of the skeleton assume in the recent species, which they have the opportunity of studying in a more complete manner than they can have in the case of fossil species. More especially I object to the practice of such students as describe species of fossil animals from fragments, which it would be very unwise to declare to be distinct if they belonged to some recent species which there was an opportunity of examining in a complete state and of comparing with other skeletons of allied species. Yet many fossil species have been described from such specimens, so that our catalogues are thereby encumbered with useless names.

## 2. NOTE ON THE HABITS OF THE KINKAJOU (*CERCOLEPTES CAUDIVOLVULUS*). BY DR. J. E. GRAY, F.R.S., ETC.

The Kinkajou was formerly considered a Lemur, and the manner in which it uses its feet as hands might well mislead a casual observer. I saw one the other evening in the Zoological Gardens resting on its rump with the tail coming out in front between its hind legs. It was holding in its fore feet a slice of bread, and every now and then it would take off a piece with one or the other of its fore feet, and hold it as in a hand to its mouth, or take from it small pieces with the other hand like a child eating a cake, and quite as handily; yet this animal has no opposite thumb on any of the feet, and only short fingers and toes webbed nearly to the claws.

## 3. SUPPLEMENTARY NOTES ON THE MUSTELIDÆ. BY DR. J. E. GRAY, F.R.S., ETC.

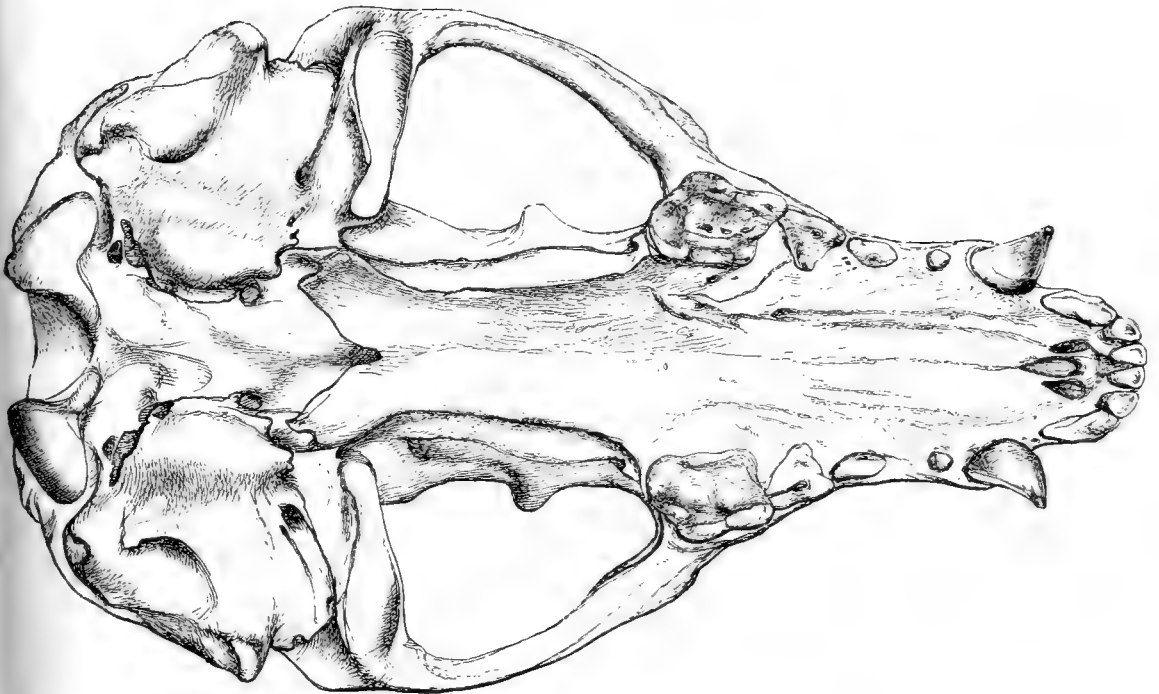
In my Revision of the *Mustelidæ* (P. Z. S. 1865, p. 100) I find that I neglected to give the external characters by which the two species of Ratels might be distinguished; they are as follows:—

*Mellivora indica*. Black; the back iron-grey; crown of the head white. India.

*Mellivora capensis*. Black; the back iron-grey; the crown and a broad stripe down each side of the back to the tail white. South Africa.

The latter species is easily known by the greater quantity of white on the head and the broad white lateral edge to the iron-grey colour on the back.

I take this opportunity of giving two illustrations of the skull of *Arctonyx collaris*, which should have accompanied my description of that species (*l. c.* p. 138).



Skull of *Arctonyx collaris*, described anteà p. 138.

4. NOTE ON THE HABITS OF THE MUSQUASH OF NORTH AMERICA.  
 BY CAPT. G. E. BULGER, CORR. MEMB.

One day, during the early part of the spring of 1849, I was rambling about the neighbourhood of the village of St. Valentines, near Isle-aux-Noix, in Canada East, with two friends, one of whom was accompanied by a tiny Spaniel of the King-Charles breed. Presently the little dog, which had been running on in front of us, began to bark, and, looking up, I beheld him engaged in a combat with some small darkly-coloured animal, of about his own size. I hastened to the spot, and soon ascertained the dog's opponent to be a large Muskrat (*Fiber zibethicus*), which showed no disposition to retreat on my approach, but maintained the conflict with a courage and ferocity I was quite unprepared for. Indeed, after some minutes, the little rodent was so evidently getting the best of the battle, that I judged it right to interfere, and, consequently, struck him with my stick. Instead of causing him to beat a hasty retreat, as I fully expected, this assault of mine only appeared to change the current of his rage, and render him still more angry than before. He at once quitted the dog (an arrangement apparently very gratifying to the latter), and attacked me, rising on his hind legs, and making charges at my stick, which, of course, I kept between us. This strange battle, solely defensive on my part, was maintained until I thought fit to terminate it by killing my savage little adversary, which I did easily with a blow on the head. The incident appeared to me to be so odd and unaccountable, that I at first fancied it must have been the result of some peculiar idiosyncrasy on the part of the individual Muskrat, and not characteristic of his race. However, I was soon disabused of this idea; for almost immediately afterwards I saw two more of my warlike little foes under the transparent ice. I broke the latter with my stick, just above where one of the animals was standing, and, possibly, touched him with some of the fragments. However, the result was an instant onslaught on his part, though he did not appear inclined to leave the water. Whenever I held the stick to him, he attacked it furiously, but he would not follow it out of the stream, and I eventually killed him in the same manner as the first one. I only met with one more during the remainder of the walk; and with him also I had a spirited contest, similar, in most respects, to the one last described.

5. ON THE STRUCTURE OF LEPTOSOMA DISCOLOR. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

Since the time of Brisson and Levaillant, I am not aware that any original observations have been made upon one of the most abnormal types of the strange avifauna of Madagascar—the *Leptosoma* of Vieillot—although several attempts have been made to fit it into different parts of the natural system. The collectors who have recently obtained access into the interior of Madagascar have sent



home many examples of both sexes of this bird, and I am thus enabled to offer a few remarks upon some remarkable points in its structure which have hitherto escaped observation.

The *Leptosoma* was first made known to science by Brisson\*, who describes both sexes in his usual accurate manner from specimens in the museum of M. l'Abbé Aubry. Brisson remarks upon the obvious differences between this bird and the ordinary *Cuculi*, which might entitle it to constitute a genus by itself†. Buffon figures both sexes in the 'Planches Enluminées' (pl. 587, 588), and in the text thereto copies parts of Brisson's description.

Levaillant also figures both sexes of this bird in his 'Oiseaux d'Afrique'‡, and pretends to have met with it in "Cafferland," as in the many other cases where the falsehood of his statements is equally glaring§. Several scientific appellations have been bestowed upon the bird upon the faith of these authors, such as *Cuculus afer*, Gm. S. N. i. 418, *Cuculus discolor*, Hermann, *Bucco africanus*, Stephens (Zool. ix. p. 25), and *Leptosomus viridis*, Vieill. Enc. Méth. iii. p. 1342||. Of these it becomes necessary to adopt *discolor* as the permanent specific designation of the species, although not the first given (as Gmelin's term involves a gross error in the locality), and to combine it with Vieillot's generic term *Leptosoma*, so that the correct name of the bird will be *Leptosoma discolor*.

Lesson in 1831 (Traité d'Ornithologie, p. 134) conceived the unhappy idea that the older authors had been wrong in regarding the somewhat dissimilar sexes of this bird as belonging to the same species, and accordingly made of the female a separate species under the name *Leptosomus crombec*. Prof. Reichenbach, not satisfied with this, has gone so far¶ as to establish a new genus (*Crombus*) on the female, and to place it in a different part of the system! In his 'Conspectus,' Prince Bonaparte retains this form near the *Cuculidæ*, but makes an independent family of it (*Leptosomidæ*). In his more recent 'Conspectus Systematis Ornithologiæ'\*\* he has removed it into the neighbourhood of the American *Bucconidæ*. Before attempting to solve the question as to which of these two views is most correct, I must ask leave to call the Society's attention to some remarkable points in its structure, which appear to have been hitherto unnoticed.

The first thing which strikes one as remarkable in examining the

\* Ornith. iv. p. 160, pl. xv. f. 1 & 2.

† "Species ista rostro donatur multo rectiore quam reliquæ omnes hujus generis species: quod rostrum nequaquam est superne convexum, sed angulosum. Nares habet longas, et versus mediam longitudinem mandibule superioris oblique positas. Ab aliis speciebus insuper discrepat cauda duodecim rectricibus conflata, dum in alteris decem tantum nec amplius unquam observavi. Hæc species posset suum genus constituere."

‡ Le Vouroudriou, v. t. 226 et 227.

§ Cf. Sundevall's Commentary on Levaillant in Kong. Sv. Vet. Ak. Handl., n. s., ii. pt. 1.

|| Here and in his 'Analyse' Vieillot writes the name *Leptosomus*. But *Leptosoma* is correct.

¶ Handb. d. Sp. Orn. ii. p. 51.

\*\* Ann. d. Sc. Nat. ser. 4. Zool. i. (1854).

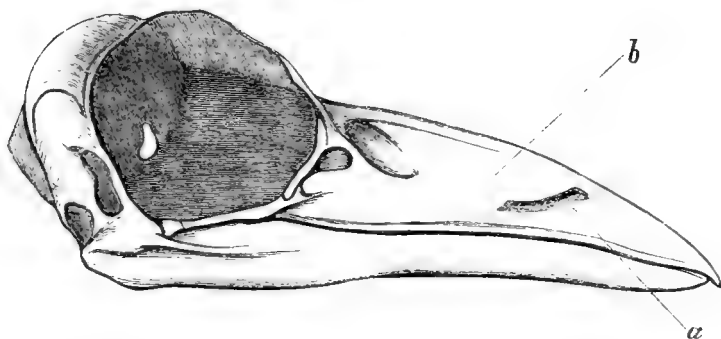
external characters of *Leptosoma discolor* is the extreme elongation of the feathers of the lores and their projection forward over the bill on each side. The bill is in reality long and strong, and the gape

Fig. 1.

Head of male *Leptosoma*.

very wide; but the basal half is entirely concealed from view by this extraordinary development of the loreal plumes. It is, I suppose, for the purpose of getting the nostrils out of the way of these that the openings of them are carried so far forward. They are placed laterally, rather nearer the apex of the beak than the front

Fig. 2.

Outline of the skull of *Leptosoma*.

(where the feathering commences), and consist of a narrow diagonal slit, just as in the genus *Eurystomus*. But in *Eurystomus* the apertures lie, as is the case in the majority of birds, at the base of the beak close to the frontal plumes. On examining the skeleton of *Leptosoma* we see at once that this remarkable formation has been effected by the elongation of the basal portion of the beak, and that the lateral coverings of the nasal passages (*alæ nasi*), which in most birds are entirely membranous, have in this form become completely ossified, so as to add very materially to the strength of the upper mandible.

A very similar formation occurs in *Eurystomus*, but is not carried to the same extent, the covering of the nasal passages remaining membranous in this form.

The wings of *Leptosoma* are of moderate length, reaching to about half the length of the tail from its base. The primaries are ten in number, the third, fourth, and fifth being nearly equal and longest, the second half an inch shorter, and the first more than an inch shorter again, being about equal to the eighth. The first six are narrowed towards the apex; the remaining four are broad-tipped like the secondaries. The secondaries are twelve in number.

The tail consists of twelve rectrices of nearly equal length, and squared at the apices.

The feathering of *Leptosoma* presents some remarkable characters. The body-feathers have a long downy auxiliary plume, longer than

Fig. 3.

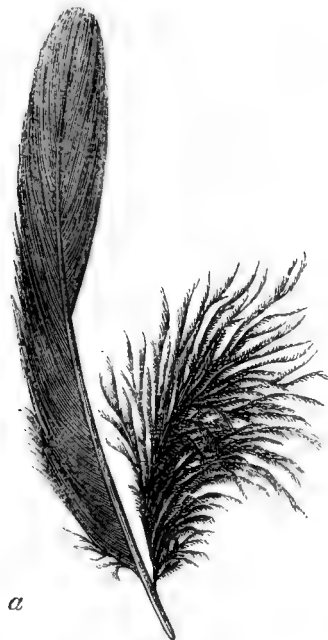
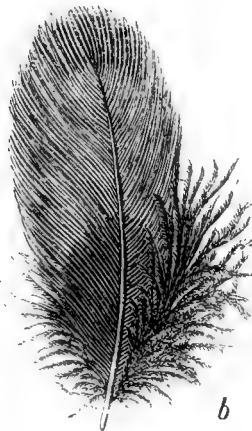


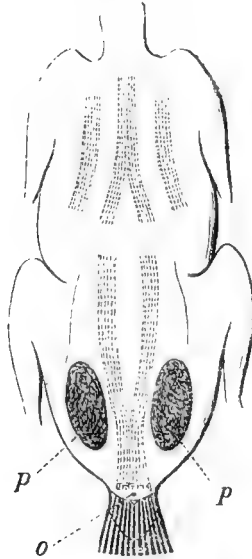
Fig. 4.



half the length of the feather itself. In *Eurystomus* there is a similar auxiliary plume, but not quite so highly developed. In the *Cuculidæ*,

I believe, the auxiliary plume is always deficient\*. The upper ptilosis also appears nearly similar to that assigned by Nitzsch to *Coracias* and *Eurystomus*. The spinal tract bifurcates between the shoulders, leaving a wide featherless space. The branches are then discontinuous for a short distance, but reappear in two gradually converging lines, which unite on the rump. But here a very abnormal

Fig. 5.



feature presents itself, which is found neither in the *Coraciidæ* nor in any other family of the Order Picariæ. This is two large and highly developed powder-down patches (*p, p*), which are placed on the flanks, on each side of the rump. They are of an oval shape, and measure about  $1\frac{3}{4}$  inch in length by an inch in breadth. The development of these lubricating organs may perhaps account for the atrophy and almost total disappearance of the oil-gland, which can scarcely be recognized in the minute papilla (*o*, fig. 5), situated at the base of the two medial tail-feathers†.

\* Cf. Nitzsch, Pterylographic, p. 129.

† This is, I believe, the first instance of powder-down patches having been noticed to occur in any species of the Order Picariæ. Nitzsch (Pterylographic, p. 53) describes them as met with in the following genera:—

Nauclerus .....	} Order.
Elanus .....	
Cymindis .....	} Accipitres.
Artamus .....	
Tinamus .....	Passerinæ.
Ardea and its affines.....	Gallinæ.
Cancroma .....	} Grallæ.
Eurypyga .....	

Mr. Bartlett has determined their presence in *Balæniceps* (P. Z. S. 1861, p. 131) and *Rhinochetus* (ibid. 1862, p. 218).

The sternum of *Leptosoma*, a specimen of which Mr. A. Newton has kindly lent me from his extensive collection of these objects, does not, I must admit, present us with any very close resemblance to that of *Coracias*. At the same time I do not see that it is in any respect more like that of the *Cuculidæ*.

Fig. 6.

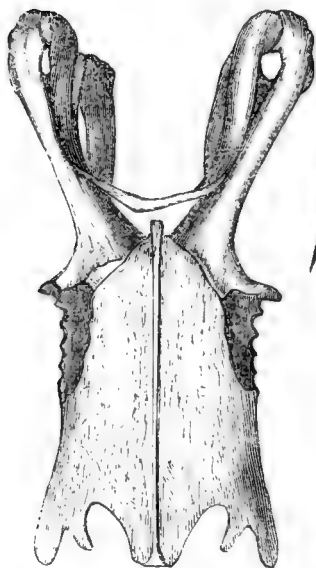


Fig. 7.

Sternum of *Leptosoma*.

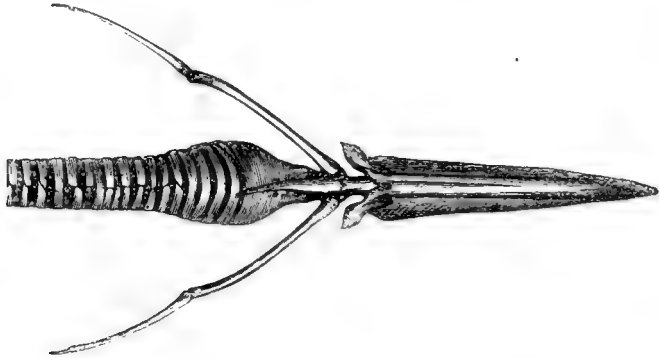
The two posterior fissures so characteristic of the greater number of forms of the order Picariæ are here run together, forming but one large opening, the apophysis between them not reaching to the line of the posterior margin, and the outer fissures being smaller and not so deep as the inner pair. In *Coracias* and *Eurystomus* the outer fissures are deeper, and the separating apophysis advances quite to the posterior margin. There are two other points in which the sternum of *Leptosoma* differs considerably from that of the *Coraciidæ*. These are (1) the very rudimentary condition of the episternal process (*e. p.*, fig. 7), and (2) the remarkable thickening of the rami of the furcula at their anterior extremities, and their attachment to the front of the coracoid by a massive head. In *Coracias* and *Eurystomus*\* the episternal apophysis is well-developed and terminates in a point, which advances some way forward between the coracoids, nor are the rami of the furcula thickened to any noticeable extent where they join the coracoids. It may also be noticed that the coracoids of *Leptosoma* overlap one another a little at their junction with the sternum, as is the case with some of the *Accipitres*.

The tongue of *Leptosoma*, of which Mr. Newton has also kindly lent me a specimen, is remarkable for its thin horny nature and pel-

\* Cf. Blanchard, Recherches sur les caractères ostéologiques des oiseaux, Ann. d. Sc. Nat. ser. 4. Zool. vol. xi. p. 127.

lucid appearance, and (as far as I can tell, the example not being quite perfect) for being without any traces of laceration at its ex-

Fig. 8.



Tongue of *Leptosoma*.

tremity. It is much lengthened, and of nearly uniform thickness throughout; but the sides are bent upwards, leaving a deep medial channel, which grows shallower towards the base, where it terminates in two simple lateral projections without any traces of papillæ.

In a note to his 'System der Pterylographie' (p. 131), Nitzsch has stated that in two examples of *Leptosoma* examined by him the outer toe "appeared to have four phalanges," instead of five, the normal number. This, however, is not the case: *Leptosoma* does not diverge from the ordinary rule among birds in this respect. The structure of its feet may be described as follows:—

The tarsus is rather longer than the second digit, measuring 1·2 in. in length. It is covered in front with a series of ten or twelve irregular oblong scutes, which are divided in the upper and lower portion of the tarsus, but entire in the middle. On the outer side is a series of smaller similar scutes. Behind, the tarsus is covered with numerous small irregular hexagonal scutes, which extend over the lower surface of the planta.

The first or posterior digit measures 0·63 in. in length, including the nail, and is placed behind in its usual position. The second and third digits are placed directly in front, and measure 0·63 and 1·5 in. respectively (with the nail). They show no appearance of syndactylism, being separated nearly to the base. The fourth digit measures 1·11 in. in length, and, as I have already stated, has the normal number of five phalanges—the first two being very short, each measuring only about 0·5 in. in length. It is articulated not in a directly reversed position, as among the more typical *Zygodactylæ*, but laterally, rather more behind than in front. It will therefore be seen that *Leptosoma*, even in this respect, diverges widely from the *Cuculidæ*, *Bucconidæ*, &c., in which the fourth digit is placed in a directly reversed position.

So much, then, I am at present able to say concerning the peculiarities of this remarkable type. In order to refer *Leptosoma* deci-

sively to its proper place in the natural series, an examination of the soft parts of its structure still remains to be made, which as yet I have had no opportunity of doing. But it appears to me that sufficient is known to show that *Leptosoma* can no longer be left as a genus of the family *Cuculidæ*, from which it differs in many important points, particularly in the form of the nostrils, in the presence of an auxiliary plume on the body-feathers, in having twelve tail-feathers, and in the structure of its feet. As far as I can at present form an opinion, a more natural situation for *Leptosoma* would be as the type of a separate family in the neighbourhood of the *Coraciidæ*. The singular structure of the nostrils very much resembles that of *Eurystomus*. *Eurystomus* also has the auxiliary plume, and the same number of tail-feathers—although differing from *Leptosoma* in the form of the sternum and the structure of the feet, so that they could hardly be associated together in the same family.

I have as yet had no opportunity of seeing more than a stuffed specimen of another singular Madagascar type—the *Brachypteracias leptosomus*; but I think it very probable, from the superficial examination I have made of it, that this, as suggested by Lesson, may be the missing link which connects *Leptosoma* with the *Coraciidæ*.

#### EXPLANATION OF THE FIGURES.

- Fig. 1. Head of *Leptosoma*, showing the projection of the loreal and frontal plumes, and the position of the nostrils.  
 Fig. 2. Outline of the skull of *Leptosoma*, showing the position and form of the nasal apertures (*a*) and the ossified covering (*b*).  
 Fig. 3. Lower surface of a feather from the back of a male *Leptosoma*, with part of the inner web removed, so as to show the auxiliary plume more clearly.  
 Fig. 4. Lower surface of a feather from the breast of a female.  
 Fig. 5. Upper surface of *Leptosoma* with feathers removed (reduced), showing the bifurcation of the spinal tract and the position of the two powder-down patches (*p, p*) and oil-gland (*o*).  
 Figs. 6, 7. Sternum of *Leptosoma*.  
 Fig. 8. Tongue and hyoid bones of *Leptosoma*.

#### 6. NOTE ON THE NIDIFICATION OF MIRAFA HORSFIELDI.

By E. P. RAMSAY, OF DOBROYDE, N.S.W.

Not having hitherto met with any description of the nest and eggs of *Mirafra horsfieldi* of this colony, and deeming it a subject of regret that the eggs of so common a bird in our neighbourhood should remain any longer undescribed, I beg leave to offer a few remarks upon the habits and nidification of this Lark.

Our *Mirafra* (for, as far as is yet known, we have only one species) shows a decided preference for the cultivated parts of the country, although it may be found upon the grassy slopes, on the borders of creeks, and on the plains in the interior.

It is very plentiful in the hay-, barley-, and wheat-fields, where it may be frequently seen perched upon the top of a sheaf, pecking the

grain out of the ears, for which its short, thick bill seems wonderfully well adapted. Its flight differs slightly both from that of *Anthus* and *Cincloramphus*, but in some respects approaches nearer to that of the latter; it is very undulating. When the bird is about to descend, it quivers with its wings, and sails down with a peculiar tremulous motion. This may also be observed between each undulation when the bird is flying quietly: but when suddenly flushed or flying to any distance, this peculiarity is not noticeable; at other times it immediately attracts attention and renders this species conspicuous among all the other Larks—with which, during October and the three following months, the fields literally swarm, as they rise before you in numbers at every step you take.

The nests of *Mirafra horsfieldi* are usually found during the months of November, December, and often as late as January and February. They are loose ragged structures, and not finished off nicely, like those of *Anthus australis*. They are cup-shaped, and are composed wholly of grasses, without any particular lining. The situation chosen is a little hollow scraped out by the side of a tuft of grass or straw, or behind a clod of earth; the front edge of the nest alone is smoothed down—the back part being left ragged, and often drawn forward as if to help to conceal the eggs. The nest is about  $2\frac{1}{2}$  inches in diameter by 1 inch in depth. On the 4th of February, 1861, we took a nest from a hay-field at M'Quarie Fields containing three eggs, which is the usual number. These are in length from 8 to 10 lines by from 6 to 7 in breadth, and of a light earthy brown, thickly marked over the whole surface with freckles of a much darker hue. Some specimens are darker in colour than others; and after a time the ground-colour becomes of a more yellowish tint, and the markings much duller and more indistinct.

#### 7. INDIAN ORNITHOLOGICAL NOTES, CHIEFLY ON THE MIGRATION OF SPECIES. BY CAPT. R. C. BEAVAN, LIEUT. BENGAL SURVEY, C.M.Z.S.

July 28th, 1864, Barrackpore, near Calcutta.—The Black-headed Oriole (*Oriolus melanocephalus*, Linn.) is common about the station, flying from tree to tree, and uttering his cheerful whistle. It is curious that one hardly ever sees the female of this bird, the proportion of males to females in collecting skins being generally as six to one. The Bengal Babbler (*Malacocercus terricolor*, Hodgson) is the characteristic inhabitant of the bamboo-groves in the neighbourhood; and small parties of them seem to keep much to particular spots near villages, but not, I think, with the dirt-devouring intent ascribed to them by some. In gardens the curious Tailorbird (*Orthotomus longicauda*, Gmelin) may be seen fitting from bush to bush in amorous pursuit of its mate, or diligently searching the creepers near the house for insects. The bare summit of a lofty *Casuarina* tree is generally frequented by a Barbet, of which two species are common, the first more so than the



second—the Blue-throated Barbet (*Cyanops asiatica*, Lath.), and the small Crimson-breasted one (*Xantholæma indica*, Lath.). I have heard these birds compared to a parson in a pulpit, from their peculiar habit of taking up an elevated position on a tree and, when there, turning their heads from one side to the other at each note uttered, just as if they were addressing an audience below. The Small Barbet, although the rarest here, becomes the most abundant species of its race when we get out of Lower Bengal into the uplands of the Bancoorah and Maunbhoom districts, to the westward of Calcutta. We look in vain for our common Green Bee-eater (*Merops viridis*, Linn.), which is so abundant in the cold weather that almost every dead bough bears one. A careful examination shows a Bee-eater, which is, however, rather rare and difficult of approach: this is a nearly allied species (*M. philippensis*), which during the rainy months takes the place of the commoner species (*M. viridis*), but not in such numbers.

August 1st.—A stroll with the gun in the neighbourhood reveals a common Paddy-bird (*Ardeola leucoptera*, Bodd.) which, though so numerous, generally appears during the rains to have almost entirely forsaken us. It is a curious and interesting subject of inquiry this periodical migration of some of our commonest birds. With the country under water, the Heron and Egret tribes cannot, perhaps, get at their finny prey so easily as in October and November, when the water begins to dry up; but where do they go? is the question; and where do the majority breed? Some, doubtless, nest in various parts of Lower Bengal; but no observer yet seems to have come across a sufficient number of their nests to account for the vast numbers of birds one sees during the cold weather—not in flocks, as my words would seem to imply, but here and there, every little pond with three or four round its edges. Our common Magpie, or, more correctly speaking, Tree-Pie, is *Dendrocitta rufa*, Scop., which stays with us all the year round and breeds here. A Dove (*Turtur suratensis*, Gmel.) is frequently seen about bamboo jungles near the villages; it is not very plentiful yet, but probably gets an addition to its numbers a few weeks hence by the arrival of others. About this date I observed large numbers of Parrakeets (*Palæornis torquatus*, Bodd.) of an evening, flying about the palmyra trees near the railway-station. They had evidently assembled in such large flocks to roost only; for an examination showed their stomachs to be filled with grain or chenna, of which none grows in this neighbourhood, and, even if it did, could scarcely be ripe yet. Many were young birds, with undeveloped tail-feathers.

August 6th.—The small yellow Bulbul (*Iora typhia*, Linn.) is plentiful, questing for insects amongst the flowers of the acacia; it has much of the habits of the English Tomtit in the way it creeps about from bough to bough. Associated with it on the same tree, but much more on the wing, is that gem of our Indian Honey-suckers, *Leptocoma zeylanica*, Linn., approaching in its metallic hues the gorgeous Humming-birds of America. The station parade-ground yields a Lark which has apparently only just arrived and is

still in pairs—the Indian Titlark (*Corydalla rufula*, Vieill.). The little Green Heron (*Butorides javanicus*, Horsf.) is occasionally met with in a retired corner of the bank of some pond. The only Kingfishers seen are the pied *Ceryle rudis* and the common *Alcedo bengalensis*, the latter not plentiful yet. Plenty of Magpies about (*Dendrocitta rufa*), chiefly young birds attended by their parents.

August 14th.—A walk along a muddy road towards Neilgunje does not yield much. The country is still swamped, but the fields of waving rice hide the water from view. Except in the immediate vicinity of villages, it is impossible to progress across the country without wading. A pair of the Ashy Swallow Shrike (*Artamus fuscus*, Vieill.) are busy in the air near some high trees. In flight this bird resembles a Swallow so closely that it requires some attention to discriminate it. An occasional Magpie Robin (*Copsychus saularis*), a few white Egrets passing overhead, a solitary Cormorant (*Graculus javanicus*, Horsf.), and a large Kingfisher (*Halcyon leucocephalus*), together with a small flock of the Shell Ibis (*Anastomus oscitans*) busily feeding in a swamped rice-field, comprise nearly all the new arrivals. A small flock of the pretty Powé Myna (*Temenuchus malabaricus*) is found in a tree near a village, busily feeding; and a green object, flashing for an instant in the sun in pursuit of an insect, turns out to be the Blue-tailed Bee-eater (*Merops philippensis*, Linn.).

August 17th.—I shot a beautiful specimen of an Australian bird, busily feeding in a rice-field. It is the Banded Grass-Parrakeet of Gould (*Melopsittacus undulatus*), and, though apparently a wild specimen in the adult plumage of the male, must have escaped from captivity. Mr. Blyth tells me he saw numbers of these birds some years since in the menagerie at Burdwan.

September 2nd.—Since Jerdon, in his 'Birds of India,' vol. ii. p. 674, regrets that he has no information with regard to the times of the appearance and departure of the Pintailed Snipe (*Gallinago stenura*, Temm.), as distinguished from the common Snipe (*G. scolopacina*, Bonap.), I am anxious to find out which species arrives first with us in Lower Bengal. Although Snipes are said to have arrived, I have not yet seen a single specimen of either species. Their forerunners, the Snippets (*Totani*), have come; a pair were observed to-day; and other migratory cold-weather visitants are dropping in daily.

September 5th.—Came across a flock of Powé Mynas in moulting-plumage; these birds are not nearly so common as they used to be here. Kingcrows (the *Dicrurus macrocercus* of Vieillot), as well as most other birds, including the Blue-tailed Bee-eater, are moulting now; the latter still about, but appears now in pairs. I fancied that a few weeks ago several were seen together. Paddy-birds are getting more numerous, but losing their breeding-plumage. Cormorants arriving. The small Kingfisher (*Alcedo bengalensis*) is tolerably common. Still a general scarcity of birds. Heard that a flock of Golden Plovers had been seen on the parade-ground, and that Snipe had been brought into the station by natives in former years as early as July. These had, of course, bred in the neighbourhood.

The Nutmeg-bird (*Munia undulata*) is plentiful in fields of ripe rice, together with the Weaverbird, which latter (*Ploceus baya*, Blyth) breeds about here, and is common all the year round. The Sparrow (*Passer indicus*), also, is abundant, and evidently a permanent resident. Among Cuckoos, the Koel (*Eudynamys orientalis*, Linn.) is frequently seen towards evening, flying from tree to tree with drooping wings and tail, uttering its peculiarly harsh and disagreeable call, which too generally arouses one from one's slumbers in the early morning before dawn. It frequents the thick trees in the compounds of houses and the vicinity of villages, and appears to avoid the uninhabited parts of the country.

September 6th.—Secured a specimen of the peculiar plaintive Cuckoo near the station, apparently just arrived—a young male *Polyphasia (tenuirostris*, Gray?), with its stomach filled with caterpillars and other soft insects. Feet light yellow, inclined to greenish yellow above; claws sharp and black; bill brownish-black; upper mandible, tip of lower, and gape reddish-brown. Length  $9\frac{1}{2}$  in. Peculiar in having the primary coverts white.

September 26th.—Snipes about, but not very plentiful: eight to ten couple can, in a favourable locality, be killed in a day; but in this immediate neighbourhood nearly all are snared by the natives for the Calcutta market. The species, from their arrival there in a plucked state, is not ascertainable. A pair of the White-faced Wagtail (*Motacilla luzoniensis*) first seen, feeding in a newly ploughed field. Orioles appear more plentiful,—and the Indian Tidlark (*Corydalla rufula*) decidedly so; six may now be observed where a month ago only a pair were visible. Paddy-birds (*Ardeola*) putting on cold-weather plumage, and more common. The Kingcrow (*Dicrurus macrocercus*) has nearly done moulting; young birds still seen without the lengthened tail-feathers. *Merops philippensis* still about, but getting scarce. *Pastor malabaricus* flying from tree to tree in small flocks. Mynas (both *Acridotheres tristis* and *Sturnopastor contra*) in flocks, instead of pairs. Kites (*Milvus govinda*, Sykes, and *Haliastur indus*, Bodd.) are getting numerous; some have scarcely finished moulting. An occasional Adjutant (*Leptoptilos agala*) seen. Weaverbirds (*Ploceus*) still building. Koels (*Eudynamys*) very numerous near the house.

September 27th.—Shot my first Snipe of the season, a Pintail (*Gallinago stenura*), in very good condition. Secured a bird on the wing which appeared to cause a great deal of alarm amongst a party of the Red-eared Bulbul (*Otocompsa jocosa*). It was much like a Hawk on the wing, but turned out to be the Hawk Cuckoo (*Hierococcyx varius*, Vahl). Another cuculine bird, secured in a thick bushy tree, was *Coccytes melanoleucos*, Gmel. The first Grey Shrike (*Lanius cristatus*) also seen, and three Teal observed flying overhead; so that cold-weather visitants are evidently coming in daily.

In the evening saw the first of the common Bee-eater (*Merops viridis*), several hawking over a newly-ploughed field, evidently just arrived, and in beautiful plumage. Scarcely a single *M. philippensis* appears to be left; but their places—actually the same sprays

the latter frequented a few days ago—are now occupied by *M. viridis*. This elegant bird is essentially a tyrant in habits, in the old acceptation (*τύραννος*) of the word. Seated on a dry twig at the extremity of a limb of a wide-spreading mango-tree which overhangs the tank, he chooses his post of observation, which gives him a clear look-out in all directions, with the skill of a general; his head is constantly turned from side to side in unceasing watchfulness. His long black beak glistens in the sun; and its rays impart quite a metallic appearance to his chestnut-coloured head, whilst his beautiful eyes, of a bright crimson hue, ever awake and watchful, are well set off by the black streak of feathers which, commencing at the base of the beak and passing round them, ends in the ear-coverts, and gives him quite an air of mustachoeed dignity. His bright green plumage, too, is so much like the glistening upperside of a leaf, that when once lost sight of it is uncommonly difficult again to make out the whereabouts of our little friend. But wait, let us see him swoop. Down, quicker than thought, from his perch, a flash of shining green is seen for a second to dart, then turn, with outspread tail and wings, hovering for a second in the bright sun-beams, as if to thank them for their genial warmth and the food they have brought, and back to his solitary watch-post to await the next victim.

The Yellow Bulbul (*Iora typhia*), so common in August last, has now almost disappeared. The Amethystine Honey-sucker (*Leptocoma zeylanica*) is common in cocoa-nut trees, amongst the drooping bunches of yellow flowers. Mynas decidedly forming into flocks. The common Paddy-bird (*Ardeola leucoptera*) in fine cold-weather plumage, with few exceptions.

September 28th.—An occasional *Merops philippensis* still about. A Whistling Teal (*Dendrocygna awsuree*, Sykes) or two met with; and a Pintailed Snipe secured whilst shooting Bats after sunset on the parade-ground. A single Yellow Wagtail (*Calobates sulphurea*) seen in drains near the house.

October 1st.—Snipes seen near the line of railway to Calcutta; Snippets (*Totani*), however, tolerably plentiful, as are also Bee-eaters of the common species (*Merops viridis*). Cormorants and Egrets frequently seen. Kingcrows (*Dicruri*) in numbers about telegraph-wires. Painted Snipes (*Rhynchæa bengalensis*, Linn.) have been seen within the last few days.

October 28th.—With regard to the arrival of Snipes in the neighbourhood of Barrackpore, I have ascertained that the Pintailed probably arrive earlier, and in greater numbers at first, than the common species; the first killed in September were of the pintailed variety; and of several bags examined lately these formed the greater portion; of thirteen killed by a friend and myself yesterday, every single one was a Pintail. The first Quail (*Coturnix communis*?) observed; as also a Bustard Quail (*Turnix ocellatus*). Flocks of Geese seen flying overhead, at no great elevation, about the 24th of this month.

November 14th.—Shot a fine Kestrel (*Tinnunculus alaudarius*) which was hawking over a rice-field; this is the first seen this

season. Procured also a specimen of the Blue-throated Warbler (*Cyanecula suecica*, Linn.), of which three or four were observed in some reeds. *Motacilla luzoniensis* is now common. Jerdon does not draw any distinction, except size, between the male and the female; the latter, from a fresh specimen now before me, has no black at all on the head or back, all grey ashy (like the male) except a little frontal patch of white. There is no mistake about the species, as it was killed with its mate, a male in full plumage.

November 17th.—The Pintailed Snipes appear to have nearly all left the country, and to have been replaced by the common Snipes. Out of fifteen examined to-day all were full Snipes, excepting one or two Jack Snipes, which are the first of the latter species seen this year. A Ruby-throated Warbler (*Calliope kamtschatkensis*, Gmel.) killed near the station, where it frequents thick hedges.

November 19th.—Killed one Pintailed Snipe out of three; but they are evidently rare.

November 21st.—Of nine Snipes examined, all belonged to the common species. Observed in cages a pair of the Golden-fronted Green Bulbul (*Phyllornis aurifrons*). These birds had been brought from Dacca, where it appears they are commonly caged, and vulgarly called Mockingbirds, their powers of imitation being highly developed.

## 8. DESCRIPTIONS OF SEVEN NEW SPECIES OF AUSTRALIAN LAND-SHELLS. BY JAMES C. COX, OF SYDNEY, M.D. ETC.

### HELIX ARIDORUM.

*H. testa profunde umbilicata, depresso-globosa, solidiuscula, parum nitente, radiatim rugoso-striata, sub lente subtilissime granulata, infra leviuscula, corneo-virescente; spira parva, late depressa, apice obtuso, sutura impressa; anfractibus quatuor et dimidio, convexis, ultimo peramplo, rotundato, tumido; apertura lunari-circulari, peristomate tenui, reflexo, margine columellari basi dilatato, et umbilici semissem obtegente.*

Diam. maj. 0·56, min. 0·50, alt. 0·40 unc.

*Hab.* Clarence River, New South Wales (*Macgillivray*). Under logs on dry stony ironbark ridges.

### HELIX FLOSCULUS.

*H. testa obtecte perforata, depresso-lenticulari, tenuiuscula, pelucida, radiato-striata, lutescente, fasciis crebris ferrugineis radiatis, anfractu ultimo præsertim et ad umbilicum extendentibus, cinguloque interdum infra carinam; spira convexo-conica; anfractibus quinque, convexiusculis, ultimo carinato; apertura angulato-lunata, peristomate simplici, ad columellam vix expanso.*

Diam. maj. 0·40, min. 0·37, alt. 0·26 unc.

*Hab.* Norfolk Island (*Turner*).

**HELIX URARENSIS.**

*H. testa late et perspective umbilicata, depresso-circulari, tenui, nitida, epidermide flavo-cornea induta, creberrime et irregulariter elevato-striata, supra crasse, infra tenuiter; spira vix prominente, apice depresso; anfractibus quatuor et semisse, gradatim increscentibus, modice convexis, ultimo carinato; apertura obliqua, lunari-circulari, peristomate tenui, modice expanso, et ad columellam dilatato.*

Diam. maj. 0·30, min. 0·25, alt. 0·15 unc.

*Hab.* Urara, Clarence River (*Macgillivray*).

Allied to *H. strangeoides*, but not closely, being more coarsely sculptured, and in the mode of increase of the whorls being very different from it and the others of the same section—*Helices ptychomphala, franklandiensis, strangei, assimilans, &c.*

**HELIX GREENHILLI.**

*H. testa umbilicata, globoso-turbinata, lævigata, obsolete striata, lineolis undulatis minutissimis confertis sub lente manifestis, rufo-castanea, subtus viridi-fulva; anfractibus sex, ultimo per amplo convexo, cæteris convexiusculis; apertura lunato-sub-circulari, peristomate tenui, modice reflexo, columella basi dilatata umbilicum fere obtegente, labro intra albido, extra viridi-fulvo.*

Diam. maj. 1·2, min. 1, alt. 0·9 unc.

*Hab.* Upper Dawson River, Queensland (*Greenhill*).

Allied to *H. grayi, H. gilberti, &c.*

**HELIX SPLENDESCENS.**

*H. testa obtecte perforata, globoso-conica, tenui, pellucida, lævigata, polita, castanea, ad os juxtaque locum solitum carinæ saturatiore, fascia albida infra suturam, et subtus fasciis duabus albidis latioribus; spira conica, apice albo; anfractibus sex, subplanatis, ultimo ad os supra planato, convexo, obsolete-tissime carinato, antice producto; apertura perobliqua, rotundo-elongata, antice subsinuata, peristomate tenui, reflexo, ad columellam rectam expanso, castaneo, albo anguste marginato.*

Diam. maj. 0·95, min. 0·80, alt. 1·10 unc.

*Hab.* Salomon Islands (*Turner*).

**HELIX NAUTILOIDES.**

*H. testa obtecte perforata, orbiculari, depressa, regulariter costulata, epidermide rufo-cornea induta; spira planata, sutura impressa; anfractibus quatuor et dimidio, convexiusculis, ultimo tumido, supra ad suturam convexo, et ad os leviter planulato; apertura obliqua, lunato-ovata, intus margaritacea, margine externo supra subsinuato columellarique umbilicum demum obtegente, peristomate simplici.*

Diam. maj. 0·23, min. 0·19, alt. 0·12 unc.

*Hab.* Clarence River, New South Wales (under stones and logs on ironbark ridges) (*Macgillivray*).

Although bearing considerable resemblance to the widely umbilicated and more coarsely sculptured *H. juloidea*, yet its nearest ally is *H. sericulata*, a smaller, more delicate, and more finely ribbed species.

VITRINA PLANILABRIS.

*V. testa auriformi, valde depressa, tenui, translucente, polita, epidermide olivaceo-viridi induta, leviter striata et (sub lente) lineolis paucis depressis spiralibus; spira pusilla, viz prominente, nucleo albido; anfractibus tribus, ultimo peramplo, planato, exterius convexo; apertura lunato-ovata, intus margaritacea, peristomate tenui, margine columellari pertenui, plano, externe carinato.*

Diam. maj. 0·80, min. 0·50, alt. 0·26, apert. 0·55 × 0·42 unc.

*Hab.* Mitchell River, New South Wales (*Porter*); Urara River, New South Wales (*Macgillivray*).

A large and much depressed species, easily distinguished by the flatness of the base of the shell along the inner lip. The animal when disturbed exhibits and exudes a purple dye. Young shells show greater tumidity of the body-whorl.

9. DESCRIPTIONS OF TWO NEW SPECIES OF MARINE BIVALVE SHELLS FROM SOUTH AUSTRALIA. BY GEORGE FRENCH ANGAS, C.M.Z.S.

1. BARBATIA (ACAR) LAMINATA.

*B. testa subcylindraceo-oblonga, inæquilaterali, latere antico brevior rotundato, postico elongato, superne subangulato; albida, epidermide vix nulla; concentric fimbriato-costata, interstitiis valde excavatis; umbonibus tumidis, subdistantibus; ligamenti area angusta, subdeclivi.*

Long. 15 lin., alt. 7 lin.

*Hab.* St. Vincent's Gulf, South Australia (*Coll. Angas*).

This shell most nearly resembles *A. squamosa*, Lam., but is more elongate and cylindrical, with the umbones tumid and more distant. The sculpture of the concentric ribs consists of a series of hollow frills, whereas in the allied species it is always solid and tubercular.

2. SPISULA ADELAIDÆ.

*S. testa ovata, subcompressa, subsolida, albida, epidermide pallido-fulva induta; subæquilaterali, latere antico paulo brevior rotundato, latere postico subacuminato; margine ventrali convexo, dorsali antice rotundato, postice subcompresso, arcuato et superne obtuse angulato.*

Long. 9 lin., alt. 7½ lin.

*Hab.* In muddy estuaries, Port Adelaide Creek, St. Vincent's Gulf, South Australia (*Coll. Angas*).

10. CONTRIBUTION TO THE KNOWLEDGE OF THE BRITISH CHARRS. PART III. BY ALBERT GÜNTHER, M.A., PH.D., M.D., F.Z.S.

(Plate XL.)

Since the publication of my last paper on British Charrs\* I have received, among other examples, a most remarkable form, which, in the excessive development of its fins, differs from all the other species known to me from Great Britain and the continent of Europe. Only *Salmo grayi* from Ireland and *S. nivalis* from Iceland approach it in the length of the pectorals; but the former cannot well be confounded with it, having much larger scales and the body compressed and rather elevated; from the latter it differs in several points of minor importance, and especially in the increased number of pyloric appendages, which, besides, are extremely narrow and slender. For specimens of this Charr I am indebted to Mr. Gould, to whom they were sent by Mr. Hanbury Barclay, and who informs me that they inhabit a very retired loch in Inverness-shire, Loch Killin, about 2000 feet above the level of the sea. They are caught only in September and October, when they approach the edge of the loch to spawn.

This Charr was already known to the late Wm. Thompson, in whose work on the Natural History of Ireland, iv. p. 164, we find the following note:—

“About fifteen miles from Loch Corr is Loch Killin, situated in the pastoral vale of Stratherrick. Three specimens of char have thence been brought me. They are remarkably different from the Loch Corr example, are of a clumsy form, have very large fins like the Welsh fish(?), and are dull in colour, of a blackish leaden hue throughout the greater part of the sides, the lower portion of which is of a dull yellow; no red appearing anywhere. So different, indeed, is this fish from the char of the neighbouring localities, that it is believed by the people resident about Loch Killin to be a species peculiar to their lake, and hence bears another name,—‘Haddy’ being strangely enough the one bestowed upon it. This fish is only taken when spawning, but then in great quantities, either with nets or a number of fish-hooks tied together, with their points directed different ways. These, unbaited, are drawn through the water, where the fish are congregated in such numbers that they are brought up impaled on the hooks. The largest of my specimens is 16 inches in length, and others of similar size were brought to my friend at the same time—on the 26th or 27th September, when about a ‘cart-load’ of them was taken. The flesh of some was white and soft. They contained ova the size of peas. On dissection my specimens were found to be male and female; externally the sex could not have been told with certainty. Their stomachs and intestines were empty. This fish bears a resemblance to the Lough Melvin char, but differs from it in some characters.”

\* Proc. Zool. Soc. 1863, p. 6.







Considering this Charr to be one of the best-marked species of this genus, we propose for it the name of

*SALMO KILLINENSIS*. (Pl. XL.)

D. 14-15. A. 13. P. 13. V. 9. L. lat. 180. Vert. 62.

Cæc. pyl. 44-52.

Head and body thick, but slightly compressed; the greatest depth of the body equals the length of the head, and is two-ninths of the total length (to the extremity of the central caudal rays); the length of the head is a little more than one-half of the distance between the snout and the vertical from the origin of the dorsal fin. The lower jaw is rather shorter than the upper; and the maxillary extends scarcely beyond the hind margin of the orbit in adult males. Teeth very small. Snout obtuse; eye of moderate size, much shorter than the snout, and about half the width of the interorbital space. Suboperculum very short and high. Fins excessively developed; pectoral not much shorter than the head: dorsal long and high, the longest ray being nearly as long as the head (without snout), or shorter than the pectoral fin; the length of the last ray is two-thirds of the length of the base. The ventral fin extends nearly to the vent; caudal very broad, slightly emarginate. Head, upper parts, and fins brownish black; lower parts with an orange-coloured tinge in the male; sides with very small, light, inconspicuous spots. Anterior margins of the lower fins white or light orange-coloured.

The specimens are from 10 to 15 inches long.

11. OBSERVATIONS UPON A FIN-WHALE (*PHYSALUS ANTIQUORUM*, GRAY) RECENTLY STRANDED IN PEVENSEY BAY. BY WILLIAM HENRY FLOWER, F.R.S., ETC., CONSERVATOR OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

On the evening of Monday, November 13th, 1865, during a strong south-easterly gale, the body of a large Whale was thrown upon the beach in Pevensy Bay, Sussex, about 10 miles to the west of Hastings. It was claimed by the Hon. Board of Admiralty, and sold by public auction on the 15th, for the sum of £38, to a company of fishermen residing at Hastings and Eastbourne. I visited the spot, for the purpose of examining the animal, on the 16th, and also on the 20th and 21st, when the body was cut up by its owners for the sake of the oil which might be obtained from it, and with a view of preserving the skeleton. The difficulties attending upon the investigation of the external form and internal structure of one of these colossal creatures in the circumstances under which this one presented itself have been graphically described by Eschricht\*, and must be my excuse for the imperfection of the following notes.

When thrown ashore, the carcase was already in an advanced

\* Untersuchungen über die nordischen Wallthiere, p. 3.

state of decomposition; the cuticle was almost entirely lost from the surface, so that evidence of the original colour could only be obtained from isolated patches remaining here and there attached to the true skin, which was of a uniform dirty white hue. The surface was moreover in most parts covered with circular or oval pits, about an inch across and a quarter of an inch deep, in many of which fine parallel striations showed indications of teeth, apparently of Dog-fish. Friction against the shingly beach had in some places added to the destruction of the surface caused by natural decay and the attacks of the voracious little sharks. Thus the dorsal fin and the extremities of the flukes of the tail were greatly injured, the former reduced almost to shreds.

When I first saw the animal, it was lying much in the position in which it came aground, a little way below high-water mark. The ventral surface was uppermost, and more of the left side than the right exposed. The thoracic and abdominal regions were much distended with gas, well displaying the capabilities for extension permitted in the skin by the characteristic longitudinal furrows, most of which were opened to their widest extent. These furrows at once pronounced the animal to be a Rorqual, and the small pectoral limb showed that it belonged to the subfamily *Balænopterinæ*. A little further examination convinced me that it was an adult male of the common species of large Fin-Whale (*Physalus antiquorum*, Gray; *Pterobalæna communis*, Eschr.). Its general appearance agreed very closely, as far as one could judge in the unfavourable position in which it lay, with the figure given by Schlegel of a young individual (40 feet long) of this species, stranded, in 1841, at Katwijk aan Zee\*. It was, I should say, rather less slender in proportion to its length; but this was a point difficult to judge of in its unnaturally inflated condition. The lower jaw projected in a most marked manner beyond the upper, fully 18 inches.

The principal measurements (in taking which I was assisted by my friend Mr. J. W. Clark, of Cambridge) were as follows:—Extreme length, from tip of lower jaw, in a straight line to the end of tail, 67 feet; from the point of the upper jaw to the anterior angle of insertion of the pectoral limb, 21 feet; between the latter point and the posterior canthus of the eye, 6 feet 2 inches. Length of the opening between the eyelids 4 inches. Length of pectoral limb, measured from anterior angle of insertion, 6 feet 9 inches; from head of humerus, after it had been cut off, 7 feet 6 inches. Extreme width of caudal fin about 13 feet, allowing for the abraded points. Length of the tail (or of the base of each fluke) 3 feet 4 inches. Depth of the cleft at the end of the tail, between the flukes, 3 inches. Height of the greatly compressed bicarinated caudal extremity of the body, 4 feet from the commencement of the lateral expansion of the tail, 4 feet 6 inches; hinder end of dorsal fin to the end of the tail, 15 feet; from end of tail to middle of anal aperture, 17 feet 9 inches; from the latter to the hinder end of genital cleft, 2 feet 7 inches. Length of the cleft 2 feet 8 inches; from anterior end

\* Abhandlungen aus dem Gebiete der Zoologie, &c., 2tes Heft. 1843.

of the same to middle of umbilicus 4 feet 5 inches—the latter being thus 27 feet 5 inches distant from the end of the tail.

One of the most striking points in external conformation in which this Whale differs not only from all known toothed Whales, but from *Balæna*, *Megaptera*, and even most of the *Balænopterinae*, at least if the published figures of these animals are correct, is the great vertical depth of the much compressed caudal portion of the trunk, which changes little from the dorsal fin to the commencement of the lateral expansion, where the upper and lower sharp margins suddenly begin to converge, running as a strong keel for half the length of the flukes. The long, narrow, and pointed flukes have the hinder margin nearly straight. They presented in a very marked manner a peculiarity noticed by Dr. Murie in his account of a Fin-Whale captured at Gravesend\*, viz. that they do not set out, at least the anterior part of them, in the same plane from the middle line of the tail, but the right one sweeps at first upwards, and is therefore convex above, the left one sweeping as much downwards, and being therefore concave. This affects chiefly the anterior and inner third of each fluke; the posterior edges and outer ends appeared to lie in an even plane.

The furrowed region of the under surface commenced at about the middle of the lower jaw, and extended exactly as far back as the umbilicus, and on each side to the axillæ. The furrows were not symmetrical on the two sides of the body; they frequently divided at very acute angles, and united sometimes to the same, and sometimes to adjoining furrows; their general depth was  $\frac{1}{2}$  inch, and the intervals between them from 2 to 3 inches. The penis was extruded, and about 6 feet in length, cylindrical at the base, and regularly tapering towards the extremity. Its orifice did not resemble that described and figured by Dr. Murie†, but was single and terminal, with a deeply lobed margin. Immediately behind the root of the penis were two longitudinal grooves, about 10 inches long,  $1\frac{1}{2}$  inch deep, and 3 inches apart, slightly converging posteriorly. Each of these lodged a much compressed nipple, which reached in height to a level with the edge of the groove, and measured  $1\frac{1}{4}$  inch from before backwards, and rather less than  $\frac{1}{2}$  inch from side to side. They were of a pink colour, and had a soft, finely nodulated surface. These organs thus differed totally in situation from the rudimentary nipples of the male Porpoise, which are lodged in a single deep cavity behind the penis, having a minute aperture on the surface in the median line of what may be called the perinæum. The male mammary organs of the Cetacea were first described by Pallas in the *Beluga*, but appear to have remained unnoticed by any other author, until Eschricht verified their presence and fully described them in many different species‡.

The chin terminated in front by a slightly elevated vertical ridge; on each side of this were scattered somewhat irregularly, and extending over a space of 9 inches in length and  $2\frac{1}{2}$  inches in breadth, twenty-five distinct deep circular pits, mostly surrounded by a dark-coloured

\* Proc. Zool. Soc. 1865, p. 210.

† Ibid. p. 214.

‡ L. c. p. 83.

ring. These were evidently hair-follicles, from which the hairs had fallen out in consequence of the decomposition of the body; fortunately one hair still remained *in situ*; it was white, straight and stiff, about  $\frac{1}{2}$  inch long. It was so loosely attached that by the time I had brought home the piece of skin (now a preparation in the Museum of the Royal College of Surgeons) it was no longer to be seen. Whether any similar follicles existed on the outside of the upper lip I cannot say, as it was nearly buried in the shingle\*; the same reason prevented me getting a view of the blowholes. The part of the skin in which the external auditory meatus should have been situated on the side turned uppermost was, unfortunately, completely destroyed by one or more of the before-mentioned causes.

As to the colour, the remaining patches of cuticle on the upper surface of the body and the outer side of the pectoral fin were of a blue black; those on the whole under surface, from the chin to the tail, including the under surface of the fin, were white. A considerable portion of the large under lip was black. The cuticle remained attached to the bottom and sides of the furrows on the throat and abdomen, and, being in the greater part black, gave a very conspicuous appearance to the furrows when opened out, contrasting strongly with the white raised intervals. For a space of about 3 feet on each side of the middle line, on the throat, chest, and anterior half of the abdomen, the bottom and sides of the furrows were pink; on both sides of this and all across the posterior part of the furrows they were black. The demarcation between the two colours was very distinct; but where the pink epidermis approached the black, it was spotted or mottled with the latter colour.

A part to which the attention is sure to be soon directed in examining a Whalebone-Whale is the roof of the mouth; but the structure and mode of growth of the baleen have been so fully described by Hunter, Ravin, Rosenthal, and, finally, Eschricht and Reinhardt, that few further observations are necessary. The central portion of the palate, covered by a pale-coloured mucous membrane, formed a high angular ridge, like the roof of a house, posteriorly; but this gradually subsided anteriorly, until it became quite flat and very narrow (not more than 6 inches across). It expanded again in front to a width of 8 inches, and terminated by an almost abruptly truncated end. Around this the two sets of baleen met each other in the middle line, separating the palate by an interval of  $1\frac{1}{2}$  inch from the front of the hard and tense upper lip†. The distance from the front edge of the conjoined sets of baleen to the tip of the snout was 5 inches. The space was mostly covered by a rayed indentation, looking very like an old cicatrix; but as it was situated exactly in the middle line and tolerably symmetrical, it was probably natural.

The chief baleen blades were 23 inches long on their outer, some-

\* In Schlegel's figure above referred to, hairs are represented on the ends of both upper and under jaws.

† The two sets of baleen appear to meet in the middle line in front in all the Rorquals; but in the Greenland Right Whale (*Balæna mysticetus*) they are, according to Eschricht and Reinhardt, separated by a considerable interval.

what concave edge, including their hair-like termination, and 12 inches broad at the base; the whole set was 14 inches broad, the inner 2 inches being made up of four or five subsidiary blades, with straight, parallel sides. These are not mere detachments split off as it were from the inner side of the chief blade; for they are not even placed in a line with it or each other, but often in a line with the intervals between the main blades. The main blades, where they were largest, were set rather less than  $\frac{1}{2}$  inch apart; for in a space of 6 inches I counted fourteen blades. Anteriorly they decreased in size, and, in the part encircling the palate in front, consisted of little, isolated, irregularly scattered, very narrow blades, having an oval section, with the long axis in the direction of that of the head; their length at this part I could not ascertain, as they had all been cut off short. Posteriorly they also diminished, and the whole broad area from which the whalebone grew became covered with closely packed small blades, each ending in a flattened tuft of hair and gradually becoming narrower, until at the hindermost part they were resolved into a mat of fine hairs. The horny baleen was readily pulled off from its vascular matrix, a portion of which, removed from behind the middle of the right side of the palate, was obtained for the College Museum. The dense vascular layer (containing much oil) immediately investing the bone is about 1 inch thick; from this spring a series of transverse laminæ, exactly corresponding to the whalebone blades, both the large as well as the subsidiary plates. These laminæ, in the case of the largest plates, were  $1\frac{1}{2}$  inch in depth. They end in a fine fringe of hair-like bodies, about 4 inches long and gradually tapering to a point, which penetrate into the interior of the horny blade, and which serve for secreting the pulp of the whalebone hairs. The toughness and power of resistance to decomposition of these vascular secreting organs was very surprising.

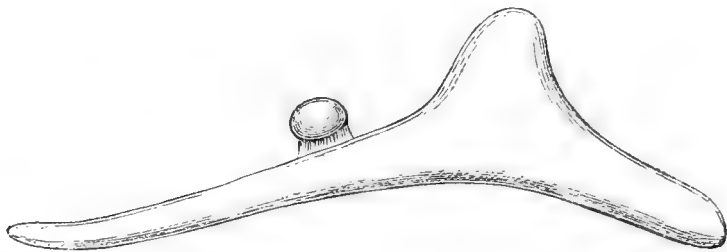
The colour of the baleen was certainly different from what it is usually said to be in the common Fin-Whale. The hairy terminal parts, as seen when looking into the mouth, were, from end to end of the series, of a uniform dirty yellowish white, resembling, in fact, the baleen of *Balænoptera rostrata*. The anterior smaller blades were entirely of a creamy white; and this colour prevailed throughout the whole series, though streaked longitudinally with slate-colour of varying intensity. In the middle and posterior part of the series the latter colour occupied about the outer half of the blade, and was most intense near the edge, so that when seen from without the set had a dark bluish colour.

Unfortunately, the decomposed state of the carcase and the hurry with which the operation of cutting up was conducted, added to the inclement state of the weather, prevented me from making any satisfactory observations upon the visceral anatomy. My principal attention was therefore directed to preserving the skeleton in a perfect condition, and observing, as far as opportunity permitted, the natural connexions of the bones. To save the rudimentary pelvic bones from the destruction to which they are almost invariably consigned, was of course my first care; but here I was nearly too late: these bones,

with the surrounding parts, had, before I arrived on the spot on Monday morning, been already severed from their connexion with the spinal column, and had to be sought for among a mass of most uninviting-looking carrion thrown upon the beach. Dr. Murie kindly assisted at this part of the examination; and we were not long in discovering their situation and in determining one of the most important points in the anatomy of this animal that has hitherto remained unsolved.

Many years ago Reinhardt discovered that, besides the ordinary elongated bone found on each side of the pelvis in all Cetacea, and to which the corpus cavernosum of the penis is attached, there is also, in the Greenland Whale (*Balæna mysticetus*), a second, smaller, more rounded bone, attached by ligamentous fibres to the outer side of the former. More recently it has been proved (Eschr. & Reinhardt 'On the Greenland Whale') that, at least in some, if not all specimens of the same animal, a third, still smaller bone is present, attached to the distal end of the second. In the *Megaptera* there is a second bone on each side, though smaller and less definitely shaped than in *Balæna*; but hitherto no trace of this bone has ever been found in any of the true Fin-Whales, although in one species at least (*Balænoptera rostrata*) it was carefully searched for by Eschricht. This distinguished cetologist was at first inclined to regard these accessory bones, especially as then only the one pair were known, as having their nearest analogy in the marsupial bones of the Marsupialia; but in his more recent work, written in conjunction with Reinhardt, they are regarded (and, I think, with much reason) as the homologues of the posterior extremities of the ordinary Mammalia—the first accessory bone representing the femur, and the second (found only in the *Balæna mysticetus*) the tibia.

On searching in the neighbourhood of the larger bone, I found, not indeed another bone, but a distinct nodule of cartilage, of a slightly compressed irregularly oval form,  $1\frac{1}{4}$  inch long and  $\frac{3}{4}$  inch across, enveloped in a fibrous capsule, and attached by fibrous tissue, at the distance of about  $\frac{1}{2}$  inch, to the outer side of the main bone,



rather in front of the middle. Both of the larger bones had this cartilaginous appendage, which I can scarcely doubt is the rudimentary representative of the hind leg of this colossal mammal.

The two bones forming the pelvis resembled each other very closely both in size and form, and were precisely similar in general



characters to the corresponding bones in the skeleton of the common Fin-Whale, now in the Alexandra Park; only they were  $2\frac{1}{2}$  inches shorter: their length was 16 inches. Rather behind their middle is a short strong angular projection; the posterior or shorter ramus is subcylindrical and truncated; the anterior or longer ramus is thin and flattened.

The other bones, as far as I could see them, confirmed the diagnosis of the species made from the external characters. There were 15 pairs of ribs, the last rib well-developed and attached to the transverse process of the corresponding vertebra; the first had no capitular process, but resembled that at the Rosherville Gardens, figured by Dr. Murie in these 'Proceedings' (1865, p. 224).

The lumbar vertebræ were fourteen in number. The tail is not yet sufficiently cleaned to count its bones. The sternum was more regularly cross-like than in any other *Physalus* I have seen, but still maintained its usual character of being broader than long, the dimensions being 23 and 22 inches respectively. The ends of the first ribs were articulated to its hinder ramus—their anterior borders being in close contact, and connected by strong fibrous tissue with the posterior margins of the projecting lateral arms of the sternum.

Although the animal appeared to be adult, a large portion of the posterior end of the upper border of the scapula, as much as a foot in depth, consisted only of cartilage.

One other observation may be worth recording, which is, that in taking off the skin from the bones of the forearm, on the inner surface, in the interval between the radius and ulna, were seen some well-developed muscles (the red fibres of which reached nearly to the lower end of these bones) ending in strong tendons, passing to, and radiating out on, the palmar surface of the hand. Circumstances prevented me from following out the details of their arrangement and distribution; but as in the Porpoise and those few other Cetaceans of which the limbs have been dissected no muscles are found below the elbow, and as they can, apparently, have little or no function, their presence is of considerable interest, and this notice may direct attention to their fuller investigation on some future occasion.

12. NOTICE ON RHODOPHYTON, A NEW GENUS OF ALCYONIADÆ, FOUND ON THE COAST OF CORNWALL. BY DR. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., ETC.

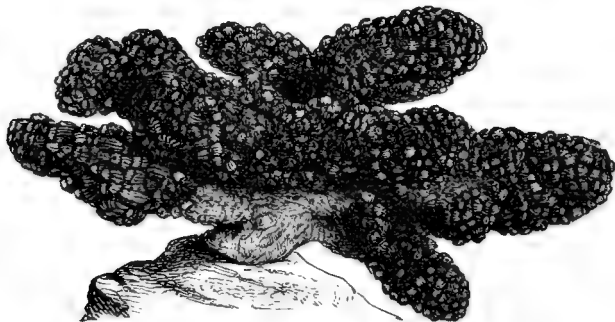
My friend Mr. Couch, of Polperro, has kindly sent to me for inspection a drawing which he has made of a fleshy Coral that Mr. W. Langham dredged on the coast of Cornwall, stating that he believed it differed from any described in Dr. Johnston's work, and thought it might be *Alcyonium exos* of Gmelin (the *Alcyonium palmatum* of Pallas), which it certainly is not. He has since sent the specimen to me for the British-Museum collection; and I have compared it with all the species that I know, and with the descriptions

of the different exotic species described by MM. Milne-Edwards and Haimes in the 'Histoire Naturelle des Coralliaires,' and I am inclined to believe that it has not been described by them.

### RHODOPHYTON.

Coral-flesh cellular, covered with a hard continuous calcareous coat, contracted at the base, expanded above, and divided into several oblong lobes or branches, covered with short cylindrical tubes with a circular mouth. Polypes half retractile, forming when retracted a white tubular termination to the cells. The more developed cells of the polypes, especially those at the end of the lobes, are longitudinally grooved.

This genus differs from the typical *Alcyonia*, or *Lobulariæ*, taking *A. digitatum* for the type, in the outer surface being covered with a continuous crustaceous coat, and in each of the polypes being enclosed in a distinct tubular sheath projecting from the general surface. It differs from all the *Alcyonia* in the polype being only half retractile; that is to say, the upper part of the body of the animal is fleshy and projects beyond the end of the calcareous tube—where the tentacles are retracted, making a white or whitish apex to the polype-tubes.



*Rhodophyton couchii.*

### RHODOPHYTON COUCHII.

*Hab.* British Seas, Cornwall, near Polperro (*Jonathan Couch, Esq.; Brit. Mus.*).

Dr. Hassall, in the 'Annals and Magazine of Natural History,' vol. vii. p. 285, thought he had discovered *Alcyonium rubrum*\* of Müller in Dublin Bay; but in the 'Annals and Magazine of Natural History,' vol. xi. p. 112, probably influenced by some observation of Mr. Macgillivray, he described this Coral as a new species, under the name of *Alcyonium glomeratum*, with the following diagnosis:—"Polypidom massive, of no very defined outline; colour a deep uniform red, the shade of which approaches to vermilion." He states that it is often to be observed growing on the same shell as *A. digitatum*, "each possessing its peculiar colour."

\* From an error of the pen, or of the press, it is called *Alcyonidium rubrum*.

Thus far his observation appears to be referable to a typical *Alcyonium*, or *Lobularia*, with sunken cells and completely retractile polypes; and I do not see why it may not be *A. rubrum* of Müller.

Mr. Couch, in the third part of the 'Cornish Fauna,' by his late son and himself, has described and figured a Coral under the name of *Alcyonium sanguineum* (t. 13. f. 1). Mr. Couch informs me that he regards the one he last sent to me as quite different from the one he described. Unfortunately the specimen he described does not appear to have been preserved; so that I cannot examine the type.

Mr. Couch's description is copied by Dr. Johnston in his 'History of British Zoophytes' (vol. i. p. 178). The generic form seems to agree pretty well with the Coral under discussion; but he specially describes the *cells as imbedded*, and the figure must be that of a typical *Alcyonium*.

Dr. Johnston, in the work before referred to, considers the *Alcyonium sanguineum* of Couch to be only a synonym or redescription of the *A. glomeratum* of Hassall, and describes it under the latter name, giving Hassall's diagnosis as the specific character; but I think that if any one will compare the description of Couch with the diagnosis of Hassall, he will see that they are most probably distinct.

Couch specially observes, "The protuberances in the *Alcyonium digitatum* are generally not very numerous; do not divide low down, but arise from the sides and edges of the larger lobes; are always stout, somewhat compressed, and more closely resembling the teat of a cow than the human finger." In *A. sanguineum* "the lobes are very numerous, and divide nearly as low as the base; they are elongated, cylindrical, and very nearly resemble the little finger both in shape and size." This description, in some respects, agrees with *Rhodophyton couchii*. But Mr. Couch particularly says, "the surface is rather rough, coriaceous, occupied by numerous spicula; the star-shape depressions are numerous, slightly depressed, yellow, marked with eight rays; the cells are imbedded;" which is the description of a true *Lobularia*, and very unlike the tubular cells and semiretractile polypes of *Rhodophyton*.

I may observe that Milne-Edwards, in the 'Coralliaires' (vol. i. p. 118), following Dr. Johnston, regards *Alcyonium glomeratum* and *A. sanguineum* as the same species, adopting the former name; but the character of the section to which he refers it, and which he gives as the character of the species, is copied from Couch's description of *A. sanguineum*, and does not in the least fit the description or the name which Hassall gives to his species. This shows how one mistake leads to many.

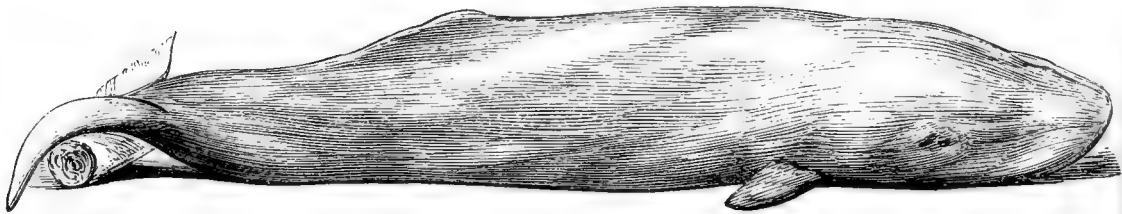
I am inclined to believe that *A. digitatum*, *A. rubrum*, Müller & Hassall (= *A. glomeratum*, Hassall), and *A. sanguineum* are all good species, and quite distinct from *Rhodophyton couchii*.

13. NOTICE OF A NEW SPECIES OF SPERM-WHALE BELONGING TO THE GENUS EUPHYSETES OF MACLEAY. BY GERARD KREFFT, CURATOR AND SECRETARY, AUSTRALIAN MUSEUM, SYDNEY, CORR. MEMB. ZOOL. SOC.

On Monday last, information reached me that a "Colt Whale" had been stranded at Manly Beach; and suspecting that it might be *Euphysetes grayii*, of which this Museum is in possession of the original skeleton, I immediately repaired to the spot, and found my supposition verified, as far as I could then judge, the toothless upper jaw, and the long, sharp-pointed, hook-like teeth of the lower jaw leaving no doubt in my mind as to the genus. With a view of exhibiting this rare visitor, some of the fishermen had carried the animal into a dark shed, strongly objecting to its removal for the purpose of photographing it. It was measured, with the following results:—

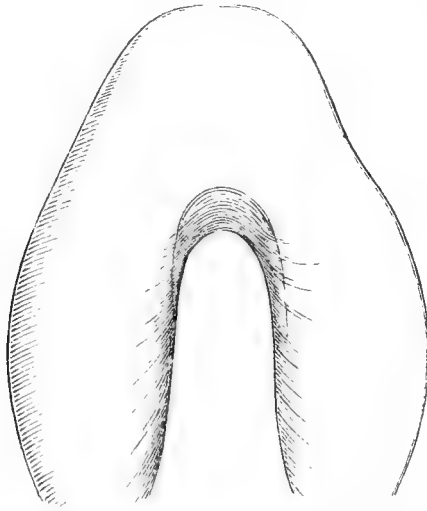
	ft.	in.
Total length .....	10	8
Breadth of tail .....	2	8½
Pectoral fin.....	1	7
Around body behind paddles.....	6	2
————— the eye.....	5	1
Before dorsal fin, or hump .....	5	3

Fig. 1.



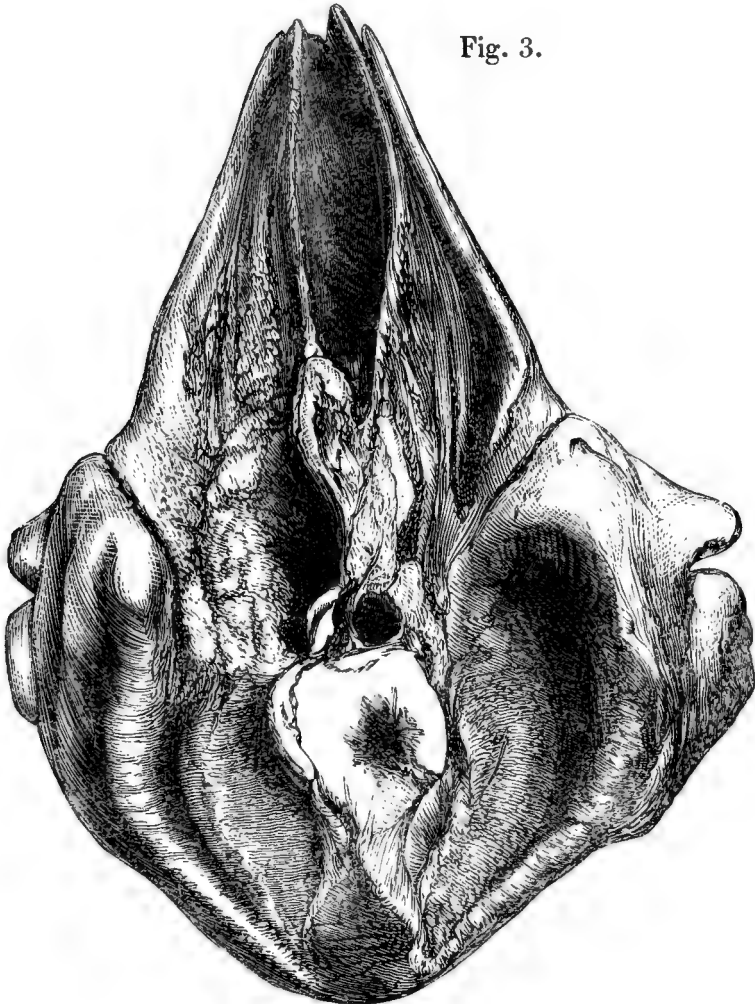
Colour black, yellowish beneath. The head is short and thick, rather broad, and the snout receding somewhat, like that of a shark (fig. 2). The mouth is small, the upper jaw toothless; but after removing the flesh two rows of holes, communicating with each other more or less, were observed; and I believe that teeth were probably imbedded therein at the time of birth, and subsequently shed. This, of course, is only surmise; but as no holes were noticed when flesh covered the gums, the holes could not be for the reception of the teeth in the lower jaw. Looking at the skull from above, it shows at first a remarkable resemblance to that of *Euphysetes grayii*, MacLeay, but the sides of the spermatic cavity, so sharp in Gray's Whale, are rounded off in the present species; and the blow-hole, which is fully 1½ inch in diameter in Gray's animal, is not quite an inch in the new one. The ridge dividing the cavity in this new Whale is almost formed into ivory, and many spots of the same substance are im-

Fig. 2.



Snout (from below).

Fig. 3.



Skull (from above).

bedded here and there in the less hard, darker, and porous bone. The lower jaw also much resembles that of Gray's Whale; but the sides are not so thin; the teeth are longer, stronger, and curved backwards, instead of standing out sideways. The rami in Gray's Cetacean are not much thicker than parchment. The teeth of the present species are thirteen in number in each ramus, the first three being almost straight, the next four gently curved backwards, and the last six almost hook-like. The seventh tooth, which is about half broken, is apparently the longest and strongest of the set.

If people only knew how valuable complete specimens of animals are to the naturalist, they would certainly not mutilate them as they often do; for had it not been for Mr. Skinner, who secured this Whale, all the teeth would have been knocked out to be made into "charms" for watch-chains.

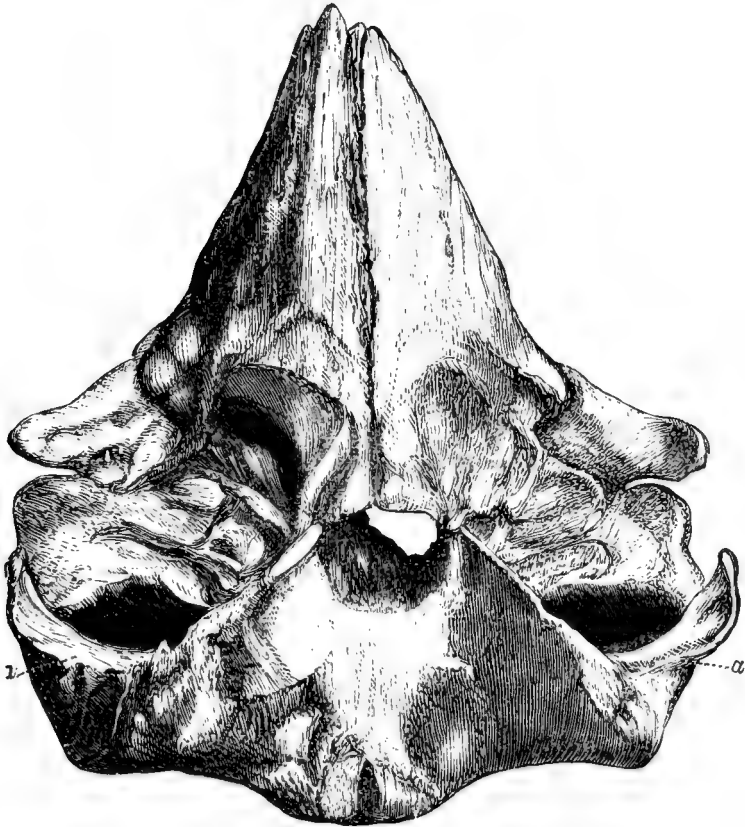
The spinal column consists of the anchylosed cervicals, thirteen dorsal, nine lumbar, and twenty-six caudal vertebræ, the first ten of which have V-bones attached to them. All the vertebræ are considerably larger and much more porous than those of *E. grayii*, the neurapophyses being very broad at the top. The total width of the atlas is 6 inches, its greatest vertical height  $5\frac{1}{2}$  inches, and length or thickness  $2\frac{1}{4}$  inches; this bone is so spongy that in holding it against the light one can see clear through the pores of the neurapophysis as through a sieve. There are thirteen ribs on each side, differing but slightly in length, as the following table will show:—

<i>Right Side.</i>		<i>Left Side.</i>	
	in.		in.
1	15	1	$15\frac{1}{2}$
2	22	2	22
3	25	3	25
4	26	4	$26\frac{1}{2}$
5	$25\frac{1}{2}$	5	$25\frac{3}{4}$
6	$24\frac{3}{4}$	6	25
7	$23\frac{1}{2}$	7	$23\frac{1}{2}$
8	22	8	22
9	19	9	$18\frac{1}{2}$
10	17	10	17
11	16	11	16
12	$11\frac{1}{2}$	12	12
13	$3\frac{1}{2}$	13	4

The respective weight of the two sides is—Right side, 5 lbs. 9 ozs.; Left side, 5 lbs. 8 ozs. Not one of these ribs is grooved like the eighth, ninth, and tenth in Gray's Whale. In shape they differ both from *Catodon* and from *Euphysetes grayii*, being rather rounder at the upper half, and becoming flat towards the end; the outside edges are strongly marked with a series of knobs or protuberances, which in the ninth and tenth are strongest. The sixth, seventh, eighth, and ninth ribs suddenly diminish in width about 6 inches from the end, after producing a sharp protruding ridge.

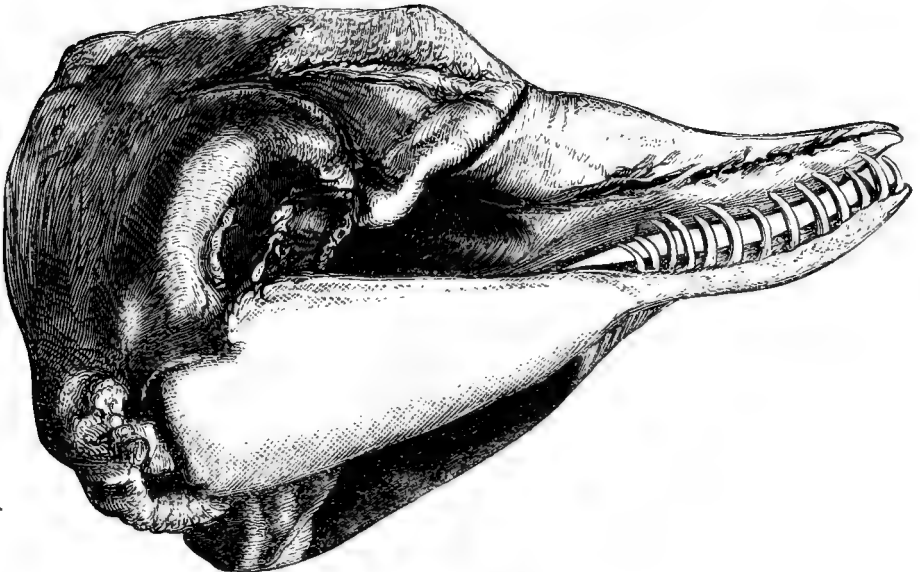
The scapular, the hyoid bones, the sternum, and the pectoral fins

Fig. 4.



Skull (from below).

Fig. 5.

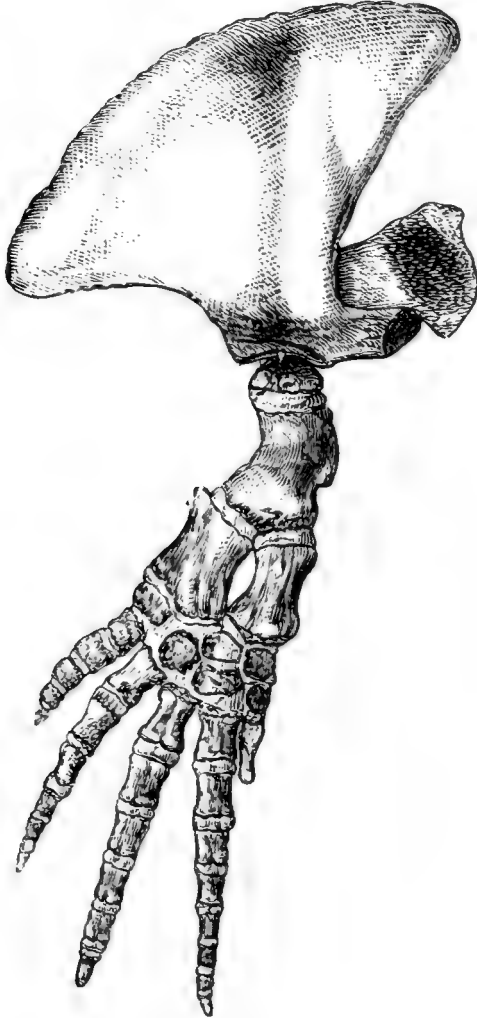


Skull (side view).

differ considerably from the corresponding parts in Gray's Whale; but these parts not being macerated, I shall give a full description of them at a future time.

The length of the spinal column is 7 feet 4 inches without cartilage; the head measures 18 inches, making a total of 8 feet 10 inches; the cartilage is very thick in some places, so that at least 1 foot 6 inches should be allowed for it; and the total length of the skeleton, when articulated, will therefore be 10 feet 4 inches.

Fig. 6.



I believe that I have proved that this Whale is different from the *Euphysetes grayii* of MacLeay; and I only regret that the great mind which established the genus is no more. Nothing would have given me more pleasure than to have seen this animal (which will



yield perhaps the most complete skeleton of a Cetacean ever discovered) described by William Sharp MacLeay. As it is, my feeble efforts must suffice; and being under deep obligations to the greatest naturalist Australia ever had, I wish to pay a slight tribute to his memory by proposing the name of *Euphysetes macleayi* for this new species.

DESCRIPTION OF THE FIGURES

(taken from the photographs forwarded by Mr. Krefft).

- Fig. 1. Outline of the whole animal.  
 2. Snout seen from below.  
 3. Upper surface of skull.  
 4. Under surface of skull.  
 5. Side view of skull, showing teeth *in situ*.  
 6. Bones of the pectoral limb. (Added from a photograph received subsequently to the original communication.)

14. ON A SUPPOSED NEW SPECIES OF FIN-WHALE FROM THE COAST OF SOUTH AMERICA. BY DR. H. BURMEISTER, FOR. MEMB.\*

I now send you the drawing of a bladebone of another species of Whale, which I received a few days since from a friend of mine for our Museum. The bone is taken from a skeleton of an animal cast on shore on the coast of the Samboramban Basin, near the mouth of the river Salado, to the south of Buenos Ayres; but as the people in the vicinity found that the vertebræ were very good to make chairs for their houses, they cut off the spines, and brought home only the bodies; each of them is said to be  $1\frac{1}{2}$  foot high. This bladebone was sent by the keeper of the farm there to the owner in Buenos Ayres, who has promised me to write immediately to his officer to send all the bones not yet broken to Buenos Ayres, when I hope I shall be able to send you further information. But the skull is said to be already entirely broken up and destroyed.

The bladebone is of an enormous size; and therefore I thought, before I had seen it, that it might belong to a true *Balæna*; but now that it is in my hands I find that it must belong to a Fin-Whale, because it is much broader than high. As you say in your paper that *Megaptera* has no coracoid process, or has only a very small one, this bladebone cannot belong to that genus; and therefore I suppose, from the enormous size, it may be that of a species of *Sibbaldius*, to which genus belong the largest Balænopteriidæ. It seems to be an unknown species, and, as I find no mention in your papers of such a Whale in this part of the southern hemisphere, I propose the name of *Sibbaldius antarcticus* for it; but you may change the name if you believe another more convenient.

I give you the description of the bone. It is mostly flat, and has the general figure of the third part of a circle, being half as high as broad. The outer margin is regularly curved, with an indication of

\* Extracted from a letter addressed by the author to Dr. J. E. Gray.

an obtuse angle on the hinder part of the circumference; towards the glenoid cavity it becomes much thicker, and has here the thickness of the diameter of that cavity. On the outside (fig. 1) the surface is somewhat excavated, with the indication of an obtuse radial crest on the fore part of the hinder half; on the inside the surface is flatter, and has five long and three short, obtuse radial elevated lines. The fore margin is thin, with the indication of an obtuse angle in the upper half, and under that angle are two descending small spines. The hinder margin is somewhat curved inwards, but more straight in the middle of its course. The acromion is a very large compressed process, which is somewhat broader and rounded at the end, and with two obtuse prominences on the under margin near to the base. The upper margin is very sharp, and continued on the outside of the bladebone as a sharp prominent crest. The coracoid process is half the size of the former, and

Fig. 1.

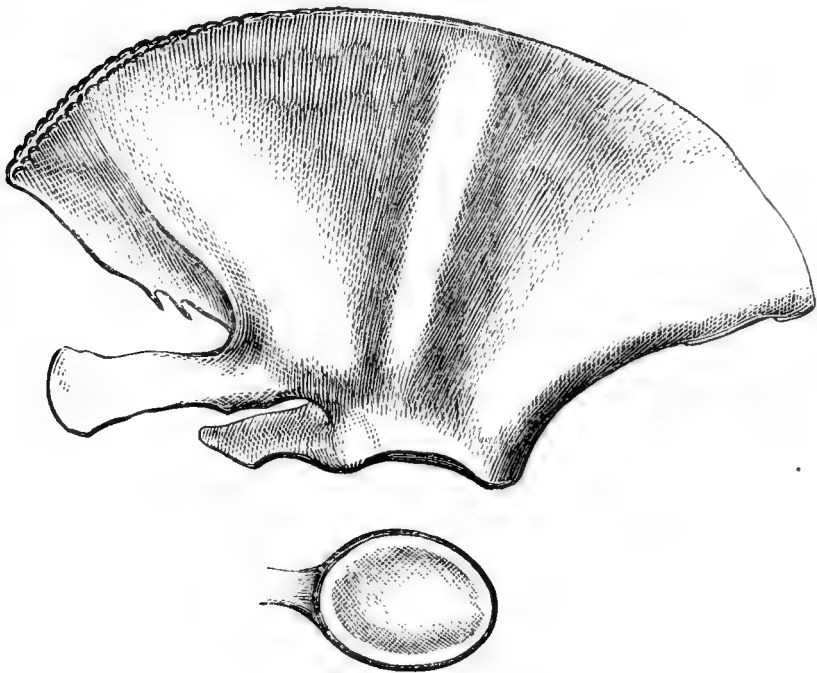


Fig. 2.

obliquely truncated at the end. The glenoid cavity (fig. 2) is a broad ellipse of a longitudinal diameter of 14 inches, and a transverse of 11 inches, but somewhat more curved on the outer than the inner side. The whole bladebone measures 6 feet from before backwards, and 3 feet from above downwards. If a horizontal line be drawn from the anterior to the posterior angle, the upper part of the vertical line which it intersects is 1 foot 11 inches high, the lower part 2 feet 1 inch. The acromion is 1 foot  $7\frac{1}{2}$  inches long, and 7 to

9 inches broad; the coracoid process measures 11 inches in length, and 5 inches in breadth.

DESCRIPTION OF THE FIGURES.

- Fig. 1. Outer surface of *scapula* of *Sibbaldius antarcticus*.  
2. Outline of the glenoid cavity.

15. ON A REMARKABLE DISCOVERY OF DIDINE BONES IN RODRIGUEZ. BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

When, a few months ago, I exhibited to the Society three bones of a species of Didine bird which had lately been found in Rodriguez by my brother and Captain Barclay\* (P. Z. S. 1865, pp. 199–201), and expressed the opinion that a rich reward awaited the careful explorer of the caves in that island, I had little notion that the fulfilment of my anticipation was so near at hand. Though I was sure that my brother's partial success would make him redouble his efforts to organize a systematic search of the caverns he had hurriedly visited in 1864 (see *Ibis*, 1865, pp. 146–154), yet the failure which had attended his many previous attempts to inspire others with the zeal he himself felt forbade me to be sanguine and to expect that any good or important results would immediately follow. It was therefore with extreme gratification that, while attending the meeting of the British Association at Birmingham at the beginning of September last, I received from him a letter, dated "Mauritius, 3rd August, 1865," from which the following is an extract:—

\* \* \* "Two days ago I received from Mr. George Jenner, the Magistrate of Rodriguez—to whom be all honour—a box containing Turtles' and Birds' bones. With pleasure I divided them, and found that of the latter there are remains of no less than *sixteen* or *seventeen* individuals! They are all apparently of one species, but of two sizes, the difference in this respect being probably owing to sex. The most plentiful bones are tibiae, of which there are two or three quite perfect, the antero-proximal ends being well preserved. There are also several very good femora and metatarsi, three portions of pelvis (showing most conclusively that they did not belong to a Struthious bird), one anterior end of a coracoid (showing the same fact), several humeri of both sizes, an ulna and two radii, and a phalanx of the middle toe. Of these, I believe that the upper end of the tibia, the portions of the pelvis and of the coracoid, the ulna, radius, and phalanx are bones which have not before been found, and are therefore doubly valuable. I retain here a couple of perfect legs of the two sizes for our Museum; but the rest I am sending home by this mail. It will be seen that there is one tibia which is much longer than any of the others; it is not a perfect one; but there is such a strong resemblance between them all that I feel sure they are but of

\* By a blunder on my part I before mistook this gentleman for a son of Sir Henry Barkly, the Governor of Mauritius, to whom he is aide-de-camp, and I consequently misspelt his name, which should be written as above.

one species. On reading over Mr. Bartlett's paper in the 'Proceedings of the Zoological Society' for 1851 (p. 280), I must say that I do not think he shows any good reason for supposing that the true Dodo ever existed in Rodriguez, or that remains of more than one species have been found in that island; and now that I have examined these bones, I am still more convinced of the fact.

"I am writing to Mr. Jenner to beg him to look out for some of the smaller bones, which I feel certain must exist; and, with any luck, I think we ought to get a perfect skeleton some day."

It appeared to me that the information contained in this extract was too interesting to be kept to myself, and accordingly I communicated it to Section D, on Monday, 11th September. Meanwhile our Secretary, Mr. Selater, with that readiness to promote the cause of science which always distinguishes him, moved, and finally obtained, the appointment of a Committee of the Association to assist my brother, Mr. Edward Newton, in his researches, a liberal grant of money being placed at its disposal for the purpose. Not long after, the bones, which I had been anxiously expecting, arrived, and I now have the satisfaction of exhibiting them to the Society—a satisfaction which is so lively that I do not feel humiliated by having to recant the opinion I entertained on a former occasion, and to acknowledge that Mr. Bartlett and myself were wrong in separating from the *Pezophaps*, or *Didus solitarius*, a so-called *D. nazarenus*, Bartlett (P. Z. S. 1851, p. 284)—the bones on which these two supposed species have been founded being in truth (as I now agree with my brother in believing) only specimens of the different sexes of the same species\*. I have not come to this conclusion without great deliberation; but it is impossible, I think, for any one to examine carefully the present large series of specimens and yet maintain a contrary opinion. The corresponding bones agree so entirely in form, in relative proportion, in everything but size, that I am unable to resist the inference that they belong to one species only. This inference however leads to other considerations, some of which I suspect are of importance.

The affinities of the extinct Didine birds to the order *Columbæ*, first detected by Professor Reinhardt, have, since the publication of the well-known monograph of Messrs. Strickland and Melville, met with pretty general acceptance among ornithologists. But, so far as I know, none of the existing *Columbæ* present any remarkable sexual distinctions, either in bulk or otherwise. As a group, the Pigeons are remarkably and, relatively to most birds, abnormally uniform in this respect. In the species to which the bones now exhibited belong, however, the contrary is most conspicuously the case; and one naturally turns to seek other instances in which a species differs

\* It is some consolation to me to find that Mr. Strickland (Trans. Zool. Soc. iv. pp. 187-196) was led into the same error—a pardonable one, I think, when the absence (from the series of eighteen bones described by him and Dr. Melville) of all bones of intermediate size, such as I now possess, is considered. Mr. Strickland retained his name *Pezophaps solitaria* for the supposed larger species, assigning the smaller bones to another, which he called *P. minor* (p. 191).

from most of its allies in a similar manner. Two, if not more, such instances will at once occur to every ornithologist. They are those of the Capercally (*Tetrao urogallus*) and the Great Bustard (*Otis tarda*). In both these birds, I believe, the disproportion in size between the sexes is not greater than is observable in the remains of the species now before the Society. But then another idea is called up: *Tetrao urogallus* departs from the usual habits of the *Tetraoninæ* by being polygamous; and (though I am aware that the statement has been disputed) the same is said to be the case with *Otis tarda*. Indeed I am inclined to suppose that with all species of birds the practice of polygamy is accompanied by a more or less considerable disproportion in the size of the sexes. Whether the converse proposition is true I am not in a position to declare. The account given of the '*Solitaire*' (and that these are the bones of *Solitaires* there can be, I believe, no reasonable doubt) by Leguat, and quoted at length from the old translation by Strickland, leaves it, I think, an open question whether this bird was polygamous or not, though that able naturalist (p. 54) considers it to have had monogamous habits; and certainly the statement of Leguat, that the male birds assisted in incubation, seems to confirm this view. The question is one which is not likely to meet with a solution now; but I would remark that it bears very little on the affinities of the bird, since a consideration of the cases I have cited of the Capercally and the Great Bustard shows that polygamous species may be very closely allied to others which are monogamous, and therefore, even if it could be proved that the *Solitaire* came under the former category, the fact would scarcely affect the theory of its Columbine affinities.

The collection of bones I now exhibit consists of specimens which may thus be roughly enumerated:—

	Large Size.		Small Size.	
	Right.	Left.	Right.	Left.
Femora . . . . .	4	5	2	4
Tibiæ . . . . .	7	8	9	7
Fibulæ . . . . .	2	0	0	0
Tarso-metatarsi . . . . .	5	5	0	6
Median digital phalanx . . . . .	1?	0	0	0
Humeri . . . . .	2	1	2	1
Ulnæ . . . . .	2	0	0	1
Radii . . . . .	0	1	0	1
Coracoid (anterior portion) . . . . .	0	0	1	0
Portions of pelvis . . . . .	1		3	

Some of the specimens, I must state, are not to be classed as above without hesitation. Though the difference of the extremes in size on either side is very great, there is a not inconsiderable number which are not so easily assigned; and of these most appear, from unmistakable characters, to be the bones of fully adult birds. But, again, in the case of *Tetrao urogallus* it is well known that the same thing is to be observed. The adult males of that species vary, even in the same locality, greatly in size, to whatever cause the fact be owing,

while the females in this respect agree more closely with one another. On the strength of this consideration I am inclined to presume that all the larger examples of the bones of *Pezophaps* or *Didus solitarius* are those of adult males; while all the smaller ones, among which there is not the same remarkable difference of size, are those of females.

I have further to remark that, during the late visit of Professor Steenstrup to this country, I had the opportunity of showing the present collection of bones to that eminent naturalist; and that he corroborated an opinion I had already formed, namely, that these specimens bear undoubted traces of the birds to which they belonged having been eaten by men or predatory animals. Professor Steenstrup has enjoyed such extraordinary opportunities of examining the remains found in the kitchen-middens of his own country, that his judgment on this point is hardly to be questioned. I much wish I was not compelled to come to this conclusion; for, if it be so, the experience of the Danish archæontologists shows that the chances of obtaining, I will not say a complete skeleton, but such a series as would contain a perfect specimen of every bone in the skeleton, are very much diminished, since some bones there are which, I believe, are never found under these circumstances. I confidently look forward, however, to receiving before very long a still larger collection of Didine bones from the Mascarene Islands, and in that expectation I forbear to enter into any detailed description of the examples now exhibited; for I hope that with increased material in my hands there may be submitted to the Society a paper upon them suitable for publication in our 'Transactions.'

16. REMARKS UPON THE AFFINITIES OF THE PRONGBUCK (*ANTILOCAPRA AMERICANA*). BY A. D. BARTLETT, SUPERINTENDENT OF THE SOCIETY'S GARDENS.

Notwithstanding that this remarkable animal has been the subject of considerable notice, I believe few naturalists have felt perfectly satisfied with its supposed affinities; none, however, appear to have hesitated to place it among the hollow-horned Ruminants. Once there, its most interesting structure and economy were altogether overlooked and unsuspected. No writer that I can find, has ever stated that this animal carries deciduous horns. This character has always been considered to belong exclusively to the Cervine group of Ruminants; and however much the Pronghorn differed from the Antelopes, still it has been retained among them upon this supposed distinctive character. I will now endeavour to prove that this animal's affinities are closer to the genus *Cervus*, to which I think it more nearly allied, than to the Antelopes. Although it does possess to a great extent the characteristics of the hollow-horned Ruminants, still I think I shall be able to show that the horns of the Prongbuck are a modification of the horns of *Cervus*, with a strong resemblance to and intermediate character approaching the hollow-horned Ruminants'. In support of this statement, I adduce the fact that the Prongbuck

sheds its horns ; and the evidence I am now able to produce and lay before you is positive and unmistakeable, although this has been denied repeatedly by many authorities. I call your attention to the following words of Messrs. Audubon and Bachman in their second volume of the 'Quadrupeds of North America,' p. 198.

"It was supposed by the hunters at Fort Union that the Pronghorned Antelope dropped its horns ; but as no person had ever shot or killed one without these ornamental and useful appendages, we managed to prove the contrary to the men at the Fort by knocking off the bony part of the horn and showing the hard spongy membrane beneath, well attached to the skull, and perfectly immoveable."

Another well-known and eminent writer and naturalist, the late Sir John Richardson, in his 'Fauna Boreali-Americana,' says of the Prongbuck, at page 268.

"The females are stated by some American writers to have horns like the males, although smaller ; but in one gravid and therefore at least nearly full-grown individual which I have examined, there was merely a short obtuse process of the frontal bone, scarcely to be felt through the fur and not covered with horn."

This was probably the first horn, which is doubtless covered with hair in its early stage of growth.

But in his recently-published work upon the Mammals of North America, contained in the Pacific-Railways Reports, Prof. Baird says (p. 667) :—

"The female sometimes has no horns externally ; frequently, however, there is a short horny tubercle of a few lines, occasionally two inches long ; it does not show any curve, however, although usually warty at the base. When horns appear wanting in the female, they may sometimes be found concealed among the hair of the head."

Many who are now present will remember that in the month of January last a living male Prongbuck was purchased by this Society, and placed in the Gardens. The animal, at that time, was thin, and in poor condition, probably owing to the voyage it had so recently made from North America. Its horns were about three inches long, and exhibited no signs of the prong. This, however, could be felt among the hair at the base of the then growing horn. The animal made but little progress or improvement in condition till about the month of April. At this time it much improved, and the horns showed signs of rapid growth, apparently becoming complete with the prongs at midsummer. This condition continued until about the middle of October, at which time the horns appeared to have again commenced growing : not only were they increased in length, but they spread wider apart at the points.

On the morning of November 7th, the keeper, somewhat alarmed, called my attention to the fact that one of the horns of the Prongbuck had fallen off (fig. 1, p. 720). I hurried to the spot immediately, fearing that some accident had happened, and reached the paddock in time to see the second horn fall to the ground. My astonishment was much increased at observing that two fine new horns were already in the place of those just dropped, that these

Fig. 1.



Horn, as shed.

new horns were soft and covered with long, straight, smooth, and nearly white hairs, and that the bony core (that I had expected to see) was thickly covered with soft new horny matter. These new horns appeared larger than the hollow portion of the horns just cast

Fig. 2.



Horn, just before it was shed, showing the new horn beneath.

—an appearance due to the fact of their having pushed off the shed horns by their growth. The long hair at the base of the horns (see fig. 2) had concealed the separation that was taking place.



I will again quote Messrs. Audubon and Bachman. In their volume previously referred to they remark (p. 204):—

“As to the shedding of the horns of this species, I never was able to ascertain it; but a fine buck we killed late in November had a soft space between the head and the horn, over the bone, that looked as if it had grown that length in one season.”

As a proof that the shedding of these horns was not the result of any disease or accident, I may remark that whenever the hollow horn of any Ruminant is broken or torn from its bony support, a copious discharge of blood immediately follows; and the horn so removed is never replaced by any subsequent growth. This remark applies equally to any injury done to the outer or velvety covering during the progress of growth of the solid horns of the genus *Cervus*: innumerable instances can be found; I will mention the following, which may be deemed sufficient to illustrate the truth of this statement.

A young male Nylghau (*Portax picta*) accidentally struck off the horny covering when these parts had become nearly full-grown, leaving the bony cores bare and bleeding; the bleeding continued a short time, and the bony stumps when dry became nearly black; the animal continued in good health, and bred with the females, and lived several years without the slightest sign of horny covering making its appearance.

I will not trouble you with further remarks upon this point, feeling it unnecessary, but proceed to direct your attention to the various forms and the differences in size to be found among the horns of the Prongbuck. I have selected a few illustrations from Prof. Baird's Report before alluded to, and these have been drawn and enlarged to life-size by my friend Mr. Jennens from a plate in that report. My friend, Mr. Moore, the Curator of the Derby Museum of Liverpool, has also kindly sent for my use the fine head and original horns that have been described by Dr. Gray, and figured in this Society's 'Proceedings' under the name *Antilocapra anteflexa*: to these I shall again allude.

Now this variation in form is more in accordance with my notions of *Cervus* than of the Antelope-type, in which no great diversity of form is found in the same species, while in the Deer-tribe the most remarkable variation is to be found in almost every species.

The Cervine characters consist, however, not only in a mere resemblance on account of diversity of form in the horns, but in the fact of their being deciduous, together with the hairy covering. But, in speaking of the affinities of this animal, I am struck by the peculiar resemblance it has to the Giraffe, not only in the structure of its horns, but in its legs and feet, the total absence of false hoofs, glands, &c. Nor can I avoid noticing the resemblance it bears to some of the Wild Sheep both in colour and general appearance, and in the thickness and structure of its coat. Here, again, its likeness to the Deer-tribe is most strongly marked—the white patch on the rump\*, the brittle hair, the fine legs, the elastic gait, the full, dark eye, and

\* A gland of considerable size exists in the back of this animal, immediately over the white patch.

the almost erect horns. But here, again, the Chamois is seen ; in fact it does appear to me that we have in this animal the elements of all the group—forcing one to call to mind the extinct monster *Sivattherium*, whose wonderful remains indicate to us a beast with four horns of great size, and, from their form, probably partaking of the characters of several different existing forms ; and the remarkable difference in form of the pair of horns in the fore part of the skull as contrasted with those behind, affords the ground for much speculation upon this subject.

But to return to the animal under consideration. May it not be one of the remnants of an extinct race, whose diversity of characters point out to us by a very easy method how one form may slowly glide to the right or to the left as it were, and by little alteration become a *Stag*, an *Antelope*, or a *Sheep* ?

The consideration of the peculiar structure and remarkable variation in the size and form of the horns of the Prongbuck has led me to believe that this animal may approach more nearly to the genus *Cervus* than to any other ; and this idea prompts me to suggest that the hairy covering in which the newly-formed bony core is enveloped during the growth of the Stag's horns is the homologue of, and should be regarded as representing, the horny part which is more strongly developed on the bony cores of the hollow-horned Ruminants—or, in other words, that the so-called solid-horned Ruminants (*Cervus*) shed their horny, hairy, dried, vascular covering at the completion of the growth of the bony core.

This explanation of the process of the development of all horns appears to me more probable and natural, inasmuch as the covering of the deciduous horns is always, or nearly always, hairy, while these hairs have their terminal roots upon the inner surface, and this character is carried out in a most remarkable manner in the horns of the Prongbuck.

The hairs connected with this structure are not only very numerous, but pass completely through the horny structure, extending from the base of the horn upwards above the prong. In proof of this, I was myself astonished when taking a cast of the internal part of the hollow horn ; the cast, upon being withdrawn, presented the appearance of the specimen now before you.

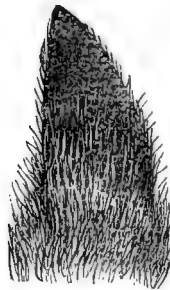
It is probable there may be objections offered to this theory of the growth of the so-called solid horns, seeing that, in the early condition of the budding forth of the new horn, the parts are largely supplied with numerous blood-vessels, and from their power to deposit rapidly the bony matter, the increase of which carries out at a marvellously rapid rate this vascular and cuticular or tegumentary covering. By the rapid growth of bone, the outer covering becomes thin, and the circulation is cut off at the base by the increase and development of the bur. As its functions cease it soon becomes withered, and is shed, leaving the branching bony structure to fall off after the rutting-season.

If this be the correct explanation of the growth of some of the structures now under consideration, I think a considerable difference

will be found in the growth and formation of the horns of the Prongbuck; it will be seen that the bony core is much smaller, when compared with the cavity or hollow space in the horny casing, than in any other hollow-horned Ruminant that I am acquainted with. This fact, I think, will show that the space admits of the growth and formation of the new horn, the bone being thickly covered with vascular integument; and the hairs appear to grow upon the surface of this, beneath the old horn; the extreme point appears first to put on the horny matter (see fig. 4, p. 724); this increase of growth, acting like a wedge, forces the old horns upwards and outwards until they fall off.

An examination of the cast horn from the living specimen at the Gardens, shows clearly the structure and the singular manner in which the hairs pass through the horny substance; that they do so is clearly to be seen by the casts now on the table. Being a little puzzled, on looking into the cavity of the cast horns, at the small size of the hollow, I determined to take a cast of the interior; for this purpose I melted some gutta-percha and filled up the hollow space, and as soon as it had become hard, I withdrew the specimen before you, covered, as you see, with the hairs in the same manner as the new horns on the head of the living animal: the roots of these hairs having become fixed in the gutta-percha, were drawn through the minute openings in the horn. This can be done easily upon any of the specimens of the shed horns of this animal.

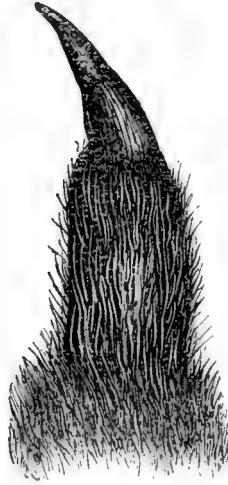
Fig. 3.



With reference to the frequency of the shedding of the horns of this animal, I can only offer a surmise. Judging from the rapidity of the growth of the young horn, I reasonably conclude that it occurs annually. In support of this, it may be remembered that our animal's horns in January last were barely 3 inches in length, while by June of the same year they were fully formed, and measured 8 inches; they were cast the first week in November—that is, on the 7th; the new horns on that day (see fig. 3) were about 4 inches long; they are now, this day, 6 inches long, having grown 2 inches in twenty-one days (see fig. 4).

Besides this, we have the testimony of Messrs. Audubon and Bachman, as previously quoted, that in the month of November they found in the buck killed by them the soft space between the horn

Fig. 4.



and the skull, which they supposed to be due to that year's growth. A still further proof bearing upon this conclusion will be equally well seen in the fine specimen now before the meeting, kindly lent by my friend, Mr. Moore, from the Derby Museum at Liverpool; this example is evidently from a larger and older animal, as is shown by the superior size of its horns. The core upon which the freshly-developed horn rests has been removed from the hollow horny cavity; and it will be seen that it has already attained a length of  $6\frac{1}{2}$  inches, in this respect being larger than that of the Society's animal when first shed.

One remarkable feature yet unnoticed is the absence in the new horns of the curved or hooked point. This part of the subject necessarily requires further observations during its growth; but I have already noticed that the extreme horny point is moveable at the apex of the bony core. This suggests to my mind the possibility of the point assuming a contrary direction during its growth, probably by an accident; and this would well account for the remarkable disposition of the specimen now before you from the Liverpool Museum, described and figured in the Society's 'Proceedings' for 1855 (p. 10), by Dr. Gray, under the name of *Antilocapra anteflexa*. I am therefore inclined to believe that this individual does not represent a different species, but a deformity of growth.

Having, I hope, at least, proved beyond all doubt the deciduous nature of the horns of the Prongbuck, and alluded to what I consider its affinities, and these considerations being founded principally upon the character of the horns, I am obliged to admit the great difficulty I see in the classification or arrangement of the Ruminantia upon this character only, seeing that in both Deer (*Cervus*) and Antelopes the females, in some instances, carry horns, and in the smaller members of the family the males as well as females are without these appendages. Nevertheless I believe there is no other

character of equal importance, and that by an increased knowledge of these structures a nearer approach to the perfect arrangement of this important group will be made.

In concluding, I think I have shown—

- 1st. That the Prongbuck is not a true Bovine animal.
- 2ndly. That this animal sheds its horns.
- 3rdly. That the structure of these organs appears to be imperfectly understood.

#### DESCRIPTION OF THE FIGURES.

Fig. 1. Perfect horn when shed, November 7th.

2. Old horn in process of being thrown off, showing the separation between the old and the new horn.
3. New horn, as it appeared when the old horn had been shed.
4. New horn after twenty-one days' growth.

#### 17. SHORT ACCOUNT OF PART OF A SKELETON OF A FINNER WHALE, SENT BY MR. SWINHOE FROM THE COAST OF FORMOSA. BY DR. J. E. GRAY, F.R.S., F.L.S., V.P.Z.S., ETC.

Mr. Swinhoe has sent to the British Museum part of the head, three cervical vertebræ, the first and seven other dorsal vertebræ, and eight ribs of a large Finner Whale which was thrown ashore on the coast of Formosa. The bones are nearly of the size of similar bones of the European Finner (*Physalus antiquorum*), which often reaches to the length of 60 or 70 feet, and they most probably belong to an animal nearly of that size.

The second and third cervical vertebræ are united, as in the small Finner (*Balænoptera rostrata*) of Europe, while in all the larger Finners which are as yet known these two bones are always free.

This union of the second and third cervical vertebræ is one of the characters by which the genus *Balænoptera* is separated from the genus *Physalus*. The front part of the neural canal has the sub-circular form of that of the genus *Balænoptera*, and not the oblong, transverse form of the neural canal in *Physalus*. I am therefore inclined to refer these bones to the genus *Balænoptera* until we know more of the skeleton and external form of the animal.

I am, however, inclined to believe that when the animal and its skeleton are better known it will be found to have some particular characters, as the forms of the bodies of the vertebræ and the lateral processes show some alliance to the genus *Physalus*. It is to be regretted that the number of the vertebræ, the form of the lumbar vertebræ, and the form of the first ribs were not observed; and they are all required to determine with certainty to what genus it must hereafter be referred. It may for the present be designated

#### BALÆNOPTERA SWINHOII.

The second and third cervical vertebræ are united by the anchy-

losis of the neural arches. The second cervical vertebra (figs. 1, 2) has large, broad, truncated lateral processes with a large, oblong,

Fig. 1.

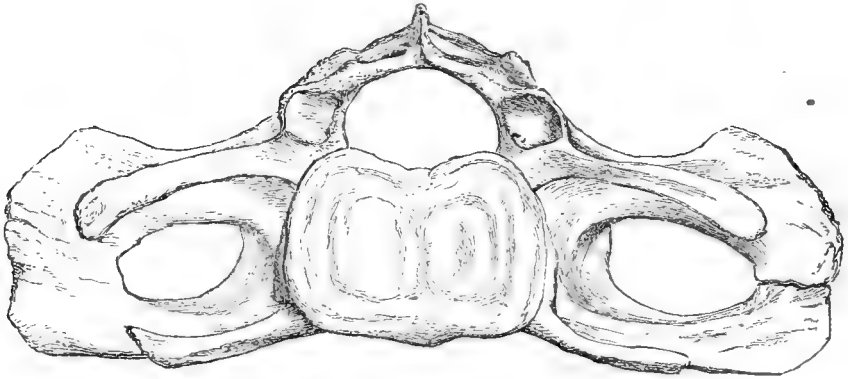
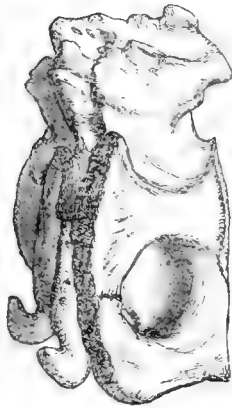


Fig. 2.



subcentral perforation; the lateral processes are each two-thirds of the transverse diameter of the articulating surface of the body of the vertebra. The neural canal of the second cervical vertebra subcircular, rather less high than broad, and not quite so wide as half the diameter of the front sides of the body of it. The third cervical vertebra (see figs. 1, 2) has a thin, oblong, transverse body, which is broader than high; the lateral processes are slender, truncated at the end, not so long as the transverse diameter of the body, curved towards each other at the end, but not united so as to form a ring. The neural canal of the third cervical vertebra is oblong, transverse, rounded above, as wide as half the transverse diameter of the body of the vertebra, and about one-third broader than high. The rest of the cervical vertebræ are free, not anchylosed either by the bodies or neural arches. The fifth or sixth cervical (see figs. 3, 4) has a thin body, with slender, nearly straight upper lateral processes, and

Fig. 3.

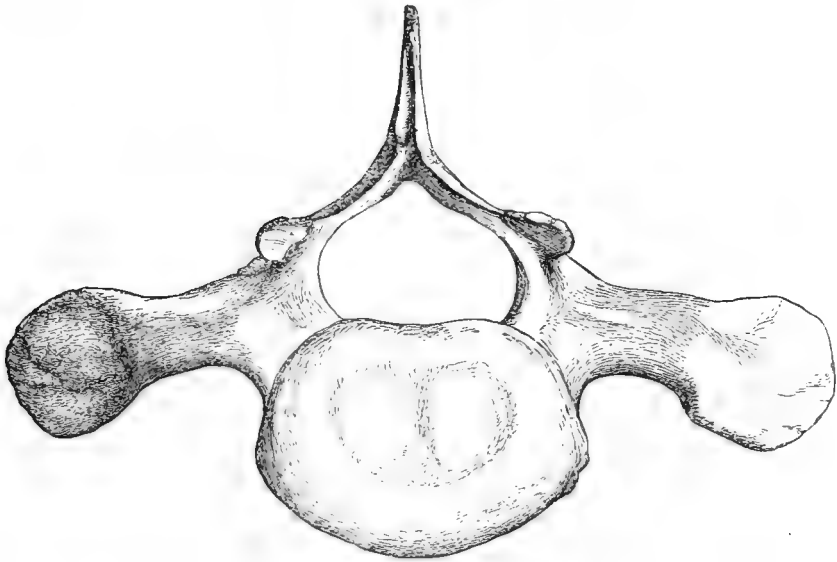
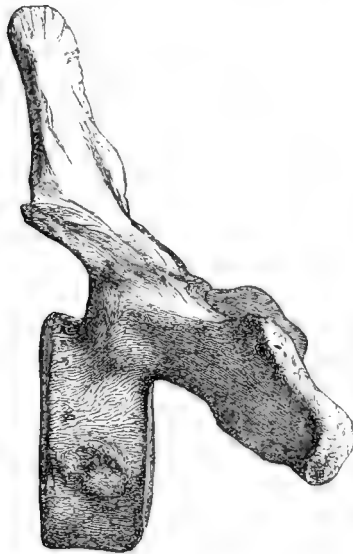


Fig. 4.



only a very short tubercle on each side below. The first dorsal vertebra (figs. 5, 6, p. 728) has a very high dorsal spine, a rather small, oblong body, a strong lateral process on each side above, which is expanded at the end. The eight ribs have simple heads.

These bones seem to show an animal three times as large as the *Balaenoptera rostrata* of Europe.

Fig. 5.

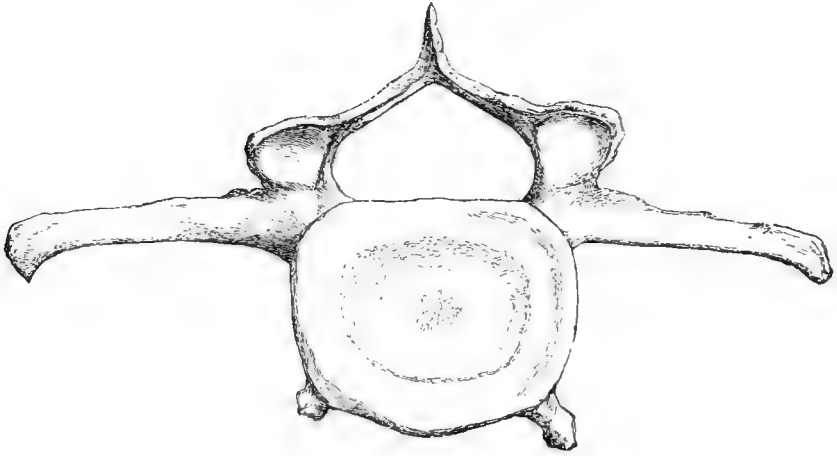


Fig. 6.



## DESCRIPTION OF THE FIGURES.

- Fig. 1. Back view of the second and third cervical vertebræ united together by the neural arches.  
 2. Side view of the same vertebræ.  
 3. The back view of the fifth or sixth cervical vertebra.  
 4. Side view of the same vertebra.  
 5. The back view of the first dorsal vertebra.  
 6. Side view of the same vertebra.



18. DESCRIPTION OF A NEW SPECIES OF CETONIA, WITH REMARKS ON THE ALLIED SPECIES. BY ARTHUR G. BUTLER, F.Z.S., ASSISTANT, ZOOLOGICAL DEPARTMENT, BRITISH MUSEUM.

SCHIZORHINA EBENINA.

*Crassa, lata, tota nigro-ebenina; clypeus elongatus, emarginatus; thorax marginatus, a latere depressus; scutellum triangulare; elytra marginata; pedes spinosi.*

Clypeus black, elongate, triangularly notched in front, laterally reborded, coarsely and densely punctured, depressed behind the eyes; mandibles clothed with reddish hairs; eyes lateral, pitchy. Thorax shining black, with marginal ridge; emarginate in front; narrower in front than behind; nearly as broad as the elytra; punctured all over, more densely and coarsely at the sides. Scutellum shining black, nearly triangular, a patch of coarse punctures on each side. Elytra shining black, with a marginal ridge and longitudinal equidistant lines of small but regular punctures. Pygidium transversely wrinkled. Body beneath shining black; head and centre of thorax clothed with black setæ; mesosternum compressed, produced, abruptly pointed in front; abdomen coarsely punctured. Legs black; femora compressed, those of fore and middle legs coarsely and rather densely punctured, that of fore leg densely clothed with black setæ; femur of hind leg more sparsely and finely punctured; middle and hind legs with fewer setæ; tibia of fore leg compressed, coarsely punctured, outer edge trispinose, inner edge with a marginal line of minute black setæ and terminated by a long spine; tibia of middle leg cylindrical, coarsely punctured above, smooth below, its inner side clothed with black setæ, its outer edge unispinose, its apex tridentate and unispinose; posterior tibia elongate, subcylindrical, strongly punctured except at its apex, outer edge unispinose, inner edge clothed with long black hairs, apex tridentate and bispinose; tarsi five-jointed.

Length 18 lines.

*Hab.* Oceania. Exact locality unknown.

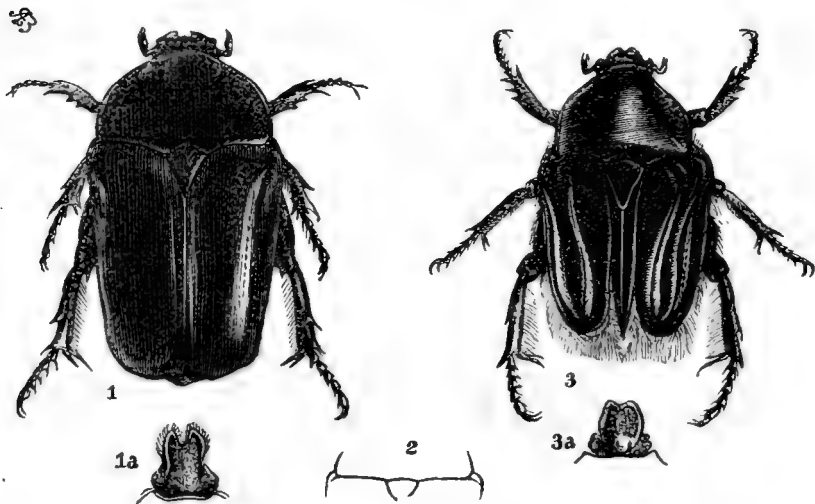
Closely allied to *Cetonia flammula* (Voyage au Pôle Sud, Zool. iv. p. 132, pl. 9. f. 4), but differs from it in the following particulars:—

The thorax is punctured all over, but much more coarsely at the sides; the scutellum is only punctured at the sides, not at the base; the elytra have no red patch, and are distinctly and regularly punctured. It also differs from the *figure* of that species in being much broader and more robust, the thorax also being much broader in front and much more deeply sinuated behind. The legs in the *figure* are so badly executed, and the description of them goes so little into detail, that it is impossible to say whether they agree or not.

Also closely allied to *Schizorhina idæ*, White (Proc. Zool. Soc. 1856, p. 16, pl. xli. f. 7), but differs from it in its entirely different colouring, greater proportionate length, more perfectly punctuated and more distinctly margined elytra, in having the sternum much

more abruptly pointed in front, and the thorax more depressed in front and more distinctly margined.

This species is the largest in the genus, being longer by two lines than *S. nortoni*, the species which I described in the 'Annals and Magazine of Natural History,' September 1865.



#### DESCRIPTION OF THE FIGURES.

- Figs. 1, 1 a. *Schizorhina ebenina*.  
 3, 3 a. *S. nortoni*.  
 2. Back of thorax of *S. flammula*.

December 12, 1865.

Dr. J. E. Gray, F.R.S., Vice-President, in the Chair.

Dr. Gray communicated the following extract from a letter recently received from Prof. W. Lilljeborg, For. Memb. :—

“A Paris j’ai été très-intéressé de voir les squelettes des Cétacés, qui sont là dans le Jardin des Plantes, et avant tout de voir les squelettes des Balénidés. J’ai vu là un exemplaire empaillé et le squelette appartenant d’un jeune individu de *Balænoptera musculus* (ou *Physalus antiquorum*) d’une longueur de 14 mètres, échoué à l’embouchure de la Seine en 1847. Au commencement j’étais convaincu de trouver dans cet exemplaire une autre espèce que *Physalus antiquorum* et la même que votre *Benedenia knoxii*, puisqu’il montrait du côté gauche la même forme d’*épistropheus* et des autres vertèbres cervicales; mais j’ai vu après cela qu’il avait les procès transvers d’*épistropheus* du côté droit annuliformes, ou formant un anneau

complet, quoique l'anneau analogue du côté gauche de l'*épistropheus* n'avait pas encore été achevé. Le nombre des vertèbres était 62 (justement le même que j'ai trouvé au squelette du *Physalus antiquorum* à Bergen en Norvège); dont 7 cervicales, 14 dorsales, 16 lumbosacrées, et 25 caudales. Les côtes étaient 14 paires. Les os d'*antibrachium* (*radius* et *ulna*) étaient un peu plus minces que chez l'adulte *Physalus antiquorum*, mais pourtant pas si minces que chez *Sibbaldius laticeps*. La première paire des côtes avait tout-à-fait la même forme que celle que vous avez décrite et figurée (P. Z. S. 1864, p. 214, fig. 2) comme la seconde; peut-être la 1<sup>re</sup> était perdue. Outre cela en voyant que les procès transverses de l'*épistropheus* du côté droit étaient soudés et annuliformes je me trouvais nécessité d'accepter l'opinion du Mr. Flower que votre *Benedenia knoxii* est la forme jeune du *Physalus antiquorum*.

“Il y avait à la cour auprès du muséum d'anatomie comparée un presque complet, mais pas justement articulé, squelette d'un *Eubalæna*, qui avait échoué sur la côte de Nouvelle Zélande et qu'on avait étiqueté comme une *Balæna australis*; mais c'est une espèce tout-à-fait différente, sans doute votre *Eubalæna antipodarum*. Elle n'a qu'un rudiment d'acromion à l'omoplate, et la forme du même os est en outre très distinctive. La caisse (*os tympanicum*) était perdue. Les fanons étaient fixés à leur place sur ce squelette. Il y avait aussi un petit modèle en plâtre de l'animal.”

In reference to his note on the supposed occurrence of the European Sea-Eagle in North America, published in the Society's 'Proceedings' for 1863\*, Mr. P. L. Sclater stated that the second Eagle of the pair obtained by Mr. A. W. Crichton in Nova Scotia had died in Lord Lilford's possession in immature plumage, and that the skin of the bird had been transmitted to Prof. Baird for the collection of the Smithsonian Institution. Prof. Baird was of opinion that it was probably referable to *Haliaëtus leucocephalus*.

The bird obtained in Newfoundland and presented to the Society's collection by Mr. J. Rendall, which Mr. Sclater had supposed to be *H. albicilla*, had now completed its autumnal moult, and had turned out to be a female of the American Sea-Eagle (*H. leucocephalus*).

It followed, therefore, that Mr. Sclater had made a great error in supposing these birds referable to *H. albicilla*, and that there was at present, as far as he was aware, no authority for the occurrence of that bird on the mainland of North America.

The Secretary read a letter addressed to him by Dr. C. J. Smith, late Inspector-General of Hospitals, Madras Army, calling his attention to the following paragraph in the 'Times of India':—

“Capt. B. F. Heysham writes as follows:—‘Should you deem the following facts worthy of notice, I have much pleasure in placing them at your disposal. One of the Government Elephants of the Thyetmyo establishment gave birth to a fine male calf on the 3rd of August, 1865; and as, I believe, the period of gestation with Elephants

\* Proc. Zool. Soc. 1863, p. 251.

is not generally known, the following particulars may prove interesting:—She first paired, with a wild Elephant, on the 18th of December 1863, and on various occasions between that and the 8th of January 1864, which gives 593 days from the first date. For the first twelve months, although we carefully watched her, there was no such increase of size or alteration of shape as would indicate that she was in calf; but in the thirteenth month, *i. e.* January 1865, it was discovered that she had milk; and this was the first reason we had to consider her in calf. The secretion of milk so long before calving seems extraordinary and worthy of remark. The young Elephant when born weighed 175 lbs., and was 2 feet 10 inches high.’”

Mr. A. Newton read a letter addressed to him by Mr. George Clark, announcing the discovery in Mauritius of some bones of the Dodo (*Didus ineptus*), which would shortly be transmitted to this country for sale.

The following papers were read:—

1. NOTICE OF SOME NEW SPECIES OF SPIDER MONKEYS (ATELES) IN THE COLLECTION OF THE BRITISH MUSEUM. BY DR. J. E. GRAY, F.R.S., F.L.S., V.P.Z.S., ETC.

The first two of these Spider Monkeys, when they were alive, were considered to be unlike any that had before been in the Society's Gardens. Since they have passed into the collection of the British Museum, I have carefully compared them with all the specimens we have in that collection; and they seem to be distinct from any we before possessed, or that have been noticed in the 'Systematic Catalogue.'

The first three species here described belong to the section of the genus that has the inside of the leg of the same colour as the outside.

The first has been named by Dr. Sclater, in the last edition of the 'Catalogue of the Vertebrated Animals in the Gardens of the Society,' the "Grizzled Spider Monkey;" and I gladly adopt the specific name he has proposed.

1. ATELES GRISESCENS, Sclater, MS.

Fur moderately long, black, with many silvery-white hairs interspersed; tail black, underside greyish; hair of the forehead moderately long; face —? thumb none.

"Grizzled Spider Monkey," Sclater, List of Vert. Anim. in Zool. Gard., edit. 3, 1865, p. 6.

*Hab.* —? British Museum.

This species is very like *A. ater* and *A. paniscus*, but is at once known by the silvery hairs intermixed with the black ones, and the pale colour of the underside of the tail. There is no approach to these characters in any of the specimens of these species in the Museum.

## 2. ATELES CUCULLATUS.

Fur very long and flaccid, blackish silvery grey; the crown and nape, the hands, and feet black; sides of the rump blackish; hair of the crown very long, forming a large hood expanding over the eyebrows; face reddish, large; orbits black.

*Hab.* —? British Museum.

The colour of the back is produced by the intermixture of a nearly equal quantity of very long blackish and grey hairs; the hairs of the crown and the hands and feet are short and black to the base.

## 3. ATELES FUSCICEPS, Fraser, MS., 1848.

Black; hairs rather long, shining, crisp, some of the longer ones of the back with indistinct brown tips; crown of the head rusty-brown; hands stout.

*Hab.* South America. British Museum.

Received from the Museum of the Zoological Society.

The fourth species belongs to the group that has the inside of the legs and the under part of the belly white, of which *A. belzebuth* is the type. In that species the underside of the tail is white in all the specimens we possess, while in the one now described the underside of the tail is black at the upper part. But the present species is at once distinguished from that and all the other *Ateles* I have seen by the thickness, softness, and length of the fur. I therefore propose to call it

## 4. ATELES VELLEROSUS, sp. nov.

Black, loins rather browner; head, outside of the limbs, the upper and lower surface of the tail deep black; throat, chest, belly, and inside of the limbs greyish white; hair very abundant, soft, and flaccid; thumb none.

*Hab.* ~~Brazil?~~

The white on the inside of the arms does not approach so near the hands as in *A. belzebuth*; and the fur on the head and body is much longer, and spreads out in all directions.

## 2. NOTICE OF SOME NEW SPECIES OF MARMOSET MONKEYS (HAPALE AND MIDAS). BY DR. J. EDW. GRAY, F.R.S., V.P.Z.S., ETC.

The species of the American Monkeys are extremely difficult to distinguish, and perhaps the Marmosets are as difficult as any; at least, if we are to judge by the works of preceding zoologists, they must be so. Some have formed them into a multitude of species, every slight variation being regarded as a species; others, as Lesson, who only worked from books, have reduced them to a small number. In doing this, they have evidently been misled by the descriptions, and have placed together species that they would never have united if they had seen them in life or in a museum. I have been naming a few

of the lately received specimens in the Museum ; and this has induced me to re-examine several that have been in the collection for years.

The species of *Hapale* may be separated into four groups :—

- I. *Ears naked, external, exposed, with a band of elongated hairs across the inner surface of the conch, forming a tuft. Tail annulated. Hapale.*

HAPALE AURITA, Geoff.

Blackish, minutely punctulated with yellow or red ; sides of the head, limbs, and hinder part black-brown ; face more or less white ; ear-tuft grey, varies ; back blackish, without any indication of cross bands.

Var. Back punctulated with red and with faint pale cross bands, especially on the loins.

*Hab.* Brazil.

A large and strong species, much larger than *H. iacchus*. Lesson united it to that species, and Isidore Geoffroy in his Catalogue places it with them, not having observed the peculiarity in the position of the tuft.

I do not know *H. humeralifer*, Geoff.

- II. *The ears naked, with a tuft of elongated hairs on the front edge of the ear-opening. Hair of sides of head elongated. Tail annulated. Iacchus.*

HAPALE IACCHUS.

The back cross-banded ; face with a white spot ; the ear-tuft black, white, or grey.

I am inclined, from the examination of a large series of specimens, to believe that this species varies in the colour of the ear-tuft and also in the extent of the white on the face. From these characters M. Geoffroy divides it into four species, viz. *I. vulgaris*, *I. albicollis*, *I. penicillatus*, *I. leucocephalus* ; but these appear to me to be only slight local or accidental varieties. They are all of the same size, and they gradually pass into each other.

- III. *Ears small, with scattered short hairs, without any ear-tuft ; sunk in the long fur of the head. Tail annulated. Cebuella.*

HAPALE PYGMÆA, Spix, Bras. t. 24. f. 2 ; Castelnau, Expéd. Amér. Sud, t.

- IV. *Ears naked, exposed, without any ear-pencil. Tail uniform black. Mico.*

HAPALE MELANURA, Geoff.

Pale brown ; head, limbs, and front of body pale ; front edge of thigh and band across loins white ; tail black.

*Iacchus leucomerus*, Gray.

Albino var. *Simia argentata*, Linn.

*Hab.* Bolivia.

To the species of *Midas* described by M. Isidore Geoffroy may be added, from the British Museum Collection.

#### 1. MIDAS LEUCOGENYS.

Black ; back and outside of hinder limbs washed with reddish grey ; face and lips black, with a large triangular white spot under each cheek.

*Hab.* Brazil.

#### 2. MIDAS RUFOVENTER.

*Midas elegantulus*, Slack, Proc. Acad. N. S. Philad. 1861, p. 463.

*Iacchus rufoventer*, Gray, Ann. N. H. xii. p. 398 (1843).

*Hab.* Brazil.

This species is at once distinguished from *M. labiatus*, with which it has been confounded in the collection, by the spot on the crown of the head and the nape, and by the rufous colour of the under part coming much more forward, nearly to the throat. In *M. labiatus* the black terminates on the front of the chest, in a straight line. It differs from *M. mystax* in the small size of the whiskers, and in the body not being black, but red below.

### 3. DESCRIPTION OF THREE SPECIES OF DOLPHINS IN THE FREE MUSEUM AT LIVERPOOL. BY DR. J. E. GRAY, F.R.S., F.L.S., V.P.Z.S., etc.

Mr. Thomas Moore, the Curator of the Free Museum at Liverpool, has kindly submitted to my examination the skeletons of three Dolphins, which have lately been most liberally presented to that institution by Captain Walker, of the ship 'Trenton.' During a voyage from India to Liverpool the Captain not only collected the specimens, preserved the bones, the tails, and the pectoral fins, but he also made drawings of the animals when they were first caught. These drawings Mr. Moore has sent to me with the skeletons for examination and comparison. A reduced representation of each of these accompanies this paper. The drawings are accompanied by models cut in pasteboard of the dorsal fins, evidently made by tracing the fins on the paper. In two of these the end of the fin is much produced backward, leaving a concave hinder margin. In the other the end is not so much produced, as the hinder edge is nearly straight.

The skull of each of the animals has the bladebones attached to it.

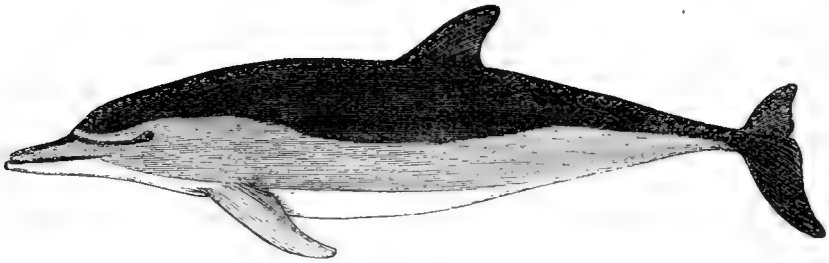
The skulls indicate two very distinct species of Dolphins, belonging to different sections of the genus ; and the drawings show that two animals having nearly similar skulls are very differently coloured—a fact which it is very interesting to have so verified.

Two of the skulls belong to the restricted genus *Delphinus*, which has *D. delphis* for its type. These have a very deep groove on each side of the palate.

Both the figures of the animals belonging to these species have a narrow black streak from the base of the upper part of the beak to the eye; but the colours of the sides of the animals are differently distributed. There is also a very slight difference in the form of the bladebones (and this cannot be sexual, as they were both females), and in the form of the back part of the palate just in front of the hinder entrance to the nostrils.

Considering that the colouring of the animals shows that they represent two species, one is struck with the very small difference exhibited in the skull by species showing such marked external differences, and can only conclude by thinking how hasty we have been in referring skulls received from very distant parts of the world all to *Delphinus delphis*, and saying that that species has a very wide geographical distribution, more especially when we consider that these two species were obtained, the one in lat.  $35^{\circ} 38' S.$ , long.  $10^{\circ} E.$ , and the other in "lat.  $34^{\circ} S.$ , long.  $7^{\circ} W.$ .\*—*Grote.*"

Fig. 1.

*Delphinus moorii.*

### 1. DELPHINUS MOORII.

Beak of skull elongate, depressed, once and three-quarters the length of the brain-cavity, and five times as long as the width at the notch at the base. The intermaxillary bones rather convex. Teeth small, slender,  $\frac{44}{48} \cdot \frac{44}{48}$ , five in an inch length of margin; the front upper very small. The groove on the palate deep and wide, reaching nearly to the lip, and wider and very shallow in front. The hinder part of the palate in front of the inner nasal opening with a broad, triangular, longitudinal groove, having flat sides and convex outer sides. The bladebone rather produced behind the ridges and truncated at the lower part of the hinder edge. Coracoid process large, subtrigonal, the front edge being truncated, the lower one oblique. Length of skull  $17\frac{1}{2}$  inches, of beak 11, of brain-case  $6\frac{1}{2}$ , of

\* The captain seems to have had a Swedish assistant; for the model of one of the dorsal fins is marked in Swedish, and the measurements are altered from Swedish to English feet and inches.



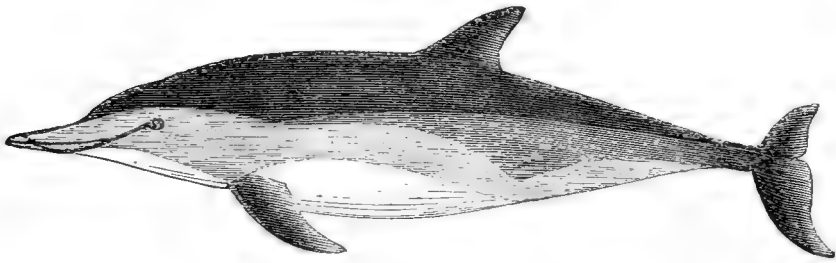
lower jaw  $14\frac{1}{2}$ ; width over condyles 7, at notch 3 inches 7 lines, at middle of beak 11 inches.

The upper surface of the beak, a narrow lunule over base of beak to the eye, the back, dorsal fin, and upper surface of tail black; a narrow lunule over the face-streak, the sides of the head, and sides, including the pectoral fin, grey; the chin and belly to the vent white. Dorsal fins high; tip rounded.

*Hab.* Lat.  $34^{\circ}$  S., long.  $7^{\circ} 3'$  W.

Length of a female from mouth to tip of tail 6 ft.  $3\frac{1}{2}$  in., of mouth 11 in., of snout  $5\frac{3}{4}$  in., to eye 1 ft. 1 in., to snout-hole 1 ft. 1 in., to pectoral fin 1 ft.  $6\frac{1}{2}$  in., to back fin 2 ft. 9 in.; length from end of tail to back fin 2 ft. 3 in., to vent 1 ft. 8 in., to privates 1 ft. 9 in.; diameter of back-fin 1 ft.  $2\frac{5}{8}$  in.

Fig. 2.



*Delphinus walkeri.*

## 2. DELPHINUS WALKERI.

The skull similar to the former, so similar that it is not easy to point out any difference in words. The teeth are rather more numerous, viz.  $\frac{47}{49} \cdot \frac{47}{49}$ , rather smaller, being six in an inch length of margin.

The hinder part of the palate in front of the inner nasal opening narrower and very sharply keeled on the sides; the sides of the narrower and shallower central groove convex, smaller, and of the outer sides concave and shorter.

The bladebone not so much produced behind the ridge, and with an oblique hinder margin, without any truncation at the lower part. The coracoid process is similar, but broader in the middle of its length, the lower edge being nearly straight.

Length of skull  $16\frac{1}{2}$  inches, of beak 11, of brain-case  $6\frac{1}{2}$ , of lower jaw  $14\frac{1}{4}$ ; width over condyles 6 inches 7 lines, at notch 3 inches 4 lines; at middle of the beak 1 inch 10 lines.

The back-fin, snout, the dorsal fin, a wavy streak from base of beak to eye, and upper surface of tail black; sides of the face and body to near the base of the tail grey, with an elongated triangular patch beginning below the pectoral fin and extending near to the base of the tail, the broadest part over the vent. Dorsal fin high, as high as long at the base; tip acute, bent back. Chin and body beneath, as high as the base of the pectoral fin and to the vent, white.

*Hab.* Lat.  $35^{\circ} 38'$  S., long.  $10'$  E. A female.

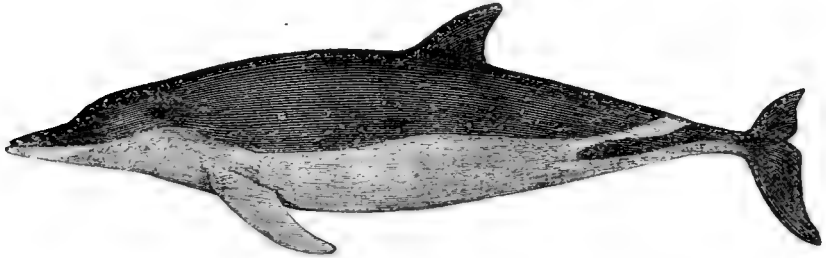
PROC. ZOOLOG. SOC.—1865, No. XLVIII.

Length from end of snout to tip of tail 6 ft.  $7\frac{1}{2}$  in.; the other measurements are nearly the same as in *D. moorii*.

The third skull belongs to the section of the genus *Delphinus* which I have named *Clymene*, which has the palate of the skull flat, without any lateral groove.

The figure represents this animal as black, greyer beneath, and with small white spots on the sides.

Fig. 3.



*Clymene punctata.*

### 3. CLYMENE PUNCTATA.

The beak of the skull once and one-half the length of the brain-cavity, depressed behind, and gradually tapering and rather slender in front; its length nearly three times the width at the notch. Lower jaw attenuated and slender, and rather bent up in front, without any gonyx. Teeth small, slender,  $\frac{40}{38} \cdot \frac{40}{38}$ , five in an inch of margin. The palate flat; the hinder part of the palate in front of the internal nostrils broad, swollen, having a very shallow central groove with rather convex inner, and very oblique, flat, external sides.

Length of skull  $15\frac{1}{2}$  inches, of beak  $9\frac{1}{4}$ , of brain-case  $6\frac{1}{4}$ , of lower jaw  $12\frac{3}{4}$ ; width over condyles  $6\frac{1}{2}$  inches, at notch 3 inches 4 lines, in middle of beak 1 inch 8 lines.

The two bladebones are rather different in general form, one being more truncated behind than the other; they are both truncated in front; and in both the coracoid process is large, with a short upper and a long, straight lower edge; one has a long, regularly arched, and the other an equally long, but sinuous, upper edge, showing that, in considering these distinctions as specific, some allowance must be made for occasional variation.

The skull is much like some of the skulls I have named *Clymene doris*; but perhaps I have included several species under that name, as some of the skulls differ in the form of the hind part of the palate. The one here described differs from all of them in having a more slender and attenuated beak.

Dorsal fin high, rather acute at the tip. General colour of body black; sides with minute white specks; the side of the body above the base of the pectoral to the base of the tail blackish grey, which colour is obliquely extended as a lunate band from behind the vent to the back near the base of the tail.

Length from end of snout to tip of tail 6 feet, to blowhole 1 ft.  $\frac{7}{8}$  in.,

to the eye 1 ft.  $\frac{7}{8}$  in., to front of dorsal fin 2 ft.  $8\frac{1}{4}$  in., to base of pectoral fin 1 ft.  $3\frac{3}{8}$  in.; length from tip of tail to back-fin 2 ft.  $4\frac{3}{8}$  in., to vent 1 ft.  $6\frac{7}{8}$  in.; diameter of body behind back-fin 1 ft.  $1\frac{1}{2}$  in., of snout  $4\frac{5}{8}$  inches, of mouth  $9\frac{5}{8}$ .

*Hab.* "Lat.  $16^{\circ} 40'$  N., long.  $21^{\circ}$  W.—*Grote.*"

4. NOTES ON A SPIDER MONKEY (*ATELES CUCULLATUS*, GRAY)  
LATELY LIVING IN THE SOCIETY'S MENAGERIE. BY DR. J.  
MURIE, PROSECTOR TO THE SOCIETY.

An adult male specimen of this Spider Monkey was purchased by the Superintendent of the Society's Gardens from a dealer in Liverpool in May 1865. It was said to have come from South America.

The animal seemed in a fair state of health until shortly before its death, which took place on the 23rd of August, 1865.

Immediately on receipt of the body, notes were taken of the colour and general appearance, wherein it differed somewhat from the known species of the genus; and Dr. Gray has thought these sufficiently characteristic to entitle the animal to a separate specific name. His description of the same from the skin\* embodies the distinctive differences. It, however, may be worth while remarking that while alive the skin around the orbits and upon the nose was bare, and of a brownish flesh-colour with darker freckles intermixed (somewhat sunburnt-like). The cheeks and lower jaw were also nearly bare of hair, but the skin more decidedly of a black shade.

The following measurements were taken shortly after the animal had died:—

Body: Length from vertex of cranium to root of tail . . . . .	14 $\frac{1}{2}$	inches.
— of tail . . . . .	27 $\frac{1}{2}$	
Girth at chest, widest part . . . . .	11	
— at abdomen . . . . .	9	
— of tail at root . . . . .	4	
— a few inches from the point . . . . .	2	
Head: Depth from vertex to base of lower jaw (barely) . . . . .	3	
Antero-posterior diameter . . . . .	4 $\frac{1}{2}$	
Breadth of vault at opening of ears . . . . .	6	
— from one to the other of external edges of orbits . . . . .	2 $\frac{1}{4}$	
Fore limb: Length of shoulder to elbow-joint . . . . .	6 $\frac{1}{2}$	
Cubital region, elbow-joint to wrist . . . . .	7	
Length, palm of hand to tips of fingers . . . . .	4 $\frac{3}{4}$	
Greatest breadth, palm of hand . . . . .	1 $\frac{1}{4}$	
Hind limb: Length from hip to knee-joint . . . . .	6 $\frac{1}{4}$	
—, knee to sole of foot . . . . .	6 $\frac{1}{2}$	
—, sole of foot, heel to tip of middle toe . . . . .	6 $\frac{1}{4}$	
Sole of foot, average breadth . . . . .	1 $\frac{1}{4}$	
— greatest breadth at ball of great toe . . . . .	2	

*Post-mortem Examination.*—The viscera did not exhibit any marked

\* See *anteà*, p. 733.

lesion sufficient to have caused death. The various organs, particularly the intestinal tract, had their tissues watery and flabby. The absorbent and mesenteric glands were somewhat enlarged, and contained strumous deposit within them. Death evidently resulted from defective nutrition, which I have already several times observed to occur in those South American Monkeys.

*Anatomy of Viscera.*—These were compared with those of *Ateles frontatus* and *Ateles belzebuth*. The *lungs* agree with the first species, excepting in having the upper lobe of the left side smaller than the lower; in *A. frontatus* they are about equal in dimensions; all three species have four holes in the right, and two in the left lung.

*Liver.*—This measured across, from the outer margin of the right to that of the left lobe, 5 inches, and from the anterior to the posterior border  $4\frac{1}{2}$  inches. As in *A. frontatus* and *A. belzebuth*, this organ is large according to the size of the body. The right half, as in them, is divided into two equal-sized portions, with an anterior deep fissure their whole breadth. The left half is separated from that of the right side by a very deep superior and inferior cleft. It also is divided into two lobes, the upper or cystic of a somewhat heart-shape, and as large as the two on the right side taken together. The gall-bladder, which is capacious and long, lies in a wide and deep fissure, excavated in the cystic lobe. The lower lobe of the left half is about equal in size to one of those in the right half. The lobus Spigelii is very small and wedge-shaped; there are two slight lateral indentations behind; this lobe is rather more deeply divided in *Ateles belzebuth* and *A. frontatus*.

The *stomach* is similar to what is found in *Ateles belzebuth*—namely, a moderately rounded cardiac end, and with the pyloric extremity narrowed and, as it were, drawn out. Length  $7\frac{1}{4}$  inches; greatest breadth at cardiac end  $2\frac{1}{2}$  inches, at centre of viscus  $1\frac{1}{2}$  inch; pyloric end narrowed, fully 3 inches long, and  $\frac{1}{2}$  an inch in diameter.

*Small intestines* 72 inches in length. *Large intestines*, including the cæcum, 18 inches; the cæcum itself is of a simple elongated conical form, and  $3\frac{1}{4}$  inches long.

*Spleen* wedge-shaped, with an additional elongated process at base; length 2 inches, and  $\frac{3}{4}$  of an inch across at the broadest part.

*Kidneys* simple, uniform, and agreeing with the two above-named species; the same may be said of the *suprarenal bodies*.

*Brain* not examined.

##### 5. OBSERVATIONS UPON PRESBYTES ALBIGENA, GRAY, AND COLOBUS GUEREZA, RÜPPELL. BY JAMES MURIE, M.D., PROSECTOR TO THE SOCIETY.

The distinctive relation of the group of Indian Monkeys first generically arranged by M. Fréd. Cuvier\* under the name of *Semnopithecus*, chiefly upon the essential character of a quinque-cuspidate posterior molar, has been subsequently, and on better

\* 'Histoire Naturelle des Mammifères,' &c., livr. 30.

grounds, confirmed by the dissections of M. Otto\* and Prof. Owen†, who have described the very peculiar sacculated condition of the stomach belonging to this genus.

Another group of African Monkeys, *Colobus*, Illiger‡, separated on account of the rudimental development of the thumbs of the anterior extremities, illustrated in species by Ogilby§ and other authorities, has also been shown by Prof. Owen|| in one species, the *Colobus ursinus*, Ogilby, to possess a pouched stomach and other viscera almost identical with that of *Semnopithecus entellus*.

In the 'Proceedings' of this Society for 1850, p. 77 and plate xvi., Dr. Gray defines and figures what he considers a new species of *Semnopithecus* (supposed to have come from West Africa) under the designation *Presbytis albigena*. This, in external appearance, bears resemblances to *P. obscurus*, although it is more like *P. melalophus*, but differing from this in being black, and, as he says, "can scarcely be a black variety of that species."

There was some doubt as to the African habitat of this new species, until M. du Chaillu brought home some skins of the animal from Gaboon, which cleared up that point. In remarking upon these specimens, a writer in the 'Natural History Review' ¶ expresses doubts as to the propriety of the species being classed along with the genus *Presbytis*. The writer remarks—"Now that its African habitat is fully established, a more accurate examination will probably show the necessity of removing this Monkey from the Asiatic group *Presbytis*, with which it has been hitherto arranged."

To a certain extent this has already been done, although clear reasons, so far as I am aware, have never been given. The stuffed skin of the typical specimen, mentioned above, is at present in the British Museum, marked *Presbytis albigena*, Gray; but the skull of the same I find, on reference to the published 'Catalogue of Bones of Mammalia,' 1861, p. 14, to be named *Cercocebus albigena*.

A specimen of this rather rare creature having lately died at the Society's Gardens, my attention has been called to its greater affinities with *Cercocebus* than that of *Semnopithecus* (*Presbytis*). The animal in question was a female from Africa, about half-grown, and sent on approval by Mr. Cross, dealer, Liverpool. It lived in the Gardens for a period of two months, and died the latter end of October (1865). From the first it was weakly and delicate, but took its food tolerably well.

As the creature was apparently younger than the typical specimen described by Dr. Gray, it may be worth while noting the differences. His description of colour and general appearance agrees closely; but in the present one the throat, sides of neck, and front of chest were

\* Zoological Journal, vol. iii. p. 249.

† Transactions Zool. Soc. vol. i. p. 65.

§ P. Z. S. 1835, p. 97.

‡ Prodrromus Syst.

|| P. Z. S. 1841, p. 84.

¶ "The Fauna of Equatorial Africa" (N. H. R. 1861, p. 292), being a critical review, chiefly based upon the works of the traveller M. P. B. du Chaillu and of the naturalist Dr. G. Hartlaub of Bremen.

not quite greyish, but rather of a dirty-brown colour; hair of the cheeks also of the same shade, some of them black and not greyish; iris yellowish brown, pupil dark blue.

The following are the dimensions, as taken after death:—

	inches.
Length, body, back of neck to root of tail . . . . .	11
———, tail . . . . .	22 $\frac{1}{2}$
———, head, muzzle to occiput . . . . .	6 $\frac{1}{2}$
———, head, muzzle to base of ear in straight line . . . . .	3
———, head, across cranial vault to meatus . . . . .	5 $\frac{1}{2}$
———, arm, shoulder-joint to wrist . . . . .	8 $\frac{1}{2}$
———, palm of hand to tip of fingers . . . . .	3 $\frac{1}{2}$
———, leg, trochanter to ankle . . . . .	9 $\frac{1}{2}$
———, sole of foot, heel to tip of third toe . . . . .	5
———, ear, from above downwards . . . . .	1 $\frac{1}{8}$
———, ear, from before backwards . . . . .	$\frac{7}{8}$

Post-mortem examination disclosed death to have been caused by tuberculous disease, which affected the peritoneum, intestines, spleen, portions of the left kidney and stomach, which were partly agglutinated together, preventing a minute anatomical investigation of these organs; but the stomach to all appearance seemed simple, and without the sacculi peculiar to *Semnopithecus* and *Colobus*—so far, therefore, distinct from either of these genera.

I have compared the skull of the adult type specimen of *Presbytes albigena* with the series of crania in the British Museum of *Semnopithecus*, *Colobi*, *Cercocebi*, &c.; and the following are my notes respecting them:—

The cranium of *P. albigena* is altogether longer than that of either of the two species of *Semnopithecus*, *S. melalophus* and *S. obscurus*, to which it bears resemblances outwardly, this length being in great part due to the elongation of the face, especially the maxillary and intermaxillary bones. The upper incisors are also in a more horizontal plane. The greater backward extension of the parietal and occipital region also helps to increase the antero-posterior diameter. This difference is best seen in profile. Looking downwards upon the vertex, the parietal region in *P. albigena* is broader, and at the sagittal suture higher than in *S. melalophus* and *S. obscurus*. On the contrary, in these two species the frontal region appears higher than in *P. albigena*, by reason of the parietal flattening in them; their skulls are also more compressed laterally. In *P. albigena* the zygomatic arches are placed nearly in two parallel lines with the sides of the skull; but in *S. obscurus*, *S. melalophus*, and other *Semnopithecus* they are considerably arched.

In these several cranial differences *P. albigena* corresponds to *Cercocebus æthiops* and *C. fuliginosus*, which possess these characters.

In every one of the skulls of the species of *Semnopithecus* in the British Museum the orbits are comparatively wider, rounder, and more staring than in *P. albigena*, which agrees with the *Cercocebi* in

this respect. The supraciliary ridges are higher and more marked in *P. albigena*; in the *Semnopithec*i the frontal bone is depressed immediately behind the ridges, which are thinner, projecting slightly forwards.

The nasal bones in the genus *Semnopithecus* are short, nearly straight, and flat; in *P. albigena*, as in the genus *Cercocebus*, they are more elongated; in the latter they are wider inferiorly, in the former relatively somewhat wider superiorly, so that *Semnopithecus* has the widest root of nose. The nasal cavity in all the *Semnopithec*i extends rather higher than the lower margin of the orbit, in *Cercocebus æthiops* and *C. fuliginosus* it does not reach the orbit by as much as the other genus goes above, and in *P. albigena*, while agreeing with these last species, it is even slightly lower. The comparative breadth of the face opposite the two maxillary bones is relatively broadest and more entirely truncated in the *Semnopithec*i, while *P. albigena* again corresponds to the *Cercocebi* in the prognathous and narrower appearance of these bones. Some species of the genus *Semnopithecus* present a curious character in the remarkable truncation of the occipital region, *S. johnii* and *S. maurus* having it nearly perpendicular; this gives the cranium, when resting on the mandible, a curious forward expression. *P. albigena*, like *Cercocebus*, has this part more shelving; *Semnopithecus melalophus* and *S. obscurus* make an approach to this in their contour.

The bony palate in *Cercocebus fuliginosus* and *C. æthiops* is longer and not relatively so broad as in *Semnopithecus*; the length of the premaxillary produces this. *P. albigena* has this character well marked.

The depth of the lower jaw in *Semnopithecus* is greatest, the same only being found in the genus *Colobus*. In the *P. albigena* and *Cercocebus* the angle of the mandible is less perpendicular and more rounded than in *S. melalophus* and *S. obscurus*; in many of the other species of *Semnopithecus*, e. g. in *S. johnii* and *S. entellus*, it is even inclined backwards.

The teeth in the several genera spoken of are alike in number. The two inner and upper incisors are very much the largest, and project considerably in the two species of *Cercocebus* examined; they are precisely similar in the specimen of *P. albigena*. The *Semnopithec*i have all the incisors small and of nearly equal size.

In the true species of *Semnopithecus*, as likewise in *Colobus*, the canines, as compared with the other teeth, are considerably larger; in *Cercocebus* and in *P. albigena* they are not so massive. In the last-named genus and species the cusps of the molars are more rounded, while they are acuminate from before backwards in *Semnopithecus* and *Colobus*. The upper penultimate molar in *Cercocebus* and the species under consideration is largest; in all the *Semnopithec*i the molars are more nearly alike in size. *P. albigena* and the *Cercocebi* can hardly be said to possess a fifth cusp in the upper posterior molar; in their lower jaw it is very rudimentary. The lower incisors in *P. albigena* are more horizontally set, and the canines less curved, than in any of the *Semnopithec*i; in this respect,

and in the less developed size of the lower incisors, the former corresponds with the genus *Cercocebus*.

The anterior premolar is longest in *Semnopithecus*, while in the adult *P. albigena* and the two species of *Cercocebus* it is rather smaller than the tooth posterior to it.

The skull of the young specimen of *Presbytes albigena*, which has partly been the occasion of the present remarks upon the several genera, shows characters, even in its juvenile condition, which would prevent its being ranked with the genus *Semnopithecus*, although, at the same time, it must be admitted, as might naturally be expected, that the distinguishing prominent points of difference are not so well marked as in the adult skull of the same species. Nevertheless it bears out, though in a less forcible manner, what I have said, as a whole, of its closer resemblance to *Cercocebus* than to *Semnopithecus*.

With respect to the genus *Colobus*, the skulls correspond in every particular to the genus *Semnopithecus*; the three individual skulls of the former in the British Museum may be said to correspond with their African representatives as follows:—*C. guereza* with *S. entellus*, *C. temminckii* with *S. melalophus* (but not so laterally compressed), while *C. polycomus* may be likened to *S. maurus* or *S. entellus*.

The crania of the *Cercopithec*i in some characters agree with *Cercocebus*, and in others slightly with *Semnopithecus*.

As related to the present subject, I shall introduce some notes I made in January 1863, of the dissection of an adult male specimen of *Colobus guereza*, Rüppell. While at Nyambura, a village in the Moro territory, about sixty miles due west of Gondokoro, on the White Nile, an animal of the above species was shot by one of our party, and on my examining the viscera the following peculiarities were observed:—

Stomach in dimensions:

	inches.
Length of greater curvature about . . . . .	29
——— of lesser curvature about . . . . .	13
Greatest breadth of organ . . . . .	6

The viscus, when laid out flat, was of an elongated, somewhat pyriform shape, with many transverse sacculi, as in the first part of the great intestines of the human subject. The cardiac extremity was rotund and expanded; there was a constriction to the left of the œsophagus, about as far distant as was the cardiac end from it; to the left of this constricted part the stomach was much narrower, and the sacculi less in capacity; a third still narrower and more intestiniform part stretched to the right of the last, and about equal to it in length. The accompanying diagram, which I lay before the Society, is from a sketch made at the time, and may convey a better idea of the appearance of the organs than a lengthened description.

Small intestines, in length 8 feet  $7\frac{1}{2}$  inches; the large intestines, including cæcum, 5 feet 9 inches. Cæcum simple, very like the representation given by Prof. Owen of that of *Semnopithecus entellus*; length  $1\frac{1}{2}$  inch, circumference  $4\frac{3}{4}$  inches.



The lungs had five lobes on the right side and four on the left; length of each about 7 inches. Pancreas short, with a bifid extremity; length  $2\frac{1}{2}$  inches, breadth  $1\frac{1}{4}$  inch.

The right and left lobes of the liver were very disproportionate in size, the left being very much the larger of the two.

I omitted to note the relative position of the liver to the stomach *in situ*; but from my sketch of the organ when taken out, it showed that whenever the stomach was distended with food it would press the left lobe of the liver over the much smaller right one, and this overlapping would produce the same irregular position of the liver in the right hypochondriac region as is recorded by Owen in *S. entellus*. The length of the left lobe, in *C. guereza*, was  $7\frac{1}{2}$  inches, of the right 4 inches.

First. My observations, though not extensive, may help therefore to bear out the fact that *Presbytes albigena*, Gray, is rather allied to the genus *Cercocebus* (where the skull has already been placed) than to the Indian group *Semnopithecus*, with which it was originally arranged; so that I consider the animal in future ought to be known by the name of *Cercocebus albigena*. The fresh specimen, moreover, adds to the certainty of its African habitat; but this, since M. du Chaillu's collection has been known, could hardly be disputed.

Secondly. The anatomical examination of *Colobus guereza* corroborates what Owen has recorded of *C. ursinus*, and strengthens belief in the visceral peculiarities belonging to the entire genus. These apparent constant characters, when taken along with those of the cranium and dentition, add wonderfully to the family likeness of the genus *Semnopithecus* and *Colobus*; and it seems that if they are not quite identical they run closely parallel, and are separated more by geographical than by anatomical characters\*.

\* In ignorance of a short statement of Dr. Pucheran, that he believed the *Presbytes albigena* of Dr. Gray to be a species of *Cercocebus*, I had, while writing the above paper, not consulted this authority. I find, however, that the first-named naturalist, in the 'Revue et Magasin de Zoologie' for June 1857, p. 242, expresses himself as follows as regards this species:—"Présentement cet individu est-il un *Semnopithèque*, comme l'a admis M. Gray, comme paraît l'admettre M. J. A. Wagner? Ce que nous pouvons certifier, c'est que son estomac est simple. Quant à la tête osseuse l'état des sutures atteste un individu encore jeune, et les derniers molaires sont encore renfermées dans leurs alvéoles; mais, nonobstant cette circonstance de jeune âge, le crâne et la face sont plus allongés que dans les têtes des *Semnopithèques* adultes. Par la forme de sa tête osseuse, le *Presbytis albigena* est un *Cercocèbe*."

As I have not assumed the merit of being the first to point out that the Grey-cheeked *Presbytes* of Dr. Gray in reality possessed nearer affinities to the genus *Cercocebus* than to *Semnopithecus*, seeing that I make mention of the typical skull in the British Museum being now placed in the Osteological Collection along with the *Cercocebus* under the name *C. albigena*, I trust that it may not be considered disrespectful towards M. Pucheran that I did not earlier refer to his opinion; but as the volume of the 'Catalogue of the Bones of the Mammalia in the Collection of the British Museum,' published in 1862, contains no reference to Dr. Pucheran's paper, printed in 1857, I believe that I may, to a certain extent, throw the onus on the former publication, which, adopting the newer generic classification of the animal, gives no clue to the more recent authority.

Looking at the matter in a broad light, and with no other desire than the

6. NOTE UPON THE ABNORMALITY OF A TAIL-FEATHER IN A MALE SÆMMERING'S PHEASANT. BY JAMES MURIE, M.D., PROSECTOR TO THE SOCIETY.

An adult male Sæmmering's Pheasant (*Phasianus sæmmeringii*, Temm.) which died and was examined by me on the 29th of November last, presented the following irregularity:—

The middle and longest tail-feather of the bird was completely turned upside down. The groove of the shaft was uppermost; the outer edge of the vane of the feather and the down at the base of the shaft were curled upwards. The brilliant colour of the reversed upper side was in no way affected by its unusual position or partial want of light. At the posterior third of the feather there commenced to be a twist, which as it reached the pointed extremity, was seen to have made a half turn of a circle, bringing what was the uppermost side at the root of the feather to be the undermost at the tip; in other words, the feather at its posterior third seemed to endeavour to right itself to its normal condition. At the root it was firmly attached to the skin, proving it not to have been the result of mere accident.

On first consideration it may be supposed that this feather had grown from the first in an inverted manner, but the spiral form, I am inclined to believe, demonstrates that when young it must have shot forth in the normal manner, and that the turn took place subsequently during the process of growth.

The feathers of birds, I understand, are occasionally found somewhat twisted at the base of the wing; and the Friesland Fowl is remarkable for the frizzly appearance of its plumage. But several gentlemen, who have had much practical experience with birds, tell me they have never met with a case wherein tail-feathers were so placed as I have related, for which reason I have thought it worthy of being mentioned.

7. ON TWO NEW SPECIES OF SOUTH AFRICAN SAXICOLÆ.  
BY DR. G. HARTLAUB, FOR. MEMB. ZOOL. SOC.

In a small collection of birds from different parts of the Cape Colony recently submitted to my examination by Mr. E. L. Layard I find two apparently new species, which I describe as follows:—

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search after truth, I conclude by pointing out that my more detailed comparison of the skull of *Presbytes albigena* with the true Indian *Semnopithecii* endorses the opinion of Dr. Pucheran and the correctness of the present name attached to the cranium in the National Collection.

With regard to the complicated stomach of the genus *Colobus*, I have further to add the testimony of Mr. Flower, that the *C. vellerosus* dissected by him, besides those examined by Professor Owen and the *C. guereza* described in this paper, all point to the certainty of this feature being common to the genus; and therefore, besides the analogy of the cranial character, this undoubtedly marks the *Colobi* and *Semnopithecii* as being but individual members of one group.

## 1. SAXICOLA CASTOR, ♂.

*Major; cinerea, remigibus fuscis; corpore subltus vix pallidiore; tetricibus caudæ superioribus albis; reetricibus 4 intermediis fusco-nigris, ternis lateralibus albis, apice late fusco-nigris, quarta nigricante, basi alba; rostro et pedibus nigris.*

Long. circa 7", rostr. 7", al. 4", caud. 2" 10", tars. 13½".

*Hab.* Karroo; Afr. mer. (*Layard*).

## 2. SAXICOLA POLLUX, ♂.

*Minor; cinerea, gutture pectoreque pallidioribus; abdomine imo, crisso et subcaudalibus albis; remigibus fuscis, primo apice conspicue emarginato-attenuato; reetricibus 4 mediis fusco-nigris, ternis lateralibus pogonio externo albis, interno fuscis, extima apice tota fusca, quarta apice latius fusca; rostro et pedibus nigris.*

Long. 6½", rostr. 6", al. 4" 1", caud. 2" 10", tars. 14".

*Hab.* Karroo (*Layard*).

*Obs.* Primo aspectu simillima præcedenti, sed minor, cauda alis et tarsis pro mole longioribus, subcaudalibus albis; reetricum coloribus alio modo dispositis.

8. ON THE GULAR POUCH OF THE GREAT BUSTARD (*OTIS TARDA*, LINN.). BY W. H. FLOWER, F.R.S., ETC.

In 'The Ibis' for 1862 (p. 107) Mr. Alfred Newton gave an exhaustive summary of the literature of the much-vexed question of the presence or absence of the "gular pouch" in the male Bustard, together with an account of a dissection performed by several competent persons (the author included), in which no trace of this remarkable organ was found. Stimulated to the research by Mr. Newton's remarks, Dr. W. H. Cullen of Kustendjie, in Bulgaria, took advantage of the frequent occurrence of the bird in his neighbourhood to renew the investigation, and found in each of the two specimens which he dissected a distinct and largely developed pouch. A description and figures of these were communicated to 'The Ibis' (April 1865, p. 143). The identical specimens having, through Dr. Cullen's kindness, been sent to the Museum of the Royal College of Surgeons, I have now the pleasure of exhibiting them to the Members of the Society, and of making a few observations upon their form and structure, confirmatory of, and supplemental to, those of Dr. Cullen.

Of the specimens received, the one consists of the lower mandible, the tongue, the hyoid apparatus, the upper portion (about 2 inches) of the œsophagus and trachea, and the gular pouch dissected away from all its attachments, except at its neck; the second is the pouch alone cut off through the neck; and this being therefore of comparatively little interest, I shall chiefly confine my observations to the first.

In the mesial line of the floor of the mouth, immediately under the root of the tongue, is a distinct and unquestionably natural opening. In what appears to be the usual contracted condition of

the parts, the opening is reduced to a T-shaped slit (the crosspiece, two lines long, being turned backwards), surrounded by well-marked deep folds of mucous membrane, which coming into apposition with each other close the orifice. These folds have a perfectly definite arrangement: traced up from the mouth of the orifice, the posterior ones are lost on the under surface of the tongue; those coming from the two sides diverge from each other, and run round the lateral parts of the base of the tongue; those from the anterior wall of the opening are continuous with the longitudinal folds on the middle of the floor of the mouth. The arrangement of these folds admits of great dilatation of the aperture, so that it will quite readily admit the introduction of the finger. When slightly distended, the opening becomes triangular, the hinder border straight and placed transversely at the base of the tongue; the apex, turned forwards, is continuous with the groove in the middle line of the floor of the mouth.

The pouch to which this opening leads is suspended by a somewhat constricted neck to the floor of the mouth, between the hinder part of the rami of the mandible; it may indeed be looked upon as a dilatation of that part of the floor situated immediately in front of the base of the tongue. A distinct but not very strong band of muscular fibres runs immediately beneath the mucous membrane of the mouth, on each side of the neck of the sack, meeting before and behind—evidently the sphincter mentioned by Dr. Cullen. It appears, however, to be only a part of the general muscular layer extending between the mandibles and the hyoid bone.

The sack itself when empty measured 9 inches in length, and, when moderately distended by allowing water to run in by its own weight, without any forcing, was found to hold three imperial pints; probably it could have been easily made to contain more, but that I did not wish to run any risk of bursting it. When thus distended it had an elongated pyriform shape, the larger end being turned upwards. Rather below the middle there was a gentle constriction. The walls of the sack are formed of a thin but perfectly distinct and tolerably strong membrane, composed of intersecting bundles of pale unstriped muscular fibres, united by connective or areolar tissue, and having numerous blood-vessels ramifying upon it. Externally it has evidently been but slightly connected with the surrounding parts by a loose areolar tissue. Internally it is smooth and lined by a distinct epithelium, continuous above with that of the mucous membrane of the mouth.

Both of the sacks had within them a few short pieces of grass and leaves\*. There appears to be no glandular structure connected with the walls; indeed the whole character of the sack points to its being a simple reservoir, probably for fluid, more analogous to the submandibular pouch of the Pelican than to anything else in the class Aves. But in the absence of fuller information as to the economy and habits of the bird, I refrain from speculating upon the purpose of this singular and apparently inconstant organ.

\* Grass-seeds have been observed by Naumann in the pouch of a Bustard (Newton, *loc. cit.*).

9. NOTES ON THE MOA-BONES IN THE NEW ZEALAND EXHIBITION OF 1865. BY JAMES HECTOR, M.D., F.G.S., DIRECTOR OF THE GEOLOGICAL SURVEY OF NEW ZEALAND\*.

In a collection of the natural resources and curiosities of New Zealand like that recently gathered together in the Exhibition which has just closed, as might be expected, the large wingless birds which once were so abundant in these islands were well represented by numerous specimens of their remains. Still, considering the profusion of Moa-bones which not only occur imbedded in the alluvial soil, but in parts of the country actually lie strewn on the surface, it is to be regretted that a more systematic search is not conducted by settlers and others possessing the necessary facilities, in order not only to obtain more perfect sets of the bones of the skeleton, but also, by amassing a large number of specimens from various districts, to afford a means of determining how many distinct kinds of these interesting birds existed. No extensive collection has ever, so far as the writer is aware, been made since that by Mr. Walter Mantell, which formed the basis for the admirable series of monographs on the structure of these birds by Professor Owen. Many fragmentary collections have doubtless been sent by private hands; but little or nothing has been added to our knowledge on the subject, with the exception of that which, I suppose, has been derived from the study of a remarkably fresh skeleton, which was sent from this province in the beginning of last year to the York Museum, and which has since been described by Mr. Allis in the 'Journal of the Linnean Society,' and by Prof. Owen in the 'Transactions of the Zoological Society.' This specimen is chiefly remarkable from being the first instance where any part of the integument or ligaments still remained attached to the skeleton†.

The following notes and the measurements of the various Moa-bones in the Exhibition are intended to direct attention to the subject, and to show the immense variety of those interesting remains which might be collected without an effort, if their true value to science were only properly known and appreciated.

*List of the various collections of Moa-bones in the New Zealand Exhibition at Dunedin, 1865.*

In the Otago Museum :—

1. Complete (or nearly so) skeleton of *Dinornis casuarinus*, set up by the writer. This skeleton stands about 5 feet 8 inches in height. The head is from a different locality, and may belong to a different species. The rest of the bones were all found together in relative position in digging in the Botanic Gardens in Dunedin. The bones were imbedded in a deposit of "Vivianite," or phosphate of iron, derived from their decomposition in contact with ferruginous waters. It is extremely common to find the cells in Moa-bones filled with crystals of this mineral.

2. A complete set of leg- and foot-bones of *D. giganteus*, exhibited

\* Communicated to the Society by Mr. W. H. Flower, F.R.S., F.Z.S.

† See Mr. Dallas's paper *antea*, p. 265.

by Mr. Payne. This specimen was restored by the writer, and measured when together 6 feet 2 inches, the length of the tibia being  $35\frac{1}{2}$  inches. It formed one of the most striking objects in the museum part of the Exhibition. It was found in alluvial soil at Ommaru; and it is not improbable that the rest of the skeleton might be found if searched for.

3. The three heads of *Dinornis ingens*(?), figures of which are enclosed, were exhibited by Mr. Coates of the gold-fields department. They were found in digging a ditch in alluvial soil. They were accompanied by imperfect skeletons of at least three different birds.

4. A large collection of bones, principally tarso-metatarsals, from marine ovens on the sandhills along the coast, where they are mixed with bones of Seals and fish and with native implements of chert, hornstone, and nephrite.

5. Collections of bones from different parts of the interior, where they lie on the surface or are imbedded in shallow alluvial deposits. Either collected by the writer, or contributed by the settlers and persons on the gold-fields. Among them is a splendid pelvis of *D. giganteus*.

6. Case of bones containing three heads, collected by F. Fenwick, Esq.; also a number of fragments of egg-shells and small leg-bones of *D. ingens*.

7. The gold-fields department exhibited a collection of very fine bones of *D. ingens* from the Wahatepu Lake.

8. In the Canterbury collections exhibited by Dr. Haast there were some fine bones of the following species, according to the catalogue:—*D. robustus*, *didiformis*, *elephantopus*, *casuarinus*, *struthioides*, and *Palapteryx ingens*. These were principally leg-bones, one sternum, and some vertebræ. Among the latter there is one unique specimen in which the crushed vertebræ are intermixed with smooth pebbles of quartz of the size of large beans, and which must, from their position, have been within the body of the animal, thus proving these smooth pebbles, that are so frequently found with Moa-bones, to be really "crop-stones," as has been conjectured.

9. The only other collection of Moa-bones in the Exhibition was that of M. Colenso from Hawkes Bay, being the only Moa-bones shown from the north island. They were very fine specimens of leg-bones, apparently of *D. ingens*.

10. One of the most curious objects of natural history in the Exhibition was a nearly complete Moa's egg, which was found in a cave in the Waizon valley, in the province of Marlborough. This egg was found resting in the hands of the skeleton of a native, who, according to the usual custom, had been interred in a sitting posture. It measures  $9\frac{1}{2}$  inches in length and 7 in breadth, and is complete, all but a few fragments a little over an inch in diameter, which have been broken from one side. The fragments have, however, been preserved and are shown along with the egg; and, from the manner in which the egg is placed, the fracture cannot be perceived.

Fragments of Moa's eggs are frequently found in various parts of the country, and Mr. Mantell satisfied himself that they must have been used as food by the natives. He inferred this from finding

that the fragments towards one end of the shell were scorched when they were found in the native cooking-ovens, which correspond to the "kitchen-middens" of Europe. His inference, therefore, receives remarkable confirmation from the manner in which this perfect specimen of the egg has been found.

In order to approximate to the number of species represented in these different collections, the following table has been constructed to show the comparative measurements of the principal bones.

As the species have been determined only from the scale of measurements given in Owen's Monograph, the nomenclature is not to be implicitly relied on.

	No. of specimens.	Length of bone.	Girth, proximal.	Girth of middle.	Girth, distal.	Species.
Femur.	1	in. 16	in. 16	in. 7.5	in. 18	<i>D. giganteus.</i>
"	11	7.5	8.5	4.5	10.5	<i>D. didiformis.</i>
"	1	9	9	5.7	11.3	} <i>D. dromioides.</i>
"	13	9.5	9.7	4.7	10.5	
"	2	14	16.5	7	14	} <i>D. ingens.</i>
"	1	14	16	7	14	
"	3	12.5	15	7.5	15.5	} <i>D. crassus.</i>
"	2	11	13.3	6.7	14	
"	9	10.3	10.5	5.3	12.2	} <i>D. struthioides.</i>
"	1	11	12	5.5	12.5	
"	1	6	...	2.5	...	<i>D. curtus.</i>
Tibia.	1	28.5	13.7	5.7	13	} <i>D. ingens, var. robustus.</i>
"	1	28	15.5	6.5	13.5	
"	1	29.5	19.5	4.5	12	} <i>D. dromioides.</i>
"	2	29	18	6	13.5	
"	1	21	...	...	...	} <i>D. giganteus.</i>
"	1	20.5	...	...	...	
"	1	35.5	16	7.7	...	} <i>D. casuarinus.</i>
"	1	33	17	7	12.7	
"	2	17.5	13	4.3	10	} <i>D. struthioides.</i>
"	5	16.5	12.7	4.3	8.2	
"	1	15.7	11	5.5	14	} <i>D. struthioides.</i>
"	1	19	12.5	5	...	
"	1	13.5	9.5	5	12.5	} <i>D. curtus.</i>
"	1	13	6	2.3	4.5	
"	1	...	11	2.3	...	} <i>D. giganteus.</i>
Tar.-metatar.	1	18.5	...	...	...	
"	1	19	12	6	15	} <i>D. ingens (?)</i> *
"	1	18.5	12	6	15	
"	1	15	...	...	...	} <i>D. struthioides (?)</i> .
"	4	16.3	11.5	5.7	13.3	
"	14	12	10.5	5	11.5	} <i>D. casuarinus.</i>
"	6	7.75	8	4.8	10	
"	1	7.5	8	4	8	} <i>D. crassus.</i>
"	1	7.3	8.5	4.5	10	
"	1	7.7	...	...	...	} <i>D. crassus.</i>
"	2	8	8.5	4.5	10	
"	3	8.5	9.5	5.3	11.5	} (?)
"	1	9.5	10.5	5.8	13	
"	2	10.5	11	5	12.5	} (?)
"	2	11	13	6.5	14.5	
"	2	10	10.5	2.7	10.7	<i>D. curtus (?)</i> .

\* These four are along with tibiae of *D. ingens*; otherwise they would agree better with *D. giganteus*.

10. PRELIMINARY NOTES ON SOME FOSSIL BIRDS FROM THE ZEBBUG CAVE, MALTA. BY W. K. PARKER, F.R.S., F.Z.S., ETC.

Four or five years since, the late Dr. Falconer and Capt. Spratt put into my hands a box of fossil bird-bones from the Zebbug Cave, Malta. Amongst these was the anterior part of a sternum showing part of the large cavity into which the trachea had entered. This structure made the determination of this particular bone easy, as it must have belonged either to a Crane or to a Swan. Dr. Falconer and I compared this and the other bones with those of the Cranes and Swans in the Museum of the College of Surgeons, and we agreed that these treasures were the remains of "Lamellirostral" birds. Afterwards I went over them all in detail and transmitted, through my friend Prof. Rupert Jones, a list of them to that great palæontologist. A few months since, Capt. Spratt requested me to describe these bones, so as to form a paper which should be illustrated by a plate of the best of the fossils, and the paper itself to be an accompaniment to a larger and more important memoir by Mr. Busk, on the remains of the three species of Elephants, which he has worked out, from the same cave. This latter gentleman has recently given me for description some additional bird-bones from the same source. These newer specimens have among them the hinder part of the skull which corresponds to one of the three species which I have been able to determine. A great proportion of these bird-bones are those of the limbs, many of the shorter being nearly perfect, whilst the longer bones are mostly broken in pieces about three or four inches in length.

The first species was a gigantic Swan, nearly one-third larger than average individuals of the Mute Swan (*Cygnus olor*). The head and more than half of the long bones belong to this kind. Its wings appear to have had the same relative length as those of the tame Swan; but the thigh-bone was relatively shorter, the tarsometatarsus (shank) was considerably longer in proportion. The most remarkable difference, however, between this extinct species (which I propose to call *C. falconeri*) is to be found in the comparative length of the phalanges; for whilst the proximal joint of the middle toe is one-fourth thicker than that of the Mute Swan, it is only three-fourths the length; so that whilst *C. falconeri* was between one-third and one-fourth larger than the common kind, it stood on longer legs, and had the comparatively short toes of a Goose.

The next species, that to which the important sternal fragment belonged, showing it to be a species of Hooper, I have doubtfully named *C. musicus* (?). Having recently examined the osteological specimens in the Museum of the College of Surgeons which are attributed to *C. ferus*\* (see Cat. Mus. Coll. Surg. vol. i. p. 233, nos. 1241-1248), I am strongly inclined to think, from the extreme difference of size, that some of the smaller ones belong to *C. bewickii*. The smaller bones from Malta may either belong to small individuals (perhaps females) of *C. musicus*, or perhaps to the smaller *C. bewickii*. Besides the piece of sternum and many shaft-bones

\* A synonym of *C. musicus*.



and phalanges, there is a large piece (two-thirds) of a sacrum, and two upper cervical vertebræ.

The remaining determinable fragments belonged either to a Duck, more than one-fourth larger than the Common Mallard (*Anas boschas*), or, which is more likely, to a small Goose, about the size of the Brent Goose (*Bernicla brenta*). There were a nearly perfect thigh-bone, the lower part of a tibia, the distal and middle part of a radius, the middle part of an ulna, the largest metacarpal, and the upper half of a coracoid, belonging to this small Anserine bird. Mr. Erxleben, who has so beautifully figured the best of these remains in the plate which is now exhibited, suggests, from the size of the fragments and the generally injured condition of the condyles even in the unbroken bones, that the birds had been carried into the cave and eaten by foxes.

## 11. DESCRIPTIONS OF A NEW GENUS AND SOME NEW SPECIES OF MOLLUSKS. BY HENRY ADAMS, F.L.S.

### MACRON WRIGHTII, H. Adams.

*M. testa ovato-trigona, solidissima, subumbilicata, alba; spira brevi, anfr. 4, convexiusculis, superne tabulatis, anfractu ultimo magno, transversim sulcato, sulcis postice evanidis, antice tribus valde distinctis; sutura canaliculata; apertura ovali,  $\frac{2}{3}$  totius longitudinis testæ; columella arcuata, callo postice copioso, canali brevi, recurvo; labro postice inflexo, antice sinuato-dentato.*

Long. 75, lat. 52 mill.

*Hab.* Coast of Patagonia (*Coll. mea*).

The specimen from which the above description is taken was obtained, I am informed by Mr. Wright, from the coast of Patagonia. It is very much beach-worn, but when in a fresh state was, I have no doubt, covered with a thick dark epidermis like the other species of the genus. *M. wrightii* differs from *M. kellestii*, which it most resembles, in being larger and more solid, and in its short spire and trigonal form.

The genus *Macron* has hitherto been considered a subgenus of *Pseudoliva*; but having recently seen the operculum of *M. kellestii*, which is unguiculate, while that of *P. levis* (the type of *Pseudoliva*) is purpuroid, *Macron* must be separated, and take rank as a genus.

### EGLISIA MACANDREÆ, H. Adams.

*E. testa subsolida, pallido-fulva; anfr. 13, rotundatis, cingulis obtusis spiralibus (quorum tres majores sunt) ornatis; interstitiis lamellis acutis, tenuibus, subdistantibus, longitudinalibus cancellatis; apertura orbiculari; columella incrassata, antice effusa et reflexa; labro simplici, acuto, intus sulcato.*

Long. 15, lat.  $8\frac{1}{2}$  mill.

*Hab.* Gibraltar (*Coll. M<sup>r</sup> Andrew.*).

A single specimen of this interesting addition to the genus *Eglisia*  
 PROC. ZOOLOG. SOC.—1865, No. XLIX.

was dredged by Mr. M'Andrew off Gibraltar. It is in the finest possible condition, and the nucleolar whorls, which are sinistral and somewhat planorbular, show that the place of *Eglisia* is in the family *Pyramidellidæ*, and not in *Turritellidæ*, in which it has been hitherto included.

AMPHITHALAMUS OBESUS, H. Adams.

*A. testa obesa, dense rufo-cornea, nitida, lævi, subdiaphana, marginibus spiræ excurvatis; vertice nucleoso normali, haud sculpto, apice mamillato; anfr. 5, subplanatis, rapide aurgentibus; basi tumida, haud sculpta; apertura subovali; labro acuto; labio (t. adultæ) a pariete separato, thalamum altissimum formante, ad marginem recto, ad junctionem labri antice curvato.*

Long.  $1\frac{1}{2}$ , lat.  $\frac{3}{4}$  mill.

*Hab.* Lord Hood's Island (*Coll. mea*).

AMPHITHALAMUS PUPOIDEUS, H. Adams.

*A. testa angusta, dense rufo-cornea, nitida, lævi, subdiaphana, marginibus spiræ irregularibus; vertice nucleoso valde mamillato, tumente, haud sculpto; anfr. 4, subplanatis, vix aurgentibus, ultimo paulum angustiore; basi prolongata, haud sculpta; apertura (t. adultæ) subcirculari, peritremate rufo, continuo; labro vix angustato; labio a pariete parum separato, thalamum lacunatum formante, ad junctionem labri antice curvato.*

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

*Hab.* Lord Hood's Island (*Coll. mea*).

This species stands on the confines of the genus, and passes towards *Stenothyra*, in shape, however, resembling *Hyala*.

HETEROCARDIA DENNISONI, H. Adams.

*H. testa ovata, subcompressa, tenui, æquilaterali, hiante, albida, transversim inæqualiter striata; latere antico rotundato, margine superiore paulo incurvato; latere postico arcuatim subtruncato, inferne rotundato; umbonibus parvis, subprominentibus.*

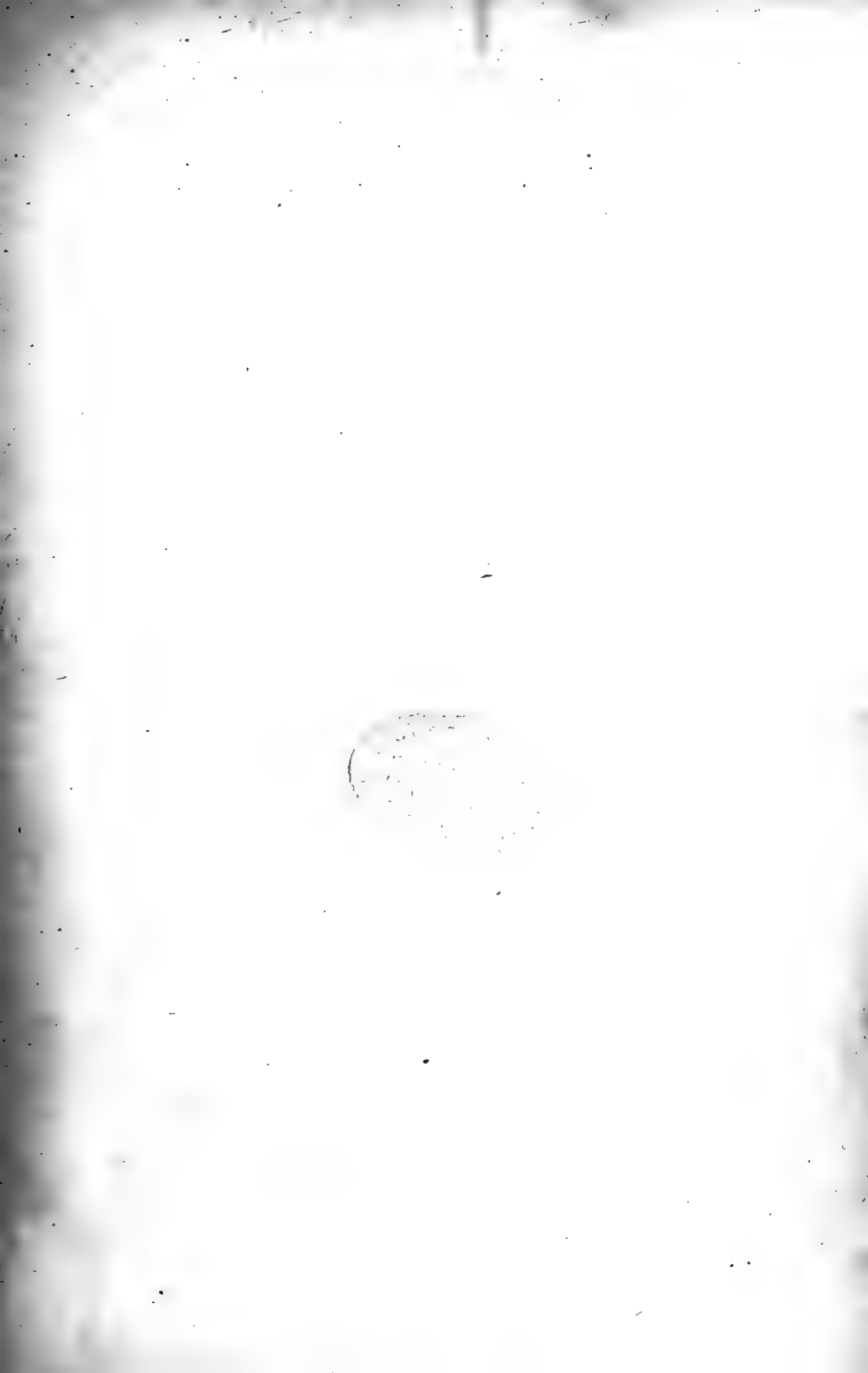
Long. 37, alt. 27, lat. 15 mill.

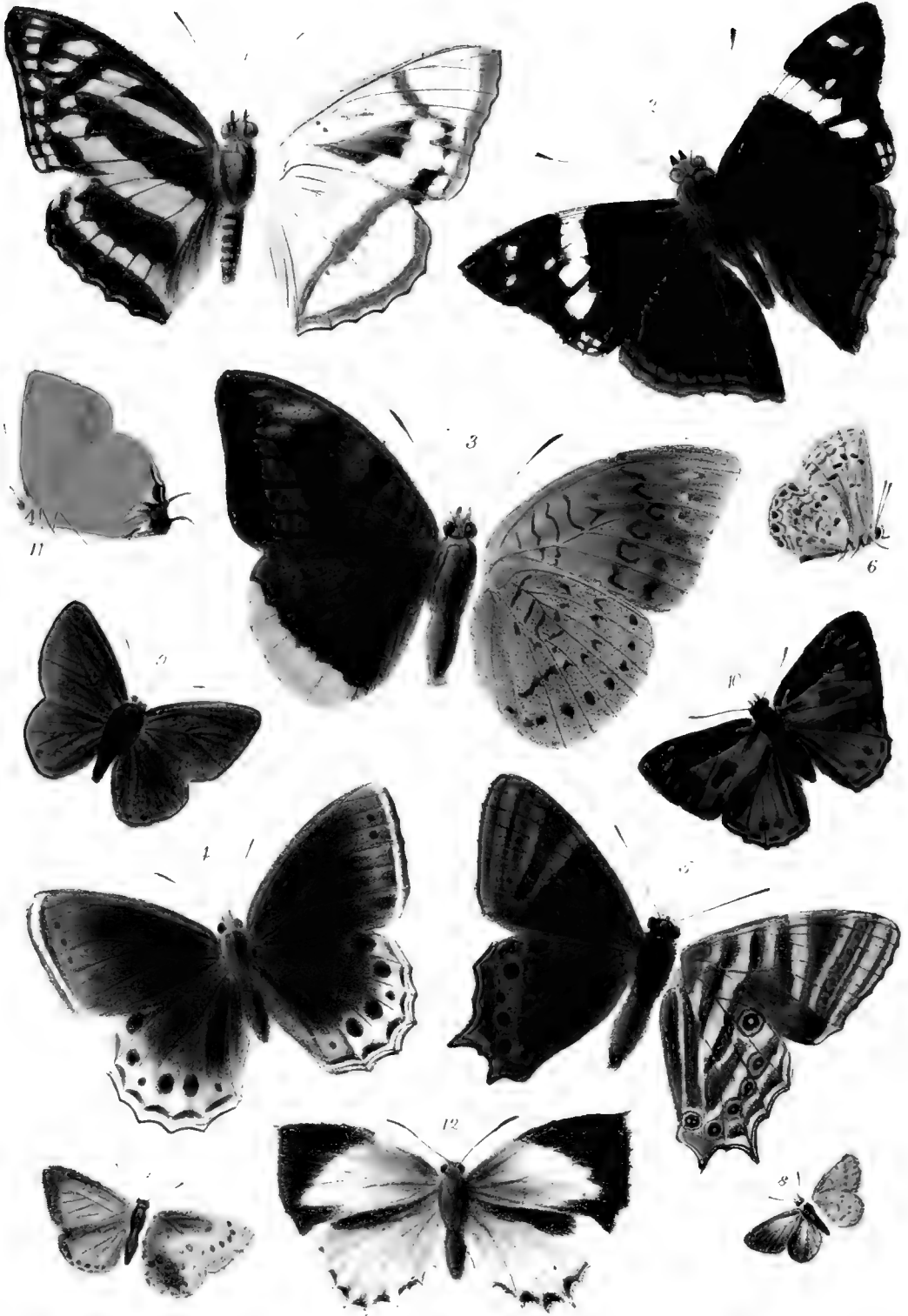
*Hab.* —? (*Coll. mea*).

This species, which is the largest of the very rare genus *Heterocardia*, is most like *H. cumingii*, Desh., but is much more oval in form, and has the umbones central. The specimen described formed part of the collection of the late Mr. Dennison, and is the only one I have seen.

Genus THYELLA, H. Adams.

*Testa æquivalvis, subtriangularis, postice subtruncata, vix flexuosa, ventricosa, epidermide tenui pallido-fulva induta, superficie valvurum decussata. In valva dextra dentes duo cardinales, quorum anterior triangularis, bifidus, posterior minor, compressus; in valva sinistra dens cardinalis solitarius, triangularis, bifidus; ligamentum internum, in fovea subcentrali vix declivi positum; dentes laterales nulli. Impressiones musculares satis conspicui, posterior rotundata, anterior elongata; linea pallialis sinuata.*

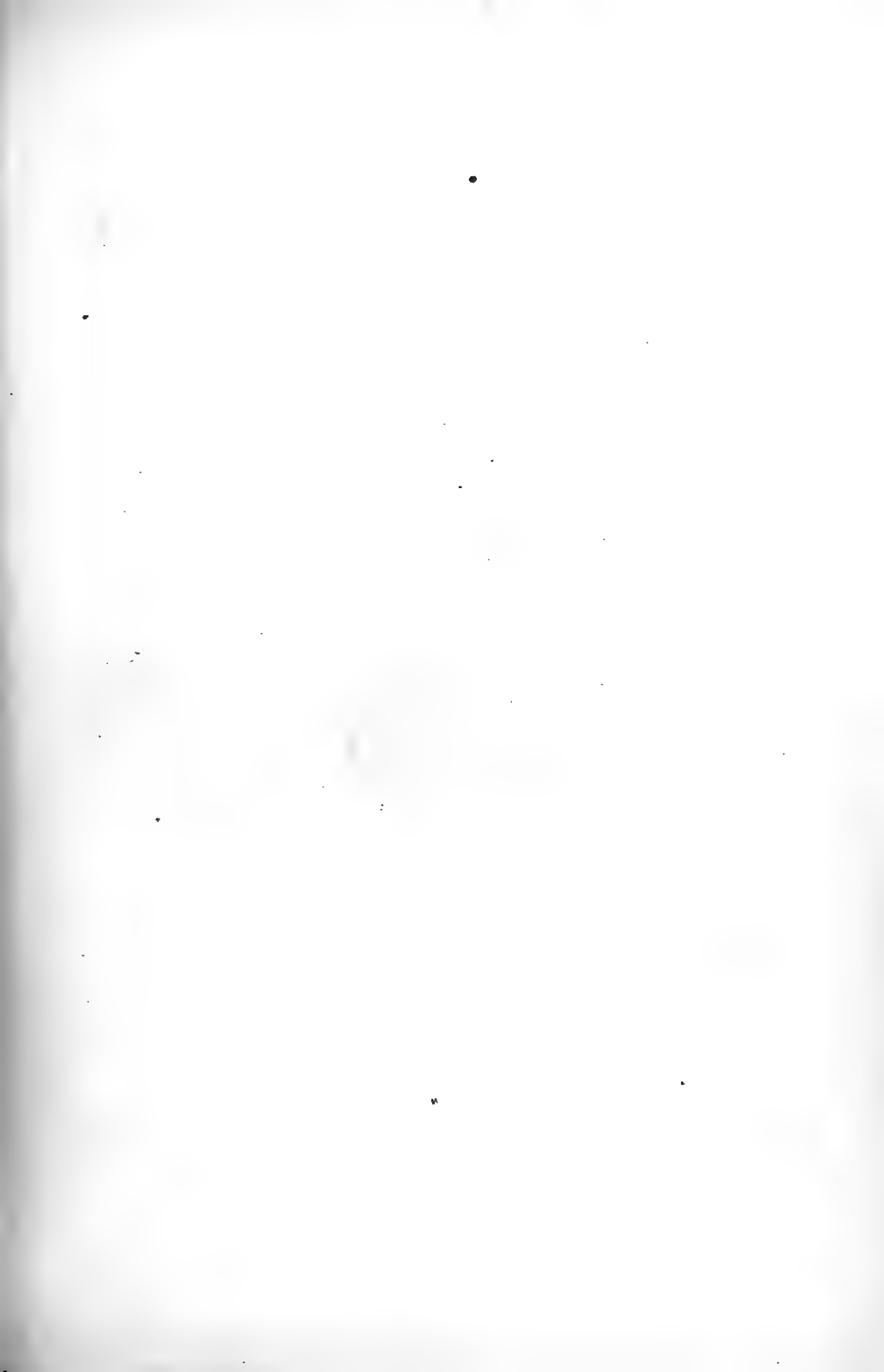


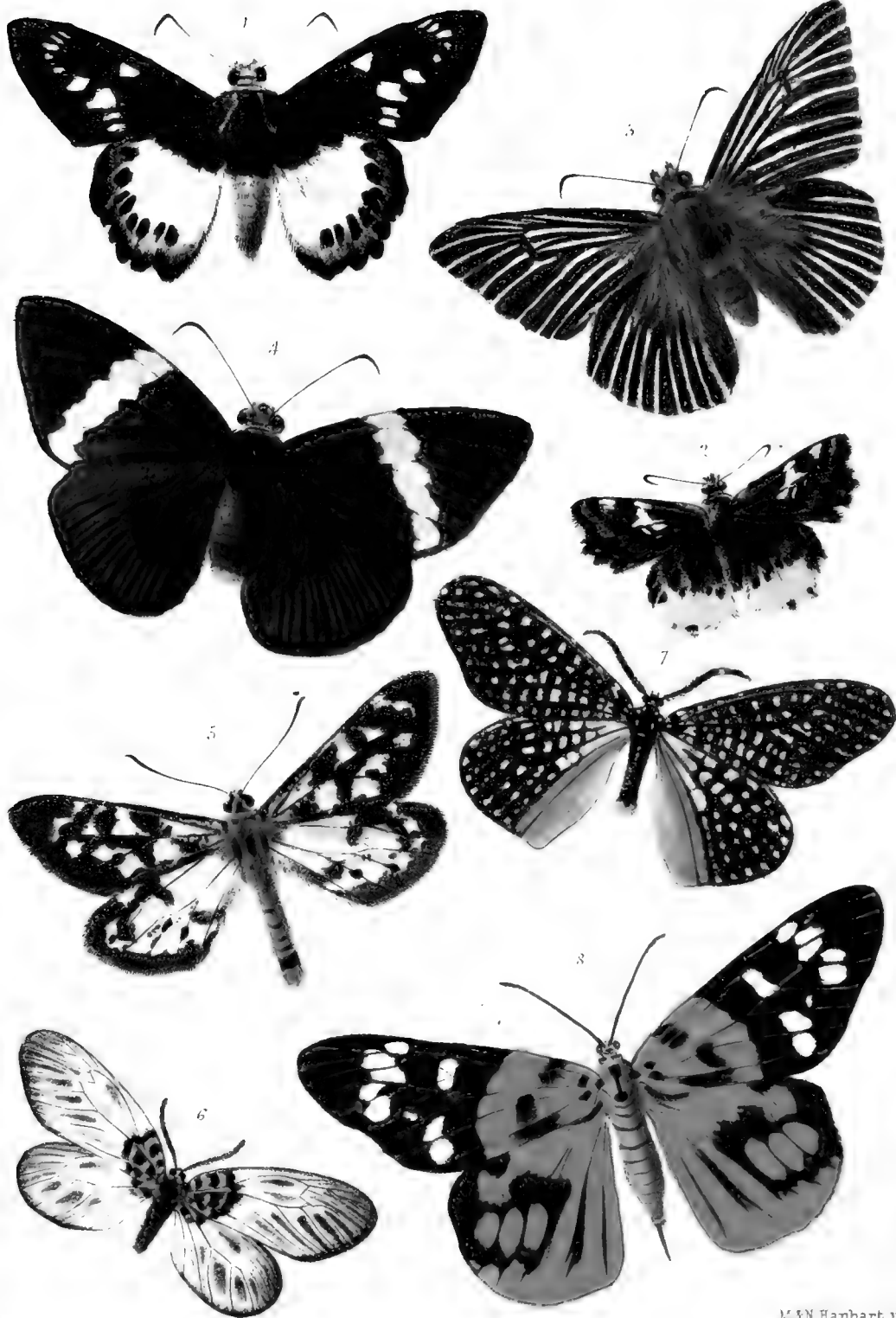


E. Cooke del.

M. & N. Hancock imp.

NEA-PACIFIC LEPIDOPTERA



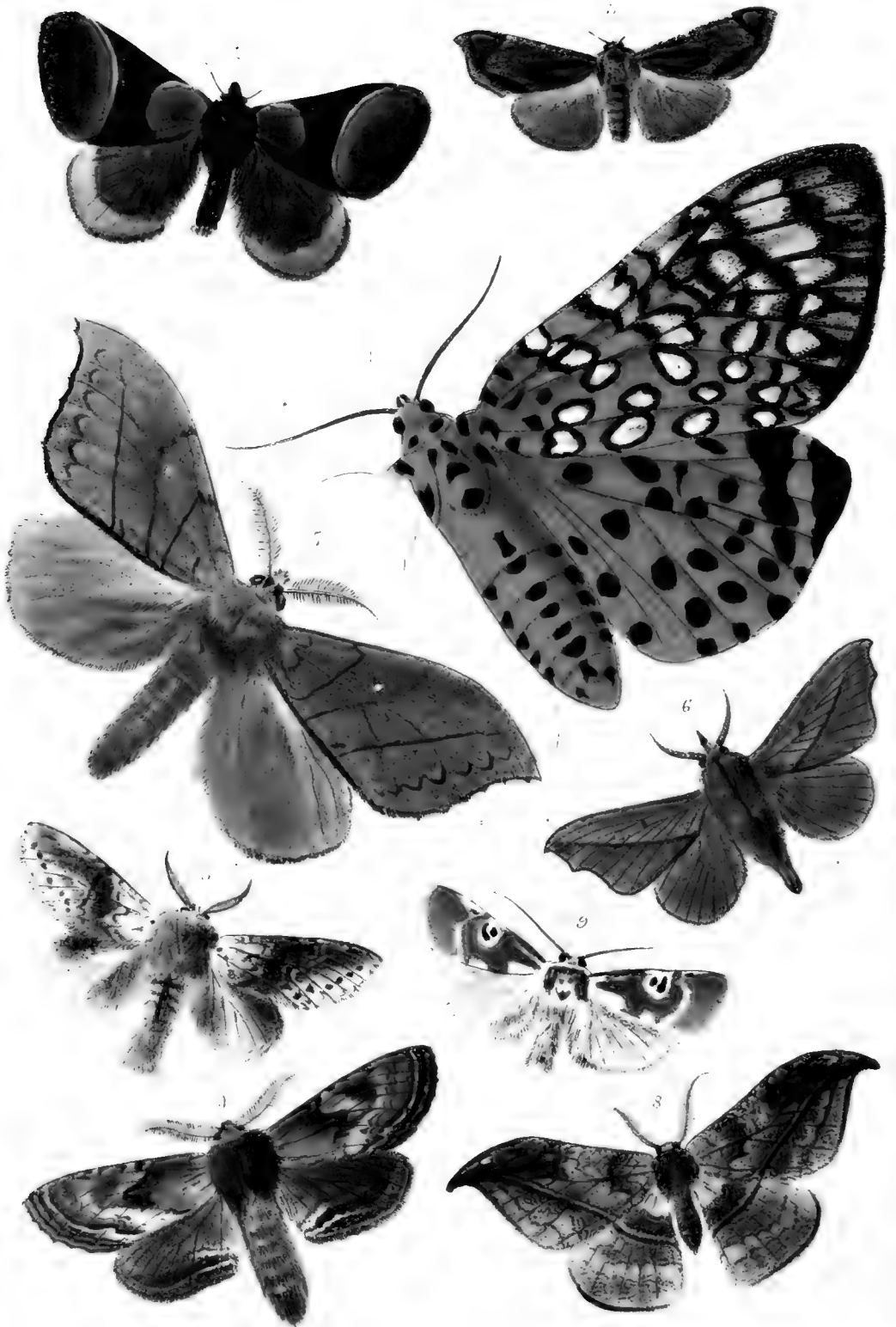


F. G. Moore del.

M. & N. Hanhart imp.

NEW INDIAN LEPIDOPTERA





M. & N. Hanhart imp



**THYELLA PULCHRA**, H. Adams.

*T. testa subæquilaterali, antice longiore, candida, valvarum superficie costis tenuibus radiantibus et liris excentricis decussata; umbonibus parvis, subrecurvis; margine dorsali excavato; sinu paliali profundo.*

Long. 13, alt. 11, lat. 7 mill.

*Hab.* Singapore (*Coll. Cuming.*).

This genus appears to have most affinity with *Semele*, but differs in the absence of lateral teeth, in its more ventricose form, and in the position of the internal ligament. The surface of the valves of the species described is decussately sculptured by radiating ribs and thin concentric liræ.

I avail myself of this opportunity to state that the genus *Leuconyx*, some time since described by my brother and myself, must be cancelled, as we have recently had an opportunity of proving that it is founded upon the internal spathulate appendage of *Pholas costata*. The name *Plectostoma* also, which I gave lately to a very peculiar form of *Helix* from Labuan, must be considered a synonym of *Opisthostoma*, Blanford, which was established to receive a small shell from India, much more Pupa-shaped than the type of *Plectostoma*, but, I think, belonging to the same group, and which has hitherto been supposed to be furnished with an operculum, and to be allied to *Diplommatina*.

## 12. ON THE LEPIDOPTEROUS INSECTS OF BENGAL.

BY FREDERIC MOORE.

(Plates XLI., XLII., XLIII.)

Excepting a brief list of Lepidopterous Insects from the N.W. Himalaya, compiled by Kollar and published in Hügel's 'Kaschmir,' and another by myself, printed in the 'Proceedings' of this Society for the present year, of a collection of Diurnal Lepidoptera recently made in nearly the same districts by Capt. A. M. Lang, no record has appeared of the many very interesting "local" Indian collections that have so frequently been formed. In the following pages a list is given of the species contained in a very extensive collection made in the Province of Bengal by Mr. A. E. Russell, of the Bengal Civil Service, who has kindly placed them in my hands for this purpose, and of others collected in the same Province by Mr. W. S. Atkinson and the late Capt. J. Lind Sherwill.

### Sect. I. RHOPALOCERA.

#### Tribe I. PAPILIONES.

#### Fam. PAPILIONIDÆ.

ORNITHOPTERA RHADAMANTHUS, Boisd. Spéc. Gén. Lép. i. p. 180.

O. POMPEIUS, Cram. Pap. t. 25. f. A.

PAPILIO MACAREUS, Godt. (Horsf. Cat. Lep. E. I. C. 1829, t. 5 f. 1).

Hills, Darjeeling.

P. XENOCLES, Doubleday (Westw. Arc. Ent. pl. 92. f. 1).

Hills and plains.

P. DISSIMILIS, Linn. (Cram. t. 82. f. C, D).

P. PANOPE, Linn. (Cram. t. 295. f. E, F).

Bauleah.

Note.—*P. dissimilis* and *P. panope* taken in *coitu*.—*A. E. Russell*.

P. CASTOR, Westw. Arc. Ent. pl. 80. f. 1, 2.

P. POLLUX, Westw. ib. pl. 90. f. 1.

P. AGESTOR, Gray, Ins. of Nepal, pl. 4. f. 2 (Westw. Arc. Ent. pl. 16. f. 2).

Darjeeling.

P. EPHYCIDES, Hewits. Exot. Butt. pl. 6. f. 1.

Hills, Darjeeling.

P. SCLATERI, Westw.

Darjeeling.

P. PAMMON, Linn. (Cram. t. 141. f. B.)

Bauleah.

P. POLYTES, Linn. (Cram. t. 265. f. A-C.)

Bauleah.

P. ROMULUS, Cram. t. 43. f. A.

Bauleah ; plains of Bengal.

P. HECTOR, Linn. (Cram. t. 141. f. A).

Central Bengal.

P. DIPHILUS, Esper, Ausl. Schmett. t. 40. f. 1.

Bauleah ; plains of Bengal.

P. VARUNA, White (Westw. Arc. Ent. pl. 66. f. 1, 2).

P. RHETENOR, Westw. Arc. Ent. pl. 16. f. 1, 1 a.

P. PROTENOR, Cram. t. 49. f. A, B.

P. POLYMNASTOR, Cram. t. 53. f. A, B.

Plains of Bengal.

- P. ANDROGEOS, Cram. t. 91. f. A, B.  
Dacca.
- P. PHILOXENUS, Gray, Ins. of Nepal, pl. 2; Westw. Cab. Orient. Ent. pl. 40. f. 2 ♀, 3 ♂.
- P. DASARADA, Moore, Cat. Lep. Mus. E. I. C. i. p. 96 (Westw. Cab. Orient. Ent. pl. 40. f. 5, ♂).
- P. ICARIUS, Westw. ib. pl. 2.
- P. HELENUS, Linn. (Cram. t. 153. f. A, B).
- P. CHAON, Westw. Arcana Ent. pl. 72. f. 1, 2.  
Hills, Darjeeling.
- P. PARIS, Linn. (Cram. t. 103. f. A, B).  
Lower hills.
- P. GANESA, Doubleday, Gray's Zool. Misc. p. 73.  
Lower hills, Darjeeling.
- P. ARCTURUS, Westw. Arc. Ent. pl. 27.  
High hills.
- P. KRISHNA, Moore, Catal. Lep. Mus. E. I. C. pl. 2 a. f. 6.  
High hills.
- P. CRINO, Fabr. (Guérin, Rev. Zool. 1840, t. 1. f. 1.)  
Plains of Bengal; near the sea.
- P. ERITHONIUS, Cram. t. 232. f. A, B.  
Bauleah.
- P. AGAMEMNON, Linn. (Cram. t. 106. f. C, D).  
Hill-tops.
- P. CHIRON, Wallace, Linn. Trans. xxv. p. 66.  
*P. bathycles* of India, *auctorum*.  
Foot of hills.
- P. JASON, Esper, Ausl. Schmett. t. 58. f. 5.  
Balasore.  
Larva feeds on *Michelia champa* and *Uvaria longifolia*.—*A. Grote*.
- P. SARPEDON, Linn. (Cram. t. 122. f. D, E).
- P. CLOANTHUS, Westw. Arc. Ent. pl. 11. f. 2.
- P. ANTIPHATES, Cram. t. 72. f. A, B.  
Balasore; lower hills.

*P. ANTICRATES*, Doubleday (Catal. Lep. B. M. pt. 1, pl. 3. f. 3).  
Hills.

5. *P. NOMIUS*, Esper, Ausl. Schmett. t. 52. f. 3.

Plains.

Abounds in the vicinity of Calcutta and other parts of Bengal during the dry hot season.—*E. Blyth*.

*P. GLYCERION*, Gray, Ins. of Nepal, pl. 3. f. 2; Westw. Arc. Ent. pl. 55. f. 3.

High hills.

*LEPTOCIRCUS CURIUS*, Fabr. (Donov. Ins. of Ind. pl. 47. f. 1; Genera of Diurn. Lep. pl. 4\*. f. 1).

Found only on the slopes of the hills to the eastward and north-eastward.—*A. Grote*.

*L. MEGES*, Zink. Sm. Nova Acta, xv. p. 161.

? Bengal.

*TEINOPALPUS IMPERIALIS*, Hope, Trans. Linn. Soc. xix. pl. 11. f. 1, 2, ♂; Westw. Arc. Ent. pl. 60, ♀.

Hills over 9000 feet elevation.

*CALINAGA BUDDHA*, Moore, Catal. Lep. Mus. E. I. C. pl. 3 a. f. 5.

Lower hills.

#### Fam. PIERIDÆ.

*PIERIS PASITHOË*, Linn. (Cram. t. 43. f. D, E).

*P. THISBE*, Cram. t. 233. f. C.

*P. BELLADONNA*, Fabr. (H.-Schff. Pap. Exot. f. 13, 14).

Valleys of the lower hills.

*P. EUCHARIS*, Drury, Ins. ii. pl. 10. f. 5, 6.

Larva feeds on *Loranthus*.—*A. Grote*.

*P. HIERTE*, Hübn. Zuträge, f. 77, 78.

Plains of S.E. Bengal.

*P. AGOSTINA*, Hewits. Exot. Butt. pl. 1. f. 1, 2.

Lower hills and upwards to 7000 feet.

*P. DESCOMBESI*, Boisd. Spéc. Gén. Lépid. i. p. 465.

Lower hills.

*P. CLEMANTHE*, Doubleday, Ann. Nat. Hist. xvii. p. 23.

Valleys of the lower hills.

*P. THESTYLIS*, Doubleday, Gray's Zool. Misc. p. 76, ♂.

*P. seta*, Moore, P. Z. S. 1857, pl. 44. f. 3, ♀.

Hills.

*P. ROUXI*, Boisd. Spéc. Gén. Lép. i. p. 481.

*P. HIPPO*, Cram. t. 195. f. B, C.

Hill (Darjeeling).

*P. LIBYTHEA*, Fabr. Ent. Syst. iii. 1. p. 190.

*P. zelmira*, Cram. t. 320. f. E, F, ♀, nec f. C, D.

*P. NERISSA*, Fab. Ent. Syst. iii. 1. p. 192.

*P. zelmira*, Cram. t. 320. f. C, D, ♀.

Plains.

*P. NEOMBO*, Boisd. Spéc. Gén. Lép. i. p. 539.

*P. COLIMBA*, Boisd. ♂.

*P. indra*, Moore, P. Z. S. 1857, pl. 44. f. 5, ♀.

*P. LALAGE*, Doubleday and Hewits. Gen. Diurn. Lep. pl. 6.  
f. 5, ♀.

*P. durvasa*, Moore, P. Z. S. 1857, pl. 44. f. 6, ♂.

Rare in the plains; common in the hills.

*P. MESENTINA*, Cram. t. 270. f. A, B.

Common everywhere but hills.

Larva feeds on *Zizyphus* and on *Capparis sepiaria*.—*A. Grote*.

*P. CORONIS*, Cram. t. 44. f. B.

*P. HIRA*, Moore, P. Z. S. 1865, p. 490, pl. 31. f. 17.

*P. NAMA*, Doubleday (Moore, P. Z. S. 1857, pl. 44. f. 1, 2, ♂ ♀).

Lower hills.

*P. GLICIRIA*, Cram. t. 171. f. E, F.

Hills (Darjeeling).

*PONTIA NINA*, Fabr. Ent. Syst. iii. pt. 1. p. 194.

*HEBOMOIA GLAUCIPPE*, Linn. (Cram. t. 164. f. A-C.)

*THESTIAS ÆNIPPE*, Cram. t. 105. f. C, D. t. 229. f. B, C.

Balasore; Malda.

*T. MARIANNE*, Cram. t. 217. f. C-F.

*T. PYRENE*, Linn. (Cram. t. 127. f. A-C.)

*CALLIDRYAS PYRANTHE*, Linn. (Cram. t. 58. f. A-C.)

Malda.

C. PHILIPPINA, Cram. t. 361. f. C, D.

C. HILARIA, Cram. t. 339. f. A, B.  
Bauleah ; Malda.

C. ALCMEONE, Cram. t. 141. f. E.  
Bauleah ; Dacca.

DERCAS VERHUELLI, Van der Hoeven, Tijds. voor Nat. Gesch. t. 8.  
f. 3, 4.

COLIAS EDUSA, var.

*C. fieldii*, Ménétr. Catal. Lep. Mus. Imp. Acad. St. Petersb. t. 1.  
f. 1.

IDMAIS CALAIS, Cram. t. 53. f. C, D.  
Balasore ; plains near the coast.

TERIAS HECABE, Linn. (Cram. t. 124. f. B, C).

T. DRONA, Horsf. Catal. (1829) t. 1. f. 13,

T. LETE, Boisd. Spéc. Gén. Léop. i. p. 674.  
Cuttack.

T. HARINA, Horsf. Cat. (1829) p. 137.

ERONIA VALERIA, Cram. t. 85. f. A.  
Plains.

E. AVATAR, Moore, Cat. Lep. Mus. E. I. C. i. pl. 2 a. f. 1.  
Hills.

Fam. DANAIDÆ.

TELCHINIA VIOLÆ, Fabr. (Cram. t. 298. f. D, E).  
Plains.

PAREBA VESTA, Fabr. (Cram. t. 228. f. A-C).  
Hills, Darjeeling.  
Larva feeds on *Passiflora* and *Thunbergia*.—*A. Grote*.

DANAIS LIMNIACÆ, Cram. t. 59. f. C, D.  
Hills.

D. MELISSA, Cram. t. 377. f. C, D.  
Plains.

D. MELANEUS, Cram. t. 30. f. D.  
Hills.

D. AGLEA, Cram. t. 377. f. E.  
Hills.

D. TYTIA, Gray, Ins. of Nepal, pl. 9. f. 2.  
Hills.

D. PLEXIPPUS, Linn. (Cram. t. 206. f. C, D).  
Plains.

D. HEGESIPPUS, Cram. t. 180. f. A.  
Plains, South Bengal.

D. CHRYSIPPUS, Linn. (Cram. t. 118. f. B, C).  
Plains up to the lower hills.

EUPLOEA RHADAMANTHUS, Fabr. (Jones, Icon. t. 45. f. 2).  
Hills. Does not occur in the plains.

E. CORE, Cram. t. 266. f. E, F.  
Plains.

E. MIDAMUS, Linn. (Cram. t. 127. f. C, D, ♂; t. 266. f. C, ♀).

E. DOUBLEDAYI, Westw.

E. DEIONE, Westw. Cab. Orient. Ent. pl. 37. f. 3.

Fam. NYMPHALIDÆ.

VANESSA CASHMIRENSIS, Kollar, Hügel's Kasch. iv. t. 9. f. 3, 4.

V. CHARONIA, Drury, Ins. pl. 15. f. 1, 2.  
Hills.

PYRAMEIS CARDUI, Linn.  
Plains.

P. CALLIRHOË, Hübn. (Cram. t. 84. f. E, F).

JUNONIA CENONE, Linn. (Cram. t. 35. f. A-C).  
Plains.

J. LEMONIAS, Linn. (Cram. t. 35. f. D-F).

J. ORITHYIA, Linn. (Cram. t. 19. f. C, D, ♂).

J. LAOMEDIA, Linn. (Cram. t. 8. f. F, G).

J. ASTERLÆ, Linn. (Cram. t. 58. f. D, E).  
Plains.

J. ALMANA, Linn. (Cram. t. 58. f. F, G).  
Plains.

Larva feeds on *Gloxinia* and *Osbeckia*.—*A. Grote*.

PRECIS IPHITA, Cram. t. 209. f. C, D.

P. HARA, Moore, Cat. Lep. Mus. E. I. C. i. pl. 3 a. f. 1.  
Hills.

ERGOLIS ARIADNE, Linn. (Cram. t. 144. f. G, H).

CYNTHIA ARSINOË, Cram. t. 160. f. A, B, ♂.  
Lower hills.

CYRESTIS THYODAMUS, Boisd. (Doubleday & Hewits. Diurn. Lep. pl. 32. f. 3; Hügel's Kasch. iv. pl. 7. f. 3, 4).

Hills.

Settles on the underside of leaves, with the wings distended.—  
*W. S. Atkinson.*

C. RISA, Doubl. & Hewits. ib. p. 262, pl. 32. f. 4.

PARTHENOS GAMBRISIUS, Fabr. (Doubl. & Hewits. ib. pl. 51.  
f. 2).

South-east Bengal.

CIRROCHROA AORIS, Doubl. & Hewits. ib. pl. 21. f. 1.  
Hills.

CETHOSIA BIBLIS, Drury, Ins. i. pl. 4. f. 2.  
Hills.

C. CYANE, Fabr. (Drury, Ins. i. pl. 4. f. 1).  
Plains and Terai.

ARGYNNIS CHILDRENI, Gray, Ins. of Nepal, pl. 11.  
Higher hills, Darjeeling.

A. NIPHE, Linn. (Cram. t. 14. f. B-E).  
Hills.

A. ISSÆA, Gray, ib. pl. 11.  
Hills.

MESSARAS ERYMANTHIS, Drury, Ins. i. pl. 15. f. 3, 4.  
Plains.

AELLA EGISTA, Cram. 281. f. C, D.  
Hills.

A. PHALANTA, Drury, Ins. i. pl. 21. f. 1, 2.

LAOGONA HIPPOCLA, Cram. t. 220. f. C, D.

L. HYPSELIS, Godt. (Doubl. & Hewits. Diurn. Lep. pl. 25. f. 1).

DIADEMA BOLINA, Linn. (Cram. t. 65. f. E, F).

Var. *inaria*, Cram. t. 214. f. A, B.—Taken at Balasore.



- D. AUGE, Cram. t. 190. f. A, B.
- PENTHEMA LISARDA, Doubl. & Hewits. Diurn. Lep. pl. 39. f. 3.
- EURIPUS HALITHERSES, Doubl. & Hewits. ib. pl. 51. f. 2.
- E. ISA, Moore, Cat. Lep. Mus. E. I. C. i. p. 161, ♀.
- E. haliartus*, Felder, Wien. Ent. Monat. iv. p. 234.
- E. NYCTELIUS, Doubleday, Ann. Nat. Hist. xvi. p. 182, ♀.
- HESTINA NAMA, Boisd. ; Doubleday & Hewits. pl. 39. f. 2.  
Higher hills.
- H. PERSIMILIS, Westw. & Hewits. Diurn. Lep. p. 281.
- NEPTIS HORDONIA, Stoll, Suppl. Cram. t. 33. f. 4.  
Plains.
- N. MIAH, Moore, Cat. Lep. Mus. E. I. C. i. pl. 4 a. f. 1.  
Hills.
- N. VIKASI, Horsf. Catal. Lep. Mus. E. I. C. 1829, pl. 5. f. 2.  
Hills.
- N. COLUMELLA, Cram. t. 296. f. A, B (Moore, P. Z. S. 1858,  
pl. 49. f. 5, ♂ ♀).
- N. SOMA, Moore, P. Z. S. 1858, pl. 49. f. 6.
- N. NANDINA, Moore, Cat. Lep. Mus. E. I. C. i. pl. 4 a. f. 7.
- N. MATUTA, Hübn. (Cram. t. 296. f. E, F).
- ATHYMA LEUCOTHÖE, Linn. (Cram. t. 203. f. E, F).
- A. MAHESA, Moore, Cat. Lep. Mus. E. I. C. pl. 5 a. f. 7.
- A. BAHULA, Moore, P. Z. S. 1858, pl. 50. f. 2.  
Darjeeling.
- A. SUBRATA, Moore, P. Z. S. 1858, pl. 51. f. 1, ♀.
- A. CHEVANA, n. sp. (Pl. XLI. f. 1.)

*Male.* Upperside dark brown; markings pale buff yellow. Fore wing with uninterrupted discoidal streak, terminated by two oblique spots; a transverse discal series of irregular-shaped spots, a submarginal row of small spots, and indistinct marginal narrow streaks. Hind wing with a broad transverse band, a submarginal lunulated band, and indistinct marginal narrow streaks. Body with pale buff-yellow waist-band and abdominal rings. Underside—fore wing with the markings as above, the interspaces ferruginous brown suffused with dark brown posteriorly, except along the base of the costa and triangularly before the apex, which is pale nacreous blue; hind wing

with a narrow transverse discal and marginal ferruginous-brown band, the rest of the wing pale nacreous blue, the broad transverse and lunulated submarginal band being paler nacreous white; a black dot on lower part of disk.

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

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

*Remark.*—The whole underside of this species is very similar to that of *Apatura ambica*; and Mr. W. S. Atkinson has informed me that in fresh-captured specimens the upperside has also the beautiful reflected purple gloss visible in that insect.

A. JINA, Moore, Cat. Lep. Mus. E. I. C. i. pl. 5 a. f. 3.

A. SELENOPHORA, Kollar, Hügel's Kasch. iv. t. 7. f. 1, 2, ♂.

A. INARA, Doubleday & Hewits. Diurn. Lep. pl. 34. f. 3, ♂  
(Moore, P. Z. S. 1858, pl. 50. f. 6, ♂ ♀).

A. CAMA, Moore, Cat. Lep. Mus. E. I. C. i. pl. 5 a. f. 5.

ABROTA GANGA, Moore, ib. i. pl. 6 a. f. 1, ♂ ♀.

*Adolias confinis*, Felder, Wien. Ent. Monat. iii. p. 183, t. 4. f. 3,  
♀ (1862).

Hills, Darjeeling.

A. JUMNA, n. sp.

*Male.* Similar to *A. ganga*; but differs on the upperside in being of a pale yellowish ferruginous, the black markings much less defined, and in having the submarginal and medial lunulated bands of the hind wings geminated. On the underside the markings are much less prominent, the geminated sinuous band being apparent as on the upperside.

*Female.* Differs from that sex of *A. ganga* on the upperside in being brown, and in having the markings ferruginous; whereas in *A. ganga* the upperside is olive-brown, and the markings suffused olive-green.

Expanse of ♂  $2\frac{7}{8}$ , ♀  $3\frac{1}{2}$  inches.

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

LIMENITIS PROCRIS, Cram. t. 106. f. E, F.

Plains of S.E. Bengal and lower hills.

L. ZULEMA, Doubl. & Hewits. Diurn. Lep. pl. 34. f. 1.

Hills.

L. ISMENE, Doubl. & Hewits. ib. pl. 34. f. 2.

Hills.

L. ZAYLA, Doubl. & Hewits. ib. pl. 35. f. 4.

Hills.

L. DARAXA, Doubl. & Hewits. Diurn. Lep. pl. 34. f. 4.  
Hills. Rare.

L. DANAVA, Moore, Cat. Lep. Mus. E. I. C. pl. 6 a. f. 2.  
Hills.

L. DUDU, Westw. & Hewits. Diurn. Lep. Mus. p. 276.  
Hills.

HERONA MARATHUS, Doubl. & Hewits. ib. pl. 51. f. 3.

CASTALIA CHANDRA, Moore, Catal. Lep. Mus. E. I. C. i. pl. 6 a.  
f. 4.

Lower hills.

APATURA AMBICA, Kollar, Hügel's Kasch. iv. t. 8. f. 3, 4.

A. PARISATIS, Westw. & Hewits. Diurn. Lep. p. 305.  
Lower hills,

A. PARVATA, Moore, Cat. Lep. Mus. E. I. C. i. pl. 6 a. f. 6.

A. SORDIDA, n. sp. (Pl. XLI. f. 2.)

*A. sordida*, Atkinson, MS.

*Male.* Upperside fuliginous brown, the fore wing black at the apex; fore wing with oblique discal bands of white spots, adjoining which is a single and before the apex two white dots; hind wing with a dark-brown pale-bordered marginal line and submarginal spots. Underside brownish grey, brown apically; fore wing with the oblique discal band of white spots, the lower spot having a black yellow-bordered ocellus; apical spots and marginal streaks white; hind wing with a transverse discal brown line bordered anteriorly with white spots, a marginal pale-bordered brown line, on the lower part of the disk is an ocellus having a black pupil streaked with blue, yellow iride, and brown outer border.

*Female.* Upperside paler, with a broad oblique uninterrupted white band; otherwise as in male. Underside pale brownish grey; the broad oblique band of fore wing as on upperside; the rest as in male.

Expanse of ♂  $2\frac{1}{8}$ , of ♀  $2\frac{1}{2}$  inches.

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

HELICYRA HEMINA, Hewits. Ent. Trans. 1864, pl. 15. f. 1.  
Darjeeling.

ADOLIAS ALPHEDA, Godt. (Moore, Ent. Trans. v. pl. 3. f. 4, ♂ ♀).

A. GARUDA, Moore, Catal. Lep. Mus. E. I. C. i. p. 186; Ent.  
Trans. v. pl. 3. f. 2, ♂ ♀.

Plains.

A. PHEMIUS, Doubleday, Westw. & Hewits. Diurn. Lep. pl. 41. f. 4, ♂ (Moore, Ent. Trans. v. pl. 3. f. 3, ♂ ♀).

A. KESAVA, Moore, Ent. Trans. v. pl. 3. f. 5 (male only).

A. SANANDA, Moore, ib. v. pl. 7. f. 3, ♂.

A. APIADES, Ménétrics, Lep. Mus. Acad. Sci. Petersb. t. 9. f. 4, ♂ (1857).

*A. sedeva*, Moore, Trans. Ent. Soc. v. pl. 4. f. 3, ♀.

A. TELCHINIA, Ménétrics, ib. t. 9. f. 3, ♂.

A. APHIDAS, Hewits. Exot. Butt. (1862) pl. 8, ♀.

? *A. telchinia*, female.

Hills.

A. BALARAMA, n. sp. (Pl. XLI. f. 3.)

*Male*. Upperside dark olive-brown; fore wing with the basal marks black, two transverse discal suffused black lines, the interspace anteriorly being brownish white; hind wing with the basal marks and two transverse discal sinuous lines black, the space between the outer line of the latter and the exterior margin of the wing slaty blue. Underside greenish grey, suffused with yellow; fore wing dull chrome-yellow medially; markings as above, black, the transverse series on the fore wing formed inwardly by irregular-shaped marks, and outwardly by suffused spots terminating anteriorly with white spots, those on the hind wing by increasing black spots surrounded with slaty blue.

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

North India. In Coll. F. Moore.

A. LUBENTINA, Cram. t. 155. f. C, D, ♀; Donovan. Ins. China, pl. 36. f. 3, ♂.

Plains.

A. COCYTUS, Fabr. Mant. Ins. ii. p. 29.

A. NESIMACHUS, Boisd., Croch. edit. Cuv. Règ. Anim. t. 139. f. 1. *Argynnis hippomenes*, H.-Schff. Lep. Exot. f. 11, 12.

A. NICEA, Gray, Ins. of Nepal, pl. 12. f. 1.

A. TEUTA, Doubleday & Hewits. Diurn. Lep. pl. 44. f. 2.

A. FRANCIÆ, Gray, Ins. of Nepal, pl. 14.

*A. raja*, Felder, Wien. Ent. Monat. iii. p. 397, t. 9. f. 2.

A. DURGA, Moore, Ent. Trans. v. pl. 9. f. 2.

A. SAHADEVA, Moore, ib. pl. 8. f. 3.

A. CONFUCIUS, Westw. in Doubl. & Hewits. Diurn. Lep. p. 291.  
Darjeeling.

A. SIVA, Westw. Cab. Orient. Ent. pl. 37. f. 4.

LEXIAS DIRTEA, Fabr. (Doubl. & Hewits. Diurn. Lep. pl. 44.  
f. 1).

SYMPHÆDRA THYELIA, Fabr. (Donov. Ins. Ind. pl. 31. f. 3).

NYMPHALIS FABIUS, Fabr. (Esper, Ausl. Schmett. t. 59. f. 1).

N. ATHAMAS, Drury, Ill. i. pl. 2. f. 3, 4.

N. BERNARDUS, Fabr. (Kollar, Hügel's Kasch. iv. pl. 11. f. 1, 2).

N. MARMAX, Westw. Cab. Orient. Ent. pl. 21. f. 3-5.

N. DOLON, Westw, ib. pl. 27. f. 2, 3.

Hills,

N. EUDAMIPPUS, Doubleday, Ann. Soc. Ent. France, t. 8.

Hills.

KALLIMA INACHIS, Boisd. Croch. Cuv. Règ. Anim. t. 139. f. 3  
(Hügel's Kasch. iv. t. 9).

Hills.

DOLESCHALLIA BISALTIDE, Cram. t. 102. f. C, D.

THAUMANTIS DIORES, Doubleday, Ann. Nat. Hist. xvi. p. 231.

T. CAMADEVA, Westw. Orient. Ent. pl. 4. f. 1.

DISCOPHORA TULLIA, Cram. t. 81. f. A, B.

D. ZAL, Westw. Ent. Trans. iv. pl. 21. f. 5, 6.

D. CELINDE, Stoll, Suppl. Cram. t. 37. f. 1.

ENISPE EUTHYMIUS, Doubl.; Westw. & Hewits. Diurn. Lep. pl.  
40. f. 2.

NEORINA HILDA, Westw. & Hewits. Diurn. Lep. pl. 65. f. 2, ♂.

Fam. SATYRIDÆ.

DEBIS EUROPA, Fabr. (Cram. t. 79. f. C, D).

Plains.

D. NEILGHERRIENSIS, Guérin, Deless. Voy. Ind. pl. 21. f. 1.

D. VERMA, Kollar, Hügel's Kasch. iv. t. 16. f. 1, 2.

*D. ROHRIA*, Fabr.

*D. isana*, Kollar, *ib.* iv. t. 16. f. 3, 4.

*D. MEKARA*, Moore, *Cat. Lep. Mus. E. I. C.* i. p. 219.

Darjeeling.

*D. CHANDICA*, Moore, *ib.* i. p. 219.

Darjeeling; Cherra Poonjee.

*D. VISRAVA*, n. sp. (Pl. XLI. f. 4.)

*Male.* Upperside dull brown; fore wing with three small black white-centred ocelli before the apex, and a marginal white line; hind wing with six submarginal blackish spots, the third and last small, bordered outwardly with white; a marginal narrow white lunulated band, and outer dark double line. Underside pale dull brown; fore wing with each apical dot encircled with white; marginal band white; hind wing with purple-white irregular basal lines, seven ocelli, each composed of a black spot with white centre and yellow outer circle, the two last ocelli geminated, all bordered with white, a marginal narrow white lunulated band, and extreme outer marginal yellowish line.

Expanse 2 inches.

N.E. Bengal. In the Coll. of A. E. Russell.

*D. SIDONIS*, Hewits. *Exot. Butt., Debis*, pl. 3. f. 16.

Darjeeling.

*D. NICETAS*, Hewits. *ib.* pl. 3. f. 17, 18.

*ZOPHOESSA SURA*, Doubl. & Hewits. *Diurn. Lep.* pl. 61. f. 1.

*Z. GOALPARA*, n. sp.

*Male.* Upperside glossy olive-brown, palest on the exterior margin; fore wing with a marginal suffused brown line; hind wing with a transverse discal line, a submarginal series of round spots, and marginal lunulated line dark brown. Underside pale glossy greyish olive-brown, suffused with darker brown exteriorly; fore wing with two short bands within the cell, a transverse discal band, and suffused submarginal line dark brown; hind wing with subbasal transverse bifid line and transverse discal sinuous band dark brown, a submarginal series of seven dark brown ocelli, the last two at anal angle geminated, each with a white central dot and yellowish border, the whole having an outer pale whitish border along each side, a marginal line of pale lunules.

*Female* dark olive-brown, pale greyish brown exteriorly; fore wing with a marginal suffused brown line; hind wing with a submarginal series of brown pale-bordered spots, a marginal narrow lunulated pale line bordered with brown. Underside glossy greyish olive-brown, palest exteriorly; markings as in male, but more suffused, those of the hind wing each with a pale border; the submar-

ginal ocelli less defined, the three upper partially covered with blue, the two next wholly so, the geminated last jet-black, the whole of them having each a separate pale-white outer circle; fore wing with three small indistinct subapical ocelli.

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

? N.E. Bengal. In Coll. A. E. Russell.

*Z. BALADEVA*, n. sp. (Pl. XLI. f. 5.)

*Male.* Upperside greenish olive-brown; fore wing with three pale apical bands, the first oblique, each extending from the costa to near the posterior angle, the medial band having a linear series of small dark spots: hind wing with a submarginal series of black, pale-ferruginous-bordered spots, the lower spot with a central white dot; a narrow marginal double black line. Underside yellowish olive-brown; fore wing with bands crossing the cell, the oblique discal and submarginal band and marginal line pale yellow, the medial band composed of six small uniform ocelli, each with a black spot having a white dot and pale ferruginous outer circle, the whole bordered inwardly by a silvery-white band: hind wing with a straight silvery-white band from inner margin extending across the cell, beneath which it terminates with yellow; a basal streak, discal and marginal lines yellow; the ocelli seven in number and very prominent, each composed of a jet-black spot with white central dot (the lowest spot with two) and pale ferruginous outer circle, the upper spot bordered with yellow, the others with a silvery-white inner band; space below the last two ocelli ferruginous; marginal lines black.

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

N.E. Bengal. In Coll. A. E. Russell.

*CYLLO LEDA*, Linn. (Cram. t. 196. f. C, D).

Plains.

*C. BANKSIA*, Fabr. (Donov. Ins. t. 25. f. 1).

Plains.

*C. VAMANA*, Moore, Cat. Lep. Mus. E. I. C. i. p. 223.

*C. BELA*, Moore, ib. p. 223.

*C. ASWA*, n. sp.

*Male.* Upperside uniform dark brown, without spots or other markings. Underside brown, uniformly covered with short grey striæ: fore wing with four or five more or less defined apical ocelli, each composed of a black spot, white pupil, pale ferruginous iride, and dark-brown outer circle; a marginal band ferruginous brown: hind wing with a transverse discal line and broad marginal band ferruginous brown; a submarginal series of six well-defined ocelli, each composed of a black spot, white pupil, ferruginous iride, and dark-brown outer circle.

Expanse 3 inches.

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

C. SURADEVA, Moore, Cat. Lep. Mus. E. I. C. i. p. 225.

SATYRUS AVATARA, Moore, ib. p. 229.

LASIOMMATA SATRICUS, Doubleday & Hewits. Gen. Diurn. Lep. pl. 64. f. 4.

NEOPE (olim ENOPE) PULAHA, Moore, Cat. Lep. Mus. E. I. C. i. p. 227.

N. BHADRA, Moore, ib. p. 227.

ZIPAËTIS SCYLAX, Hewits. Exot. Butt.

ETHOPE (olim THEOPE) HIMACHALA, Moore, ib. p. 234.

*Neorina sita*, Felder, Wien. Ent. Monat. iii. p. 403.

*Tisiphone sufta*, Boisd. MS. in Coll. B.M.

Hills.

MYCALESIS ANAXIAS, Hewits. Exot. Butt.

M. MALSARA, Moore, Cat. Lep. Mus. E. I. C. i. p. 231.

M. SAMBA, Moore, ib. p. 234.

*M. lalassis*, Hewits. Exot. Butt., *Mycalesis*, pl. 4. f. 35.

M. HESIONE, Cram. t. 11. f. C, D.

M. RUNEKA, Moore, Cat. Lep. Mus. E. I. C. i. p. 234.

M. VISALA, Moore, ib. p. 230.

M. OTREA, Cram. t. 314. f. A, B.

M. NICOTIA, Hewits. Gen. Diurn. Lep. pl. 66. f. 4; Exot. Butt., *Myc.*, pl. 1. f. 1.

M. DRUSIA, Cram. t. 84. f. C, D.

YPHTHIMA BALDUS, Fabr. (Donov. Ins. Ind. pl. 36. f. 2).

Y. PHILOMELA, Hübn. Zuträge, f. 83, 84.

MELANITIS UNDULARIS, Fabr. (Cram. t. 256. f. A, B, ♂; t. 189. f. F, G, ♀).

M. VASUDEVA, Moore, Cat. Lep. Mus. E. I. C. i. p. 238.

Silhet.

M. MALELAS, Hewits. Exot. Butt.

M. PATNA, Westw. & Hewits. Diurn. Lep. pl. 68. f. 2.

ORINOMA DAMARIS, Gray, Lep. of Nepal, pl. 7. f. 2 (Doubleday & Hewits. Gen. pl. 63. f. 3).



## Fam. LIBYTHEIDÆ.

LIBYTHEA MYRRHA, Godt. (Gray, Lep. of Nepal, pl. 12. f. 4; Boisd. Spéc. Gén. Léop. i. pl. 10. f. 8).

L. LEPITA, Moore, Cat. Lep. Mus. E. I. C. i. p. 240.

## Fam. ERYCINIDÆ.

ZEMEROS FLEGYAS, Cram. t. 280. f. E, F.

SOSPITA ECHERIUS, Stoll, Suppl. Cram. v. t. 31. f. 1.

S. FYLLA, Boisd. (Westw. & Hewits. Diurn. Lep. pl. 69. f. 3).

S. NEOPHRON, Boisd. (Hewits. Exot. Butt. 1860, f. 3).

DODONA EGEON, Boisd. (Westw. & Hewits. Diurn. Lep. pl. 69. f. 2).

D. OUIDA, Hewitson, Exot. Butt. iii. pt. 57 (1865), f. 4, 5, 6 ♂ ♀.

*Taxila erato*, Boisd. MS.

*Male.* Upperside brownish black: fore wing with three transverse discal equidistant ferruginous bands, the medial one broadest, the first two oblique; two white dots at apex: hind wing with transverse discal and two narrow marginal ferruginous bands; anal lobe with a white bar and border. Underside dark ferruginous: fore wing with the transverse bands less defined, yellow, terminating on the costal margin in white spots; two apical white spots: hind wing with bluish basal and purplish medial transverse discal interrupted bands, the latter with an inner border of brown, each having a white spot on the costal margin, that of the latter with a black inner border; two narrow marginal brown bands, two black purple-bordered dots at anterior angle, and black and white lines bordering the black lobe.

*Female.* Dull fuliginous brown, somewhat black apically: fore wing with medial broad transverse discal oblique white band, and an outer or submarginal narrow interrupted ferruginous-white line; two apical dots white: hind wing with two marginal pale-brown lines, terminated at the anterior angle with two pale-bordered black spots; anal lobe black. Underside as in male.

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

Bengal. In Coll. A. E. Russell.

## Fam. LYCÆNIDÆ.

PITHECOPS HYLAX, Fabr. Ent. Syst. iii. pt. 1. p. 304.

POLYOMMATUS PUSPA, Horsf. Cat. Lep. E. I. C. (1828) p. 67.

P. KASMIRA, Moore, P. Z. S. (1865) p. 503, pl. 31. f. 1.

P. KARSANDRA, Moore, ib. p. 505, pl. 31. f. 7.

*P. VARUNANA*, n. sp. (Pl. XLI. f. 6.)

*Male.* Upperside dull purple-blue; exterior margins with a slight pale brown border; hind wing with two or three ill-defined blackish, pale-bordered, marginal spots from anal angle. Underside grey; fore wing with a brown, white-bordered spot closing the cell, a transverse row of blackish, white-bordered discal spots, and a double row of marginal white-bordered lunules: hind wing with three transverse subbasal jet-black, white-bordered, round spots, and a fourth on the middle of the costa; a pale-brown streak closing the cell, a discal series of dark-brown spots, a submarginal row of brown lunules, and a marginal series of blackish triangular spots, all bordered with white. Palpi and legs above black, beneath white.

*Female.* Upperside brown; fore wing with a lower basal blue patch, and a narrow black spot closing the cell; hind wing with the black white-bordered marginal spots more defined.

Expanse  $1\frac{2}{12}$  inch.

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

*P. KANDURA*, n. sp. (Pl. XLI. f. 7.)

Upperside bright purple-olive: fore wing pale brown on apical and exterior margins; a row of small rounded darker-brown marginal spots. Underside white, at the base greyish white: fore wing with a dark-brown white-bordered spot closing the cell, and a transverse discal series beyond; two marginal rows of dusky lunules: hind wing with a large dark-brown patch on the lower exterior quarter of the wing; a marginal and an irregular discal series of dark-brown white-bordered spots, those crossing the brown patch bordered with darker brown; a double row of marginal dusky lunules.

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

Bengal. In Coll. A. E. Russell.

*P. SANGRA*, n. sp. (Pl. XLI. f. 8.)

*Male.* Upperside pale purple blue, the exterior margin pale purple brown. Cilia pale grey. Underside pale grey; fore wing with a blackish white-bordered streak closing the cell, a row of transverse discal spots, a marginal and submarginal row of lunules; hind wing with markings the same, and with an additional subbasal row of three similar spots. Palpi and body beneath and legs white.

Expanse  $\frac{7}{10}$ ths of an inch.

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

*LYCÆNA PARRHASIUS*, Fabr. (Cat. Lep. E. I. C. i. pl. 1. f. 3).

*L. PLUTO*, Fabr. (Donov. Ins. Ind. pl. 45. f. 2).

*L. PLINIUS*, Fabr. (Donov. ib. f. 1).

*L. THEOPHRASTUS*, Fabr. Ent. Syst. iii. 1. p. 281.

*L. ROXUS*, Godt. (Catal. Lep. E. I. C. (1828) pl. 2. f. 4).

Plains and lower hills.

*L. ROSIMON*, Fabr. (Cram. t. 340. f. C-E).

Plains.

*L. PANDAVA*, Horsf. Cat. Lep. E. I. C. (1828) p. 84.

*L. KANDARPA*, Horsf. ib. p. 82.

*L. CNEJUS*, Fabr. Ent. Syst. v. Suppl. p. 430.

*L. BÆTICA*, Linn. (Hübner. Eur. Schmett. t. 74. f. 373).

*L. ELPIS*, Godt. (Catal. Lep. E. I. C. (1828) pl. 1. f. 4).

*L. ALEXIS*, Stoll, Suppl. Cram. t. 38. f. 3.

*L. ÆLIANUS*, Fabr. Ent. Syst. iii. 1. p. 280.

*ILERDA EPICLES*, Godt. Enc. Méth. p. 646.

Darjeeling.

*I. BRAHMA*, Moore, Cat. Lep. Mus. E. I. C. i. pl. 1 a. f. 4, ♂.

*I. TAMU*, Kollar, Hügel's Kasch. iv. pl. 5. f. 7, 8.

Darjeeling.

#### *LYCÆNESTHES*, n. g., Moore.

Eyes hairy. Palpi long, compressed, porrect; third joint long, attenuated, half the length of the second. Legs moderate; femora slightly pilose beneath; mid and hind tibiæ with two short apical spurs. Antennæ slender at the base, thickened near the end, which is finely pointed. Thorax and abdomen robust. Wings moderately broad; fore wing with costal margin arched at the base; apex rather acute, exterior margin slightly oblique; subcostal vein with first branch arising at one-third the length of the wing, second and third equidistant, fourth remote, fifth joined at the base to the third; hind wing rounded exteriorly; two small very fine tail-like fascicles of hair near anal angle.

#### *LYCÆNESTHES BENGALENSIS*, n. sp. (Pl. XLI. f. 9.)

*Male*. Upperside dark purple blue, exterior margins defined by a narrow suffused black line; a small indistinct black spot at anal angle; abdominal margin brown. Underside pale greyish brown; fore wing with a short transverse double white line at the extremity of the cell, enclosing the discal veinlet, beyond which are a transverse discal chain-like white band and an outer indistinct brownish submarginal and a narrow white marginal line; hind wing with basal, discoidal, and a curved discal series of chain-like white bands; an indistinct, inwardly angled, double-lunulated, white marginal line; a black spot bordered above with orange-red near anal angle of exterior margin; a small white-encircled black spot on middle of abdominal margin. Head above brown; eyes encircled with white.

Palpi above and beneath brown, at the sides white. Thorax, body, and legs beneath white.

*Female.* Upperside pale purple brown, with suffused bluish patch at the base; exterior margins suffused with darker brown; hind wing with an inner narrow white exterior marginal line. Underside as in male.

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

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

*Note.*—Allied to *Dipsas lycænoïdes*, Felder, Lep. Amboin., Sitz. der Akad. Wiss. (1860).

DIPSAS SYLA, Kollar, Hügel's Kasch. iv. t. 4. f. 7, 8, ♂ (Hewits. Ill. Lep. Lyc. pt. 2. pl. 26. f. 3, ♀).

Darjeeling.

DEUDORIX MELAMPUS, Cram. t. 362. f. G, H, ♂.

*Thecla sorya*, Kollar, Hügel's Kasch. iv. t. 5. f. 1, 2.  
Plains, Calcutta.

D. EPIJARBAS, Boisd. (Moore, Cat. Lep. E. I. C. i. p. 32); Hewits. Ill. Lep. Lyc. pt. 1. pl. 7. f. 16–18, ♂ ♀.

D. ISOCRATES, Fabr. (Westw. Linn. Trans. ii. t. 1).

D. NISSA, Kollar, Hügel's Kasch. iv. t. 4. f. 3, 4; Hewits. ib. pl. 10. f. 42–44, ♂ ♀.

D. PERSE, Hewits. ib. pl. 8. f. 24–26, ♂ ♀.

D. TIMOLEON, Stoll, Suppl. Cram. t. 32. f. 4; Boisd. Spéc. Gén. Lép. t. 22. f. 4.

*Amblypodia rochana*, Horsf. (Catal. Lep. E. I. C. i. pl. 1 a. f. 10).

AMBLYPODIA NARADA, Horsf. Catal. Lep. E. I. C. (1828) pl. 1. f. 8, ♀.

A. AMERIA, Hewits. Cat. Lyc. B. M. pl. 8. f. 85, 86, ♂.

A. ABSEUS, Hewits. ib. pl. 5. f. 51, 52, ♀.

A. ARESTE, Hewits. ib. pl. 5. f. 43, 44, ♀.

Darjeeling.

A. ATRAX, Hewits. ib. pl. 7. f. 80–82.

Calcutta.

A. AMANTES, Hewits. ib. pl. 2. f. 1–3.

A. CHINENSIS, Felder.

Darjeeling.

A. EUMOLPUS, Cram. t. 299. f. G, H (Hewits. ib. pl. 8. f. 89).

A. CAMDEO, Doubleday (Cat. Lep. E. I. C. i. pl. 1 *a.* f. 6 ; Hewits. ib. pl. 3. f. 25, 26, ♂).

A. CENTAURUS, Fabr. (Hewits. ib. pl. 2. f. 10-13, ♂ ; f. 11, ♀).

*A. nakula*, Felder, Lep. Mal. Wien. Ent. Monat. iv. p. 395.

CAMENA CTESIA, Hewits. Ill. Lep. Lyc. pt. 2. pl. 20. f. 1, 2, ♂.  
Darjeeling.

PORITIA, n. g., Moore.

*Pseudodipsas* (part.), Felder.

Eyes naked. Palpi long; third joint slender, one-third the length of the second, finely pointed at the tip. Legs short, stout; femora slightly pilose beneath. Antennæ slender at the base; club moderate. Thorax stout; abdomen moderate, extending to two-thirds of the length of the hind wing. Wings short, very broad; costa of fore wing slightly concave in the middle, exterior margin straight, slightly oblique, posterior margin nearly as long as the costæ, posterior angle acute: hind wing very convex near the base, concave in the middle; apex, exterior margin, and anal angle rounded, scalloped; subcostal vein with first branch arising at one-third from its base and extending to the costa beyond one-third of its length, third remote, fourth arising from the second at one-fourth of the length of the first.

PORITIA HEWITSONI, n. sp. (Pl. XLI. f. 10.)

*Male.* Upperside jet-black: fore wing with the lower part of the base from beneath to beyond the cell and extending into the black of the exterior margin brilliant deep blue, or in some lights emerald-green, in the middle of which is an elongated black spot; a row of very small similar brilliant blue spots obliquely before the apex and along the exterior margin: hind wing with the same brilliant blue extending from the base beneath the cell (in some specimens encroaching within) to the exterior margin, within which is a row of more or less defined marginal and submarginal black spots; exterior margin defined by a black line; abdominal and anterior margins greyish black; a tuft of fine greyish hairs near the base. Thorax above greenish black; abdomen black. Antennæ black, ringed with white. Head and palpi above hoary. Palpi and thorax beneath and legs white; tibiæ and tarsi with black spots. Underside very pale ashy colour; both wings covered with numerous transverse irregular-shaped black-bordered pale-brown markings, those at the base short, a series across the disk zigzag, others along the exterior margin with narrow inner white lines; posterior angle of both fore and hind wings with a black spot bordered above with orange-red.

*Female.* Upperside brownish black; fore wing with a pale orange-yellow streak in the middle, above and beneath which are purple-blue connected streaks; hind wing with ill-defined purple-blue marginal and discal spots, exterior margin defined by a very narrow yel-

low line, which is bordered within by a similar white line. Cilia in both sexes alternate brown and white.

Expanse  $1\frac{3}{10}$  inch.

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

*IOLAUS LONGINUS*, Fabr. (Horsf. Cat. Lep. E. I. C. (1829) pl. 1. f. 7; Hübn. Zutr. f. 933).

I. CLEOBIS, Godt. (Hewits. Ill. Lep. Lyc. pt. 2. pl. 17. f. 8-10, ♂ ♀).

*Amblypodia hypatada*, Moore, Cat. Lep. E. I. C. i. p. 45.

I. DEVA, Moore (Hewits. ib. pt. 2. pl. 17. f. 3-5, ♂ ♀).

*ARHNÆUS ETOLUS*, Cram. t. 208. f. E, F (Hewits. ib. pt. 1. pl. 25. f. 3).

A. LOHITA, Horsf. Cat. Lep. E. I. C. (1829) p. 106 (Hewits. ib. pl. 25. f. 11).

A. SYAMA, Horsf. ib. p. 107 (Hewits. ib. pl. 25. f. 7).

*HYPOLYCÆNA OTHONA*, Hewits. ib. pt. 2. pl. 22. f. 17, 18).

Darjeeling.

H. AMASA, Hewits. ib. pl. 22. f. 19, 20.

*Papilio etolus*, Fabr. (Horsf. ib. pl. 1. f. 9).

II. ERYLUS, Fabr. (Hewits. ib. pt. 2. pl. 21. f. 1, 3, ♂ ♀).

*MYRINA JAFRA*, Godt. (Horsf. ib. pl. 2. f. 5).

M. ACTE, Doubleday (Hewits. ib. pt. 1. pl. 12. f. 8, 9).

M. TRIOPAS, Cram. t. 320. f. G, H (Guér. Icon. Règ. Anim. Ins. t. 81. f. 6).

Calcutta.

M. JALINDRA, Horsf. ib. p. 109, ♀.

*Sython thymbræus*, Hübn. Zutr. f. 671 (1832), ♂.

Balasore.

M. MANDARINA, Doubleday (Hewits. ib. pt. 1. pl. 11. f. 6, 7).

M. JANGALA, Horsf. ib. i. pl. 1 a. f. 11).

Darjeeling.

M. RAVATA, n. sp. (Pl. XLI. f. 11.)

*Female*. Upperside purple brown; discoidal cell and space below purple-blue. Tails two, bordered and tipped with white. Underside chrome-yellow; fore wing with a transverse discal pale-brown narrow line: hind wing with discal pale-brown line terminated with continuous white spots; a large black spot above each tail, interspaced with brown, bordered above by a broken line of metallic green, and

below by a white line; cilia from anal angle to beyond the tails black, edged with white.

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

Bengal. In Coll. A. E. Russell.

*LOXURA ATYMNUS*, Cram. t. 331. f. D, E (Horsf. Cat. Lep. E. I. C. (1829) pl. 2. f. 6).

*L. TRIPUNCTATA*, Hewits. (Westw. & Hewits. Diurn. Lep. pl. 74. f. 2).

*ANOPS THETYS*, Drury, Ill. Ins. iii. pl. 9. f. 3, 4; Cram. t. 238. f. D, ♀.

*Papilio cinyra*, Cram. t. 238. f. C, ♂.

*A. BULIS*, Boisd. (Westw. & Hewits. Diurn. Lep. pl. 75. f. 5; Hewits. Ill. Diurn. Lep. Lyc. pt. 1. pl. 4. f. 1, ♂).

*MILETUS BOISDUVALI*, Moore, Cat. Lep. E. I. C. i. p. 19. pl. 1 a. f. 1.

Darjeeling.

*M. DRUMILA*, n. sp. (Pl. XLI. f. 12.).

*Male*. Upperside dull fuliginous white, exterior margins scalloped; fore wing with the apex from the middle of the costa obliquely to below and near the middle of the exterior margin and thence retracing to posterior margin dark fuliginous brown, with the tips of the veins on the costa brownish white; hind wing dark fuliginous brown along anterior margin, with paler fuliginous marginal lunules. Cilia pale buff-colour. Antennæ black. Body pale brown. Underside very pale fuliginous brown: fore wing with the disk broadly dull white; three short transverse brown bands within the cell; an irregularly margined curved brown submarginal band; along the costa and exterior margin numerous small brown speckles: hind wing with basal transverse pale-bordered marks; a short row of black-bordered dark-brown pointed lunules proceeding from anal angle across the disk, with numerous brown speckles beneath it, and also on the anterior margin. Palpi and body beneath and legs pale brown.

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

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

#### Fam. HESPERIDÆ.

##### GONILOBA CHROMUS.

*Papilio chromus*, Cram. t. 234. f. E.

*Male* and *female* dark vinaceous brown.

*Male* with suffused blackish subbasal patch; both wings greyish brown basally. Cilia greyish brown. Head and thorax greenish brown. Abdomen brown. Underside with the apex of fore wing suffused with purple blue; hind wing with a narrow transverse discal

bluish-white band, a blackish patch on anal lobe, exterior to which the cilia have a short white line. Third joint of palpi and legs brown; palpi and thorax beneath dull yellow.

*Female* paler brown; fore wing with two yellowish semitransparent discal spots, and a very small similar spot before the apex.

Expanse 2 inches.

Bengal.

G. BADRA, Moore, Cat. Lep. E. I. C. i. p. 245.

*Male* and *female* yellowish brown.

*Male* with a suffused blackish subbasal patch; fore wing with three conjugated very small yellowish semitransparent spots near the costa, one-fourth from the apex. Cilia pale greyish brown. Underside brown, suffused with purple; fore wing with a blackish costal patch before the apex, posterior margin yellowish; hind wing with a subbasal and submarginal suffused blackish band, the latter terminating in a black patch on anal lobe; above the patch is a purple-white streak, and within the cell a small bluish-white spot. Palpi and body beneath dull yellow. Legs pale brown.

*Female* above brown, suffused with vinaceous, yellowish-brown basally; fore wing with the three small subapical spots (as in male) and three rather large obliquely quadrate spots, two being disposed on the disk, the third above and within the cell. Underside with the spots on fore wing as in upperside; hind wing as in male.

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

Bengal. In Coll. A. E. Russell; F. Moore; Brit. Mus. (Horsf. Coll.)

G. SENA, Moore, Cat. Lep. E. I. C. i. p. 245.

*Male*. Upperside dark chocolate-brown. Cilium of hind wing carmine-red. Underside maroon-brown; fore wing with a large buff-white patch from the middle of posterior margin, bordered above with purple; hind wing with a broad transverse purple-white band terminating before the anal angle, the inner border of which is sharply defined, the outer suffusing itself on the disk. Cilia carmine-red. Palpi and thorax in front beneath, and anal tuft dull yellow. Thorax beneath greyish brown.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell; F. Moore; Brit. Mus. (Horsf. Coll.)

#### PTERYGOSPIDEA FOLUS.

*Papilio folus*, Cram. t. 74. f. F.

*Hesperia cicero*, Fabr. Ent. Syst. iii. 1. p. 358.

P. MENAKA.

*Goniloba menaka*, Moore, Cat. Lep. E. I. C. i. p. 246.

*Male* and *female* dark brown.

*Male*. Fore wing with six minute semitransparent white spots recurring before the apex, and two similar spots from near middle



of the costa; hind wing with a large discal quadrate space pure white, a series of blackish brown marginal spots with their interspaces greyish, and within the white space two smaller paler spots. Base of abdomen white.

*Female*. Marked as in male, but having the semitransparent spots on the fore wing larger, the black marginal spots of hind wing more distinct and apart, and with the two spots on the white space. Underside as the upperside, both sexes having the base of the hind wing, palpi beneath, legs, and body greyish white, and the black spots on the hind wing extend towards the base of the anterior margin. Palpi above brown.

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

N.E. Bengal. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

#### P. RAVI.

*Goniloba ravi*, Moore, Cat. Lep. E. I. C. i. p. 246.

*Male* and *female* fuliginous brown.

*Male*. Upperside—fore wing with three minute semitransparent spots before the apex, two larger similar spots on the disk diverging inward below the extremity of the cell; across the disk are three ill-defined blackish spots, and one before it near the base; apex and exterior margin blackish: hind wing with a curved series of small blackish discal spots. Underside brown; fore wing with the semitransparent spots as above; hind wing suffused with greyish white, and having a curved series of small blackish discal spots. Palpi, body, and legs beneath greyish white.

*Female* similar, but having two very minute additional spots beneath the subapical series, those on the disk being large, and above the latter is a transverse spot at the extremity of the cell. Cilia brown throughout.

Expanse, ♂  $1\frac{5}{8}$ , ♀ 2 inches.

Bengal. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

#### P. PRALAYA.

*Goniloba pralaya*, Moore, Cat. Lep. E. I. C. i. p. 246.

*Male* and *female* yellowish brown, veins paler on the disk. Upperside—fore wing with a numerous series of variously shaped small semitransparent white spots, five of which are placed obliquely before the apex, the rest disposed from near middle of the costa and extending across the disk, three of which are in the form of elongated streaks: hind wing with the exterior half orange-yellow, having a subbasal series of longitudinal black streaks between the yellow veins; apex with suffused blackish spots. Abdomen with yellow segmental bands. Underside as above: fore wing with the veins from the base lined with yellow; a series of submarginal ill-defined yellow spots. Palpi, body, and legs yellowish brown.

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

Bengal. In Coll. A. E. Russell; F. Moore; Brit. Mus. (Horsf. Coll.).

*P. GANA*, n. sp.

*Male and female* dark brown.

*Male.* Upperside with three minute semitransparent spots obliquely before the apex; a transverse discal series of streaks, a small patch within the cell, one near the base of the wing, and exterior margin blackish: hind wing with the lower third pure white, which is straightly separated from the brown of the basal portion; apical margin and three spots on the upper part of the disk, and two spots on the middle of the white exterior margin. Underside paler brown, semitransparent spots on fore wing as above: hind wing white, suffused with brown along the anterior margin; upper discal and marginal spots as above, black.

*Female* paler. Upperside somewhat greyish brown; fore wing with spots and blackish discal streaks, and hind wing with upper discal spots as in male; exterior margin of hind wing greyish white. Underside as in male. Cilia of both sexes pure white on the lower portion of the hind wing, the rest brown.

Expanse, ♂  $1\frac{3}{4}$ , ♀  $1\frac{7}{8}$  inch.

Bengal. In Coll. F. Moore; Brit. Mus. (Horsf. Coll.)

#### SATARUPA, n. g., Moore.

Palpi stout, densely pilose, erect, projecting in front of the head; third joint minute, conical. Antennæ moderate. Body very stout. Legs slender; femora slightly pilose beneath; hind tibiæ pilose at the side and beneath; middle tibiæ with a pair, and hind tibiæ with two pairs of apical spurs. Wings—fore wing acute; costa nearly straight, exterior margin oblique; hind wing rounded exteriorly in the male, angled at the apex, and in the middle of exterior margin of the female.

SATARUPA GOPALA. (Pl. XLII. f. 1.)

*Goniloba gopala*, Moore, Cat. Lep. E. I. C. i. p. 246.

*Male and female* dark maroon-brown. Upperside—fore wing with a series of eight semitransparent irregular-shaped whitish spots recurving transversely from costal margin before the apex to near posterior margin, being there joined by a white longitudinal streak; a similar triangular-shaped spot within the discoidal cell: hind wing pure white, with the base and narrowly along anterior margin maroon-brown; a double row of black marginal spots, the interspace between the rows being suffused with bluish grey. Abdomen with broad white band; tip brown. Cilia of hind wing white. Underside as above, but with base of hind wing greyish white, and the double row of marginal spots more defined and blacker. Palpi above brown, beneath orange-yellow. Thorax and legs beneath dull white; legs in front black.

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

Darjeeling. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

## S. SAMBARA.

*Goniloba sambara*, Moore, Cat. Lep. E. I. C. i. p. 246.

*Male and female.* Upperside dark maroon-brown; fore wing with a series of seven semitransparent white spots, three being small and obliquely subapical, the rest transverse to near posterior margin and there joined by a short white longitudinal streak; hind wing with a broad central transverse whitish band, bordered by a semicircular discal series of black spots. Abdomen with whitish band. Cilia spotted with white. Underside as above, but paler; the white band on the hind wing less defined, but of a purer white. Palpi above and at the side, and legs in front blackish. Palpi and thorax beneath, legs, and abdomen whitish; tip of the last brown.

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

Darjeeling. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

## S. BHAGAVA, n. sp.

Upperside dark olive-brown: fore wing with a triangular series of three discal semitransparent white spots, the first being large and within the extremity of the cell, the second quadrate and beneath the first, the third exterior to their juncture; beneath these are small black spots bordering a brownish-white streak from middle of posterior margin; a recurved series of small similar white spots before the apex: hind wing with a broad brownish-white subbasal transverse band, bordered by a semicircular series of black spots, those exteriorly assuming the form of streaks between the veins. Abdomen with a white band. Underside as above. Palpi and thorax in front beneath orange-yellow. Cilia brown.

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

N.E. Bengal. In Coll. East India Museum.

## DARPA, n. g., Moore.

Palpi stout, densely pilose; third joint small, conical, hidden by the hairs. Antennæ moderate, hooked at the tip. Legs short; femora slightly pilose; fore tibiæ short and rather stout; mid tibiæ slightly, and hind tibiæ densely pilose; mid and hind tibiæ armed with a pair of short spurs (the usual second pair on the latter invisible). Body stout; abdomen short. Wings small; costa of fore wing nearly straight; exterior margin irregularly scalloped, produced in the middle: hind wing somewhat quadrate; exterior margin irregularly scalloped, produced to an angle in the middle.

## DARPA HANRIA, n. sp. (Pl. XLII. f. 2.)

Upperside black, with minute bluish-grey scales in patches between the veins and narrowly along the veins: fore wing with a series of semitransparent irregular-shaped spots, the largest of which is within the extremity of the cell, others above and beneath it; before the apex are three small similar conjugated spots: hind wing with a pale-yellow space broadly occupying the lower portion of the exterior

margin; apical and two medial angles with a black spot; base of wing adorned with very long brown and yellow hairs. Underside paler; fore wing with markings as above, densely irrorated with bluish-white scales: hind wing bluish white at the base, yellowish white exteriorly; anterior margin and apex blackish; below the anterior margin are three black spots, and a spot on the two medial angles of exterior margin. Palpi and body beneath, and legs, white.

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

N.E. Bengal. In Coll. F. Moore.

*ISMENE JAINA*, Moore, Cat. Lep. E. I. C. i. p. 247.

*Male* and *female* dark vinaceous brown.

*Male*. Upperside—fore wing with an orange-red subcostal basal streak, and an indistinct blackish patch beneath the cell; front of thorax, anal tuft, and cilia of hind wing bright orange-red; thorax and base of abdomen clothed with bluish-grey hairs. Underside paler brown; both wings with a small black orange-red-bordered basal spot: fore wing with a well-defined purplish-white spot within the cell, and a curved discal series of narrow less-defined spots; posterior margin broadly yellow: hind wing with the veins towards the abdominal margin and cilia orange-red; a curved ill-defined series of narrow purplish-white discal streaks. Third joint of palpi brown; thorax beneath greyish; middle of abdomen beneath and sides of the bands, and legs, orange-red.

*Female* similar, but with darker bluish-grey hairs, without the orange-red subcostal streak and black discal patch.

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

Darjeeling. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

*I. VASUTANA*, Moore, Cat. Lep. E. I. C. i. p. 247.

*Male*. Upperside deep purple brown, paler on the base of the wings; fore wing with orange-yellow costal basal streak. Cilia of hind wing broad, and bright orange-yellow. Underside glossy greyish green, the veins and narrow intermediate parallel lines blackish; a patch on posterior half of fore wing brown, bordered above with blue. Third joint of palpi brown, the rest orange-yellow. Head, thorax in front and beneath, legs, middle of abdomen beneath, and anal tuft bright orange-yellow.

*Female*. Upperside darker brown, the base of the wings greyish blue; fore wing with two small semitransparent spots obliquely beneath the extremity of the cell. Underside as in male, with the two spots as above.

Expanse, ♂  $2\frac{1}{8}$ , ♀  $2\frac{1}{4}$  inches.

Darjeeling. In Coll. East India Museum and F. Moore.

*I. HARISA*, Moore, Cat. Lep. E. I. C. i. p. 247.

*Male* and *female* brown.

*Male*. Upperside dull vinaceous brown, palest on the disk; fore wing with an orange-yellow costal streak; hind wing broadly along

anterior margin pale buff yellow. Body greyish. Cilia of hind wing orange-yellow. Underside paler, suffused with orange-yellow; fore wing with a curved series of pale-purple narrow streaks between the veins before the apex, and a broad pale buff patch along the posterior margin; hind wing with the veins and lines between them and cilia orange-yellow; a black orange-yellow-encircled basal spot on both wings; a discal series of pale-purplish streaks. Third joint of palpi brown; palpi beneath, front and sides of thorax, legs, and streak along side of abdomen orange-yellow; middle of thorax and abdomen and anal tuft orange-yellow.

*Female.* Upperside dark purple brown; the base of wings greyish, with steel-blue gloss. Body greyish. Cilia of hind wing pale orange-yellow. Underside as in male; posterior margin of fore wing with a less-defined pale patch.

Expanse 2 inches.

Darjeeling. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

#### I. AMARA, Moore, Cat. Lep. E. I. C. i. p. 247.

*Male and female.* Upperside brown, with a greenish gloss; costal streak of fore wing ochreous yellow in the male, less prominent in the female; male with a blackish subbasal patch. Cilia of both wings short, and brownish white. Body dark brown; abdomen with greyish segmental bands. Underside—fore wing brown, becoming bluish black along the base of the costa; posterior margin broadly brownish white; hind wing bluish black; veins of both wings brownish white, the space between them having a greyish-blue parallel line running their entire length. Both wings also with the black ochreous-yellow-encircled basal spot. Thorax in front and beneath, head, palpi, legs, middle of abdomen, and anal tuft ochreous yellow. Femora and tibiae with a black spot; sides of abdomen black, the segmental bands prominent. Cilia greyish.

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

N.E. Bengal. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

#### I. BENJAMINI.

*Hesperia (Thymele) benjamini*, Guér. Mén. in Deless. Voy. dans l'Inde, pt. 2. t. 22. f. 2.

*H. xanthopogon*, Kollar, Hügel's Kaschmir, iv. pt. 2. t. 18. f. 1, 2 (1844).

Darjeeling.

#### I. GOMATA, n. sp.

*Male.* Upperside pale vinaceous brown; both wings with pale brownish-yellow streaks longitudinally between the veins. Abdomen blackish brown, with yellowish bands. Cilia yellowish. Underside dark brown, with the veins and longitudinal streaks between them greyish green, the brown showing only along each side of the veins; posterior margin of fore wing broadly pale vinaceous; exterior margin of both wings defined by a brown line. Third joint of palpi and

edge of sides brown, the rest yellow. Thorax, legs, and abdomen beneath orange-yellow.

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

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

#### I. MURDAVA, n. sp.

Upperside olive-brown; fore wing with the base grey, with six small yellow spots, two within the extremity of the cell, two near the costa one-third from the apex, and two midway beneath; hind wing grey to beyond the middle. Underside pale yellowish brown; disk of fore wing blackish, spots as above; hind wing with indistinct submarginal and discal pale-yellowish spots. Abdomen above with greyish-brown segmental bands. Palpi, abdomen, and legs beneath dull yellow.

Expanse 2 inches.

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

#### I. ARIA.

*Hesperia aria*, Moore, Cat. Lep. E. I. C. i. p. 254.

*Male* and *female* chocolate-brown.

*Male*. Upperside pale brown; fore wing with a short impressed comma-like grey streak obliquely beneath the cell. Cilia yellowish white. Underside bright ferruginous brown. Palpi ferruginous brown.

*Female*. Upperside dark chocolate-brown, without the impressed streak; cilia of hind wing pale orange-yellow. Underside bright ferruginous brown.

Expanse, ♂  $1\frac{6}{8}$ , ♀  $2\frac{1}{8}$  inches.

Bengal. In Coll. A. E. Russell; F. Moore; Brit. Mus. (Horsf. Coll.)

#### I. DRUNA.

*Hesperia druna*, Moore, Cat. Lep. E. I. C. i. p. 254.

*Male*. Upperside dark olive-brown; fore wing with a well-defined obliquely-curved discal impressed grey streak; cilia of fore wing greyish white, of hind wing orange-yellow. Head, palpi, and legs beneath ferruginous brown. Underside dark purplish brown.

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

Bengal. In Coll. F. Moore; Brit. Mus. (Horsf. Coll.)

#### I. ? SASIVARNA, n. sp.

*Male* and *female*. Upperside dark vinaceous brown.

*Male*. Fore wing with a short impressed comma-like greyish-white streak obliquely beneath the cell; cilia of fore wing greyish white, of hind wing broadly, from anal angle to two-thirds of the margin, orange-yellow, thence to the angle brown. Underside dark fuliginous brown; cilia as above. Palpi and body blackish brown; abdomen with slight orange-yellow tuft.

*Female* as in male, but without the oblique greyish-white streak.  
 Expanse, ♂  $1\frac{3}{4}$ , ♀ 2 inches.  
 Bengal. In Coll. A. E. Russell; F. Moore.

I. LADON, Cram. t. 248. f. G.

CAPILA, n. g., Moore.

Palpi large, porrect, projecting beyond the head, densely pilose; third joint conical, half the length of the second. Antennæ extending to half the length of fore wing. Body moderately stout. Abdomen extending to near anal angle. Legs slender; femora slightly pilose beneath; hind tibiæ with a dense tuft of very long hairs at the side; mid tibiæ with a pair, and hind tibiæ with two pairs, of apical spurs. Wings large, broad. *Male*. Costa nearly straight; apex acute; exterior margin very oblique; posterior margin abbreviated, half the length of the costa. Hind wing with the apex angled; exterior margin convex, with slight angle in the middle. *Female* larger. Costa slightly arched; exterior margin oblique; posterior margin two-thirds the length of the costa. Hind wing nearly quadrate, the exterior margin being produced to an abrupt angle in the middle.

CAPILA JAYADEVA. (Pl. XLII. f. 3.)

*Ismene jayadeva*, Moore, Cat. Lep. E. I. C. i. p. 248.

*Male* and *female* brown. Upperside—base of wings clothed with orange-yellow hairs; both wings with a narrow longitudinal semi-transparent streak between the veins, the discoidal cell having two streaks, and a third but short streak arising from its extremity. Thorax, head, and palpi orange-yellow. Abdomen brown, with narrow white segmental bands; third joint of palpi and a few surrounding hairs and a spot on forehead brown. Underside paler brown, the semitransparent streaks being less prominent. Body and legs brown.

*Female* similar, but with the thorax and base of wings brown.

Expanse, ♂  $2\frac{5}{8}$ , ♀ 3 inches.

Darjeeling. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

PISOLA, n. g., Moore.

Palpi large, erect, projecting beyond the head, densely pilose; third joint minute, conical. Antennæ rather long, curved backward at the apex. Body very stout; abdomen extending to within one-third of the length of hind wing. Legs moderately slender; femora pilose beneath; mid tibiæ armed with a pair, and hind tibiæ with two pairs, of slender apical spurs. Wings large, broad; costa of fore wing slightly arched; exterior margin oblique; posterior margin straight. Hind wing convex at the base of anterior margin; apex, exterior margin, and anal angle convex. Subcostal vein of fore wing six-branched; second and third arising at equal distances from the first; fourth to sixth contiguous at their base to the third.

PROC. ZOOL. SOC.—1865, No. LI.

*PISOLA ZENNARA*, n. sp. (Pl. XLII. f. 4.)

*Male and female.* Upperside brown; fore wing with a broad yellowish-white semitransparent irregular-margined discal band obliquely from middle of costa to posterior angle; hind wing, in the male, exteriorly with two greyish longitudinal streaks between each vein, these being absent in the female. Abdomen with pale greyish anal tuft. Underside uniform brown, with oblique discal band as above. Front of head and palpi dull orange-yellow. Body and legs brown. Cilia brown.

Expanse, ♂  $2\frac{7}{8}$ , ♀  $3\frac{1}{8}$  inches.

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

*ACHLYODES SURA*, Moore, Cat. Lep. E. I. C. i. p. 251.

*Male and female* vinaceous brown, palest on the hind wing.

*Male.* Fore wing dull chestnut-brown along exterior margin, with a black transverse band one-third from the base; a geminated semitransparent spot on costa before the apex, surrounded by suffused black; a semitransparent lunule and a small spot on the lower part of the disk, bordered without by a black band: hind wing with a transverse subbasal, an elbowed discal, and a lower submarginal purplish-white line; apex of wing with suffused black patch and lower marginal blackish pale-bordered spots. Underside brown: fore wing suffused with greyish white at the base; markings as above: hind wing greyish white, the transverse lines less defined, marginal spots blacker, and a blackish spot near base of wing. Palpi above black. Palpi and body beneath and legs greyish white.

*Female* paler, marked on upper and underside as in male.

Expanse, ♂  $1\frac{6}{8}$ , ♀  $1\frac{7}{8}$  inch.

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

*A. VASAVA*, Moore, Cat. Lep. E. I. C. i. p. 252.

Upperside dull ferruginous, palest on the hind wing: fore wing slightly suffused with blackish along the posterior margin; an irregular series of various-shaped semitransparent spots disposed across the disk, with an exterior blackish transverse streak: hind wing with the base suffused with blackish; a subbasal agglomerated series of irregular-shaped semitransparent spots. Underside paler, marked as above, but without the transverse black outer streak on the fore wing. Palpi and body beneath whitish. Legs ferruginous.

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

Darjeeling. In Coll. East India Museum.

*NISONIADES SALSALA*, Moore, Cat. Lep. E. I. C. i. p. 250.

*Male and female* dark brown, with olive-brown gloss.

*Male.* Upperside—fore wing with two or three ill-defined yellowish spots ascending obliquely from beyond middle of posterior margin.

*Female.* Fore wing with an oblique series of small semitransparent white spots curving across the disk (more or less distinct), and terminated below by an ill-defined yellowish spot. Underside chestnut-



brown, suffused with black on the disk; fore wing with minute white spots, one at extremity of the cell, and two or three obliquely beyond; hind wing with a series of three spots disposed in a curve across the disk; cilia greyish brown. Palpi, body, and legs yellowish beneath.

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

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

*N. DASAHARA*, n. sp.

*Male and female.* Upperside dark olive-brown, with three indistinct suffused blackish transverse bands, the interspaces being slightly grey; fore wing with a minute semitransparent white spot at the extremity of the cell, another immediately above it, and three others curved before the apex. Underside brown; spots and indistinct blackish bands as above, but with the latter on the hind wing somewhat broken, with the interspaces grey, thus giving it a tessellated appearance.

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

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

*N. DIOCLES.*

*Hesperia diocles*, Boisd. MS.

*Male and female.* Upperside uniform dark glossy olive-brown, without markings. Underside pale brown, with a well-defined paler brown exterior border. Antennæ, palpi, and body dark olive-brown.

Expanse, ♂  $1\frac{3}{4}$ , ♀  $2\frac{2}{8}$  inches.

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

*PLESIONEURA SUMITRA*, n. sp.

*Male and female* dark olive-brown, paler at the base.

*Male.* Fore wing with an oblique discal series of four conjugated semitransparent white spots, the first and second large and quadrate, the other two very small, first one within the extremity of the cell, second and third beneath it, fourth exteriorly before the juncture of the first and second; a series of five small similar spots obliquely before the apex: hind wing with a submarginal row and a few discal bright orange-yellow spots; cilia of hind wing broadly alternate brown and orange-yellow. Underside as above; the orange-yellow spots on the hind wing more clearly defined. Antennæ above silvery white. Palpi and front of thorax beneath pale yellow. Abdomen with narrow orange-yellow segmental bands.

*Female* as in male, but having also a yellow costal spot above the oblique discal series of white spots.

Expanse, ♂ 2, ♀  $2\frac{5}{8}$  inches.

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

*P. PULOMAYA.*

*Hesperia pulomaya*, Moore, Cat. Lep. E. I. C. i. p. 252.

*Male* dark olive-brown, yellowish olive basally: fore wing with four oblique discal semitransparent white spots, the two upper large,

one within and the other beneath the extremity of the cell, the third small and beneath the second, fourth also small and exterior to the juncture of the upper two; obliquely before the apex are five small similar spots, the upper three being conjugated; near posterior margin are two small orange-yellow spots, the first being one-third from the base, the other one-third from posterior angle: hind wing with three rows of irregular-shaped well-defined bright orange-yellow spots; cilia of hind wing broad, alternate brown and orange-yellow. Underside as above. Top of head black, with a marginal yellow narrow line on each side. Palpi above black, tipped with yellow. Palpi, thorax, and legs beneath yellow. Antennæ with yellow subapical streak.

Expanse 2 inches.

Darjeeling. In Coll. East India Museum; F. Moore.

*P. AMBAREESA*, n. sp.

Upperside dark olive-brown, the whole surface irrorated with delicate yellowish-olive scales: fore wing with an oblique transverse discal series of pale yellowish-white semitransparent spots, the first large and within the extremity of the cell, being indented exteriorly, the second small and some distance beyond, the third large and beneath the latter; below the last are two other small spots; and one-third from the base beneath the cell is a small round similar spot; above the first on the costa is a small brighter yellow spot, which is not semitransparent; before the apex are five rather large similar spots, the three upper conjugated, as are also the other two; one or two lower submarginal very indistinct orange-coloured spots: hind wing with a row of ill-defined orange-coloured submarginal spots, and others still less defined nearer the base: cilia of both wings broad, alternate brown and yellowish white. Underside paler, more uniform in colour; markings as above.

Expanse 2 inches.

Bengal (Maungbhoom). In Coll. F. Moore.

*P. CHAMUNDA*, n. sp.

*Female.* Upperside dark brown; base of fore wing and the whole hind wing except exterior margin dark olive-brown; fore wing with an oblique transverse discal series of semitransparent silky-white spots, the first small and above the extremity of the cell, the second large and within the cell, the third beneath also large, the fourth facing the posterior angle, and a fifth exterior to and facing the juncture of the second and third; a series of five small similar spots obliquely recurving before the apex; cilia brown, on the hind wing alternated with white. Underside as above.

Expanse 2 inches.

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

*P. PUTRA*.

*Hesperia putra*, Moore, Cat. Lep. E. I. C. i. p. 253.

Upperside dark fuliginous-brown; fore wing with an oblique

discal series of three conjugated semitransparent whitish spots, the first and second large, the first within the extremity of the cell, the second beneath it, the third very small and at the lower outer angle of the latter; exterior to the junction of the upper two is a very minute spot, and before the apex is an interrupted series of five very small similar spots, the three upper being conjugated; hind wing with a submarginal and discal series of indistinct orange-yellow spots; fore wing with ill-defined, and hind wing with prominent, alternate yellowish-white and brown cilia. Underside dark brown, the semitransparent spots whiter, and the submarginal and discal spots of the hind wing pale yellow. Palpi beneath pale yellow. Body and legs beneath brownish yellow. Antennæ white in front.

Expanse 2 inches.

Bengal. In Coll. Brit. Mus. (Horsf. Cabinet); F. Moore.

*P. ALYSOS*, n. sp.

*Hesperia alysos*, Boisd. MS.

Upperside dark fuliginous brown; fore wing with a broad oblique discal irregular-margined semitransparent white band, and with one or two, and in some specimens three, very small similar conjugated spots obliquely before the apex, also one or two reversely oblique lower spots; cilia paler brown. Underside paler; band and spots as above; along exterior margin of fore wing and exterior half of hind wing suffused with purple grey. Antennæ brown, with a subapical white streak. Palpi and thorax beneath greyish brown.

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

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

*P. DHANADA*, n. sp.

Upperside dark yellowish olive-brown; the base of the wings brighter olive-brown: fore wing with an oblique transverse discal irregular-margined semitransparent yellowish band, joined above by a yellow costal spot; a small narrow streak of three conjugated similar spots obliquely before the apex: cilia brown, on the hind wing alternated with yellow. Underside—fore wing as above, the lower portion of the oblique band terminating in a suffused yellow spot; hind wing with three transverse discal series of ill-defined yellowish-olive spots; cilia as above. Antennæ minutely spotted with yellow at the base, and with a subapical yellowish band. Palpi and thorax in front beneath yellow. Abdomen with narrow yellowish segmental bands.

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

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

*P. DAN*, Fabr. Mant. Ins. ii. p. 88.

*Hesperia fatih*, Kollar, Hügel's Kasch. iv. t. 18. f. 5, 6.

*P. INDRANI*, Moore, Cat. Lep. E. I. C. i. p. 253.

Upperside bright golden-yellow: fore wing with a discal series of four semitransparent white black-bordered spots, the first small and

above the extremity of the cell, the second large, quadrate, and within the cell, the third elongate and beneath the latter, the fourth exterior to their juncture; beneath these is a pale golden-yellow black-bordered spot; before the apex is a series of four similar white spots with black border, the three upper of which are conjugated; a well-defined black spot beneath the cell near the base; exterior margin and cilia blackish, the latter white at the posterior angle: hind wing with a semicircular submarginal series of black spots, and two similar inner discal spots; exterior margin black: cilia alternate black and white. Underside blackish brown, suffused with golden yellow, brightest on the hind wing; markings as above, but more clearly defined. Tip of palpi black; thorax, body, palpi (except tip), and legs yellow. Antennæ yellow, tip black.

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

Bengal. In Coll. East India Museum; F. Moore.

**P. PRABA.**

*Hesperia praba*, Moore, Cat. Lep. E. I. C. i. p. 253.

*Male* and *female* dark chocolate-brown. Upperside—fore wing with three small conjugated subapical semitransparent white spots, three similar and larger discal spots, and a fourth above them within the cell. Underside darker brown basally, paler exteriorly; fore wing with spots as above, bordered externally by a suffused dark-brown streak; hind wing with a double series of white dark-brown-outer-bordered lunules crossing the middle of the wing, beyond which is a submarginal series of suffused dark-brown spots. Palpi, thorax, and abdomen beneath pale greyish brown. Legs brown. Cilia yellowish white, spotted with pale brown.

Expanse, ♂  $1\frac{3}{8}$ , ♀  $1\frac{6}{8}$  inch.

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

*HESPERIA THRAX*, Linn. Syst. Nat. i. pt. 2. p. 794; Donovan. Ins. Ind. pl. 49. f. 2.

**H. PANDIA**, Moore, Cat. Lep. E. I. C. i. p. 254.

*Male* and *female* dark chocolate-brown. Fore wing with bright-yellow semitransparent quadrate spots, disposed triangularly, the first large and occupying half the cell, the second also large, obliquely beneath and partly beyond, the third small and obliquely above the second; above the last are three smaller spots obliquely before the apex, the two upper being geminated; in some specimens, beneath the subapical spots is a small dot, and on the posterior margin another, both similar to the rest; cilia at posterior angle brownish white; hind wing with the cilia at the anterior angle brownish white. Underside—fore wing irrorated with grey scales near the apex, posterior margin pale brownish white, spots yellow as above; hind wing irrorated with grey scales in a series of bands across the wing.

Expanse  $2\frac{5}{8}$  to  $3\frac{1}{4}$  inches.

Bengal. In Coll. A. E. Russell; F. Moore; East Ind. Mus.

**H. SEMAMORA**, n. sp.

*Female.* Upperside dark vinaceous brown; fore wing with a curved discal series of five semitransparent white spots, the two upper minute; hind wing with a broad pure-white patch extending half across the wing from abdominal margin. Cilia of fore wing brown, of hind wing broadly white. Abdomen with white apex. Underside—fore wing dark brown posteriorly, ferruginous brown anteriorly; spots as above; a small suffused patch on the middle of exterior margin, and cilia, brownish white: hind wing with a straight inner-bordered ferruginous-brown anterior margin, the rest of the wing pure white; a marginal series of blackish spots; cilia white. Palpi and legs in front brown. Thorax, abdomen, and legs beneath white.

Expanse 2 inches.

Bengal. In Coll. A. E. Russell.

**H. DIVODASA**, Moore, Cat. Lep. E. I. C. i. p. 255.

Upperside dark olive-brown; base of fore wing and lower part of hind wing suffused with greenish olive: fore wing with a series of six yellowish semitransparent spots, three of which are small, conjugated, and obliquely before the apex, the fourth lunular and within the extremity of the cell, the fifth elongated, beneath and exterior to the latter, the sixth smaller and exteriorly above the last; beneath these are two yellow spots (which are not semitransparent), the first small, the other large and elongated. Head, thorax, and abdomen above greenish olive. Cilia pale brownish yellow. Underside grey, the disk of the fore wing brownish; fore wing with the spots as above; hind wing with a curved discal series of four or five black spots, and a single spot within the cell. Palpi, body, and legs beneath whitish grey.

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

Bengal. In Coll. East Ind. Mus.; W. S. Atkinson; F. Moore.

Larva feeds on Date.—*Atkinson.*

**H. CHAYA**, Moore, Cat. Lep. E. I. C. i. p. 255.

Upperside brown: fore wing with a series of seven (in some specimens eight) small whitish semitransparent spots disposed transversely from anterior margin obliquely before the apex, then retreating to near middle of posterior margin; two similar spots within the cell. Cilia pale brownish white. Underside paler; fore wing with spots as above; hind wing with a curved series of white dots (which in some specimens are semitransparent, and when so are visible on the upper side) on the disk, and a single dot near the base of the wing. Palpi and body beneath pale brownish white.

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

Bengal. In Coll. East Ind. Mus.; W. S. Atkinson; F. Moore.

**H. AGNA**, Moore, Cat. Lep. E. I. C. i. p. 255.

Upperside glossy olive-brown; fore wing with a series of six very small rather indistinct whitish semitransparent spots curving from

before the apex to the middle of the wing; beneath these is a short oblique pale impressed streak, which is suffused with black on its anterior margin. Cilia pale brown. Underside pale brown; spots on fore wing as above, but less defined; hind wing with a curved discal series of white dots, and a single dot near the base. Palpi and body beneath pale brownish yellow.

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

Bengal. In Coll. East Ind. Mus.; F. Moore.

*H. MANGALA*, Moore, Cat. Lep. E. I. C. i. p. 255.

Upperside dark brown; fore wing with six small whitish semitransparent spots curving from before the apex, also two small similar spots within the cell; hind wing with a discal linear series of four conjugated semitransparent spots. Cilia pale brownish white. Underside paler, suffused with greenish yellow; fore wing with spots as above; hind wing with an additional spot (which is not semitransparent) at the extremity of the cell. Palpi and body beneath dark yellowish green.

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

Bengal. In Coll. East Ind. Mus.; F. Moore.

*PAMPHILA SAGARA*, n. sp.

Upperside pale olive-brown, markings pale yellow, divided by crossing veins: fore wing with a small streak within the cell, joined above at the end by smaller streaks which reach the costa; obliquely before the apex are two separate spots, the upper one near the costa, the other below the apex, beneath and between these an oblique discal streak: hind wing with a small spot within the cell, and a discal streak. Underside paler, marked as above; veins lined with yellow. Cilia yellowish white. Antennæ minutely spotted with white. Abdomen with narrow pale-yellow segmental bands.

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

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

*P. AUGIAS*, Linn. Syst. Nat. i. pt. 2. p. 794.

*PYRGUS SUPERNA*, Moore, Cat. Lep. E. I. C. i. p. 249.

Upperside olive-brown; markings pale yellow; fore wing with three spots within the cell, two beneath it, a transverse discal series, and a submarginal row of smaller spots; hind wing with subbasal, large medial, and small submarginal spots. Cilia of both wings alternate brown and pale yellow. Abdomen with narrow pale-yellow segmental bands. Underside paler olive-brown; fore wing with the costal margin and spots as above, pale yellow; hind wing with a transverse subbasal, medial, and a narrow submarginal pale-yellow maculated band. Cilia as above, but paler. Palpi and body beneath, and legs, pale yellow.

Expanse, ♂  $\frac{3}{4}$ , ♀ 1 inch.

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

## Sect. II. HETEROCERA.

## Tribe 1. SPHINGES.

## Fam. SPHINGIDÆ.

SMERINTHUS DRYAS, Boisd. (Walk. Cat. Lep. Het. B. M. pt. 8. p. 250).

S. DENTATUS, Cram. t. 125. f. G.

LEUCOPHLEBIA LINEATA, Westw. Cab. Orient. Ent. pl. 22. f. 2.

BASIANA CERVINA, Walk. Cat. Lep. Het. B. M. pt. 8. p. 237.

B. SUPERBA, n. sp.

*Female.* Upperside—fore wing at the base, within the discoidal cell, costal margin to the apex, and along the lower portion of the disk green, varied with pale yellow on the latter and at the apex; the disk from below the apex and lower portion of the wing brown; a dark line proceeding from the apex and separating the green and brown, a transverse irregular dark line near the base of the wing from costa to inner margin, and a second inner similar shorter line; a dark mark on disco-cellular nervure: hind wing rose-pink, darkest at the base, with a transverse suffused brown band, and two short dark lines at anal angle: thorax and body brown, the latter with greenish segmental bands. Underside dull chrome-yellow; fore wing at the apex, and below a dark longitudinal line from the apex, brown, crossed by three discal zigzag pinkish lines; hind wing pale brown at the apex, with three inner transverse discal zigzag pink lines. Expanse 6 inches.

Darjeeling. In Coll. A. Grote, Calcutta; F. Moore.

AMBULYX SUBSTRIGILIS, Westw. Cab. Orient. Ent. pl. 30. f. 2.

ACHERONTIA STYX, Westw. ib. pl. 42. f. 3.

A. SATANAS, Boisd. Spéc. Gén. Léop. pl. 16. f. 1 (Westw. ib. pl. 42. f. 2.)

Balasore.

SPHINX CONVULVULI, Linn.

MACROSILA DISCISTRIGA, Walk. Cat. Lep. Het. B. M. pt. 8. p. 209.

ZONILIA MORPHEUS, Cram. t. 149. f. D.

*Perigonia obliterans*, Walk. Cat. Lep. Het. B. M. Suppl. p. 28.

PANACRA VIGIL, Guér. Deless. Voy. dans l'Inde, pl. 23. f. 1.

*Panacra lignaria*, Walk. Cat. Lep. Het. B. M. p. 156.

P. BUSIRIS, Boisd.; Walk. ib. p. 270.

PHILAMPELUS ANCEUS, Cram. t. 355. f. A.

P. NAGA, Moore, Cat. Lep. E. I. C. i. p. 271.

DARAPSA BHAGA, n. sp.

Upperside purple brown: fore wing with dark-purple-brown pink-bordered inwardly oblique basal streak, beyond which a broad darker-coloured outwardly elbowed streak, bordered anteriorly with pale pink and posteriorly with purple blue; from the costa before the apex two pale-pink curved lines, terminating jointly at posterior angle: hind wing dark purple brown, with a short pale-pink streak ascending from anal angle. Body purple brown, with pale-pink segmental bands; end of abdomen and fan-like tuft dark purple brown. Underside purple brown, with dark-brown outer margins and oblique discal streaks.

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

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

DAPHNIS NERII, Linn. (Cram. t. 224. f. D).

Plains.

PERGESA ACTEUS, Cram. t. 248. f. A.

P. CASTOR, Boisd.; Walk. Cat. Lep. Het. B. M. pt. 8. p. 153.

CHÆROCAMPA CELERIO, Linn. (Cram. t. 25. f. E).

C. ALECTO, Linn. (Cram. t. 137. f. D).

C. THYELIA, Linn. (Cram. t. 226. f. E, F).

C. LINEOSA, Walk. ib. pt. 8. p. 144.

C. CLOTHO, Drury, Ill. ii. pl. 28. f. 1.

C. LUCASI, Boisd.; Walk. ib. p. 141.

C. LYCETUS, Cram. t. 61. f. D.

C. BISECTA, Horsf. (*C. silhetensis*, Walk. ib. p. 143).

MACROGLOSSA PASSALUS, Drury, Ins. ii. pl. 29. f. 2.

M. CORYTHUS, Boisd. (Walk. Cat. Lep. Het. B. M. pt. 8. p. 92).

M. GYRANS, Boisd. (Walk. ib. p. 91).

LOPHURA HYAS, Boisd. (Walk. ib. p. 107).

SATASPES INFERNALIS, Westw. Cab. Orient. Ent. pl. 30. f. 3.

SESIA HYLAS, Linn. (Cram. t. 148. f. B).

Balasore.

## Tribe 2. BOMBYCES.

### Fam. ÆGERIIDÆ.

MELITTA BOMBYLIFORMIS, Cram. t. 400. f. C.

M. EURYTION, Westw. Cab. Orient. Ent. pl. 30. f. 5.



## Fam. AGARISTIDÆ.

## VITHORA, n. g., Moore.

*Male.* Body long, attenuated. Head and thorax covered with long hairs. Palpi porrect, extending beyond the head, pilose, third joint cylindrical. Antennæ long, slender at the base, thickened at the apex. Fore and middle legs slender; tibiæ of middle legs with two appendages, the inner longest. Tarsi long. Hind legs stout; femora covered with long hairs; tibiæ thickened in the middle, armed with two pairs of short appendages, the first pair terminal, the other pair subterminal. Tarsi short. Wings of slight texture, long, narrow; hind wings extending beyond posterior margin of fore wings; fore wing with the costal vein extending to within one-third of the apex; subcostal vein six-branched, first, second, and fifth branch contiguous at their base, third and fourth remote, sixth arising from the base of the first.

Allied to the genus *Hespagarista*.

VITHORA INDRASANA, n. sp. (Pl. XLII. f. 5.)

*Male.* Upperside fuliginous black, tinged with yellowish at the base; fore wing basally, base and end of the cell, a spot beneath the cell, and a discal series of irregular-shaped spots white; hind wing with the space from near the base and covering the disk and lower portion of the wing white, with black presenting itself in a series of discal spots. Body ferruginous, spotted with black.

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

N.E. Bengal. In Coll. A. E. Russell.

ÆGOCERA VENULIA, Cram. t. 165. f. D.

EUSEMIA MACULATRIX, Westw. Nat. Libr. pl. 2. f. 3; Orient. Ent. pl. 33. f. 1.

E. DENTATRIX, Westw. Cab. Orient. Ent. pl. 33. f. 5.

E. ADULATRIX, Kollar, Hügel's Kasch. iv. pl. 20. f. 1.

*E. bellatrix*, Westw. ib. pl. 33. f. 2.

E. VICTRIX, Westw. ib. pl. 33. f. 3.

PHÆGORISTA TRANSIENS.

*Eusemia transiens*, Walk. Cat. Lep. Het. B. M. pt. 7. p. 1588.

*Phægorista catocaloides*, Walk. Journ. Linn. Soc. vi. p. 87.

Darjeeling.

P. LONGIPENNIS.

*Catocala longipennis*, Walk. Cat. Lep. Het. B. M. Noctuidæ, Suppl.

Darjeeling.

P. BALA, n. sp.

*Male* greyish brown: fore wing slightly purple brown at the apex

and along posterior margin; a reddish-brown spot at posterior angle; two very slender pale-grey ocelli, the first small and within the cell, the second larger and beyond; inferior veins pale grey; some transverse discal pale lines; cilia greyish brown: hind wing deep yellow, with a broad irregular inner margined band, a small discal spot, and a slight streak from the base blackish brown; cilia pale grey. Abdomen deep yellow, with blackish dorsal bands. Underside—fore wing paler greyish brown; space within the cell enclosing a large round blackish spot, and oblique streak beyond, white; a whitish space at posterior angle: hind wing yellow, with suffused greyish-brown marginal band terminating in a darker spot near anal angle; a blackish discal spot. Body yellow; fore legs greyish brown.

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

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

NYCTALEMON PATROCLUS, Linn. (Cram. pl. 198. f. 2.

CALLIDULA PETAVIA, Cram. t. 365. f. C, D.

Bengal.

CLEOSIRIS CATAMITA, Hübn. Zutr. f. 653–4; Boisd. Spéc. Gén. Lép. i. pl. 23. f. 3; Westw. & Hewits. Diurn. Lep. pl. 77. f. 9.

Fam. LITHOSIIDÆ.

HYPSA ALCIPHON, Cram. t. 133. f. E.

H. CARICÆ, Fabr. Ent. Syst. p. 27.

H. EGENS, Walk. Cat. Lep. Het. B. M. ii. p. 453.

H. FICUS, Fabr. (Cram. t. 262. f. A, B).

H. HELICONIA, Linn. Syst. Nat. p. 839.

H. PLANA, Walk. Cat. Lep. Het. B. M. ii. p. 450.

ANAGNIA SUBFASCIA, Walk. ib. p. 446.

TINOLEUS EBURNEIGUTTA, Walk. ib. iii. p. 621.

Darjeeling.

CISPIA PUNCTIFASCIA, Walk. ib. iv. p. 857.

C. VENOSA, Walk. Tr. Ent. Soc. 3rd ser. i. p. 264.

DIGAMA HEARSEYANA, Moore, Cat. Lep. E. I. C. ii. p. 298, pl. 7. f. 3.

*Scydra halesidotatis*, Walk. Cat. Lep. Het. B. M. Suppl.

MACROBROCHIS GIGAS, Walk. (H.-Schæff. Lep. Exot. f. 531).

TRIPURA PRASENA, Moore, Cat. Lep. E. I. C. ii. pl. 7. f. 6.

VITESSA SURADEVA, Moore, ib. f. 7.

## GROTEA, n. g., Moore.

Palpi erect ; third joint short. Antennæ long, filiform. Thorax and body broad, robust. Abdomen as long as the hind wings. Fore wings large, broad, elongate ; costa arched at the base ; apex somewhat pointed, exterior margin slightly oblique. Hind wings large, trigonate ; the apex produced, outer margin slightly concave below the apex, rounded posteriorly. Subcostal vein of fore wing five-branched ; first, second, and fifth joined at their base ; third and fourth remote, arising beneath from the second at equal distances.

## GROTEA ELEGANS, n. sp. (Pl. XLIII. f. 1.)

*Female* orange-yellow ; fore wing with seven black spots at the base, beyond which are two transverse elbowed series of purplish-white black-bordered spots, the outer half of the wing being covered with similar series of more or less suffused purplish maculated bands, the interspaces of which apically are wholly purplish black ; hind wing with an irregular basal series, a lower discal row, a submarginal and marginal row of black spots, those of the two latter at the apex confluent. Thorax and abdomen spotted with black.

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

N.E. Bengal. In Coll. A. Grote, Esq.

BARSINE DEFECTA, Walk. Cat. Lep. Het. B. M. ii. p. 546.

Darjeeling.

B. NUBIFASCIA, Walk. ib. Suppl. p. 251.

LITHOSIA MAGNIFICA, Walk. Journ. Linn. Soc. vi. p. 103.

L. VIRIDATA, Walk. Cat. Lep. B. M. Suppl. p. 225.

L. DISJUNCTA, n. sp.

*Male*. Fore wing yellow, with the costa to near the tip, a sub-apical streak, a short oblique transverse line near base of inner margin, beyond which is an elongated triangular streak, metallic green, the space between the two latter buff brown, which colour also suffuses the middle of the wing ; hind wing yellowish white. Thorax yellow ; tegulæ metallic green ; abdomen yellow. Differs from *L. viridata* in being larger and having broader fore wings.

Expanse 2 inches.

Darjeeling. In Coll. A. E. Russell.

L. VARANA, n. sp.

*Male*. Upperside pale testaceous white. Underside with the fore wing pale brown, except a costal line, which with the hind wing is testaceous white. Antennæ and tip of palpi brown. Abdomen pale fawn-colour at the base, yellow at the tip. Legs yellow ; front of fore legs brown. Front of thorax and head pale yellow.

*Female?* white, with a yellowish costal line.

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

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

*L. BEEMA*, n. sp.

*Female*. Fore wing uniform pale greyish brown; hind wing pale yellow, with a broad greyish patch extending from the inner margin. Body greyish brown.

Expanse 2 inches.

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

*L. REMELANA*, n. sp.

*Male* white; fore wing with a transverse discal black band; the costal and upper portion of exterior margin black; hind wing with a large black discal spot.

*Female*. Fore wing with the costal and upper portion of exterior margin, a small spot on the disk, and a larger spot on the disk of hind wing black. Body white.

Expanse, ♂  $1\frac{5}{8}$ , ♀  $2\frac{1}{8}$  inches.

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

*L. BASINOTA*, n. sp.

*Male* and *female* greyish brown; fore wing dark brown, with a pale narrow line along the veins, and a pale greyish-brown spot at the base of posterior margin; hind wing very pale greyish brown. Thorax, head, antennæ, palpi, legs, and abdomen beneath dark brown. Abdomen above pale greyish brown, somewhat luteous at the tip in the male. Underside dark greyish brown; fore wing in the male with an ill-defined longitudinal ferruginous streak from the base.

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

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

*L. RETICULATA*, n. sp.

*Male* and *female* pale luteous brown: fore wing delicately reticulated with brown; a transverse discal ill-defined darker fasciated line. Underside pale luteous, pale brown within the disk of fore wing.

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

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

*BIZONE PERORNATA*, Walk. Cat. Lep. Het. B. M. ii. p. 548.

*B. GUTTIFERA*, Walk. ib. vii. p. 1779.

*B. DELICATA*, Walk. ib. ii. p. 550.

*B. fasciculata*, Walk. ib. viii. p. 1684.

*B. DIVAKARA*, n. sp. (Pl. XLIII. f. 9.)

*Male* white. Fore wing incrassated in front beyond the middle, with two transverse discal bands joined together below and enclosing two black spots, a streak along the base of the costa, and another below it joining the inner transverse band saffron-yellow; exterior margin saffron-yellow. Thorax with saffron-yellow band and spots.

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

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

UTETHESIA PULCHELLA, Linn. (Cram. t. 109. f. E).

CASTABALA ROSEATA, Walk. Cat. Lep. Het. B. M. Suppl. p. 271.

ARGINA ASTREA, Drury, Ins. ii. pl. 6. f. 3.

A. DULCIS, Walk. (Cram. t. 288. f. D).

A. ARGUS, Kollar, Hügel's Kasch. iv. pl. 21. f. 3.

A. SYRINGA, Cram. t. 5. f. C, D.

Fam. CHALCOSIIDÆ.

HISTIA FLABELLICORNIS, Fabr. (Cram. t. 30. f. E).

H. PAPILIONARIA, Guér. Mén. Mag. Zool. p. 12 (Westw. Arc. p. 20).

CYCLOSIA SANGUIFLUA, Drury, Ins. ii. pl. 20. f. 1, 2, ♀.

C. MIDAMA, Boisd., H.-Schæff. Lep. Exot. pl. 2. f. 7, ♂, 8, ♀.

*C. venusta*, Walk. Cat. Lep. Het. B. M. ii. p. 416.

C. PAPILIONARIS, Drury, Ins. ii. pl. 11. f. 4.

EPICOPEIA VARUNÆA, n. sp.

*Male*. Upperside without markings of any kind; fore wing fuliginous, base and veins black; hind wing black, with steel-blue gloss. Underside paler; fore wing with a crimson costal spot descending across the cell; hind wing with a spot on anterior margin before the angle, a narrow lunule below it, and a small spot on anal lobe crimson.

*Female*. Upper- and underside as in male.

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

Darjeeling. In Coll. A. E. Russell.

*Remark*.—The hind wing in this species is considerably produced, being  $2\frac{2}{1\frac{1}{2}}$  inches in length from the base to the tip.

E. PHILOXENÆA, n. sp.

*Male*. Upperside—fore wing fuliginous, the base and veins black; a small crimson spot on the costa one-third from the base: hind wing black, with steel-blue gloss; a white discal patch composed of two conical-shaped spots and an outward descending streak; a series of ill-defined spots on exterior margin pale crimson, and a brighter-crimson spot on anal lobe. Head and tip of abdomen pale crimson; thorax and abdomen above black with steel-blue gloss, beneath pale crimson with black bands and lateral spots. Underside paler, the crimson costal spot on fore wing large and descending across the cell; the white discal patch on the hind wing joined on the outer side by an ascending pale-crimson irregular-shaped band, and on the inner side by a descending narrow crimson streak to a spot on the

lobe of abdominal margin, which spot with four other oval-shaped spots on the exterior margin are pale crimson.

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

Darjeeling. In Coll. A. E. Russell.

*Remark.*—This species has the hind wing much produced, being over 2 inches in length from base to tip, the exterior margin being nearly straight.

*E. DIPHILÆA*, n. sp.

*Male.* Upperside—fore wing fuliginous, base and veins black; hind wing black, with steel-blue gloss, and having two white oval-shaped discal spots and an outer descending white streak, a narrow lunule on anal lobe and one or two small marginal bright crimson spots. Underside paler; fore wing with a crimson costal spot; hind wing with the white discal spots crimson-margined, above which are three small crimson spots before the angle, and below it three crimson spots, one on the anal lobe, the other two on exterior margin. Thorax and abdomen above black, with steel-blue gloss; head and body beneath crimson, the latter with black bands.

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

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

*Remark.*—In this species the hind wing has the same truncated form as in *E. philenora*.

*ERASMIA PULCHELLA*, Hope, Linn. Trans. xviii. pl. 31. f. 5.

*PHILOPATOR*, n. g., Moore.

Antennæ slightly pectinated to the tips. Palpi very small; third joint cylindrical. Proboscis rather short. Abdomen short. Fore wing elongated; costa arched at the base; apex rounded; exterior margin oblique; inner margin nearly straight; four superior veins, the third trifurcate; four inferior veins, the first and second joined from near the discal veinlet. Hind wings rounded posteriorly.

*PHILOPATOR BASIMACULATA*, n. sp. (Pl. XLII. f. 6.)

*Female* whitish, semihyaline; both wings yellow at the base, which is bordered outwardly by a fuliginous black irregular band, within which are several black spots; margins of the wings and streaks between the veins suffused fuliginous black. Antennæ black; thorax above black, with small yellow spots. Abdomen above brown, with a pale-yellowish waistband. Head and legs yellow. Thorax and abdomen beneath yellow, with black spots.

Expanse 2 inches.

Darjeeling. In Coll. A. E. Russell.

*CHELURA BIFASCIATA*, Hope, Linn. Trans. xviii. p. 444.

*CADPHISES*, n. g., Moore.

Antennæ closely pectinated to the tips. Palpi short; third joint

linear. Head conical; proboscis short. Abdomen short, extending to half the length of hind wings. Legs slender; middle and hind tibiæ with two apical spurs. Fore wing elongated; costa slightly arched; apex rounded; exterior margin oblique, inner margin abbreviated; veins slightly contorted towards the apex; three superior veins, the second trifurcate, the middle fork having a short additional branch; four inferior veins, the first and second joined from near the discal veinlet. Hind wings broadly trigonate.

*CADPHISES MACULATA*, n. sp. (Pl. XLII. f. 7.)

*Male* and *female* fuliginous black. Fore and hind wings on the upper- and undersides with a numerous series of ochreous-white spots in the male, and white in the female, disposed linearly between the veins; abdominal margin broadly in the male ochreous yellow, and in the female gamboge-yellow. Antennæ and legs black. Head and body black, spotted with white.

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

Darjeeling. In Coll. A. E. Russell.

*CHALCOSIA PECTINICORNIS*, Linn. (H.-Schæff. Lep. Exot. pl. 1. f. 6).

*C. CORUSCA*, Boisd., H.-Schæff. ib. f. 1.

*C. zuleika*, Walk. Cat. Lep. Het. B. M. ii. p. 423.

*LAURION GEMINA*, Walk. Cat. Lep. Het. B. M. ii. p. 427.

*PIDORUS GLAUCOPIS*, Drury, Ins. ii. pl. 6. f. 4.

*ETERUSIA ÆDEA*, Lind. (Clerck, Icon. t. 4. f. 2).

*E. SCINTILLANS*, Boisd., H.-Schæff. Lep. Exot. i. f. 154.

*E. sublutea*, Walk. Cat. Lep. Het. B. M. p. 430.

*E. EDOCLA*, Doubleday, Zool. ii. p. 469.

*E. CIRCINATA*, Boisd., H.-Schæff. ib. f. 156.

*E. SXPUNCTATA*, Walk. Cat. Lep. Het. B. M. p. 432.

*E. FERREA*, Walk. ib. p. 431.

*E. SHAHAMA*, n. sp.

*Female*. Upperside black; fore wing with a narrow streak at the base of the costa, another beneath the cell, a round spot at the extremity of the cell, and a submarginal series of shorter streaks saffron-yellow; a series of four rather large white spots obliquely crossing the wing from the middle of the costa; hind wing with the lower part from near the base bright orange-yellow, and a small outer discal spot of the same colour, a streak along the base of the anterior margin and a subapical spot white. Head and body bluish black. Thorax above with a spot on each shoulder, and abdomen with lateral bands, saffron-

yellow. Underside—fore wing with the veins lined with steel-blue, the streaks and spots whitish; hind wing with the anterior margin, including the cell and exterior margin, washed with pale saffron-yellow, the lower part of the wing beneath the cell bright orange-yellow. Body beneath with pale saffron-yellow streaks.

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

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

SCAPTESYLE TRICOLOR, Walk. Cat. Lep. Het. B. M. ii. p. 378.

CANERKES, n. g., Moore.

Body rather short, attenuated in the male, stout in the female, which has an exerted ovipositor. Head prominent, truncated in front. Palpi very short. Antennæ long, closely pectinated in the male, minutely pectinated and clavate in the female. Legs slender; middle tibiæ with two minute apical spurs. Fore wings long, narrow. Hind wings broad, quadrate, extending beyond the tip of the abdomen. Subcostal vein of fore wing four-branched; the third trifurcate.

CANERKES EUSCHEMOIDES, n. sp. (Pl. XLII. f. 8.)

*Male.* Fore wing yellow to one-third of its length; two small spots at the base and two larger transversely disposed spots beyond black; the remainder of the wing black, the veins being blue; a white spot within the cell one-third from its end; an irregular transverse series of white discal spots; hind wing yellow; a short basal streak, a large patch covering the fore part of the wing, enclosing four yellow spots, purple brown; veins lined with purple brown. Head and body yellow; thorax with a frontal band, lateral and dorsal spots, and narrow abdominal bands purple-brown.

*Female* as in male, but with the markings more prominent and broader.

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

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

PHALANNA POLYMENA, Linn. (Cram. t. 13. f. D).

Calcutta.

SYNTOMIS DIAPHANA, Kollar, Hügel's Kasch. iv. pl. 10. f. 7.

?*S. melas*, Walk.

*S. CREUSA*, Linn. (Cram. t. 243. f. F).

*S. MULTIGUTTA*, Walk. Cat. Lep. Het. B. M. i. p. 134.

Darjeeling.

*S. SCHÆNHERRI*, Boisd. Monogr. Zyg. pl. 7. f. 1.

*S. SUBCORDATA*, Walk. Cat. Lep. Het. B. M. p. 132.

*S. HÜBNERI*, Boisd. Monogr. Zyg. pl. 8. f. 4.



EUSCHEMA MILITARIS, Linn. (Cram. t. 29. f. 13).

NYCTEMERA LACTICINIA, Cram. t. 128. f. E.

N. LATISTRIGA, Walk. Cat. Lep. Het. B. M. ii. p. 397.

N. VARIANS, Walk. ib. p. 400.

Silhet.

N. MACULOSA, Walk. ib. Suppl. p. 198.

PTEROTHYSANUS LATICILIA, Walk. (Moore, Cat. Lep. E. I. C. ii. pl. 8. f. 8).

Fam. LIPARIDÆ.

REDOA CLARA, Walk. Cat. Lep. Het. B. M. Suppl. p. 343.

R. ARGENTEA, Walk. ib. iv. p. 827.

*Dasychira ilita*, Moore, Cat. Lep. E. I. C. ii. p. 341.

R. SORDIDA.

♂. *Stilpnotia sordida*, Walk. Cat. Lep. Het. B. M. vii. p. 1732.

♀. *Leucoma subvitrea*, Walk. ib. Suppl. p. 344.

PROCODECA ANGULIFERA, Walk. ib. iv. p. 919, ♂.

♀. *Ricine suffusa*, Walk. ib. p. 824.

PSALIS SECURIS, Hübn. Zuträge, f. 291-2, ♀.

♂. *Arestha antica*, Walk. Cat. Lep. Het. B. M. p. 805.

♀. *Rigema falcata*, Walk. ib. Suppl. p. 437.

♀. ———? *falcatella*, Walk. ib.

♀. *Anticyra approximata*, Walk. ib. Suppl. p. 440.

NAXA TEXTILIS, Walk. ib. iv. p. 1743.

GENUSA CIRCUMDATA, Walk. ib. p. 819.

AROA PYRRHOCHROMA, Walk. ib. Suppl. p. 329.

ORGYIA PLANA, Walk. ib. p. 786.

O. ALBIFASCIA, Walk. ib. Suppl. p. 325.

O. SUBFASCIA, n. sp.

*Male* ochreous brown; head and palpi ochreous; antennæ black; fore wing with a paler oblique suffused band, which extends from beneath the middle of the costa to posterior angle. Underside—fore wing darker brown, the oblique band more defined.

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

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

DASYCHIRA ANTICA, Walk. Cat. Lep. Het. B. M. p. 867.

*D. COMPLICATA*, Walk. ib. Suppl. p. 362, ♂.

*Trisula pustulifera*, Walk. ib. Suppl. p. 576, ♂.  
Darjeeling.

*D. TENEBROSA*, Walk. ib. Suppl. p. 360.

Darjeeling.

*D. BHANA*, n. sp.

*Male* dark brown: fore wing with five transverse lines of black lunules, bordered outwardly with chalybeous speckles; a ferruginous spot beyond the discal cell: hind wing paler brown, with two indistinct darker suffused transverse discal bands. Underside brown, with two ill-defined darker transverse discal bands. Cilia alternate pale and dark brown.

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

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

Allied to *D. tenebrosa*, Walk.

*D. FLAVIMACULA*, n. sp.

*Male* fuliginous brown: fore wing with two subbasal and two discal transverse undulating black lines, bordered with rufous brown; a double black spot with rufous-brown border on discal veinlet; a narrow yellow spot from posterior angle; a marginal blackish lunulated line. Underside paler, with a recurved blackish band crossing the disk of both wings; a black lunule on discal veinlet. Cilia with black spots.

Expanse  $1\frac{8}{12}$  inch.

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

#### HERACULA, n. g., Moore.

Body short; abdomen slender. Head prominent. Palpi short, not extending beyond the head, densely pilose; third joint conical. Antennæ rather short, minutely serrated. Wings broad exteriorly; costa nearly straight to one-third its length, rounded at the apex; exterior margin slightly convex; posterior margin nearly straight. Four superior veins, the second three-branched, the third proceeding from the second at one-third its length, and the fourth from near its base. Cell closed. Hind wing rounded exteriorly. Legs rather small; femora densely pilose beneath; mid tibiæ armed with a pair, and hind tibiæ with two pairs, of long apical spurs.

*HERACULA DISCIVITTA*, n. sp. (Pl. XLIII. f. 2.)

Upperside chocolate-brown; fore wing with a broad medial transverse discal much darker band, the exterior margin of which is concave, and the interior nearly circular by extending along the costa and terminating below its base, both margins with a narrow pale-white border; hind wing subdued brown, with a rather broad pale-chocolate-brown marginal band. Underside brown; apical half of

fore wing and marginal band of hind wing paler brown. Body dark brown. Antennæ, palpi, and legs blackish.

Expanse 2 inches.

Darjeeling. In Coll. A. E. Russell.

MARDARA CALLIGRAMMA, Walk. Cat. Lep. B. M. Suppl. p. 402.

SOMERA VIRIDIFUSCA, Walk. ib. iv. p. 882.

LYMANTRIA OBSOLETA, Walk. ib. iv. p. 880, ♂.

♀. *L. bhascara*, Moore, Cat. Lep. E. I. C. ii. p. 345.  
Balasore.

L. ALBICANS, Walk. Cat. Lep. Het. B. M. Suppl.

L. SUPERANS, Walk. ib. p. 876, ♀.

L. CONCOLOR, Walk. ib. p. 876, ♀.

L. GRANDIS, Walk. ib. p. 874.

L. SEMICINCTA.

*Alope semicincta*, Walk. ib. iii. p. 620.  
Raneegunge.

L. BASINIGRA, n. sp.

Upperside greyish brown: fore wing with a broad subbasal transverse fuliginous black patch, which is bordered outwardly by a darker black line; a series of black lunulated pale-bordered lines obliquely before the apex to beyond the posterior angle, between which and the outer margin are some black spots: hind wing and underside paler, without markings. Thorax and head black. Palpi, legs, abdomen, and antennæ greyish brown.

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

Balasore, Bengal. In Coll. A. E. Russell

L. MATHURA, n. sp.

*Male*. Upperside—fore wing greyish white, markings brown, with pale-brown interspaces; with two or three black and yellow spots at the base; two transverse subbasal irregular lines, between which is a broad band; a round spot within the cell and a blackish curved streak at its end; three transverse discal lunulated bands, the first broad, the others narrow; a marginal row of spots: hind wing dull yellow, with a blackish discal spot, narrow submarginal maculated band, and a marginal row of small spots. Underside dull yellow, suffused with pale brown between the veins, with darker-brown discal and marginal spots. Thorax white, with yellow and black spots. Abdomen yellow, tuft white, with dorsal, lateral, and a row beneath of black spots. Head at the sides, palpi in front, and legs yellow; palpi above and at the sides, and spots on the legs, black. Antennæ brown.

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

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

EUPROCTIS VIRGUNCULA, Walk. Cat. Lep. Het. B. M. iv. p. 836.

E. DIVISA, Walk. ib.

E. LUTESCENS, Walk. ib. p. 837.

E. ATOMARIA, Walk. ib. p. 837.

E. PARTITA.

*Numenes partita*, Walk. ib. Suppl. p. 290.  
Darjeeling.

E. RANA, n. sp.

*Male*. Upperside yellow; fore wing with the basal two-thirds irrorated with dark-brown scales, which also extend from within the cell to the middle of the outer margin in a more densely irrorated elbowed line, below which the wing is whitish; two medial irregular transverse widely separated narrow white bands from costal to posterior margin: hind wing with the abdominal margin suffused with brown. Underside pale yellow, without markings. Antennæ and body brown.

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

Silhet. In Coll. A. Grote, Esq.

NUMENES INSIGNIS, Moore, Cat. Lep. E. I. C. ii. pl. 10 a. f. 6.

*N. siletti*, Walk.

N. PATRANA, Moore, ib. p. 367.

LEUCOMA LATIFASCIA, Walk. Cat. Lep. Het. B. M. p. 831.

? *Euproctis melanophila*, Walk. ib. Suppl. p. 349.

ARTAXA VARIANS, Walk. ib. p. 796.

A. INCONCISA, Walk. ib. Suppl. p. 332.

DREATA UNDATA, Blanch. Jacquemont's Voy. Ins. pl. 1. f. 8.

*D. undifera*, Walk. ib. p. 904.

D. MUTANS, Walk. ib. p. 904.

D. CITRINA, Walk. ib. p. 905.

APONA CASHMIRENSIS.

*Gastropacha cashmirensis*, Kollar, Hügel's Kasch. iv. p. 472. t. 21. f. 4, ♀ (1844).

*Apona pallida*, Walk. Cat. Lep. Het. B. M. p. 1763 (1856), ♀.

*Male* brownish fawn-colour: fore wing with three subbasal indistinct brown transverse lines, beyond which is a small black spot near the costa; a transverse discal oblique series of six brown undulating lines, the outer line on each side the darkest, that of the exterior side with a pale inner border; a submarginal series of suffused

brown lunules: hind wing with a discal series of six indistinct undulating brown lines. Underside ferruginous brown; the discal lines of fore wing indistinct, those of the hind wing more distinct than on the upperside. Body ferruginous brown. Antennæ long and broadly bipectinated to the tips; shaft white; plumes brown. Femur and tibia densely clothed with long ferruginous-brown hairs.

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

Darjeeling. In Coll. A. E. Russell.

JANA LINEOSA, Walk. ib. p. 912.

J. CERVINA, n. sp.

*Male* pale fawn-colour; fore wing with two oblique discal chestnut-brown narrow bands, a third being slightly apparent near the base, the outer bordered with a broad lunular-margined dusky band; hind wing with three ill-defined discal bands. Antennæ and palpi above fuliginous. Abdomen with pale chestnut-brown waist.

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

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

TAGORA GLAUDESCENS, Walk. ib. v. p. 1188.

Darjeeling.

T. PANDYA, n. sp.

Upperside greyish fawn-colour; fore wings with several transverse indistinct brown undulating lines, curving inwardly to the costa, bordered exteriorly by an oblique dark double line extending from the apex to the inner margin; hind wing with a similar series of undulating lines and dark-bordered double line; both wings with a submarginal series of blackish spots.

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

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

Allied to *T. patula*; but may be distinguished by its wanting the two vitreous discal spots.

GANISA PLANA, Walk. (Moore, Cat. Lep. E. I. C. ii. pl. 10 a. f. 5).

Fam. PSYCHIDÆ.

? CRYPTOHELEA CONSORTA, Templeton, Ent. Trans. v. pl. 5. f. 6, 7.

PSYCHE, sp.

PERINA BASALIS, Walk. Cat. Lep. Het. B. M. iv. p. 966, ♂.

♀. *Euproctis antica*, var. ♂, Walk.

Fam. ARCTIIDÆ.

ALOPE OCELLIFERA, Walk. Cat. Lep. Het. B. M. ii. p. 620.

ALPHEA FOLVOHIRTA, Walk. ib. iii. p. 684.

Darjeeling.

*HYPERCOMPA MULTIGUTTATA*, Walk. ib. p. 657.

*HYPERCOMPA EQUITALIS*, Kollar, Hügél's Kasch. iv. pl. 20. f. 3.

*H. PLAGIATA*, Walk. ib. p. 655.

*CREATONOTUS INTERRUPTA*, Linn. (Cram. t. 185. f. E).

*C. EMITTENS*, Walk. ib. p. 638.

*PHISSAMA TRANSIENS*.

*Spilosoma transiens*, Walk. ib. p. 675.

*AREAS ORIENTALIS*, Walk. p. 658.

*SPILOSOMA MULTIVITTATA*, n. sp.

*Male* creamy white: fore wing with five transverse maculated fuliginous black narrow bands, the first subbasal, the second elbowed across the cell and joining the first on the costa, which is black along its base, third obliquely from middle of posterior margin to the costa before the apex, fourth from near posterior angle crossing the third to costa, fifth submarginal; a small black spot crossed by the discal veinlet: hind wing with a submarginal fuliginous line and a spot on discal areolet. Head in front, palpi, thorax beneath, and legs in front black; sides of thorax tinged with crimson; abdomen above reddish, with dorsal and lateral black dots; body and legs beneath yellowish.

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

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

*S. RHODOPHILA*, Walk. Cat. Lep. Het. B. M. Suppl. p. 294.

*S. RUBIDORSA*, n. sp.

*Male* white: fore wing with an oblique narrow grey maculated band, a small grey spot within the discal veinlet, and another spot near the base of the cell; hind wing with two submarginal grey spots and a smaller one within discal veinlet. Head black on each side in front; palpi black, beneath crimson; thorax crimson on each side and beneath in front. Legs black in front; fore femur crimson in front. Abdomen crimson above, without dorsal but with a lateral row of black dots; anal tuft white.

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

Darjeeling. In Coll. A. E. Russell.

*S. SORDIDA*, n. sp.

*Male* pale buff-brown; hind wings paler, with a pale submarginal fuliginous band and a spot on discal veinlet; abdomen above dull red, with dorsal and lateral row of blackish dots; sides of head, palpi above, legs in front, and antennæ fuliginous.

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

Darjeeling. In Coll. A. E. Russell.

*S. RUBITINCTA*, n. sp.

*Male.* Upperside—fore wing pale reddish buff-colour, yellowish apically; a short yellow-bordered maculated black line obliquely from middle of posterior margin, beyond which is a very short longitudinal black streak. Underside white, delicately suffused with pale pink on abdominal margin; three small black spots, two submarginal, the third on discal veinlet. Thorax pale reddish buff. Abdomen above red, with dorsal and lateral black spots; anal tuft white. Head buff-yellow; sides of head, palpi above, front of legs, and antennæ black. Thorax on the sides and beneath in front crimson. Underside pale buff-yellow; the short longitudinal black streak on fore wing and spots on hind wing as above.

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

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

*S. NIGRIFRONS*.

*Icambosida nigrifrons*, Walk. Cat. Lep. Het. B. M. Suppl. p. 401.

*Male.* Upperside white. An indistinct grey dot on discal veinlet of hind wing. Thorax in front buff-yellow. Palpi, head in front, thorax beneath, and legs in front black. Abdomen yellow above; beneath black, with white bands; anal tuft white.

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

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

*S. FLAVALIS*, n. sp.

*Male.* Upperside buff-yellow: hind wing yellowish white, with two blackish spots, one near the anal angle, the other on discal veinlet. Underside buff-white, the two spots on hind wing prominent. Sides of head, palpi above, and legs in front black. Abdomen with lateral row of black spots. Antennæ black.

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

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

*S. LATIVITTA*, n. sp.

*Male.* Upperside buff-yellow: fore wing with a rather broad maculated grey band obliquely from middle of posterior margin diminishing to the apex, where also there are some small submarginal spots; a grey spot near the base of the wing: hind wing whitish, with three blackish spots, two being submarginal near the angles, the third on discal veinlet. Sides of head, palpi above, legs in front, dorsal and lateral spots on abdomen black. Antennæ brown.

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

Darjeeling. In Coll. A. E. Russell.

*S. STIGMATA*, n. sp.

*Male* pale buff-yellow: fore wing with a dot at the base; two subbasal spots, a spot on middle of costa, below which an oblique series of spots to posterior margin, and two submarginal transverse series of short longitudinal streaks black: hind wing yellowish white,

with two rather large blackish spots from anal angle, and a third near anterior angle. Thorax branded with a black stripe down the middle. Abdomen reddish above, with dorsal and lateral black dots. Front of head, palpi, front of thorax beneath, legs in front, and abdomen black.

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

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

*S. SANGUINALIS*, n. sp. ♀

*Male*. Upperside buff-colour: fore wing with minute black streaks near the base; an oblique recurved transverse discal series of small longitudinal black streaks, disposed in widely separated pairs, each pair divided by a vein; a shorter submarginal series of similar streaks below the apex: hind wing suffused with red at the base; a large spot on discal veinlet, and a submarginal series decreasing in size from near anal angle. Abdomen above deep crimson, without dorsal but with a lateral row of black spots. Head in front, palpi, thorax beneath, femora at the tips, tibiæ, tarsi, and antennæ black; femora (except the tips) crimson; body beneath yellow. Underside yellow: fore wing suffused with bright crimson from the base to beyond the middle; a black spot on discal veinlet, a second spot near the costa before the apex, below which is an oblique discal streak: hind wing with spots as above.

*Female*. Upperside paler; hind wings suffused with red. Underside yellow suffused with red; fore wing with the spot nearly obsolete.

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

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

*S. RUBILINEA*, n. sp. ♀

*Male* brownish buff-colour: fore wing with two (and in some three) recurved transverse red lines, with or without short black streaks, the first subbasal, the other two discal and oblique; a short outer medially submarginal series of black streaks; a small reddish spot on discal veinlet: hind wing pale buff, suffused with crimson at the base; a large spot on discal veinlet and large submarginal spots black. Abdomen deep red above, beneath yellow, with a dorsal and two lateral rows of black spots. Head at the sides, palpi, thorax in front beneath, femora at the tips, tibiæ and tarsi, and antennæ black; femora (except the tips) in front red. Underside buff-yellow; fore wing slightly suffused with crimson from the base; both wings with a short longitudinal streak at the base, another within the cell, a large quadrate spot on discal veinlet, and oblique submarginal series of spots black.

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

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

*S. DISCINIGRA*, n. sp. ♀

*Male*. Upperside buff-brown: fore wing with the edge of the costa



reddish ; two transverse ill-defined reddish slightly spotted lines, between which is a reddish spot on discal veinlet ; a short series of ill-defined black streaks before the apex, and another short submarginal series : hind wing paler, the medial portion from the base black, where the veins are pale red and suffused on the abdominal margin with pale red. Abdomen deep red above, yellowish beneath, with ill-defined dorsal and large lateral black spots. Underside buff-yellow ; fore wing with the base of the costa, and veins basally, pale crimson, with the interspaces between the veins black ; hind wing with a basal spot, longitudinal streaks from the base, a spot on discal veinlet, and submarginal spots from anal angle black. Sides of head, palpi, femora at the tips, tibiæ, and tarsi black ; thorax beneath black and crimson ; femora (except the tips) crimson in front. Antennæ black. Thorax above with a small triangular black spot.

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

Darjeeling. In Coll. A. E. Russell.

Fam. NOTODONTIDÆ.

THIACIDAS POSTICA, Walk. Cat. Lep. Het. B. M. v. p. 1028.

*Drymonia denotata*, Walk. ib. Suppl. p. 414.

*Cnethocampa curvata*, Walk. ib. Suppl. p. 429.

STAUROPUS SIKKIMENSIS, n. sp. (Pl. XLIII. fig. 5.)

*Male*. Upperside greyish brown : fore wing with two irregular transverse yellow-bordered black lunulated lines, the first one-third from the base, the second beyond the cell, the space between which is suffused greyish black with yellow speckles, and having two black marks at the end of the cell ; a small black spot at the base of the wing, where the space to the first transverse line is greyish white ; a submarginal row of black dots, and a marginal line of narrow lunules black, both with a greyish-white inner border : hind wing brown, greyish black along anterior margin, where there are some grey marks ; a marginal lunulated grey line.

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

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

DAMATA LONGIPENNIS, Walk. Cat. Lep. Het. B. M. v. p. 1044.

Darjeeling.

CELEIA PLUSIATA, Walk. ib. Suppl. p. 463.

C. AURITRACTA, n. sp.

*Male* pale ferruginous brown, very pale along the costa : fore wing with a blackish longitudinal streak from the base beneath the cell to the exterior margin below the apex, where it is interspersed with black dots, medially beneath which is a narrow well-defined re-curved golden metallic streak ; a blackish spot at the apex, preceded by a smaller black spot and brown subcostal dots ; some small black spots near the posterior angle ; exterior margin with a linear row of

black dots. Thorax with a whitish collar. Antennæ broadly pectinated to near the tips.

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

N.E. Bengal. In Coll. F. Moore.

*MENAPIA KAMADENA*, n. sp.

*Male* luteous brown: fore wing luteous brown, clearer brown along the costa; on the posterior portion of the wing are two oblique pale darker-bordered streaks, and a series of similar streaks ascending obliquely upward and outward from before the posterior angle, above which is an oblique apical suffused dusky streak; a black dot at the end of the cell: hind wing and abdomen reddish fawn-colour. Palpi at the side black.

Expanse 2 inches.

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

*CERURA LITURATA*, Walk. Cat. Lep. Het. B. M. v. p. 988.

*C. PRASANA*, n. sp.

*Male* and *female*. Upperside—fore wing silvery white; a sub-basal maculated band, a discal apically maculated band continuing in a narrow line to a patch on posterior angle, spots along the costa, and quadrate spots on the cilia black; the maculated bands greyish exteriorly: hind wing whitish basally, fuliginous brown exteriorly; cilia with black spots. Underside white basally, fuliginous exteriorly; costa and quadrate spots on cilia black. Body creamy white; thorax with small black spots; abdomen with fuliginous black bands.

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

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

*C. DAMODARA*, n. sp.

*Female*. Upperside creamy-white; fore wing with basal dots, a subbasal transverse sinuous band, short streaks on the costa, three transverse discal sinuous lines, and short marginal streaks black, each of the latter extending on the cilia: hind wing pale fuliginous brown exteriorly, the veins darker brown; cilia creamy-white with black spots. Thorax buff-white with black spots; abdomen creamy-white with black bands. Underside creamy-white; fore wing with the disk fuliginous, where the veins are darker; costal and marginal streaks black; hind wing with the veins exteriorly, a subapical patch, and marginal spots fuliginous.

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

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

*HETEROCAMPA SIKKIMA*, n. sp.

*Male* and *female* greyish brown: fore wing hoary, with yellow speckles between the markings; a black streak from the base, sub-basal transverse marks, a narrow transverse streak closing the cell, and others obliquely beneath; two transverse discal series of black-

ish marks, between which is a row of rather prominent contiguous yellow-speckled streaks; a marginal row of alternate black streaks and whitish points: hind wing, abdomen, and underside pale greyish brown. Thorax, head, palpi, legs in front, and tip of abdomen hoary. Antennæ brown.

Expanse  $1\frac{7}{8}$  to  $2\frac{2}{8}$  inches.

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

#### H. ARGENTIFERA, n. sp.

*Male* grey: fore wing dull silvery grey, with two irregular transverse subbasal brown and blackish double lines; some blackish marks on the costa before the apex; a band of three oblique transverse discal blackish brown-margined lunulated lines, which is darkest at the ends; a marginal row of well-defined black lunular spots with silvery-grey centres: hind wing greyish brown apically, very pale ferruginous basally, with brown lunulated marginal line. Thorax, head, palpi, and legs in front grey; thorax with brown collar and blackish spots. Abdomen very pale ferruginous, with grey tip. Antennæ brown. Underside pale ferruginous brown.

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

Darjeeling. In Coll. W. S. Atkinson, Brit. Mus., and F. Moore.

#### ICHTHYURA FERRUGINEA, n. sp.

*Female* bright ferruginous: fore wing with two subbasal and one discal transverse pale lines; between the second and third line a dark pale-bordered discal spot, and an irregular oblique brown streak having a pale inner border; two ill-defined series of brown pale-bordered marginal spots. Head and a large spot on front of thorax, and anal tuft, dark chestnut-brown. Palpi at the tip black. Antennæ brown. Underside pale ferruginous.

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

N.E. Bengal. In Coll. A. E. Russell.

#### I. INDICA, n. sp.

*Male* and *female*. Upperside brownish fawn-colour: fore wing with two subbasal and two discal narrow transverse paler lines with dark-brown borders, the two latter joined at their base on the posterior margin; an interrupted submarginal row of pale spots, each with a dark-brown outer border; a similar series of spots along the exterior margin. Underside paler. Palpi, head, spot on top of thorax, and anal tuft dark brown.

Expanse, ♂  $\frac{9}{10}$ , ♀ 1 inch.

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

Larva feeds on *Flacourtia cataphracta*.—A. Grote.

#### NOTODONTA BASALIS, n. sp.

*Male* pale purplish brown: fore wing from the base to beyond the middle dark purplish brown, the margin being defined by an irregular elbowed jet-black border, which extends obliquely to the dentation of the posterior margin; apical portion of the wing dull

silvery purplish grey, with two transverse rows of brown points and a row of suffused brownish lunules; a pale-brown marginal wavy line: hind wing and abdomen pale purplish brown; thorax, head, and palpi dark purple brown. Underside pale purplish brown, both wings with an ill-defined darker suffused discal band having a pale outer border and paler costal spot.

Expanse 2 inches.

Darjeeling. In Coll. W. S. Atkinson.

PARAVETTA, n. g., Moore.

Body moderately stout. Abdomen extending to the length of the hind wing. Proboscis rather short. Palpi porrect, small, pilose, extending to the front of the head; third joint minute, linear. Antennæ broadly pectinate to three-fourths of its length in the male, setaceous in the female. Legs large, long, fore and middle femora and tibiæ pilose beneath; hind femora naked, hind tibiæ and first joint of their tarsi pilose; middle tibiæ with a pair, and hind tibiæ with two pairs, of apical spurs. Wings elongated, narrow; costa of fore wings straight, apex slightly acuminate, exterior margin angular in the middle and posteriorly, hind margin convex in the middle; four superior veins, first, second, and fourth contiguous at the base, third remote, arising from the second at one-third of its length; hind wings trigonate, slightly acuminate at the apex.

PARAVETTA DISCINOTA, n. sp. (Pl. XLIII. fig. 3.)

*Male* chestnut-brown: fore wing with a basal narrow yellow line, with a broad obliquely elbowed transverse discal pale-pinkish-brown band, which is bordered by a narrow pale-yellowish line; within the band is a darker discal spot: hind wing very pale pinkish brown, with ill-defined paler dark-bordered discal line and darker marginal line. Underside pinkish brown, with ill-defined discal line. Body and legs dark brown, tarsi yellow. Antennæ brown; thorax with a chestnut-brown spot at the base.

*Female* much darker; fore wing with the base, apex, and the discal mark bright chestnut-brown, the discal band being greyish purple, which colour extends to the base of the costa, base of posterior margin, and pervades the exterior margin; hind wing brown. Body and legs dark purple brown, tarsi yellow; spot at base of thorax bright chestnut-brown.

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

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

LOPHOPTERYX SATURATA, Walk. Cat. Lep. Het. B. M. Suppl. p. 415.

ANODONTA PULCHERRIMA, n. sp. (Pl. XLIII. fig. 4.)

*Male* ferruginous brown: fore wing with longitudinal streaks from the base, marks on the costa, and a submarginal lunulated pale-outer-bordered band bright suffused reddish brown, the interspaces being pale buff-yellow; a suffused blackish patch from the costa across

the end of the cell, beyond which is a paler patch, and an oblique lunulated double line across the disk; a hoary marginal band traversed by a narrow medial black line, and bordered by the cilia: hind wing brown, pale buff-yellow along the abdominal margin; with blackish marginal band, which is slightly hoary; two pale-yellowish lines with reddish-brown borders from the anal angle proceeding indelibly across the disk to the anterior margin. Thorax, head, palpi, and legs reddish brown. Abdomen brown, with ill-defined pale-yellow bands. Antennæ brown. Underside uniformly dull brown, except on inner margins, which are yellowish.

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

N.E. Bengal. In Coll. A. E. Russell.

*ANTHEUA DISCALIS*, Walk. (Moore, Cat. Lep. E. I. C. ii. pl. 13 a. f. 4).

*ANTICYRA COMBUSTA*, Walk. Cat. Lep. Het. B. M. v. p. 1092.

*Dinara lineolata*, Walk. ib. vii. p. 1700.

*PHALERA RAYA*, Moore, Cat. Lep. Mus. E. I. C. ii. p. 433.

*P. PARIVALA*, Moore, ib. p. 434.

*P. TENEBROSA*, n. sp.

Upperside greyish brown; fore wing with an elongated pale-grey-brown dentate-margined patch from the apex along nearly one-half of the costa, the space beneath which to a submarginal zigzag line, and the upper part of the wing to the base, is blackish brown, within which are some darker discal marks. Underside duller brown, with a medial transverse suffused blackish band having a pale outer border, and a spot on costa of fore wing.

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

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

#### Fam. BOMBYCIDÆ.

*TRILOCHA VARIANS* (Moore, Cat. Lep. E. I. C. ii. pl. 11 a. f. 6).

*Naprepa varians*, Walk. Cat. Lep. Het. B. M. p. 1153.

#### Fam. DREPANULIDÆ.

*ORETA PAVACA*, n. sp.

*Male* and *female* ferruginous fawn-colour. Upperside covered with numerous ill-defined transverse darker striæ; these on the exterior half of the hind wing replaced by small spots disposed linearly between the veins; a suffused darker band from the apex of fore wing obliquely to abdominal margin; a silvery-white zigzag discal mark and numerous transverse silvery striæ at the base of both wings and exterior to the band of the fore wing. Underside bright ferruginous, pale yellow on the posterior half of hind wing; both wings with numerous brown striæ, which, exteriorly, assume the shape of

spots. Head, palpi, front of thorax beneath, and legs in front bright crimson.

*Female* darker fawn-colour above, with the striæ, spots, and transverse oblique band also darker and more clearly defined, the latter being also present on the underside.

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

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

*O. VATAMA*, n. sp.

*Male* yellow, covered with numerous delicate transverse brown striæ: fore wing with a yellowish-ferruginous darker-bordered band, the outer border obliquely from the apex, the inner border lunulated and from near base of posterior margin to middle of the costa, where it ends in a blackish spot, beyond which is a second similar costal spot; base of the wing and along exterior margin yellowish ferruginous: hind wing with a broad subbasal yellowish-ferruginous darker-bordered band; apex slightly suffused with yellowish ferruginous; a narrow zigzag silvery-white line at the end of each cell. Underside brighter-coloured, similarly marked, but with the inner transverse line and costal spots of fore wing absent, the ferruginous colour on the hind wing extending to the base, and there being some ferruginous apical dots. Body yellowish ferruginous; front of head, palpi, and legs bright ferruginous; antennæ brown.

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

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

*DREPANA DUPLEXA*, n. sp. (Pl. XLIII. fig. 8.)

*Male* brownish fawn-colour, darkest at the apex, palest on the hind wings; fore wing very falcate, with a double black line obliquely from the apex to middle of abdominal margin of hind wing, the inner line narrow and palest; between the line and the base of the wing some transverse pale lunulated black lines; a small blackish rounded spot with pale border before the apex near the costa; exterior to the line on the fore wing is a series of rounded spots composed of brown streaks, beyond which is a brown submarginal lunulated line; hind wing exterior to the band with short transverse brown striæ.

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

Darjeeling. In Coll. A. E. Russell.

*D. PATRANA*, n. sp.

*Male*. Upperside dull pale cinnamon-brown: fore wing with numerous minute silvery scales disposed along the veins; a subcostal and two transverse pale-yellow lines, the first of the latter denticulated with black on its outer border; exterior line dark-bordered, and joining the costal line before the apex; a suffused black oblique spot at the end of the cell; a row of black dots along the lower half of exterior margin: hind wing yellowish anteriorly, with a short transverse yellow dark-bordered line from middle of abdominal mar-

gin; three or four black dots along the exterior margin from the posterior angle. Underside yellow, with an indistinct transverse brown line, and a discal dot on fore wing.

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

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

*D. VIRA*, n. sp.

*Female.* Upperside pale fawn-colour; hind wing pale yellow anteriorly; two oblique dark-brown lines crossing both wings, between which are three small white discal spots; a pale submarginal line; exterior borders of both wings defined by a brown line. Underside yellow, with the transverse lines narrow and pale brown; marginal line brown.

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

Darjeeling. In Coll. A. E. Russell.

*D. SADANA*, n. sp.

*Male.* Upperside yellow; fore wing with several ferruginous dark-centred blotches below the apex, and two paler spots within the cell, a blackish dot near the base of posterior margin, some indistinct blackish submarginal lunules; hind wing with several small ill-defined ferruginous-brown spots on the lower half. Underside paler, with the exterior margin below the apex, three subapical, and two discal dots pale ferruginous.

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

Darjeeling. In Coll. A. E. Russell.

#### FAM. SATURNIIDÆ.

*CRICULA TRIFENESTRATA*, Helfer (H.-Schæff. Lep. Exot. pl. 17. f. 80, ♀).

*Saturnia zuleika*, Westw. Orient. Ent. pl. 11. f. 1, ♂.

*C. DREPANOIDES*, n. sp.

*Male* pale fulvous, suffused with grey on the fore wing to near the apex, and at the angles of the hind wing; exterior margins bordered with fulvous red; a narrow dark-purple-brown band obliquely from the apex to middle of inner margin, continuing across the hind wing near the base; fore wing with a conglomerated series of large and small clear yellow discal spots, a subbasal zigzag and a submarginal lunulated reddish line; hind wing with five yellowish brown-bordered discal spots, the central one the largest and medially semitransparent, a discal and submarginal lunulated reddish lines.

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

Darjeeling. In Coll. W. S. Atkinson, Esq.

*SALASSA LOLA*, Westw. Orient. Ent. pl. 12. f. 3.

*ACTIAS SELENE*, McLeay, Leach's Zool. Misc. pl. 70 (Cram. t. 31. f. A, B).

PROC. ZOOL. SOC.—1865, No. LIII.

A. MÆNAS, Doubleday (Westw. Orient. Ent. pl. 22).

ANTHERÆA PAPHIA, Linn. (Cram. t. 146. f. A, t. 147. f. A).

Balasore; Bauleah.

A. FRITHI, Moore, P. Z. S. 1859, pl. 65. f. 1.

A. HELFERI, Moore, ib. pl. 64. f. 2.

A. ASSAMA, Helfer (Westw. Orient. Ent. pl. 20).

A. MIRANDA, Atkinson (Moore, Trans. Ent. Soc. 1865, p. 424).

SATURNIA GROTEI, Moore, P. Z. S. 1859, pl. 65. f. 2.

S. ANNA, n. sp.

*S. anna*, Atkinson, MS.

*Male* dark olive-green: fore wing powdered with yellow to the discal zigzag band, which has a contiguous outer lunulated olive-brown band, and a double series of yellow triangular marginal spots, a bluish and red apical patch and an adjacent white-bordered black spot, a blackish pale-yellowish-bordered patch at the base of the wing, and a subbasal irregular transverse narrow blackish band; ocelli dull crimson, with blackish border, white and purple inner circle, and blackish centre: hind wing purplish brown at the base, suffused with crimson near the ocellus; a subbasal irregular transverse pale inner-bordered blackish band; two transverse discal zigzag bands and marginal double spots as in fore wing. Body purple brown; thorax with a yellowish collar; abdomen with a yellowish waistband. Antennæ yellowish.

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

Darjeeling. In Coll. W. S. Atkinson, Esq.

LOEPA KATINKA, Westw. Orient. Ent. pl. 1. f. 2.

L. SIKKIMA, n. sp.

*Loepa sikkima*, Atkinson, MS.

Distinguished from *L. katinka* by its smaller size, the male differing in being of a darker yellow, the fore wing having the exterior margin of a clay-brown colour, and the space within the transverse zigzag discal line from the costa dusky.

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

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

*Note.*—“*L. katinka* also occurs at Darjeeling (but sparingly), and is always larger than the dark form, which appears earlier in the year (beginning of August). *L. sikkima* inhabits the hot valleys, whereas *L. katinka* is found at from 5000 to 7000 feet elevation.”  
—*W. S. Atkinson in epistolâ.*

ATTACUS ATLAS, Linn. (Cram. t. 381. f. C).<sup>7</sup>

A. EDWARDSII, White, P. Z. S. 1859, pl. 57.



A. CYNTHIA, Drury, Ins. ii. pl. 6. f. 2.

A. RICINI, Jones, Trans. Linn. Soc. 1804, p. 42.

*Saturnia arrundi*, Milne-Edw. Bull. Agric. Fr. 1840, pl. 10.

*A. lunula*, Walk. Cat. Lep. Het. B. M. p. 1221.

Fam. LIMACODIDÆ.

SCOPELODES UNICOLOR, Westw. Nat. Libr. Ins. p. 222.

MIRESA ALBIPUNCTA, H.-Schæff. Lep. Exot. f. 179.

Darjeeling.

M. CASTANEIPARS, n. sp.

Glossy creamy-white, with pale glaucous reflections: fore wing with a large irregular-shaped dark-chestnut-brown subbasal patch, which is paler, intersected by the veins and a transverse whitish line; thence to the posterior angle and gradually upwards the space is suffused with pale chestnut-brown; a small blackish spot near the costa one-third from the apex; exterior margin and end of the veins defined by a blackish line: hind wing suffused with pale chestnut-brown at the base. Thorax pale chestnut-brown; tip of abdomen chestnut-brown. Palpi above and fore legs in front blackish. Under-side creamy-white; fore wing suffused with black along the costa and beneath the cell.

Expanse  $1\frac{3}{10}$  inch.

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

CANDYBA PUNCTATA, Walk. Cat. Lep. Het. B. M. vii. p. 1761.

*Belgoræa subnotata*, Walk. ib. Suppl. p. 497.

LIMACODES RETRACTATA, Walk. Cat. Lep. Het. B. M. Suppl. p. 487.

Darjeeling.

TRISULA VARIEGATA, Moore, Cat. Lep. E. I. C. ii. pl. 13 a. f. 1.

Fam. LASIOCAMPIDÆ.

LEBEDA PLAGIFERA, Walk. Cat. Lep. Het. B. M. vi. p. 1459.

L. FERRUGINEA, Walk. ib. p. 1458, ♂.

*L. ampla*, Walk. ib. p. 1412, ♀.

L. NOBILIS, Walk. ib. p. 1456.

L. BUDDHA, Lefebvre (Moore, Cat. Lep. E. I. C. ii. pl. 12 a. f. 2, ♂ ♀).

*L. plagiata*, Walk. Cat. Lep. Het. B. M. p. 1464, ♂.

L. REPANDA, Walk. ib. p. 1460.

**L. VINATA**, n. sp.

*Male* ferruginous grey: fore wing with the edge of costa ferruginous; three very oblique transverse narrow dark-ferruginous lines, the first and second straight with a pale-whitish inner border and having a blackish dot medially between them, third or outer line undulated, with yellow outer border: hind wing suffused with dark ferruginous along the inner margin, terminating irregularly across the disk. Cilia of both wings dark ferruginous. Palpi blackish. Head and thorax with a dark-ferruginous band down the middle. Abdomen dark ferruginous above, paler towards the tip. Underside—fore wing dark ferruginous, with the veins defined by yellow lines; the two outer oblique transverse lines and spot dark brown, the interspace yellow posteriorly; a grey patch at the apex: hind wing grey, irrorated with dark ferruginous; a subbasal indistinct dark transverse line and two irregular pale discal streaks.

Expanse  $2\frac{5}{8}$  inches.

Darjeeling. In Coll. A. E. Russell.

**MUSTILIA FALCIPENNIS**, Walk. ib. Suppl. p. 581.

Darjeeling.

**ESTIGENA PARDALE**, Walk. (Moore, Cat. Lep. E. I. C. ii. pl. 13 a. f. 1, ♂ ♀).

**BHARETTA**, n. g., Moore.

*Male*. Body moderately stout, extending beyond the hind wings. Head prominent. Palpi porrect, hairy, extending beyond the head. Antennæ pectinated, curved backwards. Legs stout, densely clothed with hairs; hind tibiæ with two short apical spurs. Wings moderate; fore wings slightly acuminate at the tips, angulated exteriorly below the apex and more slightly before the posterior angle; hind wings rounded exteriorly.

**BHARETTA CINNAMOMEA**, n. sp. (Pl. XLIII. fig. 6.)

*Male*. Upperside cinnamon-colour, somewhat fuliginous below the apex, with purple hyaline gloss exteriorly; fore wing with a brown pale-inner-bordered transverse streak obliquely from one-third of the posterior margin to the apex, three small black subbasal spots, two being within the cell, the third above it; hind wing with a transverse oblique very indistinct darker band.

Expanse 2 inches.

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

**ANDRACA BIPUNCTATA**, Walk. Cat. Lep. Het. B. M. Suppl. p. 582.

Darjeeling.

**A. TRILOCHOIDES**, n. sp.

*Male*. Upperside dark purple brown; exterior margins not festooned: fore wing with three ill-defined blackish transverse undula-

ting lines, the third sharply retracted towards the costa; a deep-black spot between the first and second lines; thickly along the costa and before the apex, and slightly along the transverse lines, are minute white scales; two medially submarginal spots composed of yellowish scales: hind wing pale at the apex, brown at the base, with two transverse black lines, the inner one nearly straight, the outer broadly lunulated in the middle and having a brown exterior border; a black discal dot. Abdomen with a blackish waist and tip of anal tuft, the latter with white points. Underside ferruginous brown, with two transverse black lines and discal spot, the outer line with pale exterior border; abdominal margin with a black-and-white fringe, and a black medial tuft of rather long hairs.

Expanse 2 inches.

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

#### GANGARIDES, n. g., Moore.

*Apona* (part.), Walker.

Antennæ moderately pectinated to near the tip. Palpi thick, projecting beyond the head; third joint short, ascending. Body stout; abdomen long, extending beyond the hind wings. Legs stout, rather densely clothed with hairs. Fore wings long, acuminate at the tips; costa arched in the middle; exterior margin concave below the apex, sinuous; subcostal vein with two branches. Hind wings trigonate; apex rounded; exterior margin slightly sinuous.

#### GANGARIDES ROSEA.

*Apona rosea*, Walk. Cat. Lep. Het. B. M. Suppl. p. 513.

Darjeeling.

G. DHARMA, n. sp. (Pl. XLIII. fig. 7.)

Upperside—fore wing dull yellow, irrorated with minute brown scales; two subbasal and two discal transverse brown lines, a submarginal series of brown pale-inner-bordered lunules; a small raised white spot between the second and third transverse lines: hind wing ochreous yellow, tinted with rosy. Body dull yellow, irrorated with brown. Antennæ pale brown. Underside buff-yellow, densely irrorated with greyish brown, appearing in parts in patches. Both wings with an ill-defined blackish transverse line. Cilia brown.

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

N.E. Bengal. In Coll. A. E. Russell.

TRABALA VISHNU, Lefebvre, Zool. Journ. iii. p. 207.

*Amydoma prasina*, *A. pallida*, *A. basalis*, Walk. Catal. pp. 1415-1417, ♂ ♀.

T. MAHANANDA, n. sp.

Differs from *T. vishnu* in its much larger size, the male distinguished by the dark bands of the fore wing being more oblique, and the female by the transverse bands, large subbasal patch, discoidal

spot, and submarginal series of spots more prominent and of a rufous brown.

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

N.E. Bengal. In Coll. A. E. Russell.

TARAGAMA GANESA, Lefebvre, Zool. Journ. iii. p. 211, ♂.

*Bombyx siva*, Lefebvre, ib. p. 210, ♀.

*Megasoma albicans* et *M. venustum*, Walk. Cat. B. M. vi. pp. 1449, 1450, ♂ ♀.

SUANA BIMACULATA, Walk. (Moore, Cat. E. I. C. ii. pl. 13 a. f. 2, ♂ ♀).

*Lebeda concolor*, Walk. ib. p. 1463, ♂.

*Suana ampla*, Walk. ib. p. 1502, ♀.

#### Fam. COSSIDÆ.

COSSUS CADAMBÆ, n. sp.

*C. cadambæ*, Atkinson, MS.

Upperside—fore wing dark greyish brown, marked with numerous short black striæ and transverse irregular black lines; hind wing pale greyish brown, with numerous brown striæ. Underside pale greyish brown, covered with numerous short brown striæ.

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

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

*Note*.—According to Mr. Atkinson, "this species is rather common about Calcutta; the larva perforating the wood of *Nauclea cadamba*. The larva is very like that of *C. ligniperda*, except that it is much smaller, and when full-grown of a darker colour—reddish chestnut. The moth appears at intervals from the end of February till November."

ZENZERA MINEUS, Cram. t. 131. f. D.

Z. INDICA, Boisd., H.-Schæff. Lep. Exot. f. 166.

#### Fam. HEPIALIDÆ.

PHASSUS SIGNIFER, Walk. Cat. Lep. B. M. vii. p. 1568.

### DESCRIPTION OF PLATES XLI., XLII., XLIII.

#### PLATE XLI.

Fig. 1. *Athyma chevana*, p. 763.

2. *Apatura sordida*, ♂, p. 765.

3. *Adolias balarama*, p. 766.

4. *Debis visrava*, p. 768.

5. *Zophoessa baladeva*, p. 769.

6. *Polyommatus varunana*, p. 772.

7. — *kandura*, p. 772.

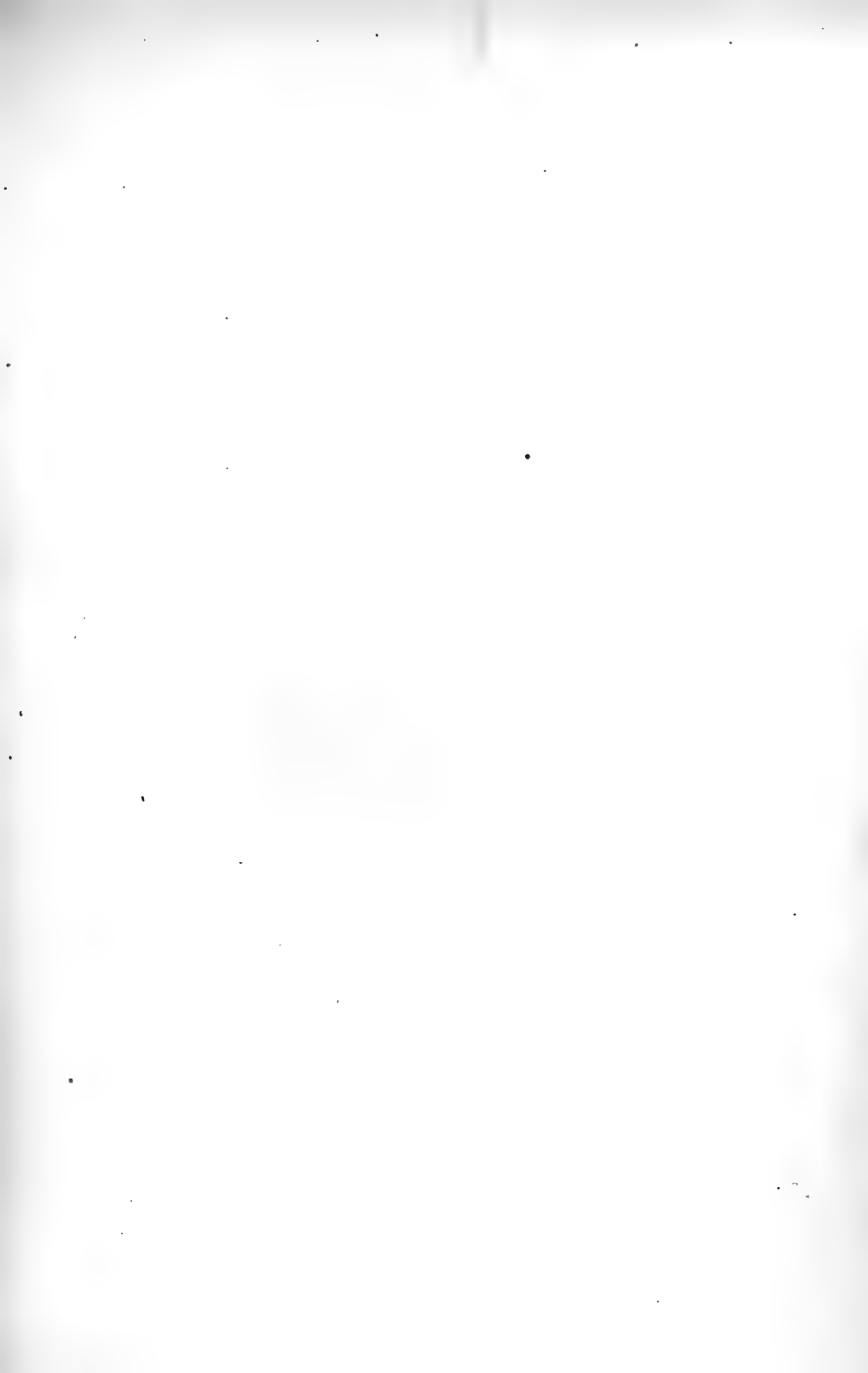
Fig. 8. *Polyommatus sangra*, p. 772.

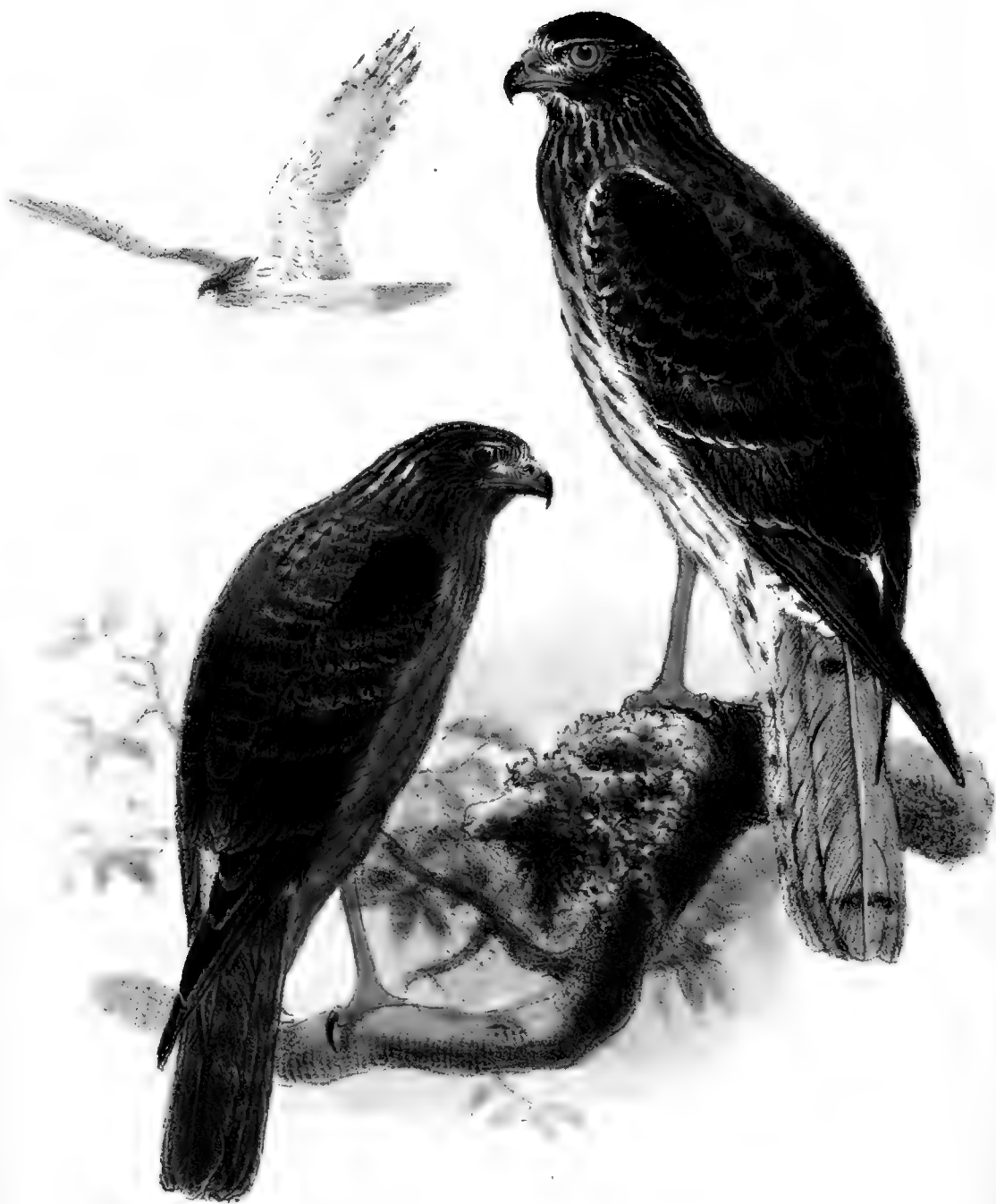
9. *Lycænesthes bengalensis*, ♂, p. 773.

10. *Poritia hewitsoni*, ♂, p. 775.

11. *Myrina ravata*, p. 776.

12. *Miletus drumila*, ♂, p. 777.





J Wolf del et lith

M & N Hanhart imp

CIRCUS WOLFI

## PLATE XLII.

- |  |   |
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| <p>Fig. 1. <i>Satarupa gopala</i>, ♂, p. 780.<br/>         2. <i>Darpa hanria</i>, p. 781.<br/>         3. <i>Capila jayadeva</i>, ♂, p. 785.<br/>         4. <i>Pisola zennara</i>, p. 786.</p> | <p>Fig. 5. <i>Vithora indrasana</i>, p. 795.<br/>         6. <i>Philopator basimaculata</i>, p. 800.<br/>         7. <i>Cadphises maculata</i>, ♂, p. 801.<br/>         8. <i>Canerkes euschemoides</i>, ♀, p. 802.</p> |
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## PLATE XLIII.

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|---|---|
| <p>Fig. 1. <i>Grotea elegans</i>, ♀, p. 797.<br/>         2. <i>Heracula discivitta</i>, p. 804.<br/>         3. <i>Paravetta discinota</i>, p. 814.<br/>         4. <i>Anodonta pulcherrima</i>, p. 814.<br/>         5. <i>Stauropus sikkimensis</i>, p. 811.</p> | <p>Fig. 6. <i>Bharetta cinnamomea</i>, ♂, p. 820.<br/>         7. <i>Gangarides dharma</i>, ♂, p. 821.<br/>         8. <i>Drepana duplexa</i>, p. 816.<br/>         9. <i>Bizone divakara</i>, ♂, p. 798.</p> |
|---|---|

13. ON A NEW SPECIES OF HARRIER FROM NEW CALEDONIA.  
 BY JOHN H. GURNEY, F.Z.S.

(Plate XLIV.)

Some time since, I received from M. E. Verreaux, of Paris, two specimens of the Harrier of New Caledonia, which appear to me to belong to an undescribed species very nearly allied to, yet distinct from, the Harrier found in Joanna Island and in the Island of Réunion, to which M. Jules Verreaux has given the name of *Circus maillardi*, and which was figured and described in the first series of the 'Ibis,' 1863, p. 163.

I propose to assign to this new species the name of my friend Mr. Wolf, to whose talented pencil all students of zoology, and especially those who study the birds of prey, are so greatly indebted.

The specimens of *Circus wolfi* which I have received from M. Verreaux appear to me to be both males, one evidently in the plumage of the first year, the other adult or nearly so.

On comparing the latter with an adult male of *Circus maillardi* recently obtained in Joanna Island, and liberally presented to the Norwich Museum by Mr. Edward Newton, I can find little or no difference in size or form, except that the quill-feathers of the wings and tail are slightly broader in *C. maillardi* than in *C. wolfi*, and that the proportionate length of the primaries in the two species does not appear identical.

In both species the third primary is the longest, the fourth next, and then the second; but in *Circus maillardi* the fifth equals the second in length, whilst in *C. wolfi* it falls decidedly short of it; again, in *C. maillardi* the sixth primary is slightly longer than the first, whilst in *C. wolfi* the relative proportions of these two feathers are reversed.

The colouring of the upper part of the head and neck, also that of the back, rump, and upper side of the wings, is extremely similar in both species; but it is slightly darker in the adult males of *Circus maillardi*, and the contrast between the black and grey feathers

of the wings is decidedly more conspicuous in that species than in *C. wolffi*.

In the specimens before me the middle feather of the tail bears one transverse mark near its base in *C. wolffi*, whereas the corresponding feather bears four such marks in *C. maillardi*. In each species there is also a single mark near the end of the feather; but both this and the markings on the upper portion of it are much more distinct in *C. maillardi* than in *C. wolffi*. The shaft-markings on the throat in *C. wolffi* are browner than in *C. maillardi*, and on the breast and abdomen they are not only browner but also broader, extending in *C. wolffi* to the under tail-coverts, which in *C. maillardi* are of a pure white.

The inner side of the primaries in *C. maillardi* are a pure white near their base, the remainder being black. In *C. wolffi* the basal parts are yellowish white, and the remainder of the underside of the primaries are of a pale slate-colour, crossed with narrow bars of a darker slate-colour at intervals of about an inch, the tips of the feathers being also dark.

The young male of *C. wolffi* resembles *C. maillardi* in a similar state, but is not so dark in its plumage, and is more rufous in the region of the abdomen, in which it resembles the young male of *Circus assimilis*.

14. NOTICES OF SOME APPARENTLY UNDESCRIBED SPECIES OF SAPIJOUS (CEBUS) IN THE COLLECTION OF THE BRITISH MUSEUM. BY DR. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S., ETC.

(Plate XLV.)

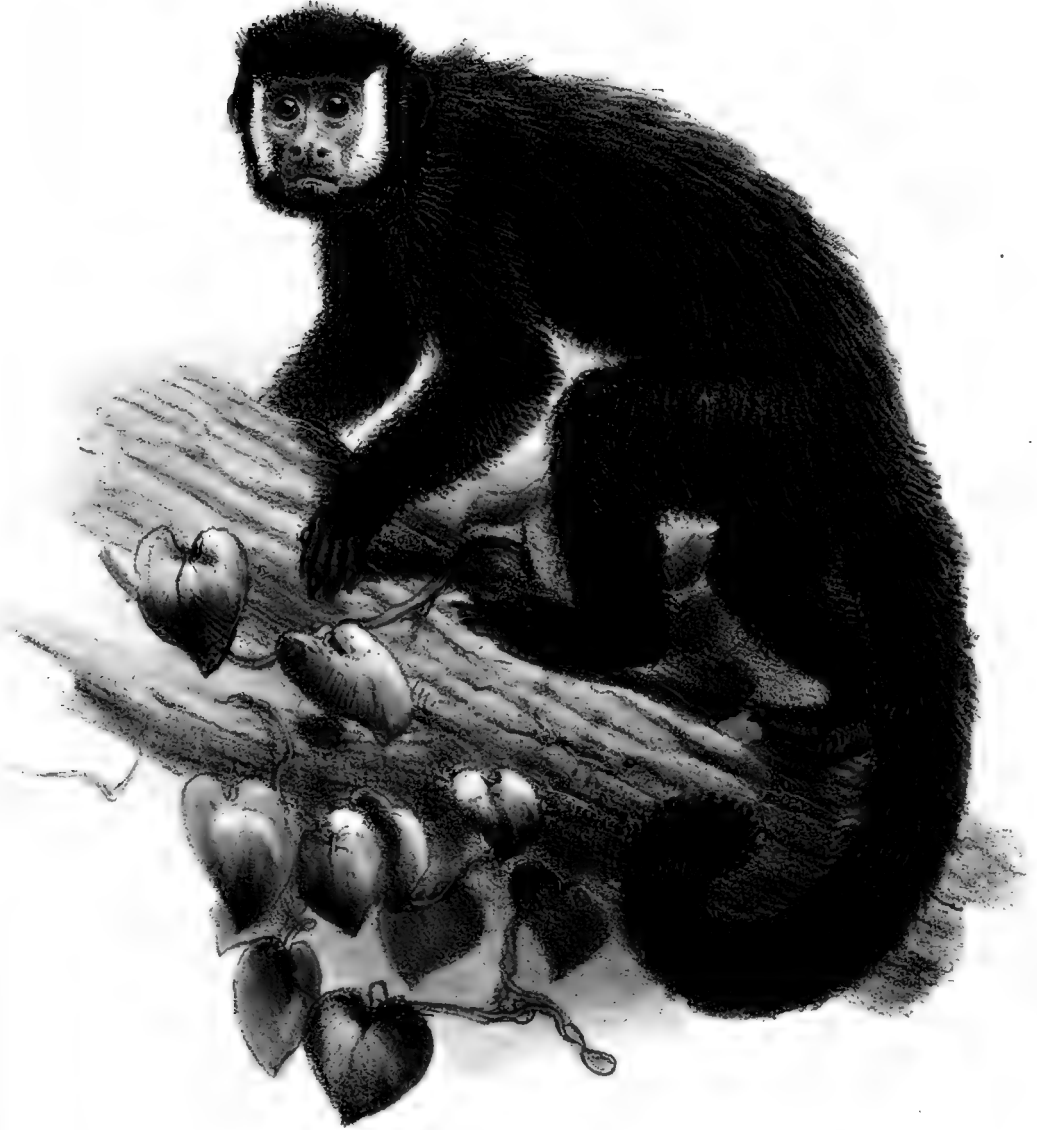
The distinction of the species of the American Monkeys is very difficult, and perhaps the genus *Cebus* the most difficult of all. Next to the difficulty of distinguishing them is that of determining the names which have been applied to them by different authors, and (what ought not to be the case) the determining of the figures, given by Spix and others, representing the species under consideration.

This mainly arises from the great variation of colour that the specimens of the same species present.

The difficulty has also been increased by the works of compilers like Lesson and Wagner, who depend on the descriptions of authors without having the opportunity of examining species to correct their theories, and yet venture to decide what are species and what varieties: and the result shows how dangerous it is for compilers to venture to go beyond the author from whom they copy.

M. Isidore Geoffroy has shown that *Cebæ* when in confinement, especially in a dark place, become bleached; and he believes that specimens so decolorated have often embarrassed zoologists and led them into error (Castelnau, 'L'Amér. du Sud, Mammifères,' p. 10, note).







There are two good essays on this genus, both based upon the collection in the Jardin des Plantes at Paris, which contains the type specimens described by the older French zoologists (viz. MM. I. Geoffroy, F. Prevost), and in Pucheran's 'Catalogue Méthodique de la Collection des Mammifères,' Paris, 1851, and Dr. A. G. Dahlbom's 'Studia Zoologica,' vol. i. 1856. The latter gives comparative descriptions of the species, drawn up in the form of tables.

I have compared these with the large collection of specimens in the British Museum, and believe that the species I have here described are not contained in them.

In stuffed specimens there is to be observed a considerable difference in the length and slenderness or thickness of the fingers, and at one time I thought this might afford a good character; but I observed that the fingers of those that are short when adult appeared to be longer and more slender in younger specimens, and I am not satisfied that part of this difference may not depend on the art of the taxidermist.

I believe that the manner in which the hair is distributed on the head is a good character, but this is one which requires careful examination; for the animal-preserver, by carelessness or by design, sometimes disfigures specimens in this respect. But the difference between natural distribution and disfigurement is easily discovered by careful study.

The greater number of species have a generic coloration; that is to say, the side of the head, the chest, and the front of the fore legs, and often the shoulders and outside of the thighs, are paler-coloured than the rest of the body. A few of the species are at once known by the distribution of their colours, as *C. leucocephalus* by its white head, chest, and shoulders, all the rest of the body being dark in this species; *C. leucogenys*, *C. cirrifer* and *C. vellerosus* are known by their uniform black colour, and *C. flavescens* by its nearly uniform pale yellow; *C. xanthocephalus* is known from the others by the yellowness of the hinder part of the body before the thighs.

The species in the British Museum may be thus arranged:—

I. *Hairs of the crown reflexed, bent back round the face, forming a short, erect crest over each eyebrow. Colour uniform.*

1. *C. LEUCOGENYS*, sp. nov. (Pl. XLV.)

Fur blackish, soft, elongate, silky, with a thick underfur; hair of head short, of the circumference of the face reflexed; cheek and temple pale yellow.

*Hab.* Brazil.

II. *Hairs of the crown bent back; those on the sides of the dark crown-spot elongate, in the perfect state forming two more or less erect crests or tufts.*

2. *C. APELLA*, I. Geoff., is the hornless, and *C. fatuellus*, I. Geoff., the horned state.

3. *C. ELEGANS*, I. Geoff. = *C. pallidus*, Gray.

*Hab.* Bolivia.

4. *C. CIRRIFER*, I. Geoff.

5. *C. VELLEROSUS*, I. Geoff.

Perhaps a thicker-furred variety of the former.

The younger specimens, and sometimes the older ones, are destitute of crests in all these five species, and therefore may be confounded with those of the next section.

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

III. *Hairs of the crown short, reflexed, adpressed, not forming any crest.*

6. *C. CAPUCINUS*, I. Geoff.

7. *C. XANTHOCEPHALUS*, Spix, = *C. monachus*, Fischer.

8. *C. ALBIFRONS*, I. Geoff.

9. *C. HYPOLEUCUS*, I. Geoff.

10. *C. LEUCOCEPHALUS*. (Fig. 4.)

Fur dark reddish brown, very obscurely punctulated; head to the front edge of the ears white; a short central narrow black streak on the back of the forehead; feet blackish.

This may be a variety of *C. versicolor*, Pucheran, although he particularly says it has no streak on the forehead.

*Hab.* Columbia.

11. *C. FLAVESCENS*.

Fur nearly uniform pale yellow fulvous; the cheeks, whiskers, and hair under the throat greyish; the crown, nape, and middle part of the back rather darker; outside of the leg rather redder; hair of the top of the head and nape rather elongate, and directed backward.

*C. gracilis*, Gray, List Mamm. B. M.; not Spix, t. 5.

*Hab.* Brazil.

IV. *Hairs of the crown of the head elongate, erect, forming a single central more or less conical crest.*12. *C. ROBUSTUS*.13. *C. ANNELLATUS*. (Fig. 3.)

Fur brown, reddish-washed, especially on the thigh, hairs with several pale rings; streaks on sides of neck bent down in front of the shoulders, bright yellow; belly reddish; crown, temple, whiskers, fore and hind legs, and tail blackish; face with dark-black hairs; crown-spot broad, with a broad line to the forehead and to the whiskers.

M. I. Geoffroy mentions, but does not describe, a Monkey under *C. capucinus* which may be this species.

*Hab.* Brazil.

V. *Hairs of the crown radiating from a centre; directed forward in front, and forming, with the eyebrows, a transverse crest.*14. *C. CHRYSOPUS*, F. Cuvier.

*Hab.* Brazil.

15. *C. SUBCRISTATUS*. (Fig. 2.)

Fur blackish brown; outside of the hind legs yellowish-washed; sides of face pale ashy; front of shoulders of the upper arms yellowish; the superciliary crest distinctly marked.

*Hab.* Brazil.

VI. *Hairs of the crown elongate, erect, diverging in all directions, forming a kind of cap.*16. *C. CAPILLATUS*. (Fig. 1.)

Fur rather elongate, brown, slightly washed with yellow, especially

on the thighs; sides of the forehead grey; sides of neck, outsides of the shoulders and fore legs fulvous; crown and nape blackish.

*Hab.* Brazil.

The series of skulls of different species in the British Museum collection do not present any characters by which they can be divided: the adult skulls are almost all of nearly the same size and proportions; they only differ in the form of the impression of the muscles of the lower jaw. In some they are separated only by a very thin central ridge, extending the whole length of the skull; in others they are separated by a broad space of nearly equal width; but in some others the edges of the scars are far apart in front, and close together, with a linear ridge, behind, leaving a triangular smooth space on the fore part of the crown. But these are doubtless changed by age, though there must be a considerable difference in the form of the muscles of the last group and those of the two former ones.

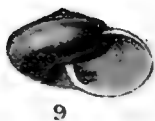
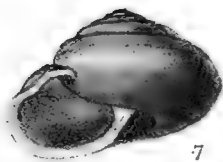
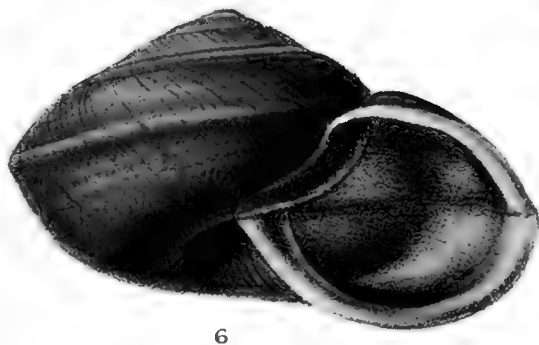
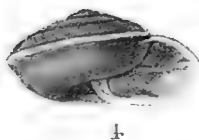
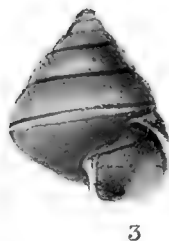
15. DESCRIPTIONS OF THIRTEEN NEW SPECIES OF LAND-SHELLS FROM FORMOSA, IN THE COLLECTION OF THE LATE HUGH CUMING, COLLECTED BY MR. ROBERT SWINHOE, VICE-CONSUL OF THAT ISLAND. BY DR. LOUIS PFEIFFER.

(Plate XLVI.)

1. *HELIX VESTA*, Pfr. (Pl. XLVI. fig. 9). *T. subobtecte perforata, depressa, tenuis, lævigata, nitidissima, pellucida, virenti-cornea; spira subconoidea, vertice minuto, papillari; sutura marginata; anfr. 5½, convexiusculi, regulariter accrescentes, ultimus rotundato-depressus, antice non descendens, basi medio impressus, perforatione callo subclausa; apertura obliqua, dilatato-lunaris; perist. simplex, marginibus subconvergentibus, columellari arcuatim ascendente, ad insertionem reflexiusculo.*  
Diam. maj. 15½, min. 13, alt. 7½ mill.

2. *HELIX SHERMANI*, Pfr. (Pl. XLVI. fig. 5). *T. umblicata, lentiformis, carinata, solidula, oblique striata et sub lente subgranulata, rufo-fusca; spira conoideo-convexa, vertice minuto, subpapillari, pallido; sutura marginata; anfr. 7, lente accrescentes, planiusculi, ultimus non descendens, acute carinatus, subtus convexior; umbilicus latiusculus; apertura fere diagonalis, securiformis; perist. simplex, marginibus vix convergentibus, basali arcuato, ad insertionem non dilatato.*  
Diam. maj. 18, min. 16½, alt. 8 mill.

3. *HELIX GRANTI*, Pfr. (Pl. XLVI. fig. 10). *T. umblicata, turbinata, tenuiuscula, striatula, sub lente fortiore minutissima decussatula, parum nitens, fusco-cornea; spira subregulariter conica, vertice subtili; anfr. 6¼, convexiusculi, ultimus infra carinam acutam, marginem fere attingentem convexior, in um-*







*bilicum mediocrem subito ascendens, antice vix descendens; apertura diagonalis, rotundato-lunaris; perist. tenue, marginibus convergentibus, supero breviter expanso, basali arcuato, reflexo, columellari dilatato, patente.*

Diam. maj. 15, min. 13, alt. 8 mill.

4. **HELIX SWINHOEI**, Pfr. (Pl. XLVI. fig. 6). *T. mediocriter umbilicata, turbinato-depressa, solidula, oblique ruguloso-striata striisque spiralibus confertissimis subtiliter sculpta, unde subsericea, fulvo-fusca, submarmorata; spira breviter turbinata, obtusula; anfr. 5-5½, superi planiusculi, ultimus vix descendens, superne subtumidus, medio carina prominente obtusa cinctus, subtus inflatus; apertura diagonalis, rotundato-lunaris, intus cærulescenti-margaritacea; perist. carneo-fuscum, marginibus convergentibus, callo tenui junctis, supero anguste expanso, basali reflexiusculo, versus insertionem sensim dilatato.*

Diam. maj. 52-58, min. 43-48, alt. 27-28 mill.

β. *Minor, fulva, peristomate pallide roseo, apertura intus alba.*

Diam. maj. 46, min. 39, alt. 25 mill.

5. **HELIX FORMOSENSIS**, Pfr. (Pl. XLVI. fig. 7). *T. sinistralis, umbilicata, subturbinato-depressa, tenuiuscula, oblique subtiliter striata, sub epidermide tenuissima cerea albida; spira breviter turbinata, vertice obtuso; anfr. 5½, regulariter accrescentes, parum convexi, ultimus peripheria obsolete unifasciatus et subangulatus, antice vix descendens, subtus convexus, striis spiralibus minutissimis sculptus, circa umbilicum mediocrem profundum non compressus; apertura diagonalis, late lunaris; perist. subincrassatum, marginibus remotis, supero sinuato, expansiusculo, basali reflexo, ad insertionem dilatato.*

Diam. maj. 26, min. 22½, alt. 12-13 mill.

6. **HELIX BACCA**, Pfr. (Pl. XLVI. fig. 8). *T. umbilicata, globoso-depressa, solida, levissime striatula, albo-lutescens, fasciis 3 castaneis (peripherica latiore) ornata; spira breviter turbinata, vertice subtili, carneo; anfr. 5½, modice convexi, ultimus non descendens, basi subinflatus, striis spiralibus obsoletissimis sculptus, circa umbilicum angustissimum impressus; apertura parum obliqua, lunaris, intus alba, fasciis pellucidibus; perist. album, undique breviter reflexum, marginibus remotis, basali ad insertionem dilatato, subangulato.*

Diam. maj. 23½, min. 20½, alt. 14 mill.

7. **HELIX MELLEAE**, Pfr. (Pl. XLVI. fig. 4). *T. umbilicata, depressa, carinata, tenuiuscula, sub lente minutissime granulata, oleoso micans, pallide fulva; spira parum elevata, vertice obtuso; anfr. fere 5, planiusculi, regulariter accrescentes, ultimus antice vix descendens, infra carinam acutiusculam subinflatus; umbilicus mediocris, profundus; apertura parum obliqua, subangulato-lunaris; perist. albidum, marginibus vix convergentibus,*

*supero anguste expanso, basali subreflexo, columellari breviter ascendente, superne subdilatato.*

Diam. maj. 22, min. 20, alt. 9 mill.

8. *BULIMUS SWINHOEI*, Pfr. (Pl. XLVI. fig. 2, 2a). *T. umbilicata, ovato-conica, tenuiuscula, oblique striatula, striis spiralibus confertissimis decussata, fulvida, strigis brunneis vel nigricantibus irregulariter ornata; spira convexo-conica, sursum pallida, vertice acuto; anfr.  $6\frac{1}{2}$ , parum convexi, ultimus spira brevior, basi rotundatus; apertura parum obliqua, truncato-ovalis, intus cærulescenti-margaritacea; perist. simplex, tenue, margine dextro anguste expanso, columellari late fornicatim reflexo.*  
Long. 35, diam. 20 mill.

9. *BULIMUS SPHÆROCONUS*, Pfr. (Pl. XLVI. fig. 3). *T. subclausa perforata, globoso-conica, tenuiuscula, oblique striata, carneo-albida, epidermide nitida fulvida vestita; spira conica, vertice acutiusculo; anfr. 6, convexiusculi, ultimus spira brevior, ventrosus, medio linea rufa cinctus; columella verticalis; apertura obliqua, subquadrangularis; perist. tenue, breviter expansum, marginibus remotis, dextro subflexuoso, columellari sursum dilatato, reflexo.*  
Long. 22, diam. 17 mill.

10. *BULIMUS INCERTUS*, Pfr. (Pl. XLVI. fig. 1). *T. subperforata, oblongo-turrita, tenuis, minute et oblique ruguloso-striata, nitidula, fulva; spira convexo-turrita, vertice obtusulo; anfr. 10 convexiusculi, ultimus  $\frac{1}{4}$  longitudinis vix formans, rotundatus; apertura perobliqua, lunari-rotundata; perist. simplex, rectum, margine columellari ad insertionem vix reflexo.*  
Long. 10, diam.  $4\frac{3}{4}$  mill.

11. *CLAUSILIA SWINHOEI*, Pfr. (Pl. XLVI. fig. 11). *T. leviter arcuato-rimata, fusiformi-turrita, solida, oblique striata, sericea, castanea; spira sensim attenuata, apice obtusa; anfr. 10-11, convexiusculi, ultimus basi turgidus; apertura verticalis, ovalis, angulo supero rotundato; lamellæ fortes, supera marginalis, altera obliqua; lunella imperfecta, e pliculis 6 formata; plica palatalis 1 elongata, subcolumellaris fere ad marginem emersa; perist. continuum, album, callosum, superne appressum, cæterum reflexum.*  
Long. 31-34, diam. 8 mill.

12. *CLAUSILIA SHERIDANI*, Pfr. *T. subrimata, fusiformi-turrita, solidula, striata, nitida, saturate castanea; spira a medio subregulariter attenuata, apice acutiuscula; sutura simplex, profunda; anfr. 9-10, convexi, ultimus angustior, costulato-striatus, solutus, dorso angulatus, basi rotundatus; apertura subobliqua, angulato-piriformis; lamellæ parvulæ, approximatae; lunella exigua, remota; plica palatalis 1 elongata, sub-*

*columellaris ad marginem emersa; perist. continuum, undique breviter expansum.*

Long. 15-16, diam.  $3\frac{1}{2}$  mill.

β. *Peristomate extus intusque albo-incrassato, inde apertura coarctata, lamella inferiore et plica columellari vix conspicuis.*

13. **PTEROCYCLOS WILSONI**, Pfr. (Pl. XLVI. fig. 12). *T. late umbilicata, subdiscoidea, solidula, striatula, nitida, fulva, castaneo dense fulgurata; spira medio vix elevata; anfr.  $4\frac{1}{2}$ , modice convexi, ultimus subdepresso-rotundatus, medio linea castanea cinctus; apertura diagonalis, subcircularis, intus violacescens; perist. duplex; internum expansiusculum, adnatum, superne vix incisum, externum patens, ad anfractum contiguum productum, tum late inflexum, latere dextro angustius involutum. Operc.?*  
Diam. maj. 22, min. 18, alt.  $7\frac{1}{2}$  mill.

#### DESCRIPTION OF PLATE XLVI.

Fig. 1. *Bulimus incertus.*

2, 2a. — *swinhoei.*

3. — *sphæroconus.*

4. *Helix mellea.*

5. — *shermani.*

6. — *swinhoei.*

Fig. 7. *Helix formosensis.*

8. — *bacca.*

9. — *vesta.*

10. — *granti.*

11. *Clausilia swinhoei.*

12. *Pterocyclos wilsoni.*

#### 16. DESCRIPTIONS OF FIVE NEW SPECIES OF LAND-SHELLS, FROM THE COLLECTION OF THE LATE HUGH CUMING. BY DR. LOUIS PFEIFFER.

1. **BULIMUS AURIS**, Pfr. *T. profunde compresso-umbilicata, ovato-turrita, solidula, lævigata, alba, strigis parvis undulatis castaneis signata; spira turrita, acutiuscula; anfr. 6, convexi, ultimus spiram subæquans, rotundatus, antice ascendens; apertura subverticalis, obverse auriformis, intus violaceo limbata; columella profunde et valide transverse plicata, violacea; perist. late expansum, marginibus approximatis, callo junctis, columellari flexuose elevato.*

Long. 39, diam.  $14\frac{1}{2}$  mill. Apert. cum perist. 20 mill. longa, medio 13 lata.

*Hab.* Venezuela.

2. **BULIMUS TENUILABRIS**, Pfr. *T. profunde umbilicata, ovato-turrita, tenuis, sublævigata (sub lente minute spiraliter striata), nitida, alabastrina; spira turrita, apice acuto; anfr. 7, planiusculi, ultimus spira brevior, antice vix ascendens, basi compresso-rotundatus; apertura vix obliqua, truncato-oblonga; perist. simplex, margine dextro breviter expanso, columellari ad basin usque per dilatato, patente.*

Long. 30, diam. 12 mill. Apert. cum perist.  $14\frac{1}{2}$  mill. longa, 10 lata.

*Hab.* Venezuela.

3. **BULIMUS JUAREZI**, Pfr. *T. perforata, conico-ovata, tenuiuscula, striata vel plicatula, cerea, strigis linearibus olivaceis sparse notata; spira conica, acutiuscula; sutura subirregularis; anfr. 5½, convexiusculi, ultimus spiram superans, inflatus; apertura parum obliqua, angulato-subovalis, intus albido-margaritacea; perist. simplex, marginibus callo tenui vitreo junctis, dextro recto, columellari perdilatato, patente.*

Long. 31, diam. 18 mill. Apert. 19 mill. longa, 10–11 lata.

*Hab.* in provincia pacifica reipublicæ Mexicanæ.

4. **PSEUDACHATINA ELONGATA**, Pfr. *T. imperforata, oblongo-turrita, solida, irregulariter oblique plicata et supra suturam cingulo granulato munita, rubello-fulvida; spira turrita, apice obtusula; sutura albo marginata, crenata; anfr. 7½, superi convexi, sequentes subplanati, ultimus medio obtuse carinatus, ½ longitudinis superans; columella callosa, subtruncato-torta; apertura parum obliqua, oblongo-ovalis; perist. simplex, marginibus callo crasso albo junctis, dextro anguste expanso.*

Long. 84, diam. 33 mill. Apert. 37 mill. longa, 20 lata.

*β.* *Minor, nigro-castanea, pallide marmorata.*

Long. 70, diam. 28 mill.

*Hab.* ad fluvium Gaboon Africae.

5. **ACHATINA CALABARICA**, Pfr. *T. oblongo-turrita, tenuiuscula, conferte striata, nitida, fusco-nigricans, interdum pallidius strigata; spira subconcavo-producta, vertice minuto; anfr. 9, modice convexi, summi costulati, ultimus ⅓ longitudinis subæquans, medio filocarinatus; columella arcuata, ad basin aperturae subverticalis rhombeo-ellipticæ oblique truncata; perist. simplex, rectum, marginibus callo tenui junctis.*

Long. 28, diam. 11 mill. Apert. 11 mill. longa, 6 lata.

*Hab.* Old Calabar Africae.

17. LIST OF ANIMALS COLLECTED AT MOHAMBO, MADAGASCAR, BY MR. W. T. GERRARD. BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

Specimens of animals from Madagascar are so very scarce in the museums of this country, that I make no apology for presenting to the Society a list of a small collection made in that remarkable island by Mr. W. T. Gerrard, a travelling naturalist, and lately received by me from Mr. Edward Newton. The collection does not, it is true, contain any species previously undescribed, and in this respect differs from all others from Madagascar that I have had an opportunity of examining; but several of the species are of undoubted rarity, and have perhaps never before been seen in England.

I am indebted to Mr. P. L. Sclater for being so good as to furnish me with the names of the Mammals; and as the Mammals of Ma-

Madagascar have been an especial object of study with him, his determination of the four species in the collection cannot fail to be satisfactory. Dr. A. Günther in like manner has been kind enough to supply the necessary information respecting the Reptiles. To the list I have added such notes of the local names, the colours of the soft parts, and the like, as were on the labels attached by Mr. Gerrard to the specimens, all of which are stated to have been collected in July or August 1865.

## MAMMALIA.

## 1. MICRORHYNCHUS LANIGER (Gmelin).

["Footsieffock."]

## 2. PTEROPUS EDWARDSI, Geoffroy.

["Fanny."]

## 3. VESPERUS MINUTUS, Temminck.

["Vanuboru."]

"Kindly determined for me by Dr. Peters."—P. L. S.

## 4. ERICULUS NIGRESCENS, Geoffroy, Mag. de Zool. 1839, t. 3, 4.

["Suke."]

The first specimen, I believe, of this little quadruped which has been brought to England.

## AVES.

## 1. TINNUNCULUS NEWTONI, Gurney, Ibis, 1863, p. 34, pl. 2.

["Hitskitsia." Iris hazel; beak bluish; cere and legs orange-yellow.]

A male and female, obtained in July and August. The latter is the first example of that sex which I have seen, and, though somewhat resembling the female of *T. punctatus* from Mauritius, is much smaller, and has the ground-colour of the upper tail-coverts ashy grey, barred with black. In all the examples, even the males, of *T. punctatus* that have come into my possession, the upper tail-coverts have been rufous; and I feel assured that Mr. Gurney was perfectly justified in establishing the Madagascar bird as a distinct species. The male example sent by Mr. Gerrard resembles "specimen A" of Mr. Gurney's description and its accompanying plate; but in a small collection, recently presented to the Norwich Museum by Mr. Caldwell, there are four examples (two males and two females) of *T. newtoni*, which all have the deep-bay breast, so as to correspond with "specimen B;" this would accordingly seem to be the prevailing type of the adult bird in *T. newtoni*.

## 2. MICRONISUS MADAGASCARIENSIS (Verreaux).

["Ferass." Iris bright orange; cere and legs yellow.]

Mr. Gurney remarks to me of this species that it "appears, both

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in size and colour, to hold an intermediate place between *M. polyzonoides* and *M. tachiro*. In the character of the markings and in general colour it closely resembles the adult *M. tachiro*, while in size it is nearer *M. polyzonoides*, the female of which is as nearly as possible the same size as the male of *M. madagascariensis*."

3. ASIO MADAGASCARIENSIS (A. Smith).

["Ankang." Iris brown ; beak and claws black.]

The collection contains one specimen of this curious Owl.

4. CORACOPSIS VASA (Linnæus).

5. POLIOPSITTA CANA (Gmelin).

["Coruck."]

6. LEPTOSOMA DISCOLOR (Hermann).

["Volondrue."]

I quite agree in what I understand to be Mr. P. L. Sclater's opinion of the affinities of this very remarkable form\* ; and in corroboration I would call attention to the habit of playing in the air, as noticed in this species by Dr. Roch and my brother (Ibis, 1863, pp. 166, 167), and in *Coracias garrula* by Sir Charles Fellows (Ann. N. H. iv. p. 213).

7. MEROPS SUPERCILIOSUS, Linnæus.

["Ceskirineskring."]

8. CORYTHORNIS VINTSIOIDES, Lafresnaye.

["Vinci." Iris dark.]

9. CENTROPUS TOLU (Linnæus).

["Tulu," "Moose." Iris scarlet.]

10. CONA CÆRULEA (Linnæus).

["Marea."]

11. SERISOMUS CRISTATUS (Linnæus).

["Sukum." Iris dark hazel ; cere blue ; beak and legs black.]

12. CAPRIMULGUS MADAGASCARIENSIS, Sganzin.

["Tar-taros."]

13. ZOSTEROPS MADAGASCARIENSIS (Linnæus).

["Subera." Iris reddish brown ; lower mandible lead-colour ; upper mandible bluish black ; legs lead-colour.]

14. NECTARINIA ANGLADIANA, Shaw.

["Su'il." Iris dark.]

15. NECTARINIA SOUIMANGA (Gmelin).

["Su'il."]

\* See *antèà*, p. 682.—P. L. S.

## 16. ARTAMIA RUFA (Gmelin).

[“ Skit-bug.”]

The collection contains a pair of this species, which I have never seen before. The male corresponds accurately with Dr. Hartlaub's description (Orn. Beitr. Faun. Madag. p. 48), the glossy black of the head extending all down the throat to the breast. The female has the chin, throat, and foreneck white. In other respects she resembles the male very closely, but has the colours less bright.

## 17. LEPTOPTERUS VIRIDIS (Gmelin).

[“ Sart-sart.” Iris hazel; beak lead-colour; legs black.]

## 18. DICRURUS FORFICATUS (Linnæus).

[“ Dronga.”]

## 19. VANGA CURVIROSTRIS (Gmelin).

[“ Voron-bang.” Iris dark.]

## 20. ? TCHITREA MUTATA (Linnæus).

[“ Sket-volulu;” “ Sket-ranu.”]

I am inclined to agree with Professor Schlegel (N. T. D. 1865, pp. 84, 86) in considering *Muscicapa mutata* of Linnæus to be identical with *Tchitreia pretiosa* of Lesson and *T. holosericea* of Temminck. Mr. Gerrard's collection contains three fine Paradise Flycatchers, with the tail of a fourth. One of the former, marked “ male,” corresponds accurately with Dr. Hartlaub's description of *T. pretiosa*: the other two, marked “ female,” agree as well with his descriptions of *T. mutata* and *T. holosericea*, except that they have no crest; in both the tail is entirely chestnut, the middle feathers not being greatly prolonged. One has the secondary wing-coverts edged with white, the other with chestnut. The tail of the fourth is chestnut, except the two elongated middle feathers, which are white, partially bordered with black—the edging on the outer web being the broadest, and for more than half its length occupying the whole width of the web. The examination of a large series of examples is required before arriving at any definite conclusion on the point at issue.

## 21. HYPsipETES OUROVANG (Gmelin).

[“ Wrova.”]

## 22. CISTICOLA MADAGASCARIENSIS (Hartlaub).

[“ Teen-teen.” Iris pale yellow.]

I think that this species belongs rather to the genus *Cisticola* than to *Drymæca*, in which it was placed by Dr. Hartlaub (Orn. Beitr. Faun. Madag. p. 35), since it possesses *twelve* rectrices, *ten* being the usual number in *Drymæca*.

## 23. ELLISIA TYPICA, Hartlaub.

[“ Spritic.”]

## 24. PRATINCOLA SIBYLLA (Linnæus).

[“Tetrat.” Iris brown; legs and beak black.]

## 25. FODIA MADAGASCARIENSIS (Linnæus).

[“Fu'de.” Iris dark; beak and legs grey.]

## 26. SPERMESTES NANA (Pucheran).

[“Sangerreet.”]

## 27. MIRAFRA HOVA, Hartlaub.

[“Flift.” Usually on the ground: has something the habit of *Alauda arborea*. I have not, however, seen it rise higher than the low trees.]

## 28. HARTLAUBIA MADAGASCARIENSIS (Linnæus).

[“Volontaynombi.” Iris dark brown; beak and legs black.]

## 29. ACRIDOTHERES TRISTIS (Linnæus).

[“Martine.” Iris red, margined with white dots; beak, eye-patch, and legs yellow.]

An example in the collection is, I believe, the first of the species that has been obtained in the island, though it was observed there in 1862 by Mr. Edward Newton. The specimen agrees exactly with others from Mauritius.

## 30. NUMIDA TIARATA, Bonaparte.

[“Akanga.”]

## 31. MARGAROPERDIX STRIATA (Gmelin).

[“Trou-trou.” Iris black; bill bluish at base, with black tip; legs speckled bluish olive.]

## 32. TURNIX NIGRICOLLIS (Gmelin).

[“Kebo.” Iris pale yellow; beak and legs greyish brown.]

## 33. PORPHYRIO MADAGASCARIENSIS (Gmelin).

[“Talave.” Iris reddish brown; beak and bald patch on forehead red; legs flesh-colour.]

I take this opportunity of remarking that the *Oiseaux bleus*, mentioned in the “Journal of the Sieur D. B.” (P. Z. S. 1844, p. 77) as occurring in the island of Bourbon (Réunion) nearly two hundred years ago, probably belonged to this large species of *Porphyrio*.

## 34. CANIRALLUS KIOLOIDES (Pucheran).

[“Scoza-vout.”]

The collection contains one example of this very scarce species, which I have never seen before. The specimen agrees entirely with Dr. Hartlaub's description. In the list of birds observed in Madagascar by Dr. Roch and my brother, the name of this bird was by mistake inserted (Ibis, 1863, p. 173). The examples obtained by the former gentleman proved on further examination to be *Rougetius bernieri*.



## 35. ROUGETIUS BERNIERI, Bonaparte.

["Scoza-rana." Iris reddish brown; beak red at base, black toward the tip; legs olive.]

## 36. BIENSIS MADAGASCARIENSIS (Verreaux).

["Keer-keer." Iris bright scarlet; beak rosy, upper mandible black along the ridge; legs greyish brown.]

## 37. GALLINAGO BERNIERI, Pucheran.

["Rava-rava."]

## 38. ARDEA PURPUREA, Linnæus.

["Longusa." Iris, cere, and legs yellow.]

## 39. ARDEA BUBULCUS, Savigny.

["Voron-ombi." Iris and beak light yellow; legs greenish yellow.]

## 40. ARDEA IDÆ, Hartlaub?

["Tambo-crats."]

A single specimen in the collection agrees so very closely with Dr. Hartlaub's description of *Ardea idæ* (Orn. Beitr. Faun. Madag. p. 75) that I am inclined to refer it to that species, which is, however, otherwise unknown to me.

## 41. LOPHOTIBIS CRISTATA (Gmelin).

["Ceakokar." Iris golden brown; bill pale yellow; face and legs flesh-colour.]

## 42. DENDROCYGNA VIDUATA (Linnæus).

["Cerea." Brought alive from the interior.]

## 43. DENDROCYGNA MAJOR, Jerdon.

["Tyca." Brought from the interior.]

With respect to the identification of this species, I follow Mr. Sclater's opinion (P. Z. S. 1864, p. 300).

## 44. ANAS BOSCHAS, var. DOMESTICA.

["Cabach." Brought alive from the interior.]

## REPTILIA.

## 1. CHAMÆLEON BIFURCUS, Brongniart.

["Tanroondro" ♀.]

## 2. PELOPHILUS MADAGASCARIENSIS, Duméril et Bibron.

["Acuma" ♀. The Malagache say that this Serpent sometimes takes men (?) and young cattle.]

## 3. HETÆRODUS MADAGASCARIENSIS, Duméril et Bibron.

["Martingum."]

18. ON THE IDENTITY OF THE HAIRY-NOSED WOMBAT (*PHASCOLOMYS LASIORHINUS*, GOULD) WITH THE BROAD-FRONTED WOMBAT (*P. LATIFRONS*, OWEN), WITH FURTHER OBSERVATIONS ON THE SEVERAL SPECIES OF THIS GENUS. BY JAMES MURIE, M.D., PROSECTOR TO THE SOCIETY.

(Plate XLVII.)

The distinctness of certain species of Wombat has been the subject of discussion and controversy among several eminent naturalists.

As far back as 1845 Professor Owen, in a paper read before this Society, pointed out, from a skull which came into his possession from South Australia, that there must be extant another species of Wombat besides the well-known *Phascolomys wombat* of Péron and Lesueur; and for the animal from which the skull was obtained he proposed the name of *Phascolomys latifrons*, as indicative of the most prominent character displayed by the cranium. In his masterly summary of the comparison of the two skulls, published in the 'Proceedings' for 1845, p. 82, and likewise in the 'Transactions' of the Society, vol. iii. p. 303, he produced evidence so distinctive of two species as in a manner to be indisputable.

At all events, Prof. Owen's statement and opinion could not be controverted at the time, and were fully endorsed the year following (1846) by Mr. Waterhouse\*, himself no mean authority on the Marsupials.

The matter rested thus until 1861, when Mr. G. F. Angas transmitted some notes to the Society (P. Z. S. 1861, p. 268) upon an animal living in the Botanical Gardens in Adelaide, which he supposed to be the *P. latifrons* of Prof. Owen. It certainly differed in colour and relative dimensions from *P. wombat*; but as he did not examine the skull, there was still a doubt of its being the true *P. latifrons*, Owen.

This opinion of Mr. Angas was rejected by Mr. Gould, who, in his work on the 'Mammals of Australia,' 1863, vol. i. text and plates 57, 58, gave two illustrations of what he conceived to be Prof. Owen's Broad-fronted Wombat, basing his judgment on an unusually large skin sent to the British Museum from South Australia, and which was of "a light sandy buff or isabelline colour."

Shortly after this Prof. M'Coy forwarded to Mr. Gould drawings and descriptions of two Wombats, which had been acquired by the Acclimatization Society of Melbourne; and about the same time the former gentleman was enabled to examine the skull of one of these, which he pronounced to be that of *P. latifrons*†.

Notwithstanding this, Mr. Gould, in the publication of the next part of his volume already referred to, answered these observers as follows:—"I should have considered that Mr. Angas and Prof.

\* Natural History of the Mammalia, vol. i. p. 253.

† See Prof. M'Coy's description, quoted by Mr. Gould in his 'Mammals of Australia,' vol. i.





M'Coy were correct in their conclusion, had not one of the animals [supposed to agree with their description] sent to this country died, and thus afforded an opportunity of comparing its skull with that in the College Museum above mentioned [Owen's type specimen]. On this being done, it was found that the two skulls did not agree; and I believe I am at liberty to say that Mr. Flower, who has charge of the collection, is of opinion that they could never be considered as belonging to the same species.

"Under these circumstances I had no alternative but to give the Hairy-nosed Wombat a distinctive appellation, and, at the suggestion of Dr. Sclater, I have assigned to it that of *lasiorhinus*."

In the June number of the 'Annals and Magazine of Natural History' for 1863, vol. xi. p. 457, Dr. Gray has given a "Notice of three Wombats in the Zoological Gardens, Regent's Park," wherein he acknowledges two of these to be true *Phascolomys*—namely, *P. ursinus*, the already well-known species of Wombat of Péron and Lesueur, "of a dark silvery-grey colour," and another, which he calls *P. angasii*, with the "fur blackish-brown, nearly uniform."

But he says, "The third specimen is certainly a distinct genus, as distinct from *Phascolomys* as *Halmaturus* from *Macropus*, or *Ovibos* from *Bos*." For the new genus he adopts the generic term *Lasiiorhinus*, and gives as a specific name *M'Coyii* to this, the very same animal which Mr. Gould had already named the Hairy-nosed Wombat, *Phascolomys lasiorhinus*.

The other large-sized Wombat in the British Museum collection, which Mr. Gould believed to be Owen's *P. latifrons*, Dr. Gray renames *P. setosus*, not acquiescing in the opinion formed by his fellow worker.

With reference to Prof. Owen's *Phascolomys platyrhinus*, originally named in the 'Catalogue of the Osteological Collection in the College of Surgeons' Museum,' and presented by Dr. Hobson (vol. i. prep. no. 1841), Mr. Gould says that it is questionable if it is distinct; although already Prof. M'Coy, in the quotation given by Mr. Gould, seems to think that Mr. Angas and Mr. Gould themselves might really have had that animal under their consideration. Dr. Gray is silent upon this species, from which one would infer that he also considers it to be only the Common Wombat.

With all this conflicting evidence before us, it at present remains uncertain whether the *P. latifrons* of Owen is yet determined—that is, as regards the identification of the skin or living animal with the skull first described and demonstrated by him to belong to a distinct species. The same may be said of his *P. platyrhinus*.

As to the other species of Mr. Gould and Dr. Gray, these alone rest on such external characters that a more complete examination of the skeleton and internal anatomy may prove them either to be varieties of *P. wombat* or *P. platyrhinus* itself.

The typical specimen of Wombat to which Mr. Gould gave the name of *P. lasiorhinus*, and the same alluded to and figured by him in his volume, having lately died at the Society's Gardens,

it became a point of interest to examine the body, and particularly the skull, with the endeavour to set the disputed point at rest.

For this purpose, and in order to learn how far this specimen agrees or differs from the supposed *P. latifrons* of Mr. Angas and Prof. M'Coy, the colour, aspect, and dimensions may first be noted.

This I consider the more desirable as, although Mr. Gould has signified that those observers had the same animal under their consideration, yet he has not compared in detail the appearance of the Society's specimen.

The two sides of the body of this (the skin of which is now deposited in the National Collection) are of a lightish grey, tinged with brown (the silvery mouse-colour of Angas). This is produced by the roots of the hairs being of a dark brown, their points, for half an inch or so, tipped with white and buff; while widely scattered through the whole are single black hairs. Here and there wavy mottled lines are seen, where a preponderance of the dark or light tints run side by side. The upper surface of the neck, the shoulders, and back, almost as far as the loins, are of a darker brown, caused by the hairs terminating in an umber-colour.

The broad, somewhat truncated posterior extremity of the body is of a more rufous tint, and the hairs are stronger and longer, rough, and directed inwards, or in an opposed line to those of the back (the circular rosettes of M'Coy).

The under surface of neck, chest, and inside of fore limbs is white, the continuation of this in the abdomen and inside of hind legs merging into a light rufous tint, which joins the similar but rather darker hue of the rump of the animal.

The outsides of the hind limbs are also of a rufous brown, of the fore limbs less so, inclining to the same shade as the sides of the body. The posterior border of each of the fore limbs has a projecting white fringe of longer hairs, the continuation of those from the axilla. The feet are hairy to the proximal end of the claws, and of a hazel-brown.

Upper surface of the forehead lighter than the back of the neck, but of a similar shade to the sides of the body. There is a whitish-grey spot above and below the eyes, and a large triangular black portion at each inner and outer canthus. Upon the centre of the forehead, between the eyes, is a black or dark-coloured spot.

The eyelashes and cheek-whiskers have strong black hairs, intermixed with one or two white ones. The tip of the nose and around the nostrils is white (this may have been more flesh-coloured when the animal was alive); the bridge of the nose above this is of a drab tint, and covered with very short smooth hairs. There is a similar coloured patch upon the under surface of the mandible; but the root of the lower jaws is of a yellowish colour, lost in the white of the neck.

The backs of the ears are similar to the neck; but there is a tuft of long white hairs on their outer base, and inside they are covered by short, stiff, appressed whitish hairs.

*P. lasiorhinus* is also rather longer and broader in the body than *P. wombat*; the ears are long and elliptically pointed, instead of being short and rounded; and the face is broader; but this is in part

produced by the more dilated fleshy muzzle and open nostrils. In *P. wombat* the nose is certainly more pointed.

The fur is very peculiar, uncommonly soft, fine, and silky to the feel, the whole animal being in a greater or less degree more glossy than the common species.

Prof. M'Coy, so far as I am aware, has not given any measurements of the one examined by him; but I quote Mr. Angas's, placing them opposite the dimensions taken by myself, as shown underneath:—

	Society's spec.	Mr. Angas's.
	in. lin.	in. lin.
Body: Length from snout to root of tail .....	37 0	37 0
_____ of tail .....	1 0	1 0
Height at shoulder .....	13 6	12 0
_____ at loins (hips) .....	13 0	14 0
Girth at the chest .....	35 0	28 4
_____ at the loins .....	32 6	
_____ at the neck .....	19 6	
Breadth of back at scapulæ .....	7 6	
_____ at middle .....	9 0	
_____ at iliac bones .....	8 0	
Head: Length from snout to occiput .....	9 0	10 0
_____ nose to root of ear .....	8 0	
Girth above eyes .....	18 6	18 0
Breadth between eyes (inner canthus) .....	3 11	3 0
_____ (outer postcanthus) .....	6 0	
_____ roots of ears .....	5 0	5 0
_____ of muzzle .....	2 6	
_____ between tips of ears .....	11 0*	8 0
Ears, length .....	3 0	3 8
_____ breadth, when flattened out .....	2 0	
Orbit (elliptical), length .....		
_____ breadth .....		
Fore limb: Girth at axilla .....	10 0	
_____ at middle .....	8 0	
_____ at wrist joint .....	5 0	
Sole of foot, length to tip nail mid. toe .....	2 6	3 3
_____ of thumb .....	1 3	
_____ breadth posteriorly .....	2 1½	
_____ at about its middle .....	1 9	
Hind limb: Girth at groin .....	12 6	
_____ at about middle .....	7 0	
_____ at ankle-joint .....	5 0	
Sole of foot, length to tip nail mid. toe .....	3 9	4 4
_____ of great toe .....	0 6	
_____ breadth posteriorly .....	1 9	
_____ about middle .....	1 7	

\* The great difference here shown of 3 inches may in truth not exist; for in taking the dimensions the ears were pulled apart, which evidently was not the case in Mr. Angas's specimen; but I had not his paper by me at the moment.

From the foregoing remarks it will be seen that the Wombat under consideration differs widely from the Common Wombat, both as regards dimensions and colour—also that there is a most close agreement in the aggregate with the externally marked characters so well described by both Mr. Angas and Prof. M'Coy; in fact they so approach each other as to leave little room for doubt that these gentlemen had the very same species under their consideration. If, indeed, without looking at the specimen, the hand be passed over the skin, the fur feels so extremely soft and silky that one would not for a moment confound the animal with any other of the known adult Wombats.

So far one may rest satisfied with these three individual specimens of Wombat being of the same species; for notwithstanding that Mr. Angas has not particularly remarked the hairy muffle, and although the feet in his specimen seem to have been lighter in shade than Prof. M'Coy's, yet the latter gentleman in his very graphic account does not lay sufficient stress on the equally telling peculiarity, the softness of the fur. Besides this, every other part of their separate descriptions admirably coincide.

Having descanted with sufficient minuteness upon the general outward appearance of our specimen and its similarity with those deemed to be *P. latifrons*, it remains to be demonstrated from the skull that ours is compatible with no other than the Broad-fronted Wombat; and upon the cranium the whole argument turns.

In the article already quoted (in the 'Transactions' of this Society) Professor Owen has given excellent plates of the natural size of the skulls of *P. wombat* and *P. latifrons*. He has, furthermore, succinctly described and pointed out in detail the characteristic differences between the two.

On comparing, then, this skull of *P. lasiorhinus*, Gould, with the original typical specimen at the Museum of the College of Surgeons and with Owen's plates and descriptions, it agrees so completely in every respect as to leave not a shadow of doubt as to its identity.

The more easily recognizable differences in *P. latifrons*, of the greater height of the intermaxillary bones, the broader and nearly equal-sided triangular nasals, the great interorbital breadth, and well-marked postorbital processes, together with the enormously excavated supratympanic cells, are determinable at a glance; further minute and critical examination but certifies to the correctness of this off-hand and cursory inspection.

No further direct evidence or lengthened description is therefore presumed to be necessary, excepting to lay the skull alongside Owen's figures before the Society, when the conclusive identity of the cranium of the *P. lasiorhinus* of Gould with the *P. latifrons* of Owen must at once be admitted.

Although essentially agreeing in all the specific characters, the present cranium of *P. lasiorhinus* differs in several minor details from the original type specimen, which may be worthy of mention as illustrating that in individual skulls of the same species such slight variations do occur, probably either from sex or age.



Our skull is apparently from a younger animal, as the sagittal and lambdoidal sutures are not obliterated as in the College specimen, which latter has also the supraoccipital crests and the postorbital angles more prominent. The frontal bones anteriorly, as well as the nasals at the median suture, in our specimen are very flat, whereas in the typical skull they are convex and considerably raised. In this last cranium the frontal bones in the median line extend with a thin narrow wedge-shaped projection forward for half an inch between the nasals; in our specimen the two nasal bones posteriorly form nearly a straight line across. The posterior palatine foramina are larger in our younger skull, and have between them a more slender columella of bone.

Both skulls have the foramen magnum of an oval outline; in this respect they materially differ from *P. wombat* and the type of *P. platyrhinus*, which have it of a trefoil figure, as Owen\* has observed.

While studying the matter from a different point of view, by reason of the *P. lasiorhinus* taking the place of Gould's *P. latifrons*, and upon comparing the size of several adult crania of *P. wombat*, I was struck with the great size assigned by Mr. Waterhouse †, in his volume already mentioned, to two skulls, namely that of Owen's *P. latifrons* and the common *P. wombat*. The latter, which he considered typical, was one in the British Museum collection, and, as he believed, belonged to an aged individual.

Upon consideration, I concluded he must have had before him, and taken his admeasurements from, a specimen of *P. platyrhinus* without being aware, or at least believing, that this species differed from *P. wombat*.

On examination of the very same skull from which his measurements were taken, proved by the exactness of its dimensions, and by the partial obliteration of the frontal and nasal sutures as stated by him to exist in the specimen, I found, to my surprise, I had been forestalled, while supported in opinion, as already Professor Owen, most possibly without being aware of this being Mr. Waterhouse's type of *P. wombat*, had relabelled the skull in question *P. platyrhinus*. This fact was certified by Mr. Gerrard's showing me the Professor's own handwriting on the ticket attached to the specimen.

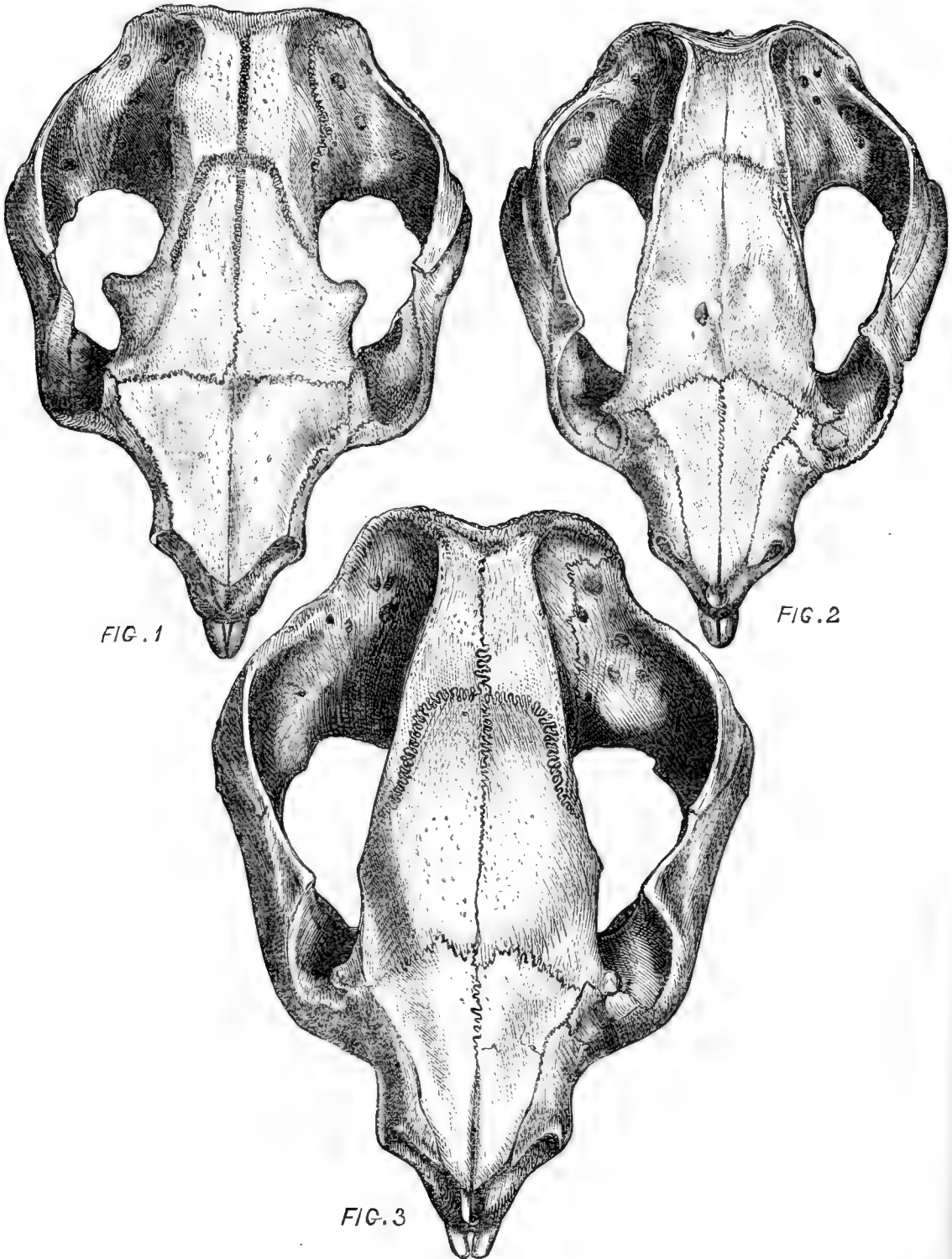
My attention in this way was called to think upon what might be considered the average or comparative limits of the size of the crania of the three species *P. wombat*, *P. latifrons*, and *P. platyrhinus*.

The following table is the result of a series of measurements of skulls, chiefly those in the British Museum and College of Surgeons.

In the first column of the table are shown the proportions of the typical skull of *P. latifrons*, Owen; alongside of which are the corresponding dimensions of this second cranium, belonging to the same species: the agreement in their several proportions is very close. Then follow the comparative measurements of a series of crania of what I take for the true *P. wombat*; these are intended to illustrate the skull at different ages in this species.

\* "On the Osteology of the Marsupialia," Trans. Zool. Soc. vol. ii. p. 383.

† Nat. Hist. Mamm. vol. i. p. 251.



Skulls of the three species of Wombat, reduced to one-half of the natural size.  
Fig. 1. *P. latifrons*, Owen, from a specimen lately living in the Society's Gardens.  
2. *P. wombat*, Pér. et Les., from a specimen belonging to Mr. Gerrard.  
3. *P. platyrhinus*, Owen, from a specimen belonging to Mr. Bush.

Table of the Comparative Admeasurements of a series of Skulls of Wombats.

	<i>P. latifrons</i> , Owen.			<i>P. wombat</i> , Péron et Lesueur.						<i>P. platyrhinus</i> , Owen.					
	Typical skull, Coll. Surg.	Zool. Soc. spec. Fig. 1.	Brit. Mus., no. 291 a.	Brit. Mus., no. 291 a.	Spec. belonging to Mr. Gerrard, Fig. 2.	Brit. Mus., no. 291 d.	Brit. Mus., no. 291 b.	Coll. Surg., no. 1792.	Typical skull, Coll. Surg., no. 1841.	Mr. Bush's spec., no. 1797 a, Coll. Surg.	Sir G. Grey's spec. Coll. Surg.	Mr. Bush's spec. now Mr. Frank Buckland's.	Mr. Bush's spec. Fig. 3.	Brit. Mus. type, given as <i>P. wombat</i> by Waterhouse.	
Total length of cranium .....	6 3	6 5	5 6	6 1	9 4	6 4½	9 6	9 6	7 3	7 3	7 4½	7 5	7 7	8 1	
Greatest width, which is at the posterior part of the zygomatic arch .....	5 0	4 9	4 1	4 9	4 8	4 9	4 11	4 11	5 6	5 6	5 6	5 7½	5 6	5 9	
Width of skull behind orbits, where contracted by temporal fosse .....	1 3?	1 5½	1 5	1 6	1 4	1 3 8½	1 9	1 6½	1 1	1 11	1 11	1 2	1 1	1 11	
Width, anterior part of zygomatic arch .....	.....	4 0	3 3	3 3	3 7½	3 6	3 10½	4 1½	4 6	4 7	4 7½	4 7	4 5	.....	
Length from occipital crest to temporal fossa .....	2 0	2 2	1 8½	1 9	1 8	1 8½	1 10½	1 10	2 2	2 4	2 2	2 2	2 2	2 11	
Length of nasal bones .....	2 5	2 4	1 5	1 6½	1 6	1 5	1 9	1 7	2 2	2 9	2 7	2 7	2 10½	2 11	
Width of same behind .....	1 2	1 2	0 7	0 6	0 7½	0 7½	0 8	0 7	0 10½	0 11	0 9	0 11	0 11	0 10	
Width of same near apex .....	2 5	2 4	1 11	2 2	2 4½	2 1½	2 7½	2 6	2 6	2 7½	2 4?	2 5	2 11	2 6	
Length of frontal bones .....	2 9	2 7½	1 9	1 10	1 11	2 0	2 2	2 0	2 8	2 3	2 5	2 5	2 4½	2 6	
Width of same between orbits .....	.....	0 3	0 4½	0 7	0 7	0 7	0 8	0 7½	.....	0 7½	.....	0 8	0 7	.....	
Width of each intermaxillary bone as seen from above .....	3 7	3 8	2 11	3 2	3 5	3 6	3 2?	.....	4 3	4 1½	.....	4 3	4 3	4 7	
Length of palate .....	0 5½	0 3½	0 4	0 3	0 4½	0 3	0 4	.....	0 5	0 3	.....	0 4	0 4	0 5	
Width between the anterior molars .....	0 10½	0 9	0 7	0 8	0 8	0 8	0 9	.....	0 11	0 10	.....	0 10	0 9	0 10½	
Width between the posterior molars .....	0 9	.....	0 6	0 6½	.....	0 6	0 10	.....	0 9	0 9	.....	0 9	0 9	0 9	
Depth of the same taken singly .....	0 3	.....	0 3	0 4	.....	0 4½	0 3	.....	0 4	0 4	.....	0 5	0 6	0 5	
Distance between incisor teeth (upper jaw) and molars .....	1 6½	1 8	0 11	1 2½	1 2	1 3	1 4	1 5	1 9	1 7	1 7	1 7	1 9	1 11	
Total extent of row of molar teeth .....	1 9	1 10½	1 7	1 10½	1 11	1 11	1 8	2 11	2 11	2 2	2 1	2 1	2 0	2 1½	
Length of lower jaw .....	4 4	.....	3 11	4 5	.....	4 4½	4 9	4 9	.....	.....	.....	5 7	5 7	5 11	
Widest breadth of same .....	.....	.....	3 11	4 7	.....	4 9	5 0	4 10½	.....	.....	.....	5 7	5 4	5 9	
Height in a vertical line dropped from coronoid process .....	2 9	.....	2 9	2 8	.....	.....	3 2	3 0	.....	.....	.....	2 9	2 11	2 11	
Width of lower incisors .....	0 6	.....	0 7	0 7	.....	0 6	0 7½	0 8	.....	.....	.....	0 7	0 7	0 8	
Depth of the same .....	0 3	.....	0 2	0 2	.....	0 3	0 4	0 3	.....	.....	.....	0 3½	0 3	0 3½	

Lastly are given a number of crania of what I suppose to represent *P. platyrhinus*, on account of their great size and other distinguishing peculiarities. These last are of much greater relative dimensions than either of the others.

Being convinced that the skull of Mr. Gould's *P. lasiorhinus* (Gray's *Lasiiorhinus latifrons*) answered in all particulars to Owen's *P. latifrons*, and that there was, moreover, a somewhat constant and striking difference between the crania of *P. wombat* and others answering to the typical skull of *P. platyrhinus*, I found myself prepared to believe that this last might, after all, turn out to be identical with Dr. Gray's and Mr. Gould's larger-sized species.

This idea would have but rested, or been dependent, on the supposition of the relation of the superior-sized skulls to the larger skins, had I not had the good fortune of obtaining an entire skeleton and a separate skin of what I have since made out to be two individuals of *P. platyrhinus*.

My able colleague, Mr. A. D. Bartlett, in his customary kind manner, procured these for me from his friend Mr. Bush, of Clapham. The latter gentleman had received three unusually large living specimens of Wombats from Victoria in 1863 or 1864; and all of the animals subsequently dying, he retained the skin of one, and the entire dried carcass of another.

I have also been favoured in having had access to several portions of the skeleton which belonged to the above skin, and among these the cranium\*, which is so important, inasmuch as it shows that the two animals belonged to the same species. Furthermore I have been assured they were male and female, which thus extricates us from the difficulty which might be raised that the large size of the skull was probably dependent on sex. The several bones to which I have just made allusion grace the admirable new osteological series formed by Mr. Flower at the Hunterian Museum.

I shall now take into consideration the skulls of these two Wombats as enabling a judgment to be formed how far they agree with *P. platyrhinus*, commencing with that one first regarded by Owen as presenting specific differences.

In the 'Osteological Catalogue of the Museum of the Royal College of Surgeons' (vol. i. p. 334), Professor Owen in naming the skull of a Wombat (*P. platyrhinus*) points out that "it differs from the *P. vombatus* in its superior size, in the greater relative breadth of the nasal bones, and in the larger and deeper excavation above the tympanic bone." These distinguishing characters coincide with those of the skulls in question; and further comparison of the latter with the typical cranium itself permits of other resemblances being noted, as well as that they vary slightly individually; while altogether they do not coincide with the skulls of *P. wombat*, to which, however, in some points, they bear close analogies.

If the preceding table be consulted, it will be best seen what com-

\* Now no. 1797a, Osteological Series, Mus. Roy. Coll. of Surgeons. The specimen has been regarded as belonging to the Common Wombat and named accordingly by the present Conservator.

parative agreement there is between these three in measurements, and in what respects they differ from those of *P. wombat*.

Before summing up the marks which seem to indicate or serve as a means of distinguishing the skull of *P. platyrhinus* from that of *P. wombat*, it is proper I should dwell for a moment upon some observations on the skull of this last species made by Dr. Gray (Proc. Zool. Soc. 1847, p. 41). I must, however, with due deference to that naturalist, acknowledge my ignorance of his paper until my attention had first been directed to some of the differences which he so concisely indicates. In his paper he points out that three crania of Wombats in the British Museum vary from each other in several particulars. Two of these, from Van Diemen's Land, are much smaller, more depressed and truncated behind, and have two moderate-sized oblong postpalatine foramina; the third specimen, from New South Wales, is altogether bigger, and has two large triangular postpalatine foramina; while all three disagree in the relative position and size of their upper incisors.

These differences he attributes to individual variation, although suggesting that more than one species might be confounded under the same name. We see from this that Dr. Gray, without exactly admitting specific distinction, yet was the first to call attention to several of the diagnostic peculiarities of *P. platyrhinus*.

The chief specialities, therefore, which seem to serve to distinguish the skull of *P. platyrhinus*, are these four:—the greater size of the cranium, the greater relative breadth of the nasal bones, the moderately deep tympanic excavation, and more triangular form of the posterior palatine foramina as compared with that of *P. wombat*.

In *P. latifrons* the supratympanic cavity and postpalatine foramina are still larger than in *P. platyrhinus*, especially the latter in one of the specimens examined. In *P. platyrhinus* the columella, composed of the two conjoined inner edges of the horizontal plates of the palatine bones, is intermediate in thickness between those of *P. latifrons* and *P. wombat*, the last having it the stoutest. Professor Owen\* says that these foramina "deserve particular attention, as they are generally specific."

The more depressed truncation in the skull behind, as observed by Dr. Gray in *P. wombat*, may be due to age; but it is noteworthy that in the adult of *P. platyrhinus* there are two very marked backwardly produced supraoccipital crests, and these are much stronger in every way than in the largest specimen of *P. wombat* that I have seen.

In *P. platyrhinus* the two squamous portions of the temporal bones are relatively shallower than in *P. wombat*, while *P. latifrons* has them most prominent and convex.

Both in *P. wombat* and *P. platyrhinus* the upper incisors present an internal longitudinal furrow; *P. platyrhinus*, besides, has a longitudinal groove upon the external surface near the posterior angle, which I do not find in *P. wombat*, excepting very slightly in one specimen in the College of Surgeons, where it is almost dis-

\* Trans. Zool. Soc. vol. ii. p. 388.

cernible, but broader and shallower, in the right upper incisor. In the same specimen, however, the left one does not exhibit any sign of such a depression. Longitudinal striation of these teeth in *P. wombat* is not constant as it is in *P. platyrhinus*.

The frontal sinuses in *P. platyrhinus* correspond in size to the greater breadth of cranium at this part, but they are still larger in *P. latifrons*.

The outer surface of the symphysis of the mandible in *P. platyrhinus* tapers steadily as it passes backwards towards the molars; in *P. wombat* it juts out very considerably opposite the premolar.

The two lateral parietal ridges are more raised, and taper more towards each other at the occiput, in *P. platyrhinus*; but this may be sexual, as in Mr. Bush's female specimen they are very similar to those of *P. wombat*.

Although drawing attention to what seems to separate and distinguish the crania of *P. platyrhinus* from *P. wombat*, it must be borne in mind that I do not lay great weight upon the minor distinctions which I myself have observed; for, in a more extensive series of specimens than that which I have been able to examine, it is possible these may be found to be fallacious. In truth, I but call attention to these points as worthy of future observation, the more essential differences being those previously noted by Prof. Owen and Dr. Gray.

Assured respecting the similarity of the skulls of these two specimens to the type of *P. platyrhinus*, the next point of importance is the consideration of the skin as a means of ascertaining if it resembles any of the species named alone from external characters.

The skin of one of Mr. Bush's specimens, which I place before the Meeting, is not in such a perfect state as could be wished; but it is in sufficient condition, and well enough shows that the hair all over the body and limbs is of a dark-brown colour, and not so mingled with grizzly grey as in the common species. The nape of the neck is somewhat darker, the hairs being more tipped with black; and this is continuous along the median line of the back, broadening out at the loins into a more diffused blackish tinge.

The head is of a similar brown colour, as are the sides of the body, the lightest shade being underneath the neck.

The ears are too much destroyed for the colour or appearance to be distinguished.

The fur is coarse, quite different from that of *P. latifrons*, and more resembling that of the common species.

The skin altogether is rather larger than that of the Common Wombat, as the size of the bones clearly demonstrates.

Neither the coloration of the skin, its size, nor that of the entire animal harmonizes with our knowledge of the common species; but they answer precisely to Dr. Gray's definition of the characters belonging to the species he has named *Phascolomys angasii*. Moreover in some respects the coloration approaches, especially in the back, the shade of the animal at present living in the Society's Gardens, which Mr. Gould names *P. niger*.

Indeed, after carefully comparing the skin, which I show you, with the large darker-coloured living animal, I feel quite satisfied as to the two being of one species; for, although the one at the Gardens is much the darker variety, it seems to me we have merely the same basis of brown tint in both, the living animal having more generally diffused blackish-tipped hairs distributed through it; the colour is certainly not a pure black in the specimen named *Phascolomys niger*\*.

I may also add that when Dr. Gray saw the present brown skin, he recognized it as similar to that of the Wombat which he named *P. angasii*.

Apart from the immediate study of the skin, but yet in close connexion with it, I may be allowed for a moment to call attention to the casts of soles of the feet of the three species, which present gradations in dimensions corresponding to the size of the different animals, but they agree in the disposition of the pads and furrows.

The following are the comparative admeasurements taken from the posterior part to the roots of the nails, the nails themselves being injured from the difficulty experienced in retaining the foot in steady position while the creature struggled to relieve itself:—

	Length.		Breadth.	
	in.	lin.	in.	lin.
Fore foot, Hairy-nosed Wombat, <i>P. latifrons</i> . . .	2	5	2	3
———, common species, <i>P. wombat</i> . . . . .	2	10½	2	6
———, Black Wombat, <i>P. platyrhinus</i> (?) . . .	3	3	3	0
Hind foot, Hairy-nosed Wombat, <i>P. latifrons</i> . . .	3	6	1	8
———, common species, <i>P. wombat</i> . . . . .	3	8	1	11
———, Black Wombat, <i>P. platyrhinus</i> (?) . . .	3	10½	2	3

In this manner, from the comparative examination of skull and skin, we are driven to the conclusion that the original *Phascolomys platyrhinus* of Prof. Owen includes Dr. Gray's species *P. angasii* and Mr. Gould's *P. niger*; so that there remains but one animal which there may still be a doubt respecting, namely, "the Big Yellow Fellow" of the natives of the Murray River (Mr. Gould's *P. latifrons* and Dr. Gray's *P. setosus*); but, after what I have shown in favour of a diminution of species, it is possible it may likewise only be found to be a light variety of *P. platyrhinus*.

In further support of the probability of this last view, I exhibit to the Society the skin and skull of a young specimen of Wombat, which possess uncommon interest from the fact of their being the preserved parts of the specimen made mention of by Mr. Gould; indeed they are neither more nor less than the same which he supposed to be a young Hairy-nosed Wombat, and the skull of which he showed to Mr. Flower, who, on comparison, rightly pronounced it to belong to an animal unlike the *P. latifrons* of Owen.

To judge of this young skull we of course require to compare it with those of the different species; and taking that of *P. latifrons* to commence with, it differs essentially from this in the

\* Gould's 'Mammals of Australia,' vol. i. letterpress to pl. 60.

form of the incisors, in the breadth of the postorbital processes, in the shape of the zygomatic arches, in having a shallow and not the enormous excavation of the tympanic cavity, and in the relative length to the breadth of the entire cranium.

As compared with *P. wombat*, it more nearly corresponds to that type, but already, in this young stage, has the posterior palatine foramina larger than in *P. wombat*, thus agreeing with *P. platyrhinus*. The nasal bones also assimilate with *P. platyrhinus* in their greater relative breadth; the tympanic cavities are larger than what might be expected in the young of *P. wombat*, although not equal to *P. latifrons*; and the upper incisor teeth are set slantingly together and are deeply longitudinally striated, as in *P. platyrhinus*. From all these characters one would infer it to be the cranium of a young *P. platyrhinus*, and not either that of *P. latifrons* or *P. wombat*.

The skin of this specimen assists us in determining the species.

The body and legs are of a yellowish-brown colour, considerably darker, even to blackish brown, upon the neck and back; the fore feet are brown; the head, under surface of neck, whole of abdomen, and inner surface of legs are light sandy-buff (isabelline colour).

The ears are large and prominent and somewhat pointed, clothed posteriorly with hair the same colour as that of the back of the neck, apparently also hairy inside; but this must be expressed with a doubt, from their abraded condition.

The eyebrows and cheek-whiskers are black. There is no white hairy muffle as in *P. latifrons* (*P. lasiorhinus*).

The outward characters, therefore, clearly define it from *P. wombat*, even if we are dubious by reason of the age of the animal; for in *P. wombat*, at a similar early period, the colour is not different from that of the adult. Dr. Gray\* has remarked that "the young Tasmanian Wombat (*P. ursinus*) is dark like the adult," and this fact is proved by specimens at present displayed in the British Museum.

The absence of the white hairy muffle, coarser nature of the hair, and the colour prevent one classing it with the *P. latifrons*; so that it must either be the young of Gould's large species or of Dr. Gray's *P. angasii*; for it combines the colour of both, and leads to the supposition that these two may be but varieties of the same species.

As I have tried to show that the brown species, *P. angasii*, comports with Owen's *P. platyrhinus*, and also that this young skull likewise agrees more closely with *P. platyrhinus* than *P. wombat*, there remains to be said that, if I have given sufficiently convincing data, it will be allowed the several species of the authors named must be grouped, at least provisionally, or until better evidence is produced to the contrary, under the head of *P. platyrhinus*, Owen; for, according to the law of priority, this specific name is that which ought to be adopted.

I have, in this place, a further remark to make regarding the

\* Annals and Mag. Nat. History, 1863, vol. xi. p. 459.



fossil species of Wombat (*P. mitchelli*, Owen). Professor Owen, in the 'Catalogue of Fossil Mammals and Birds in the Museum of the Royal College of Surgeons,' has formed a separate species upon the evidence of a few molar and incisor teeth, and observes, "In this species the molar teeth have the antero-posterior diameter greater in proportion to the transverse, as compared with the molars of *P. wombat*; the first grinder is also relatively larger, and of a more prismatic form; the upper incisors are less compressed, and more prismatic; this difference is so well marked that, once appreciated, any one might recognize the fossil by an incisor alone. There is a similar difference in the shape of the lower incisor. The fossil is also a little larger than the largest cranium in the Hunterian Collection."

When this species was formed, the skull of *P. platyrhinus* could not have been in the Hunterian Collection\*; for, upon examining the fossils in question, I find that they answer closely to the corresponding parts of *P. platyrhinus* in the same Museum; neither are they so very large, as one of the molars fitted the socket of the jaw of the skull which I show you. I have been enabled also to examine some other portions of fossil Wombats' jaws, obtained from the Wellington Caves, Australia, and now deposited in the Geological Society's Museum. These also correspond to the same parts in *P. platyrhinus*, one large piece, the roof of the mouth with teeth *in situ*, being exactly the same in measurement as the bone of the male specimen obtained from Mr. Bush.

In the size of the bones and shape of the teeth, then, it would seem, the fossil form *P. mitchelli* agrees with the recent species *P. platyrhinus*; so that we have a curious and most important piece of evidence that this species may have existed during the post-pliocene period, and have been a congener with those gigantic Marsupials the *Macropus atlas*, *Diprotodon australis*, and *Nototherium inerme*.

Besides this last fossil form of animal resembling *P. platyrhinus*, there is still another, but of enormous magnitude, a more fit representative of and companion to the above gigantic fossil Marsupials. The specimens on which a separate species has been founded, and provisionally named *Phascolomys magnus*, are deposited in the British Museum, and consist, among others, of the following parts:—

Portions of a lower jaw containing teeth.

Portions of radius and ulna.

A whole tibia.

Several vertebræ, and various fragments of different bones.

There are, besides, in the Collection, although not displayed, two plaster casts of mandibles and other parts evidently belonging to the same species.

The very great size of all of these bones entirely precludes them from being confounded either with the recent or other formerly existing, but possibly contemporaneous, species.

\* I have now the authority of Professor Owen to state that I am correct with regard to the supposition of the skull in question not having been in the College Collection when *P. mitchelli* was named.

These larger fossils are all marked as having been obtained from the post-pliocene deposits, Darling Downs, Australia, and were presented to the National Collection, some by Sir Daniel Cooper, Bart., others by T. W. Isaacs, Esq.

They are as yet undescribed; but Prof. Owen, in his article on the "Osteology of the Marsupialia," Trans. Zool. Soc. vol. iii. p. 306 (1849), refers to similar specimens in the following terms:—"I have recently obtained evidence from the post-pliocene deposits of the district of Melbourne, through the kindness of my friend Dr. Hobson, of an extinct Wombat, a true *Phascolomys*, at least four times as large as either of the known existing species."

At a future time I may find opportunity to treat more fully upon the comparative differences of the remaining bones of the skeleton of the three animals, the skulls of which I have figured, and therein point out in detail the reasons for adopting Dr. Gray's generic term *Lasiorhinus* (which, however, I am inclined only to use as subgeneric) to the animal known as the Broad-fronted Wombat of Owen, and the Hairy-nosed Wombat of Gould.

But for the present I shall assume the distinction, and at this stage terminate by calling attention to what, from my short researches, I deem the proper specific classification, characters, and synonyms of the group.

#### PHASCOLOMYIDÆ.

- Genus PHASCOLOMYS. { 1. *P. wombat*, Péron et Lesueur.  
2. *P. platyrhinus*, Owen.  
3. *P. magnus*? (fossil).
- Subgenus LASIORHINUS. 4. *P. latifrons*, Owen.

I have not here included the fossil genus *Diprotodon*, previously classed in this group by Prof. Owen (Trans. Zool. Soc. vol. ii. p. 332), as I believe more recent observations tend rather to show its nearer affinity to the Kangaroos.

#### Order MARSUPIALIA.

##### Family PHASCOLOMYIDÆ (Owen, 1839).

*Characters*.—Incisors  $\frac{2}{2}$ ; canines  $\frac{0}{0}$ ; premolars  $\frac{1-1}{1-1}$ ; molars  $\frac{4-4}{4-4}$  = 24. Incisors scalpriform in both jaws; false and true molars with persistent pulp. Stomach outwardly simple, but containing within a special cardiac gland; cæcum short and wide, with a vermiform appendix.

##### Genus PHASCOLOMYS (Geoffroy, 1803).

*Phascolomys*, Geoffroy, Notice sur une nouvelle espèce des Mammifères, &c., Ann. du Mus. d'Hist. Nat. ii. p. 364, 1803.

*Vombatus*, Geoffroy, Bulletin des Scien. par la Soc. Philom. iii. p. 185, 1803.

*Phascolomys*, Illiger, Prodrömus Syst. Mamm. p. 77, 1811.

*Amblotes*, Illiger, *loc. cit.* p. 78.

*Characters*.—Fur rough and coarse; muffle naked. Skull of moderate breadth in proportion to length; postorbital ridge and frontal process obsolete; nasal bones of moderate breadth; supratympanic cavity moderately excavated; foramen magnum of a trefoil figure. Upper incisor teeth forming one-third of a circle, and set with the enamelled surface chiefly outwards. Dorsal vertebræ 15, lumbar vertebræ 4, and ribs 15 in number; transverse processes of caudal vertebræ long and broad.

### 1. PHASCOLOMYS WOMBAT.

Body of moderate size; seldom more than 3 feet long. Ears short and rounded. Colour dark grizzly greyish brown, produced by dark-brownish hairs for the most part tipped with silvery grey, the longer ones with black points. Skull between  $5\frac{1}{2}$  and  $6\frac{3}{4}$  inches in length; nasal bones relatively long and narrow; supratympanic excavation very shallow; postpalatine foramina oblong and of moderate size; scapula long as compared with its breadth.

*Phascolomys wombat*, Péron et Lesueur, *Voyage aux Terres Australes*.

*Wombat*, Collins's Account of the English Colony in New South Wales, &c., p. 153, with plate, 1802.

*P. fossor*, Sevasteanof, in *Mém. de l'Acad. Impér. de St. Pétersbourg*, i. p. 444, 1809.

*Womback*, Bewick, *Quadrupeds*, 6th ed. p. 522, 1811.

*P. wombat*, Leach, *Zool. Miscell.* ii. p. 101, pl. 96, 1815.

*P. fusca*, Desm. *Mamm.* part i. p. 276, 1820.

*P. bassii*, Lesson, *Manuel de Mamm.* p. 229, 1827.

*P. ursinus*, Gray, *List of Mamm. in Brit. Mus.* p. 95, 1843, and *Ann. & Mag. Nat. Hist.* vol. xi. p. 458, 1863.

*P. wombat*, Waterhouse, *Nat. Hist. Mamm.* vol. i. p. 246, 1846; Gould, *Mamm. of Australia*, vol. i. pls. 55, 56; Angas, *P. Z. S.* 1861, p. 269.

### 2. PHASCOLOMYS PLATYRHINUS.

Body large, generally above 3 feet long. Colour varying from pale yellowish brown (isabelline hue) to blackish brown, or even approaching black, but nearly always uniform according to the variety; no silvery-grey tint. Skull from 7 to 8 inches long; nasal bones relatively broad to their length; supratympanic cavity moderately deep; postpalatine foramina triangular, large; scapula broad as compared with its length.

*Phascolomys platyrhinus*, Owen (type skull), *Cat. Osteol. Series Mus. Roy. Coll. Surgs.* vol. i. p. 334, 1853.

*P. mitchelli*, Owen (fossil species described from fragments of teeth), *Appendix to Sir Thos. Mitchell's Three Expeditions into Australia*, vol. ii. p. 368, pl. 48, 1830.

*P. latifrons*, Gould (the pale variety), *Mammals of Australia*, vol. i. text and plates 57 & 58, 1863.

*P. setosus*, Gray (the pale variety), Ann. & Mag. Nat. Hist. vol. xi. p. 457, 1863.

*P. angasii*, Gray (the brown variety), Ann. & Mag. Nat. Hist. xi. p. 457, 1863.

*P. niger*, Gould (the black variety), Mammals of Australia, vol. i. letterpress to pl. 60, 1863.

### 3. PHASCOLOMYS MAGNUS?

A fossil species, undescribed; bones several times as large as those of either *P. wombat* or *P. platyrhinus*. Specimens in the British Museum.

### Subgenus LASIORHINUS, Gray.

Fur smooth and silky; muffle hairy; incisors much curved, forming nearly a semicircle; the enamelled surface directed nearly forwards. Dorsal vertebræ 13; ribs 13; lumbar vertebræ 6. Skull broad in proportion to length; nasal bones relatively very broad; frontal bones broad, presenting a well-marked supraorbital ridge and postorbital process; supratympanic hollow, very large; foramen magnum oval; transverse processes of caudal vertebræ short and narrow.

### 4. PHASCOLOMYS LATIFRONS. (Pl. XLVII.)

Size about equal to that of *P. wombat*, but body longer. Fur of a light silvery mouse-colour, with mottled, darker, buff and purplish hairs; muffle broad, white, and hairy; ears large, prominent, and acutely pointed; white spot above each eye; chest, neck, and inside of fore limbs whitish; rump of a rufous tint.

*Phascolomys latifrons*, Owen, Proc. Zool. Soc. 1845, p. 82, and Trans. Zool. Soc. vol. iii. p. 303.

*P. latifrons*, Angas, Proc. Zool. Soc. 1861, p. 269.

*P. lasiorhinus*, Gould, Mamm. Australia, vol. i. pls. 59, 60.

*P. latifrons*, M'Coy (see Gould's text).

*Lasiorhinus M'Coyii*, Gray, Ann. & Mag. Nat. Hist. vol. xi. p. 459, 1863.

## APPENDIX.

## LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE.

## DURING THE YEAR

1865.

- Jan. 3. A Collection of Marine Animals. Presented by Col. Le Couteur.
4. 3 Vulpine Phalangers. *Phalangista vulpina* (Shaw). Presented by the Acclimatization Society of Victoria.
- 1 Short-headed Phalanger. *Belideus breviceps* (Waterh.). Presented by the Acclimatization Society of Victoria.
- 1 Cereopsis Goose. *Cereopsis novæ-hollandiæ*, Lath. Presented by the Acclimatization Society of Victoria.
- 4 Maned Geese. *Bernicla jubata* (Lath.). Presented by the Acclimatization Society of Victoria.
- 3 Australian Sheldrakes. *Casarca tadornoides*, Jard. & Selb. Presented by the Acclimatization Society of Victoria.
- 2 Cuvier's Podargus. *Podargus cuvierii*, Vig. & Horsf. Presented by the Acclimatization Society of Victoria.
- 3 Harlequin Bronze-winged Pigeons. *Peristera histrionica*, Gould. Presented by the Acclimatization Society of Victoria.
- 5 Weka Rails. *Ocydromus australis* (Sparrm.). Presented by the Acclimatization Society of Victoria.
- 1 Bower-bird. *Ptilonorhynchus holosericeus*, Kuhl. Purchased.
5. 1 Common Chameleon. *Chamæleon vulgaris*, Daud. Presented by T. Stillwell, Esq., F.Z.S.
7. 6 ♀ Common Pheasants. *Phasianus colchicus*, Linn. Purchased.
- 1 White-whiskered Lemur. *Lemur leucomystax*, Bartlett. Purchased.
9. 1 Stock-Dove. *Columba ænas*, Linn. Presented by H. B. Bellamy, Esq.
- 1 Cheetah. *Felis jubata*, Schreb. Deposited.
- 1 Grivet Monkey. *Cercopithecus griseo-viridis*, Desm. Deposited.
- 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Deposited.
- 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Deposited.
10. 1 Clothonia. *Eryx johnii* (Russell). Purchased.
12. 1 Bower-bird. *Ptilonorhynchus holosericeus*, Kuhl. Purchased.
- 1 Sykes's Monkey. *Cercopithecus albobularis*, Sykes. Purchased.
14. 1 Red and Yellow Maccaw. *Ara chloroptera*, Gray. Presented by J. Aird, Esq.

- Jan. 14. 2 Red-sided Green Lories. *Polychlorus magnus* (Scop.). On approval.  
 2 Black-tailed Parrakeets. *Platycercus melanurus* (Vig.). On approval.  
 2 Young Blossom-headed Parrakeets. *Palaeornis bengalensis* (Linn.). On approval.  
 1 Black-crested Eagle. *Spizaëtus occipitalis* (Daud.). On approval.  
 2 Brown Capuchin Monkeys. *Cebus apella* (Briss.). On approval.  
 2 Capuchin Monkeys. *Cebus capucinus*, Geoff. On approval.  
 1 White-fronted Capuchin Monkey. *Cebus albifrons*, Geoff. On approval.  
 2 Young Drills. *Cynocephalus leucophæus*, Desm. On approval.  
 1 Young Guinea Baboon. *Cynocephalus papio*, Desm. On approval.  
 1 Hocheur Monkey. *Cercopithecus nictitans* (Linn.). On approval.  
 1 West African Python. *Python sebæ* (Gmel.). On approval.
17. 1 Brown Coati. *Nasua fusca*, Desm. Presented by Capt. Pike.  
 1 West African Python. *Python sebæ* (Gmel.). Purchased.  
 2 Brown Capuchin Monkeys. *Cebus apella* (Briss.). Purchased.  
 2 Weeper Monkeys. *Cebus capucinus*, Geoff. Purchased.  
 1 White-fronted Capuchin Monkey. *Cebus albifrons*, Geoff. Purchased.  
 2 Drills. *Cynocephalus leucophæus*, Desm. Purchased.  
 1 Guinea Baboon. *Cynocephalus papio*, Desm. Purchased.  
 1 Hocheur Monkey. *Cercopithecus nictitans* (Linn.). Purchased.  
 2 Red-sided Green Lories. *Polychlorus magnus* (Scop.). Purchased.
18. 1 Red and Yellow Maccaw. *Ara chloroptera*, Gray. Presented by Charles Butler, Esq.  
 1 Red and Yellow Maccaw. *Ara chloroptera*, Gray. Deposited.
19. 1 Crested Pigeon. *Ocyphaps lophotes* (Temm.). Purchased.  
 2 Palm-Squirrels. *Sciurus palmarum*, Linn. Presented by N. A. Wells, Esq.
20. 1 European Wild Sow. *Sus scrofa*, Linn. Deposited.  
 2 Common Turkeys. *Meleagris mexicana*, Gould, var. *domestica*. Presented by O. Miller, Esq.
21. 1 Saiga. *Saiga tatarica* (Pall.). On approval.  
 1 Pronghorn Antelope. *Antilocapra americana* (Ord). Purchased.  
 300 Salmon-Ova. *Salmo salar*, Linn. Deposited.  
 200 Swiss Charr-Ova. *Salmo umbla*, Agassiz. Deposited.  
 500 Swiss Trout-Ova. *Salmo lacustris*, auct. Deposited.
23. 1 Cashmere-Shawl Goat. *Capra hircus*, Linn., var. Born.
25. 4 Pale-headed Snakes. *Epicrates angulifer*, Bibb. Purchased.
- Feb. 1. 8 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Deposited.  
 4 Cheer Pheasants. *Phasianus wallichii* (Hardw.). Deposited.  
 1 ♀ Pucras Pheasant. *Pucrasia macrolopha* (Less.). Deposited.  
 4 Himalayan Snow-Partridges. *Tetraogallus himalayensis*, Gray. Deposited.  
 2 Hill-Partridges. *Arboricola torqueola* (Val.). Deposited.  
 2. 1 pair of Hamsters. *Cricetus vulgaris*, Desm. Purchased.  
 1 Reed-Bunting. *Emberiza schæniculus*, Linn. Purchased.  
 7. 2 Crested Pigeons. *Ocyphaps lophotes* (Linn.). Purchased.  
 9. 6 Common Pheasants. *Phasianus colchicus*, Linn. Purchased.

- Feb. 9. 1 Common Quail. *Coturnix dactylisonans*, Meyer. Presented by Mrs. Frank T. Buckland.
10. 6 Violet Tanagers. *Euphonia violacea* (Linn.). Purchased.
11. 2 Young Herring-Gulls. *Larus argentatus*, Brünn. Presented by Thomas Walker, Esq., F.Z.S.
- 2 Amandava Finches. *Estrellda amandava* (Linn.). Deposited.
- 2 Indigo-birds. *Cyanospiza cyanea* (Linn.). Deposited.
- 2 Spotted-sided Finches. *Amadina lathamii* (Vig. & Horsf.). Deposited.
- 2 Crimson-eared Waxbills. *Estrellda phœnicotis*, Sw. Deposited.
- 2 Orange-cheeked Waxbills. *Estrellda melpodu* (Vieill.). Deposited.
- 2 Common Waxbills. *Estrellda cinerea* (Vieill.). Deposited.
- 1 St. Helena Seed-eater. *Crithagra butyracea* (Linn.). Deposited.
- 1 Silverbeak. *Munia cantans* (Gmel.). Deposited.
13. 1 Spotted Cavy. *Cœlogenys paca* (Linn.). Presented by the Comte and Comtesse D'Eu.
- 1 White-crested Guan. *Penelope leucolopha*, Mey. Presented by the Comte and Comtesse D'Eu.
- 1 Rufous Tinamou. *Rhynchotis rufescens* (Temm.). Presented by the Comte and Comtesse D'Eu.
14. 1 Eagle. *Haliaëtus* —? On approval.
- 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Deposited.
16. 1 Red-necked Grebe. *Podiceps griseigena* (Bodd.). Presented by W. C. Horsfall, Esq.
- 1 Common Paradoxure. *Paradoxurus typus*, F. Cuv. Presented by W. Wiggins, Esq.
17. 20 Common Barnacles. Presented by J. N. Tomkins, Esq., F.Z.S.
- 2 pairs Chinese Ring-necked Pheasants. *Phasianus torquatus*, Gmel. Deposited.
- 1 ♀ Japanese Pheasant. *Phasianus versicolor*, Vieill. Deposited.
- 3 Silver Pheasants. *Euplocamus nychthemerus* (Linn.). Deposited.
18. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by W. Poinard, Esq.
21. 1 ♀ Yak. *Bos grunniens*, Linn. Deposited.
- 1 pair of Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Deposited.
22. 1 Solitary Thrush. *Petrocincla cyanea* (Linn.). Purchased.
23. 1 African Monitor. *Regenia albogularis*, Gray. On approval.
24. 1 Grivet Monkey. *Cercopithecus griseo-viridis*, Desm. Presented by His Royal Highness the Prince of Wales, F.Z.S.
25. 1 Rose-crested Cockatoo. *Cacatua moluccensis* (Gmel.). Deposited.
- 1 Chinese Sand-Grouse. *Syrrhaptus paradoxus* (Pall.). Presented by Harrington Russell, Esq., M.P.
27. 2 American Bisons. *Bison americanus* (Gmel.). Purchased.
- 1 Gigantic Salamander. *Sieboldia maxima* (Schleg.). Deposited.
- 1 Javan Parrakeet. *Palaornis javanica* (Osborn). Deposited.
28. 1 Pileated Jay. *Cyanocorax pileatus* (Temm.). Presented by Mrs. Laird Warren.
- Mar. 2. 1 ♂ Brahmin Calf. *Bos indicus*, Linn. Born.
3. 1 Black and White Goose. *Anseranas melanoleuca*, Less. Presented by Mrs. R. W. Moore.
4. 1 Common Badger. *Meles taxus* (Schreb.). Presented by Lord Garvagh, F.Z.S.

- Mar. 4. 1 ♂ Siamese Pheasant. *Euplocamus praelatus* (Bonap.). Received in exchange.  
 1 Three-banded Armadillo. *Tolypeutes conurus*, Is. Geoff. Received in exchange.  
 A Collection of Marine Fishes. Presented by Dr. Salter.  
 1 Grey Parrot. *Psittacus erithacus*, Linn. Received.
6. 1 Mauge's Dasyure. *Dasyurus maugei*, Geoff. Presented by W. S. C. Cooper, Esq.
7. 1 Crested Pigeon. *Ocyphaps lophotes* (Temm.). Purchased.  
 1 White-throated Sapajou. *Cebus hypoleucos*, Geoff. Purchased.  
 2 Turquoise Parrakeets. *Euphema pulchella* (Shaw). Deposited.  
 2 Yaks. *Bos grunniens*, Linn. Deposited.  
 2 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Deposited.  
 4 Cheer Pheasants. *Phasianus wallichii*, Hardw. Deposited.  
 1 Himalayan Snow-Partridge. *Tetrao gallus himalayensis*, Gray. Deposited.
8. 1 ♂ Eland. *Oreas canna* (Pall.). Born.  
 1 Yellow Baboon. *Cynocephalus babouin*, Desm. On approval.
9. 1 Mona Monkey. *Cercopithecus mona*, Erxl. Received in exchange.  
 4 Mauge's Dasyures. *Dasyurus maugei*, Geoff. Purchased.  
 1 Lunulated Kangaroo. *Onychogalea lunata*, Gould. Purchased.  
 1 Rufous Jerboa Kangaroo. *Bettongia rufescens*, Gray. Purchased.  
 1 Australian Monitor. *Monitor gouldii*, Schleg. Purchased.
10. 1 Porpoise. *Phocæna vulgaris*. Purchased.  
 6 pairs of Scaup Ducks. *Fuligula marila* (Linn.). Received in exchange.  
 4 Common Curlews. *Numenius arquatus* (Linn.). Received in exchange.  
 2 Oyster-catchers. *Hematopus ostralegus*, Linn. Received in exchange.
13. 1 Sambar Deer. *Cervus aristotelis*, Cuv. Born.
14. 2 Ravens. *Corvus corax*, Linn. Presented by W. R. Taunton, Esq.  
 1 ♂ Sonnerat's Jungle-fowl. *Gallus sonneratii*, Temm. Received in exchange.
15. 1 Peregrine Falcon. *Falco peregrinus*, Linn. Presented by J. M. Baragett, Esq.  
 1 Bar-tailed Godwit. *Limosa lapponica* (Linn.). Deposited.  
 1 Golden Plover. *Charadrius phuvialis*, Linn. Deposited.
16. 1 Rüppell's Vulture. *Gyps rueppellii*, Bonap. Purchased.  
 1 pair of Pileated Vultures. *Neophron pileatus* (Burch.). Purchased.  
 1 pair of Abyssinian Guinea-fowls. *Numida pitlorhyncha*, Licht. Purchased.
17. 3 Madagascar Francolins. *Francolinus madagascariensis* (Scop.). Presented by E. Newton, Esq., Corr. Memb.  
 2 Red-crowned Pigeons. *Erythrænas pulcherrima* (Scop.). Presented by Lady Barkly.  
 1 Meminna Deer. *Meminna indica*, Gray. Presented by Capt. H. W. Hire, R.N., of H.M.S. 'Orontes.'  
 1 Lesser Sulphur-crested Cockatoo. *Cacatua sulphurea* (Gmel.). Deposited.  
 1 Antillean Snake. *Dromicus antillensis*, Schleg. Presented by Edward Greey, Esq., C.M.Z.S.



- Mar. 17. 2 Common Tench. *Tinca vulgaris*, Cuv. Presented by Andrew Arcedeckne, Esq., F.Z.S.  
 1 American Squirrel. *Sciurus*, sp.? Purchased.
23. 4 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Deposited.  
 1 pair of Horned Tragopans. *Cerionis satyra* (Linn.). Deposited.  
 2 pairs of White-crested Kaleeges. *Euplocamus albo-cristatus* (Vig.). Deposited.  
 2 Black Francolins. *Francolinus vulgaris*, Steph. Deposited.  
 1 ♂ Mandarin Duck. *Aix galericulata* (Linn.). Received in exchange.  
 2 Black-backed Jackals. *Canis mesomelas*, Schreb. Presented by E. L. Layard, Esq., C.M.Z.S.
24. 500 Salmon- and Trout-ova. } *Salmo salar*, Linn. } Presented by F. T. Buck-  
   } *Salmo fario*, Linn. } land, Esq., F.Z.S.
25. 1 Sociable Vulture. *Vultur auricularis* (Daud.). Purchased.  
 1 Pair of Cereopsis Geese. *Cereopsis novæ-hollandiæ*, Lath. Deposited.
26. 1 ♂ Sambar Deer. *Cervus aristotelis*, Cuv. Born.
27. 1 Pennant's Penguin. *Apterodytes pennantii*, Gray. Presented by Commander Fenwick, R.N.  
 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by A. M. Furby, Esq.  
 1 Common Squirrel. *Sciurus vulgaris*, Linn. Presented by A. M. Furby, Esq.  
 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by W. F. Baynes, Esq.
30. 1 Common Macaque. *Macacus cynomolgus* (Linn.). Presented by Cecil T. King, Esq.
31. 1 ♂ Giraffe. *Camelopardalis giraffa*, Gmel. Born.  
 1 Vulpine Phalanger. *Phalangista vulpina* (Shaw). Born.  
 4 Emus. *Dromæus novæ-hollandiæ*, Vieill. Hatched.
- Apr. 1. 1 Pine-Marten. *Mustela martes*, Linn. Presented by John Travis, Esq.  
 3. 1 Brown Capuchin Monkey. *Cebus apella* (Briss.). Presented by the Rev. Dan. Greatorex.  
 A Collection of Marine Animals. Purchased.  
 1 Chinese Ring-necked Pheasant. *Phasianus torquatus*, Gmel. Purchased.
4. 2 Yellow-footed Rock-Kangaroos. *Petrogale xanthopus*, Gray. Born.
7. 4 Dingo Dogs. *Canis dingo*, Blumenb. Born.  
 2 Laughing Kingfishers. *Dacelo gigantea* (Lath.). Presented by F. W. Draper, Esq.  
 2 Black-eared Marmosets. *Hapale penicillata* (Geoff.). Purchased.
8. 1 Downy Owl. *Athene torquata* (Daud.). Purchased.  
 1 Senegal Parrot. *Pæocephalus senegalensis* (Linn.). Presented by Miss M. D. Du Carn.
9. 1 Hybrid Cretan Goat. *Capra beden*, Forsk. Born.  
 1 ♂ Bronze-winged Pigeon. *Phaps chalcoptera* (Lath.). Presented by Miss Ada Angus.
10. 1 Flamingo. *Phœnicopterus antiquorum*, Linn. Presented by Charles Joyce, Esq.  
 1 Berigora Hawk. *Hieracidea berigora* (Vig. & Horsf.). On approval.

- Apr. 10. 1 Wood-Owl. *Syrnium aluco* (Linn.). Presented by John Gould, Esq., F.Z.S.
11. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by T. Hayes, Esq.
13. 3 Sambur Deer. *Cervus aristotelis*, Cuv. Presented by H.M. the Queen.
- 2 ♂ Black Grouse. *Tetrao tetrix*, Linn. Presented by John Wingfield Malcolm, Esq.
- 1 Yellow Snake. *Chilobothrus inornatus*, Dum. Presented by Capt. Hammack.
15. 4 Long-tailed Glossy Thrushes. *Lamprotornis aeneus* (Linn.). Purchased.
- 3 Purple-headed Glossy Thrushes. *Lamprocolius auratus* (Gmel.). Purchased.
- 4 Green Glossy Thrushes. *Lamprocolius chalybeus*, Ehrenb. Purchased.
- 2 Vervet Monkeys. *Cercopithecus lalandii*, Is. Geoff. Presented by A. F. Green, Esq.
- 1 Black-backed Jackal. *Canis mesomelas*, Schreb. Presented by M. M. de Pass.
16. 3 Tigers. *Felis tigris*, Linn. Born.
- A Collection of Marine Fishes. Purchased.
19. 2 Aoudads. *Oris tragelaphus*, Desm. Born.
- 2 Natterjack Toads. *Bufo calamita*, Laur. Presented by — Tait, Esq.
20. 1 ♂ Giraffe. *Camelopardalis giraffa*, Gmel. Born.
- 1 ♂ Eland. *Oreas canna* (Pall.). Born.
- 2 Cardinal Grosbeaks. *Cardinalis virginianus* (Briss.). Purchased.
- 1 Chinese Ring-necked Pheasant. *Phasianus torquatus*, Gmel. Deposited.
24. 1 Serval. *Felis serval*, Schreb. Presented by Lieut. J. Plumridge, 3rd W.I. Regt.
25. 1 Orange-quilled Porcupine. *Hystrix malabarica*, Sclater. Born.
26. 1 Ortolan Bunting. *Emberiza hortulana*, Linn. Presented by — Bicknell, Esq.
27. 2 Common Hares. *Lepus timidus*, Linn. Purchased.
- 2 White Peafowls. *Pavo cristatus*, Linn., var. *albino*. Deposited.
- 1 Orinoko Goose. *Chenolopez jubata* (Spix). Purchased.
28. 1 Hybrid Lemur. Between *Lemur nigrifrons*, Geoff., and *Lemur xanthomystax*, Gray. Born.
- 1 Kittiwake Gull. *Larus rissa*, Linn. Purchased.
29. 2 Common Adders. *Pelias berus*, Merr. Presented by Thomas Barling, Esq.
30. 2 Upland Geese. *Chloëphaga magellanica* (Gmel.). Hatched.
- 3 Ruddy-headed Geese. *Chloëphaga rubidiceps*, Sclater. Hatched.
- A Collection of Small Reptiles. Presented by F. Coleman, Esq.
- May 2. 1 De Filippi's Starling. *Sturnella defilippii* (Bonap.). Presented by Capt. A. Mellersh, R.N.
- A Collection of Marine Animals. Presented by — Thomas, Esq.
- 2 Silverfish. } *Cyprinus auratus*, Linn. } Presented by Arthur J. Russell, Esq.
- 1 Gold Carp. } }
- 1 Chinchilla. *Chinchilla lanigera*, Benn. On approval.
- 4 Viscachas. *Lagotomus trichodactylus*, Brookes. Presented by Capt. Parish, R.N.

- May 3. 2 Brown Capuchin Monkeys. *Cebus apella* (Linn.). Purchased.  
 2 Malbrouck Monkeys. *Cercopithecus cynosurus*, Desm. Purchased.  
 2 Yarrell's Curassows. *Crax carunculata*, Temm. Purchased.  
 1 Crested Curassow. *Crax alector*, Linn. Purchased.  
 1 Superb Tanager. *Calliste fastuosa* (Less.). Purchased.  
 1 Brazilian Hang-nest. *Icterus jamaicai* (Gmel.). Purchased.  
 10 Rain-Quails. *Coturnix coromandelica* (Gmel.). Presented by F. J. C. Wildash, Esq.  
 1 Chinchilla. *Chinchilla lanigera*, Benn. Purchased.  
 1 Golden Eagle. *Aquila chrysaetos* (Linn.). On approval.  
 1 Cinereous Sea-Eagle. *Haliaeetus albicilla* (Linn.). Deposited.  
 1 Savigny's Eagle Owl. *Bubo ascalaphus* (Sav.). Deposited.  
 5. 1 Green Ground-Parrakeet. *Pezoporus formosus* (Lath.). On approval.  
 2 Black and White Geese. *Anseranas melanoleuca*, Less. Presented by Dr. Mueller, C.M.Z.S.  
 2 Leadbeater's Cockatoos. *Cacatua leadbeateri* (Vig.). Presented by Dr. Mueller, C.M.Z.S.  
 1 Wedge-tailed Eagle. *Aquila audax* (Lath.). Presented by Dr. Mueller, C.M.Z.S.  
 2 Australian Lizards. Deposited.  
 1 Double-crested Pigeon. *Lopholaimus antarcticus* (Shaw). Presented by the Acclimatization Society of New South Wales.  
 1 Australian Crow. *Corvus australis*, Sclater. Presented by Miss Mary J. Mayo.  
 2 Grey Crows. *Strepera anaphonensis* (Temm.). Presented by Miss Mary J. Mayo.  
 1 Hill-Crow. *Strepera arguta*, Gould. Presented by Miss Mary J. Mayo.  
 6. 1 Vigors's Parrot. *Chrysotis augusta* (Vig.). Deposited.  
 8. 1 Chacma Baboon. *Cynocephalus porcarius* (Bodd.). Presented by A. G. Smith, Esq.  
 1 Indian Grackle. *Gracula intermedia*, Hay. Purchased.  
 9. 1 Alligator. *Alligator mississippiensis* (Daud.). Presented by J. Oppenheim, Esq.  
 10. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by R. Acton Paidoe, Esq.  
 2 Two-toed Sloths. *Bradypus didactylus*, Linn. Purchased.  
 1 White-crowned Pigeon. *Columba leucocephala*, Linn. Purchased.  
 11. 1 White-tailed Gnu. *Catoblepas gnu* (Gmel.). Presented by William Cubitt, Esq.  
 1 Lioness. *Felis leo*, Linn. Presented by William Cubitt, Esq.  
 2 Weasel-headed Armadillos. *Dasyppus encoubert*, Desm. Purchased.  
 2 Kangaroos. Purchased.  
 3 Australian Monitors. *Monitor gouldii*, Schleg. Purchased.  
 2 Blue-eyed Cockatoos. *Cacatua ophthalmica*, Sclater. Purchased.  
 1 Chestnut-breasted Duck. *Anas punctata*, Cuv. Purchased.  
 7 Red-legged Partridges. *Caccabis rubra* (Ray). Deposited.  
 2 Calandra Larks. *Alauda calandra*, Linn. Deposited.  
 12. 2 South American Finches. *Sycalis*, sp. Received in exchange.  
 1 Vigors's Parrot. *Chrysotis augusta* (Vig.). Presented by P. N. Bernard, Esq.  
 13. 3 Fat Dormice. *Myoxus glis*, Schreb. Purchased.

- May 13. 1 Malbrouck Monkey. *Cercopithecus cynosurus*, Desm. purchased.  
 A Collection of Marine Animals. Presented by A. Arcedeckne, Esq., F.Z.S.
17. 5 Variegated Sheldrakes. *Casarca variegata* (Gmel.). Hatched.  
 1 Common Otter. *Lutra vulgaris* (Linn.). Presented by Lord Huntingfield.  
 1 Jugger Falcon. *Falco jugger*, Gray. Presented by the Prince Duleep Singh, F.Z.S.  
 1 Black Kite. *Milvus niger*, Briss. Presented by R. M. Young, Esq.
18. 1 Noddy Tern. *Anous stolidus*. Purchased.
19. 3 Black-necked Swans. *Cygnus nigricollis* (Gmel.). Hatched.  
 1 Golden Agouti. *Dasyprocta aguti* (Linn.). Born.  
 1 Red-billed Hornbill. *Toccus erythrorhynchus*, Temm. Purchased.  
 2 White-eared Owls. *Otus leucotis* (Temm.). Purchased.  
 2 pairs Occidental Finches. *Quelea occidentalis*, Hartl. Purchased.  
 2 Triangular-spotted Pigeons. *Columba guinea*, Linn. Purchased.  
 2 Small African Doves. *Oena capensis* (L.). Purchased.  
 6 Green Lizards. *Lacerta viridis*, Linn. Purchased.  
 3 Common Turtledoves. *Turtur auritus* (Ray). Presented by Mrs. Sidney.  
 1 Chuva Spider Monkey. *Ateles marginatus*, Geoff. Purchased.
20. 1 Chameck Spider Monkey. *Ateles subpentadactylus*, Geoff. Purchased.  
 1 Tytler's Paradoxure. *Paradoxurus tytleri*, Blyth. Presented by A. Grote, Esq., C.M.Z.S.  
 1 Zibet. *Viverra zibetha*, Linn. Presented by A. Grote, Esq., C.M.Z.S.  
 2 Lord Elgin's Hawks. *Hematornis elginii*, Tytler. Presented by A. Grote, Esq., C.M.Z.S.  
 2 Pondicherry Vultures. *Vultur calvus*, Scop. Purchased.  
 1 Asiatic Vulture. *Neophron orientalis*, Blyth. Purchased.  
 4 Brahminy Kites. *Haliastur indus* (Bodd.). Deposited.
22. 1 Alpine Chamois. *Rupicapra traagus*, Gray. Born.  
 1 Bartlett's Pigeon. *Phlogoenas crinigera*, Puch. Hatched.  
 1 Cambayan Turtledove. *Turtur senegalensis* (Linn.). Hatched.  
 2 pairs of Brent Geese. *Bernicla brenta*, Steph. Purchased.  
 2 pairs of Shovellers. *Spatula clypeata* (Linn.). Purchased.  
 2 pairs of Gargany Teal. *Querquedula circea* (Linn.). Purchased.  
 2 pairs of Tufted Ducks. *Fuligula cristata* (Ray). Purchased.  
 2 Male and 4 Female White-eyed or Castaneous Ducks. *Nyroca leucophthalma* (Bechst.). Purchased.  
 3 Male Pintails. *Dafila acuta* (Linn.). Purchased.  
 2 Female Common Teal. *Querquedula crecca* (Linn.). Purchased.  
 1 Tigress. *Felis tigris*, Linn. Received in exchange.
23. 11 Summer-Ducks. *Anas sponsa* (Linn.). Hatched.  
 1 Dusky Duck. *Anas obscura*, Gmel. Hatched.  
 1 Kiwi. *Apteryx mantelli*, Bartl. Presented by Henry Slade, Esq.  
 1 Harnessed Antelope. *Tragelaphus scriptus* (Pall.). Purchased.  
 1 Marsh-Ichneumon. *Herpestes paludosus*, Cuv. Purchased.  
 1 Genet. *Genetta*, sp. Deposited.

- May 24. 2 Lepidosirens. *Protopterus annectans*, Owen. Purchased.
25. 7 Lineated Pheasants. *Euplocamus lineatus* (Lath. MS.). Hatched.
- 8 Sonnerat's Jungle-fowl. *Gallus sonneratii*, Temm. Hatched.
- 15 Bankiva Jungle-fowl. *Gallus bankiva*, Temm. Hatched.
- 4 Ashy-headed Geese. *Chloëphaga poliocephala*, Gray. Hatched.
26. 2 Bennett's Wallabies. *Halmaturus bennettii*, Waterh. Born.
- 1 Derbian Wallaby. *Halmaturus derbianus*, Gray. Born.
- 2 Bronze-winged Pigeons. *Phaps chalcoptera* (Lath.). Hatched.
- 1 Australian Monitor. *Monitor gouldii*, Schleg. Presented by Dr. Mueller, of Melbourne, C.M.Z.S.
- 6 Australian Waxbills. *Estrellda temporalis* (Lath.). Presented by Dr. Mueller, of Melbourne, C.M.Z.S.
27. 1 Lepidosiren. *Protopterus annectens*, Owen. Purchased.
29. 1 ♂ Japanese Pheasant. *Phasianus versicolor*, Temm. Deposited.
- 1 ♀ Scemmering's Pheasant. *Phasianus scemmeringii*, Temm. Deposited.
- 1 Letter-winged Kite. *Elanus scriptus*, Gould. Presented by E. de St. Jean, Esq.
30. 3 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Hatched.
- 1 White-whiskered Pig. *Sus leucomystax*, Temm. Presented by Messrs. Glover and Co.
- 2 Brazilian Tortoises. *Testudo tabulata*, Walb. Purchased.
- June 1. 2 Sand-Badgers. *Meles ankuma*, Temm. Deposited.
2. 2 Turquoise Parrakeets. *Euphema pulchella* (Shaw). Hatched.
- 1 Red Ground-Dove. *Starnænas montana* (Linn.). Hatched.
- 2 Bronze-winged Pigeons. *Phaps chalcoptera* (Lath.). Hatched.
3. 1 Esquimaux Dog. *Canis familiaris*, Linn. var. Presented by C. A. Sothorn, Esq., F.Z.S.
- 1 Squirrel Monkey. *Callithrix sciureus* (Linn.). Purchased.
- 1 Agouti. *Dasyprocta* — ?. Purchased.
5. 4 Marmoset Monkeys. *Hapale jacchus* (Linn.). Purchased.
- 1 Teguxin Lizard. *Teius teguixin* (Linn.). Purchased.
- 2 Squirrel Monkeys. *Callithrix sciureus* (Linn.). Presented by Prince de Joinville.
6. 1 Common Goat. *Capra hircus*, Linn., var. Deposited.
- 1 Dingo Dog. *Canis dingo*, Blumb. Presented by Capt. Williams.
7. 1 ♂ Swinhoe's Pheasant. *Euplocamus swinhoei*, Gould. Presented by Robert Swinhoe, Esq., H.B.M. Vice-Consul at Formosa, C.M.Z.S.
- 1 Common Sandpiper. *Totanus hypoleucos* (Linn.). Presented by B. Mitford, Esq.
- A Collection of Marine Animals. Presented by — Thompson, Esq., of Weymouth.
- 1 Roseate Cockatoo. *Cacatua roseicapilla*, Vieill. Deposited.
8. 1 Japanese Deer. *Cervus sika*, Temm. Born.
- 1 Short-headed Pbalanger. *Belideus breviceps*, Waterh. Born.
- 1 Ring-necked Parrakeet. *Palæornis torquata* (Linn.). Presented by Miss Bushby.
- 5 Red-eared Bulbuls. *Pycnonotus jocosus* (Linn.). Purchased.
- 3 Red-vented Cockatoos. *Cacatua philippinarum* (Gmel.). Purchased.
- 2 Linnean Lories. *Eclectus linnaei*, Wagl. Purchased.
- 2 Australian Lizards. Purchased.
9. 3 Summer-Ducks. *Aix sponsa* (Linn.). Hatched.

- June 10. 1 Great Kangaroo. *Macropus giganteus*, Shaw. Presented by Chas. Magniac, Esq.  
 1 African Leopard. *Felis varia*, Gray. Presented by Mrs. Campbell.
13. 1 Spotted Hyæna. *Hyæna crocuta*, Erxl. On approval.  
 2 African Fowls. *Gallus domesticus*, Linn., var. Presented by John Petherick, Esq., C.M.Z.S.
14. 1 Goliath Heron. *Ardea goliath*, Temm. Purchased.  
 2 Grey Owls. *Bubo cinerascens*, Guérin. Purchased.  
 2 Young Turtles. Presented by L. R. Twentyman, Esq.  
 1 Rough-legged Buzzard. *Archibuteo lagopus* (Gm.). Purchased.  
 1 Scemmering's Pheasant. *Phasianus scemmeringii*, Temm. Hatched.  
 3 Hybrid Siamese and Lineated Pheasants. Between *Euplocamus praelatus* (Bonap.) and *Euplocamus lineatus* (Lath. MS.). Hatched.  
 3 Black-backed Kaleege. *Euplocamus melanotus* (Blyth). Hatched.  
 5 White-crested Kaleege. *Euplocamus albo-cristatus* (Vig.). Hatched.  
 5 Purple Kaleege. *Euplocamus horsfieldii*, Gray. Hatched.  
 1 Hybrid Ocellated Turkey. Between *Meleagris ocellata*, Temm., and *Meleagris mexicana*, Gould, var. *domestica*. Hatched.  
 3 Sonnerat's Jungle-fowls. *Gallus sonneratii*, Temm. Hatched.  
 5 Bankiva Jungle-fowls. *Gallus bankiva*, Temm. Hatched.  
 3 Mandarin-Ducks. *Aix galericulata* (Linn.). Hatched.  
 4 Bahama Ducks. *Pacilonetta bahamensis* (Linn.). Hatched.
15. 1 Common Boa. *Boa constrictor*, Linn. Presented by R. H. Soutter, Esq.
16. 1 Brown Coati. *Nasua fusca*, Desm. Presented by Capt. Henry W. Notley.  
 1 Cuvier's Gazelle. *Gazella cuvierii*, Ogilby. Presented by Capt. Alan Gardner, R.N.  
 2 pairs of Spotted-sided Finches. *Amadina lathamii* (Vig. & Horsf.). Purchased.  
 1 Blue Waterhen (from New Zealand). *Porphyrio*, sp. Purchased.
17. 1 Cashmere-Shawl Goat. *Capra hircus*, Linn., var. Born.  
 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by Masters E. and H. Harraden.
18. 1 ♂ Axis Deer. *Cervus axis*, Erxl. Born.  
 1 Common Heron. *Ardea cinerea*, Linn. Presented by Dr. A. Günther, F.Z.S.
19. 1 Douroucouli. *Nictipithecus felinus*, Spix. Purchased.
20. 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by H. H. Horn, Esq.
21. 1 Grand Galago. *Galago crassicaudata* (Geoff.). Purchased.
22. 1 Formosan Deer. *Cervus taïwanus*, Blyth. Presented by J. J. Broadwood, Esq.  
 2 Greater Spotted Woodpeckers. *Picus major*, Linn. Presented by S. C. Hincks, Esq.
23. 1 Laughing-Kingfisher. *Dacelo gigantea* (Lath.). Presented by Miss Wildash.
24. 1 Kingfisher. *Alcedo ispida*, Linn. Purchased.
26. 1 Japanese Deer. *Cervus sika*, Temm. Born.  
 1 ♂ African Elephant. *Elephas africanus*, Blum. Received in exchange.

- June 26. 2 Spiny Rats. *Echymys spinosus*, Desm. Presented by the Jardin des Plantes, Paris.
- 1 Entellus Monkey. *Semnopithecus entellus* (Linn.). Presented by Capt. H. T. Forbes, Royal Artillery.
27. 9 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Hatched.
- 4 Lineated Pheasants. *Euplocamus lineatus* (Lath.). Hatched.
- 5 Cheer Pheasants. *Phasianus wallichii*, Hardw. Hatched.
- 12 Green-breasted Pheasants. *Phasianus versicolor*, Vieill. Hatched.
- 1 Horned Tragopan. *Ceriornis satyra* (Linn.). Hatched.
- 1 Bartlett's Pigeon. *Phlogœnas crinigera*, Puch. Hatched.
- 2 Vinaceous Turtledoves. *Turtur vinaceus* (Gmel.). Hatched.
28. 1 Quebec Marmot. *Arctomys empetra* (Schreb.). Presented by E. Yeoman, Esq.
- 1 Vervet Monkey. *Cercopithecus lalandii*, Is. Geoff. Presented by Capt. Saxon.
- A Collection of Marine Fishes. Purchased.
30. 1 Tuberculated Iguana. *Iguana tuberculata*, Laur. Purchased.
- 1 Spider Monkey. *Ateles* —? Purchased.
- July 1. 1 Bennett's Kangaroo. *Halmaturus bennettii*, Waterh. Deposited.
2. 1 North American Deer. *Cervus* —? Born.
- 1 Hoopoe. *Upupa epops*, Linn. Presented by F. Campbell, Esq.
4. 2 Bronze-winged Pigeons. *Phaps chalcoptera* (Lath.). Hatched.
- 2 Crested Pigeons. *Ocyphaps lophotes* (Temm.). Hatched.
- 1 Hairy Armadillo. *Dasypus villosus*, Geoff. Purchased.
- 1 Sheathbill. *Chionis alba*, Forst. Purchased.
- 2 West African Pythons. *Python sebœ* (Gmel.). Purchased.
5. 1 ♀ Sambur Deer. *Cervus aristotelis*, Cuv. Received in exchange.
- 1 pair of Kuhl's Deer. *Cervus kuhlii*, S. Müller. Purchased.
- 1 pair of Gold Pheasants (new variety). *Thaumalea picta* (Linn.), var. Purchased.
- 1 pair of Yellow-bellied Phalangiers. *Belideus flaviventer* (Geoff.). Presented.
- 1 Brown Bear. *Ursus arctos*, Linn. On approval.
6. 1 ♂ Burchell's Zebra. *Equus burchellii*, Gray. Born.
- 7 Bahama Ducks. *Pæcilonetta bahamensis* (Linn.). Hatched.
- 3 Common Teal. *Querquedula crecca* (Linn.). Hatched.
- 1 Nicobar Pigeon. *Calœnas nicobarica* (Linn.). Hatched.
- 1 Anubis Baboon. *Cynocephalus anubis*, F. Cuv. Presented by the Crystal Palace Company.
- 2 Fruit-eating Pigeons. *Carpophaga* —? On approval.
7. 1 Crested Ground-Parrakeet. *Calopsitta novaehollandiæ* (Gmel.). Deposited.
9. 1 ♂ Persian Deer. *Cervus wallichii*, Cuv. Born.
- 1 Sun-Bittern. *Eurypyga helias* (Pall.). Hatched.
- 8 Thunder-fishes. *Cobitis fossilis*, Linn. Received.
12. 1 Ruffed Lemur. *Lemur varius*, Geoff. Purchased.
13. 20 Cardinal Grosbeaks. *Cardinalis virginianus* (Briss.). Deposited.
14. 1 Common Buzzard. *Buteo vulgaris*, Bechst. Presented by Lord Willoughby de Eresby.
- 1 Capuchin Monkey. *Cebus capucinus*? Purchased.
- 1 Purple Guan. *Penelope*, sp. Purchased.
- 1 American Lizard. Purchased.

- July 14. 9 Land-Crabs. *Cardiosoma guanhumi*, Marcgr. Purchased.  
50 Hermit Crabs. *Cænobita rugosus*, Edw. Purchased.
15. 2 Squirrel Monkeys. *Callithrix sciureus* (Linn.). Purchased.  
1 Hang-nest. *Icterus*, sp. Purchased.
16. 3 Horned Tragopans. *Cerionis satyra* (Linn.). Hatched.  
2 Impeyan Pheasants. *Lophophorus impeyanus* (Lath.). Hatched.  
1 Kingfisher. *Alcedo ispida*, Linn. Purchased.
18. 1 Young Brown Bear. *Ursus arctos*, Linn. Presented by Charles Sidgreaves, Esq.  
1 Ruffed Lemur. *Lemur varius*, Geoff. Purchased.
19. 1 Pig-tailed Monkey. *Macacus nemestrinus* (Linn.). Purchased.
20. 2 Stanley Parrakeets. *Platycercus icterotis* (Temm.). Purchased.  
2 Pileated Parrakeets. *Platycercus pileatus* (Vig.). Purchased.  
1 Fournier's Capromys. *Capromys pilorides*, Say. Purchased.  
4 Horned Vipers. Purchased.  
3 Indian Turtledoves. *Turtur*, sp. Presented by A. Macdonald, Esq.  
1 Collared Peccary. *Dicotyles tajaçu* (Linn.). Presented by P. W. Sharpe, Esq.
21. 2 pairs of Common Quails. *Coturnix dactylisonans*, Meyer. Presented by F. Moreau Hayward, Esq.  
2 Brazilian Hang-nests. *Icterus jamaicai* (Gmel.). Purchased.
22. 1 Philantomba Antelope. *Cephalophus maxwellii* (H. Smith). Presented by Capt. L. L. Perry, R.N., of H.M.S. 'Griffon.'  
1 Blue-fronted Amazonian. *Chrysotis amazonica* (Gmel.). Presented by Mrs. Sotheby.
23. 1 Chinese Jay-Thrush. *Garrulax chinensis* (Scop.). Presented by Robert Swinhoe, Esq., C.M.Z.S., H.B.M. Vice-Consul at Formosa.  
1 Concave-casqued Hornbill. *Buceros bicornis*, Linn. Deposited.  
4 Arracan Kaleeges. *Euplocamus*, sp. Deposited.  
1 Indian Mynah. *Acridotheres ginginianus* (Lath.). Deposited.
26. 3 Emus. *Dromæus novæ-hollandiæ*, Vieill. Presented by Dr. Müller, of Melbourne, C.M.Z.S.
27. 2 Turquoise Parakeets. *Euphema pulchella* (Shaw). Hatched.
28. 1 Pallas's Paradoxure. *Paradoxurus pallasii*, Gray. Presented by G. Wakeman, Esq.
29. 2 Golden-crowned Conures. *Conurus aureus* (Gmel.). Presented by Carl A. Schroder, Esq.  
1 Pennant's Parrakeet. *Platycercus pennantii* (Lath.). Received in exchange.
30. 1 Common Chameleon. *Chamæleon vulgaris*, Daud. Presented by J. Bramley, Esq.
- Aug. 1. 1 Golden Eagle. *Aquila chrysaëtos* (Linn.). Deposited.  
1 Common Heron. *Ardea cinerea*, Linn. Presented by W. M. Wyllie, Esq.  
2. 1 Thick-knee. *Ædicnemus crepitans*, Temm. Presented by R. M. Presland, Esq.  
3. 1 Great Spotted Woodpecker. *Picus major*, Linn. Presented by H.R.H. Prince Edward of Saxe-Weimar.  
1 Pallas's Paradoxure. *Paradoxurus pallasii*, Gray. Presented by Mrs. Spencer.  
4. 1 pair of Tigers. *Felis tigris*, Linn. Presented by Col. Daly.  
5. 3 Lions. *Felis leo*, Linn. Born.  
1 Vervet Monkey. *Cercopithecus lalandii*, Is. Geoff. Presented by Miss Shuter.



- Aug. 5. 1 Herring-Gull. *Larus argentatus*, Brünn. Presented by R. Tate, Esq.  
 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by H. Hindley, Esq.
7. 2 Common Sea-Eagles. *Haliaëtus albicilla* (Linn.). Presented by H. Buckley, Esq.
9. 1 Greater Sulphur-crested Cockatoo. *Cacatua galerita* (Lath.). Presented by — Thompson, Esq.  
 6 Crested Colins. *Eupsychortyx cristatus* (Linn.). Received.  
 1 Grey Ichneumon. *Herpestes griseus* (Geoff.). Presented by C. J. Mason, Esq.
11. 2 African Leopards. *Felis varia* (Gray). Born.
12. 1 Poë Honey-eater. *Prothemadera novæ-hollandiæ* (Gmel.). Presented by James M'Quade, Esq.
15. 1 ♂ Chimpanzee. *Troglodytes niger*, Geoff. Purchased.  
 2 Egyptian Geese. *Chenalopex ægyptiaca* (Briss.). Presented by W. C. Hewitson, Esq.  
 2 Bernicle Geese. *Bernicla leucopsis*, Bechst. Presented by W. C. Hewitson, Esq.
16. 2 Grey Parrots. *Psittacus erithacus*, Linn. Deposited.  
 1 Bearded Reedling. *Calamophilus biarmicus* (Linn.). Purchased.
17. 1 ♀ Wapiti Deer. *Cervus canadensis*, Briss. Born.
18. 1 West African Python. *Python sebæ* (Gmel.). Presented by W. A. Gardiner, Esq.  
 1 Black and Yellow Cacique. *Icterus*, sp. Presented by A. M. Booker, Esq.
19. 1 ♂ Dama Antelope. *Gazella dama* (Pall.). Purchased.  
 1 Korin. *Gazella rufifrons*, Gray. Purchased.  
 2 Vociferous Sea-Eagles. *Aquila vociferans* (Daud.). Purchased.  
 1 Occipital Vulture. *Vultur occipitalis*, Burchell. Purchased.  
 1 Piapec. *Ptilostomus senegalensis* (Briss.). Purchased.  
 2 pairs of Lesser Pintailed Sand-Grouse. *Pterocles exustus*, Temm. Purchased.  
 1 ♀ Ostrich. *Struthio camelus*, Linn. Purchased.  
 2 Rufous-vented Glossy Thrushes. *Lamprocolius rufiventris*, Rüpp. Purchased.  
 1 Ox-bird. *Textor alecto*, Temm. Purchased.  
 1 Cormorant from Senegal. *Phalacrocorax* —? Purchased.  
 1 Long-eared Owl. *Otus vulgaris* (Linn.). Presented by Robert Widdowson, Esq.
22. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by — Swinson, Esq.  
 1 Sykes's Monkey. *Cercopithecus albogularis* (Sykes). Purchased.
24. 5 European Sousliks. *Spermophilus citillus*. Purchased.  
 10 Fire-bellied Toads. *Bombinator igneus*. Purchased.  
 2 Salamanders. *Salamandra maculosa*. Purchased.
25. 2 Indian Porcupines. *Hystrix leucura*, Sykes. Presented by Col. Thompson.  
 4 White Storks. *Ciconia alba*, Linn. Purchased.  
 4 Bearded Reedlings. *Calamophilus biarmicus* (Linn.) Purchased.
29. 1 ♂ Persian Deer. *Cervus walluchii*, Cuv. Born.  
 3 Bartlett's Pigeons. *Phlogænas crinigera*, Puch. Hatched.  
 1 Barred Turtledove. *Geopelia striata* (Linn.). Hatched.  
 1 Pintailed Sand-Grouse. *Pterocles alchata* (Linn.). Hatched.

- Aug. 29. 2 Turquoise Parrakeets. *Euphema pulchella* (Shaw). Hatched.  
 1 Capercalzie. *Tetrao urogallus*, Linn. Purchased.
30. 2 Sooty Monkeys. *Cercocebus fuliginosus*, Geoff. Purchased.  
 1 Diana Monkey. *Cercopithecus diana* (Linn.). Purchased.  
 1 Moustache-Monkey. *Cercopithecus cephus*, Erxl. Purchased.  
 1 Grand Lory. *Eclectus grandis*, Gmel. Purchased.  
 1 Jerelang Squirrel. *Sciurus bicolor*, Sparrm. Purchased.  
 1 Ring-necked Parrakeet. *Palæornis torquata* (Linn.). Presented by — Toplis, Esq.
- Sept. 2. 4 Grenadier Weaverbirds. *Euplectes oryx* (Linn.), yellow variety. Purchased.  
 1 West-Indian Ox. *Bos taurus*, Linn., var. Presented by G. Latimer, Esq.
4. 2 Vinaceous Turtledoves. *Turtur vinaceus* (Gmel.). Hatched.  
 1 White-crested Kaleege. *Euplocamus albo-cristatus* (Vig.). Recovered.
5. 1 ♀ Wapiti Deer. *Cervus canadensis*, Briss. Born.  
 5 Black-eared Marmosets. *Hapale penicillata* (Geoff.). Presented by Alexander Collie, Esq.
- 6 Australian Wild Ducks. *Anas superciliosa*, Gmel. Received from Dr. Mueller, of Melbourne, C.M.Z.S.
- 7 Hey's Partridges. *Caccabis heyi* (Temm.). Presented by Henry C. Calvert, Esq., from Djeddah, Arabia.
- 6 Lichtenstein's Sand-Grouse. *Pterocles lichensteinii*, Temm. Presented by Henry C. Calvert, Esq., from Djeddah, Arabia.
- 6 Cape Doves. *Ena capensis* (Linn.). Presented by Henry C. Calvert, Esq., from Djeddah, Arabia.
6. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.) Presented by J. D. Lees, Esq.  
 1 Dingo Dog and four puppies. *Canis dingo*, Blumenb. Presented by Dr. Mueller, of Melbourne, C.M.Z.S.
7. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by J. S. Jarvis, Esq.  
 1 White-backed Crow. *Corvus curvirostris*, Gould. Purchased.  
 1 Crested Guinea-fowl. *Numida cristata*, Pall. Purchased.  
 1 Malee Bird. *Leipoa ocellata*, Gould. Purchased.  
 6 Ruddy Finches. *Carpodacus erythrinus* (Pall.). Purchased.  
 1 Yellow-vented Bulbul. *Pycnonotus crocorrhous*, Strickl. Purchased.  
 1 Turnstone. *Streptilas interpres* (Linn.). Purchased.
- 14 Small Reptiles.  
 Smooth Snake. *Coronella lævis*, Lacép.  
 Black Viper. *Vipera prester*, var. *nigra*.  
 Horse-shoe Snake. *Zamenis hippocrepis*.  
 Sand-Asp. *Vipera ammodytes*, Klein.
8. 1 Marsh-Harrier. *Circus æruginosus* (Linn.). Presented by C. A. Goring, Esq.  
 2 Grey Ichneumons. *Herpestes griseus*, Geoff. Presented by John Da Costa, Esq.  
 1 Brown Coati. *Nasua fusca*, Desm. Presented by John Da Costa, Esq.
9. 2 Hybrid Deer. Between American Deer and *Cervus mexicanus*. Born.  
 1 ♂ African Elephant. *Elephas africanus*, Blumenb. Purchased.  
 1 Ground-Hornbill. *Bucorvus abyssinicus* (Gmel.). Purchased.

- Sept. 9. 1 White-backed Crow. *Corvus curvirostris*, Gould. Purchased.  
 1 Crested Guinea-fowl. *Numida cristata*, Pall. Purchased.  
 6 Ruddy Finches. *Carpodacus erythrinus* (Pall.). Purchased.  
 2 Paradise-Grackles. *Acridotheres cristatus* (Linn.). Purchased.
12. 1 White-cheeked Monkey. *Cercocebus albigena* (Gray). On approval.  
 1 Terrapen. *Emys*, sp. On approval.
13. 1 White-fronted Capuchin Monkey. *Cebus albifrons*, Geoff. On approval.  
 1 Senegal Parrot. *Psephenus senegalensis* (Linn.). On approval.  
 2 Golden-crowned Conures. *Conurus aureus* (Gmel.). On approval.  
 1 Sun-Bittern. *Eurypyga helias* (Pall.). On approval.  
 1 Chilian Sea-Eagle. *Geranoaëtus aquia* (Temm.). On approval.  
 1 Capybara. *Hydrochoerus capybara*, Exl. Presented by Dr. Huggins.
16. 1 ♀ Dama Antelope. *Gazella dama* (Pall.). Purchased.  
 1 Milky Owl. *Bubo lacteus* (Temm.). Purchased.  
 1 Undulated Grass-Parrakeet. *Melopsittacus undulatus* (Shaw). Purchased.  
 1 Brown Coati. *Nasua fusca*, Desm. Deposited.
19. 1 Common Cuckoo. *Cuculus canorus*, Linn. Presented by W. Barrington d'Almeida, Esq.  
 1 Common Heron. *Ardea cinerea*, Linn. Presented by J. Lane, Esq.
20. 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by Thomas Cope, Esq.  
 1 Coati. *Nasua nasica* (L.). Sir W. C. Trevelyan.  
 1 Common Kingfisher. *Alcedo ispida*, Linn. Presented by Wm. Thompson, Esq.
21. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by Henry Jubber, Esq., F.Z.S.
22. 1 pair of Siamese Pheasants. *Euplocamus praelatus* (Bp.). Deposited.  
 1 Silver Pheasant. *Euplocamus nychthemerus* (Linn.). Deposited.  
 1 ♀ Pheasant. *Euplocamus* —? Deposited.  
 1 Hill-Francolin. *Arboricola torqueola* (Val.). Deposited.
23. 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by — Hawkins, Esq.  
 1 Garnett's Galago. *Galago garnettii* (Ogilby). Presented by Francis Chalmers, Esq.
25. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by George Newman, Esq.
26. 2 Bronze-winged Pigeons. *Phaps chalcoptera* (Lath.). Hatched.  
 3 Turquoise Parrakeets. *Euphema pulchella* (Shaw). Hatched.
27. 1 Nutcracker. *Nucifraga caryocatactes*, L. Received in exchange.  
 1 Capuchin Monkey. *Cebus capucinus*. Presented by Miss Jones.
28. 1 Sun-Bittern. *Eurypyga helias* (Pall.). Hatched.
29. 30 Crayfish. Presented by A. Arcedeckne, Esq., F.Z.S.  
 1 American Fox. *Canis*, sp. On approval.
30. 1 Molucca Deer. *Cervus moluccensis*, Müll. Born.
- Oct. 3. 1 Golden Agouti. *Dasyprocta aguti* (Linn.). Born.  
 4. 2 Anacondas. *Eunectes murinus* (Linn.). Purchased.  
 1 Lepidosiren. *Protopterus annectens*, Owen. Purchased.

- Oct. 6. 1 Emu. *Dromæus novæ-hollandiæ*, Vieill. Presented by the Hon. Mrs. Greville Howard.  
 1 ♀ King Parrakeet. *Aprosmictus scapulatus* (Bechst.). Presented by W. Hansard Rivington, Esq.  
 7. 1 Common Squirrel. *Sciurus vulgaris*, Linn. Presented by G. V. Hill, Esq.  
 10. 2 Spotted-sided Finches. *Amadina lathamii* (Vig. & Horsf.). Hatched.  
 13. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by Capt. Taylor.  
 14. 2 Waxbills from St. Helena. *Estrelida*, sp. Presented by Dr. R. Austen Allen.  
 18. 1 Grivet Monkey. *Cercopithecus griseo-viridis*, Desm. Deposited. A Collection of Marine Fishes, &c. Received.  
 19. 4 Black Swans. *Cygnus atratus* (Lath.). Purchased.  
 2 Spotted Cavies. *Cælogenys paca* (Linn.). Presented by R. T. Hadow, Esq.  
 1 pair of Black Grouse. *Tetrao tetrax*, Linn. Purchased.  
 20. 1 Spotted Hyæna. *Hycæna crocuta*, Erxl. Purchased.  
 2 Green Fruit-eating Pigeons. *Ptilonopus*, sp. Purchased.  
 21. 2 Tigers. *Felis tigris*, Linn. Presented by L. Ashburner, Esq.  
 1 Indian Leopard. *Felis leopardus*, Linn. Deposited.  
 1 Sloth Bear. *Melursus labiatus* (Blainv.). Deposited.  
 1 Caracal. *Felis caracal*, Schreb. Deposited.  
 23. 1 River-Jack. *Clotho nasicornis* (Shaw). Presented by George Atkins, Esq.  
 2 Short-tailed Utia. *Capromys brachyura*, Hill. Purchased.  
 24. 1 Porpoise. *Phocæna communis*, Less. Purchased.  
 2 Sheep from Lagos. *Ovis aries*, Linn., var. Presented by J. H. Gurney, Esq., M.P., F.Z.S.  
 26. 4 Hamsters. *Cricetus vulgaris*, Desm. Presented by Dr. G. Hartlaub, For. Mem. Z. S.  
 27. 1 ♂ Black Swan. *Cygnus atratus*, Lath. Purchased.  
 29. 1 Marmoset Monkey. *Hapale jacchus* (Linn.). Deposited.  
 30. 1 Common Boa. *Boa constrictor*, Linn. Presented by S. Lambert, Esq.  
 31. 1 Leadbeater's Cockatoo. *Cacatua leadbeaterii* (Vig.). Deposited.  
 1 Grey Parrot. *Psittacus erithacus*, Linn. Deposited.  
 1 Guinea Baboon. *Cynocephalus papio*, Desm. Deposited.
- Nov. 2. 3 Golden Eagles. *Aquila chrysaëtos* (Linn.). Deposited.  
 1 Piedmontese Cow. *Bos taurus*, Linn., var. Returned.  
 4. 1 Brown Tree-Kangaroo. *Dendrolagus inustus*, Müll.  
 6. 1 Cape Buffalo. *Bos caffer*, Sparrm. Purchased.  
 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Deposited.  
 7. 1 Sonnerat's Jungle-hen. *Gallus sonneratii*, Temm. Presented by J. C. Parr, Esq.  
 9. 2 Golden-crowned Conures. *Conurus aureus* (Gmel.). Presented by Miss Vawser.  
 1 Common Otter. *Lutra vulgaris* (Linn.). Presented by Wm. Burnley Hume, Esq.  
 1 Spotted Cavy. *Cælogenys paca* (Linn.). Presented by Wm. Burnley Hume, Esq.  
 2 Crested Agoutis. *Dasyprocta cristata*, Desm. Presented by Wm. Burnley Hume, Esq.  
 10. 1 Pagoda Owl. *Syrnium seloputo* (Horsf.). Received in exchange.

- Nov. 11. 1 ♀ Tragopan. *Cerionis satyra* (Cuv.). Purchased.
14. 1 Green Monkey. *Cercopithecus callitrichus*, Is. Geoff. Presented by W. Cheetham, Esq.
15. A Collection of Marine Animals. Purchased.
16. 1 Polar Bear. *Thalassarctos maritimus* (Linn.). Born.  
 1 Black-necked Screamer. *Chauna nigricollis*, Sclater. Purchased.  
 1 Water-Rail. *Rallus aquaticus*, Linn. Purchased.  
 1 pair of Globose Curassows. *Craz globicera*, Linn. Purchased.  
 4 Barbary Turtledoves. *Turtur risorius* (Linn.). Deposited.  
 1 Festive Parrot. *Chrysotis festiva* (Linn.). Purchased.
17. 1 ♀ Sambur Deer. *Cervus aristotelis*, Cuv. Born.  
 2 Vinaceous Turtledoves. *Turtur vinaceus* (Gmel.). Hatched.  
 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by Charles Oferberg, Esq.
18. 1 Jacket-Monkey. *Pithecia satanas* (Hoffm.). Purchased.  
 2 Brazilian Hang-nests. *Icterus jamaicai* (Gmel.) Purchased.  
 1 Brazilian Rail. *Rallus* —? Purchased.
20. 1 Macaque Monkey. *Macacus cynomolgus* (Linn.). Presented by Arthur Donnithorne, Esq.  
 1 Silver Fox. *Canis argentatus*, Desm. Deposited.  
 1 Skunk. *Mephitis americana* (Shaw). Deposited.
21. 1 Green Monkey. *Cercopithecus callitrichus*, Is. Geoff. Presented by H. B. Yeulett, Esq.  
 1 Peregrine Falcon. *Falco peregrinus*, Linn. Presented by John Wingfield Larkin, Esq.
22. 1 Bonnet-Monkey. *Macacus radiatus* (Shaw). Presented by Mrs. A. Ansell.  
 2 Black Crested Eagles. *Spizaëtus occipitalis* (Daud.). Deposited.
23. 1 Leadbeater's Cockatoo. *Cacatua leadbeaterii* (Vig.). Presented by Mrs. James M. Napier.  
 5 Cape Barn-Owls. *Strix capensis*, A. Smith. Presented by W. C. Bird, Esq.  
 1 Brazilian Blue Grosbeak. *Guiraca cyanea* (Linn.). Purchased.  
 1 Dusky Finch. *Phonipara* —? Purchased.  
 1 Sclater's Hanging Parrakeet. *Loriculus sclateri*, Wall. Purchased.  
 1 Westerman's Lory. *Electus westermanni*, Bp. Purchased.  
 Red-vented Cockatoo. *Cacatua philippinarum* (Gmel.). Purchased.
24. 1 ♂ Tibetan Deer. *Cervus affinis*, Hodgs. Presented by Capt. M. H. S. Lloyd, H.M. 89th Regiment.  
 1 Golden-headed Parrakeet. *Platycercus auriceps*, Vig. Purchased.  
 1 Green-headed Tanager. *Calliste tricolor* (Gmel.). Purchased.  
 1 Sooty Monkey. *Cercocebus fuliginosus*, Geoff. Deposited.
27. 1 Thick-billed Pigeon. *Treron crassirostris*, Fraser. Purchased.
28. 1 Rhesus Monkey. *Macacus erythræus* (Schreb.). Presented by D. White, Esq.  
 1 ♀ Isabelline Antelope. *Heleotragus isabellinus*, Afz. On approval.  
 2 Great Egrets. *Egretta alba* (Linn.). Purchased.  
 1 ♂ Goosander. *Mergus merganser*, Linn. Purchased.
29. 2 King Vultures. *Gyparchus papa* (Linn.). Presented by Josiah Booker, Esq.
30. 3 Barbary Partridges. *Caccabis rufa* (Linn.). Presented by Mrs. Brooks.  
 2 Little Armadillos. *Dasypus minutus*, Desm. Purchased.

- Dec. 1. 1 Porpoise. *Phocæna communis*, Less. Received.  
 3. 1 Dingo. *Canis dingo*, Blumenb. Deposited.  
 5. 1 Booted Eagle. *Aquila pennata* (Gmel.). Presented by R. S. A. South, Esq.  
 A Collection of Marine Animals. Purchased.  
 6. 1 Cereopsis Goose. *Cereopsis novæ-hollandiæ*, Lath. Returned.  
 8. 1 Crested Curassow. *Crax alector*, Linn. Deposited.  
 13. 1 Toque Monkey. *Macacus pileatus* (Shaw). Presented by Miss Maria Laura Ronald.  
 14. 1 Ceram Lory. *Lorius garrulus* (Linn.). Deposited.  
 1 Undulated Grass-Parrakeet. *Melopsittacus novæ-hollandiæ* (Shaw). Presented by Miss Boyle.  
 1 Grey Ichneumon. *Herpestes griseus* (Geoff.). Presented by C. E. Darley, Esq.  
 17. 1 Vulpine Phalanger. *Phalangista vulpina* (Shaw).  
 23. 2 Wart-Hogs. *Phacochærus æthiopicus* (Pall.). Deposited.  
 1 Wanderoo Monkey. *Macacus silenus* (Linn.). Presented by — Hellendaal, Esq.  
 27. 1 Iguana. *Iguana*, sp. Presented by G. E. Bird, Esq.  
 1 Common Dormouse. *Myoxus muscardinus* (Linn.). Presented by N. L. Austin, Esq.  
 28. 1 Crested Guinea-fowl. *Numida cristata*, Pall. Purchased.  
 1 Great-billed Touracou. *Corythaix macrorhyncha*, Fraser. Purchased.  
 1 Crested Guinea-fowl. *Numida cristata*, Pall. Deposited.  
 29. 1 ♂ Gayal. *Bos frontalis*, Lambert. Presented by the Babu Rajendra Mullick, C.M.Z.S.  
 6 Indian Buntings. *Euspiza*, sp. Presented by the Babu Rajendra Mullick, C.M.Z.S.  
 1 ♀ Fallow Deer. *Cervus dama*, Linn. Purchased.

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